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Impact of Forest and Land Fires on Environmental Pollution and Public Health in Sungai Raya Sub-District, Kubu Raya District

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Abstract

Forest and land fires in Sungai Raya District, Kubu Raya Regency, severely impact environmental pollution and public health. This condition causes quite significant ecological and social losses. First, the smoke produced from these fires contains various dangerous substances, such as carbon monoxide, dust particles, and toxic chemicals. Continuous exposure to these substances can cause respiratory problems, respiratory tract diseases, and other health problems in local communities. Apart from that, forest fires also result in the loss of natural habitat for various species of flora and fauna. Disrupted ecosystems can cause biodiversity loss and affect local food chains. Recovery of fire-affected ecosystems takes a long time, and some species may experience local extinction due to habitat loss. Furthermore, preventing and responding to forest fires requires significant resources in terms of personnel and equipment. Funds allocated for firefighting can disrupt local government budgets that should be used for infrastructure development and community welfare programs. Therefore, forest fires harm the environment and health and impose an economic burden on the people of Sungai Raya District. Efforts to prevent forest and land fires and educate the public regarding the risks of prevention are essential to overcome these negative impacts. Sustainable measures such as law enforcement against illegal forest burning, sustainable land management, and increasing public awareness of the importance of preserving the environment can help reduce fire risks and protect public health.

Keywords: Forest and Land Fires, Environmental Pollution, Public Health, Sungai Raya, Kubu Raya Regency

Introduction

Forest fires have grown to be a national concern that requires the government to give it significant attention. This phenomenon recurs frequently every year, particularly on the islands of Kalimantan and Sumatra in the south. It is important to realize that there is a clear link between government organizations, the community, plantation owners, and farmers that contribute to forest and land fires (Ginson, 2005). The most noticeable effect of forest and land fires is the production of smoke, which harms the general public's health, interferes with air, land, and river traffic, and hurts other economic factors. Recent forest and land fire disasters have grown more unsettling from a social and economic standpoint. It is impossible to prevent environmental contamination, which has impacted neighboring countries' political relations (Islam et al., 2023). Everyone is reminded of an incident that happened in West Kalimantan approximately ten years ago in the burning area that is currently burning. At that point, Indonesia's government had not yet taken strong action to punish those who set fire to forests and other land. The fact that so many businesses continue to utilize fire in their land preparation operations demonstrates how ineffective the government's ban on using fire for plantation land preparation is.

The primary reason for this policy's ineffectiveness is the ease and low cost of using fire. The equipment required and associated expenses are the primary distinctions, both technically and financially, between land preparation methods that involve burning and those that do not. In addition, the neighborhood has been charged with contributing to smoke in Indonesian forest and land fire incidents. The community has been using the slash-and-burn method since prehistoric times. To grow food crops, they employed a slash-and-burn technique (Tacconi, 2003). The introduction of energy substances or other components into the environment, as well as changes in the environmental structure brought about by human activity or natural processes, are some of the effects of forest and land fires. These factors lower the quality of the environment to a point where it is no longer largely capable of serving its intended purpose. The most noticeable effect of forest and land fires is the production of smoke haze, which seriously impairs air, land, river, and public health systems.

The transportation, health, economic, ecological, and social sectors are all impacted by this fire, as well as the country's standing in the eyes of other nations and the international community. Unless the fire extends uncontrollably onto producing land, it is believed that fires have a minimal influence on agricultural production because they are often started for field preparation or clearing rather than during planting (Martoyo et al., 2020). Either natural processes or human activity can result in pollution. Human activity is the primary source of most polluted ecosystems, yet it is preventable and controllable. Pollution of the environment is an inevitable result of human activity (Moegandi, 1995). Pollution of the environment cannot be prevented. Steps that can be taken to avoid polluting the environment include reducing and controlling pollution and raising public knowledge and concern for the environment. In addition to polluting the environment, forest and land fires also have the unintended consequence of affecting the health health of nearby residents. Smoke-filled, unhealthy air that interferes with people's daily activities is a sign of a polluted environment.

There is no lasting answer to this issue, which keeps coming up repeatedly.

Even though it is obvious that the reason is the forest and land fires started by local communities, traditional farmers, and Forest Concession Rights in order to create space for new plantations or agricultural land. Smoke clouds from forest and land fires make it difficult for people to see clearly. This seriously disrupts everyday activities (Martoyo et al., 2023). There have been many attempts to stop and safeguard against land and forest fires, including creating strong legal frameworks like laws, rules, and ministerial decrees. However, the outcomes have not always been ideal. Following the massive forest fires in Kalimantan in 1982–1983, there has been an increase in both the frequency and intensity of forest fires. Large-scale land and forest fires have been reported in the West Kalimantan Province region on multiple occasions, including in 1987, 1991, 1994, 1997, 2003, 2005, 2007, and the present year (2008). The 2010 Indonesian Health Development Policy lists the air pollution management program as one of the top ten initiatives because air is an environmental medium and a basic human requirement.

The community's welfare and quality of life will undoubtedly increase with a healthy atmosphere and way of living (Rahman et al, 2021). A clean environment is an aspect of public health that concentrates on determining, comprehending, and managing the effects of the environment on people. Clean, healthy air is important for environmental health since life is impossible without it. West Kalimantan's regular forest and land fires have had a concerning effect on the environment, which ultimately has a detrimental effect on people's health. As a result of forest and land fires, there were 60,066 cases of ailments, including upper respiratory tract infections, pneumonia, bronchitis, eyes, asthma, and skin, according to statistics from the West Kalimantan Provincial Health Service. Every year during the dry season, environmental pollution—specifically, smoke-filled air from the forest and land fires in Sungai Raya District, Kubu Raya Regency—becomes more and more concerning as the air quality declines, negatively affecting human health and interfering with daily activities. the neighborhoods around (Haslita et al., 2021). Environmental pollution, namely in the form of dirty air as a result of burning forests and land, causes people around the complex to feel uncomfortable carrying out their activities; this is because the air they breathe interferes with breathing, and their vision becomes less clear due to the air being covered in smoke.

Communities cause most forest and land fires, both individual and group, which are hereditary and carried out traditionally (Al Qadrie et al, 2023). Apart from that, the company also burned something. This problem is not only the government's but also society's, especially people living around the environment affected by dirty air from forest and land fires (Fathun & Elyta, 2023). Various approaches to achieving the goal of a healthy area need to involve all government, private, and community components. The government needs to have a political commitment to support activities to increase the role of the community to participate in maintaining a clean and healthy environment for the comfort of the community through facilitating the formation of community task forces/working groups and socializing the implementation of clearing forest and land areas by not burning. A natural imbalance has resulted in a disaster that is difficult to recover quickly. To study the negative impacts of forest

and land fires on agricultural production, a study based on professional observations and interviews needs to be conducted amidst the prevalence of these fires (Ningrum et al., 2024).

This case study was conducted in West Kalimantan Province during the 2006 dry season to observe and study several events directly related to the agricultural production process as a logical consequence of the fire disaster in the area concerned. One of the districts in West Kalimantan affected by forest fire smoke is Kubu Raya District. The air pollution in Kubu Raya Regency resulting from forest fires can be seen from the haze that covers Kubu Raya Regency at certain times. Some pollutants from combustion that pollute the air are carbon monoxide, particulates, ozone, sulfur oxide compounds, and nitrogen oxide compounds (Salamatus, 2003). The haze in Kubu Raya Regency due to forest fires had many negative impacts on various sectors, including health and transportation. The impact caused the community to become anxious, so a way was needed to overcome this problem. However, this phenomenon only occurs during prolonged dry seasons so that when the rainy season arrives, the community and government seem to forget about the incident, so there is no serious treatment to prevent fires or at least reduce their impact on society (Robbi et al., 2024).

West Kalimantan, which has a huge area of forest and land, cannot possibly avoid the impacts caused by human activities that deliberately cause forest and land fires (Haryaningsih et al, 2023). The problem of air pollution caused by smoke from forest and land fires that occur every year during the dry season has had an impact in the form of environmental pollution, which not only disrupts people's daily activities but also affects people's comfort. These landfills cause thick smoke to cause eye pain and can cause acute respiratory infections, pneumonia, bronchitis, asthma, and skin diseases. According to data from the West Kalimantan Provincial Health Service, there has been a sharp increase in people suffering from this disease when forests and land burn. The impacts caused by forest and land fires are very complex. Therefore, for this research to be directed and focused, the problem is limited to the impact of forest and land fires on aspects of the polluted environment, namely smoke-polluted air and public health. Therefore, this research is limited to focusing on The Impact of Forest and Land Fires on Environmental Pollution and Public Health (Olifiani & Elyta, 2023). The problem of air pollution caused by smoke from forest and land fires that occur every year during the dry season has had an impact in the form of environmental pollution, which not only disrupts people's daily activities but also affects people's comfort.

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Literature Review

Forest and Land Fires

Land and forest fires have happened virtually yearly in the past few years, especially during the dry season. Kalimantan broke previous records with 8.13 million hectares burned in land and forest fires (Fachmi, 2014). According to Tacconi (2003), the recalculation of the economic losses resulting from land and forest fires in Indonesia has cost anywhere from US$ 2.84 billion to US$ 4.86 billion, considering both monetary and non-monetary losses. These losses include expenditures associated with haze, such as HealthHealth, travel, and transportation, as well as damage from fires, such as destruction of wood, death of trees, plantations, industrial plantations, buildings, control costs, and so on (Elyta et al., 2023). The impacts of forest and land fires are difficult to calculate precisely because research into the effects of forest fires is still in its infancy, knowledge about complex ecosystems still needs to be improved, and information on critical thresholds for ecological changes related to fires is scarce.

However, based on the approximate calculations mentioned above, land and forest fires significantly impact the neighborhood and even neighboring countries (Rahmaniah et al., 2023). This catastrophe is yearly and extremely chronic, but the government's response never addresses the underlying cause. A vital component of the health sector is realizing a healthy environmental quality. As a critical component of the environment, air must be preserved and increased in quality to give living things the best possible support. Repeated forest and land fires can only occur due to arson and negligence. Natural, spontaneous fires may occur in mesophyll forest areas, which have been degraded into bushes and grasslands during the long dry season. Degradation is the result of human use or mismanagement in the past.

So, natural, spontaneous fires have a background of arson or negligence (Elyta & Sahide, 2021). The fires were intensified by the peat that made up the forest floor. Burning is carried out to prepare land for agriculture, which covers a large expanse. Steaming is also done to clear land logged in Industrial Plantation Forests for the following planting cycle. It is also possible to suspect that the burning was to cover up traces of logging on Forest Management Rights that did not comply with the provisions. Fires caused by negligence may

be ignored, where farmers are already skilled at applying safe burning techniques following the wisdom of their ancestors as written in customary law (Salamatus, 2003).

Deforestation, Migration, and Forest Land Tenure

Conflicts One of the settings/conditions of forest and land fires in Kalimantan is fires that occur in state forest areas in national parks and protected forests. Case studies in West Kalimantan show that fires in national parks and protected forests are caused by burning carried out to expand oil palm plantations. Image analysis shows a high rate of forest conversion into oil palm plantations. The high level of migration and profits from oil palm plantations are the main factors causing forest encroachment. Besides that, the problem of land conflicts in state forest areas makes natural resource management unsustainable due to the need for incentives for farmers to invest in improving land fertility and preventing forest fires. Efforts to solve the forest encroachment problem can reduce the fire and smoke problem in West Kalimantan (Elyta & Razak, 2019). Human activities are the leading cause of forest and land fires in swamp areas to fulfill their daily needs.

Among them are sonor activities and fishing, which are the causes of forest and land fires in this area. This is also triggered by the high level of land conversion and construction of canals and drainage channels, which causes groundwater levels to fall, making them vulnerable to fires, especially during the dry season (Islam et al., 2023). One way to address the issue of Indonesian forest encroachment is through community forest policy. Through community forestry, a new paradigm in forest management, communities living in forest villages can work with the government to protect, preserve, and responsibly use forest lands. Minister of Forestry Decree No. 31/Kpts-11/2001 governs permits for community forest operations, providing legal clarity on the government's and the community's rights and responsibilities in managing these forests.

In addition, the West Kalimantan administration proposed using regional government policy to address the issue of forest encroachment. The two primary programs are redlining forest areas and awarding rights for forest area management (Ginson, 2005). A systematic negotiation approach is directed at developing a socio-economic-environmental incentive/disincentive system, including building commitment (commitment sharing) to implement any changes (spontaneously or by agreement) to achieve common goals. Multi-level negotiations to respond to the distribution of authority for natural resource management in the context of regional autonomy.

Research Method

Research on the impact of forest and land fires on environmental pollution and public Health in Sungai Raya District, Kubu Raya Regency, requires a comprehensive methodological approach to understand this complex phenomenon thoroughly and in-depth (Creswell, 2010). This research uses combined methods to involve environmental and public health aspects, including field surveys, spatial data analysis, and public health studies. First,

a field survey was carried out to collect direct data regarding the impact of forest and land fires. The research team documented the fires' location, duration, and intensity. In addition, air samples are taken to analyze the content of particulates and chemical compounds that can cause air pollution. Spatial mapping is used to visualize fire distribution patterns and map the areas most affected. Public health analysis involves interviews with residents to obtain information about the health impacts they may experience concerning forest fires.

Health questionnaires are used to collect data on symptoms of respiratory illnesses, skin diseases, and other health impacts that can be associated with exposure to fire smoke. This data is then analyzed statistically to evaluate the severity and prevalence of health impacts (Nawawi, 1993). Next, spatial data analysis was used to examine the correlation between fire locations and air pollution levels and the prevalence of health impacts in various areas of Sungai Raya District. Using geographic information systems can help identify spatial patterns associated with differences in health impacts in different regions. The triangulation method is used to test the validity and reliability of the data.

The results of field surveys, public health analysis, and spatial mapping were mutually verified to ensure consistency of findings. In addition, historical data on fire events and previous public health patterns are also evaluated to understand the long-term context of possible impacts. This combination of methods provides a holistic picture of the effects of forest and land fires on environmental pollution and public Health in Sungai Raya District. With this in-depth understanding, this research can contribute to designing more effective mitigation policies and prevention efforts in the future (Moleong, 2018).

Results and Discussion

The Impact of Forest and Land Fires on Environmental Pollution

The ecological impact is in the form of a decline in the quality of the ecosystem, which functions as a life support system, as a result of a reduction in the diversity of flora and fauna species which are sources of germplasm and changes in hydrological function, local and regional rainfall patterns. The number of hotspots monitored and recorded throughout the West Kalimantan region during 2019 was 1895 points, with August and September being the months with the most hotspots, namely in August, there were 666 points, and in September, there were 1047 points (Ginson, 2005).

Table 5.1 Number of Hotspots in West Kalimantan in 2019

MONTH	HOT SPOT
January	1
February	-
March	20
April	7
May	22
June	8
July	66
August	666

September	1047
October	42
November	16
December	-
WEST KALIMANTAN	1895

Pontianak Environment and Cleanliness Service, 2019

Kubu Raya Regency has become a regular site for land fires every time the dry season enters. According to data from the Forest and Land Fire Management Unit of the West Kalimantan Provincial Forestry Service, as of 30 June 2023, 5,768.73 hectares of land in West Kalimantan had burned. The Climate Change Control Center said there would be an increase in the number of hot spots or hotspots in West Kalimantan during 2023.

The increase will reach 300 to 400 percent compared to 2022. Kubu Raya is vulnerable to forest fires because peatlands dominate the land, so it burns quickly. Fire prevention efforts are necessary (Haryono, 2005). The loss of forests has resulted in a nearly 20% increase in carbon emissions. This is quite relevant since carbon dioxide is a greenhouse gas with consequences for global warming tendencies. Over the past century, there has been a decrease in snow and ice cover, an increase in deep ocean temperatures, and a rise in ocean surface levels of 100–200 mm. Experts estimate that by 2025, the globe will have warmed by an average of 1°C if the current rate of change persists (Martoyo et al., 2023). Rising sea levels could submerge many places. It is anticipated that extreme weather will result in typhoons, floods, and droughts, as well as the spread of organisms that cause disease (Moegandi, 1995).

Two factors cause land fires, namely natural factors and human intentional factors. A biological factor is the occurrence of a long period of dry season, resulting in dryness in the area; leaves and grass that rub against each other in the wind will produce sparks, which will get bigger, and a forest fire will occur (Robbi et al., 2024). Meanwhile, the human deliberate factor is a factor that happens relatively often. Large-scale land clearing by deliberately burning forests without responsibility from the party and an individual throwing away lit cigarette butts carelessly. These two actions are factors in forest fires (Elyta & Kartikasari, 2021). The natural factors that support the occurrence of forest or land fires in West Kalimantan Province are mainly peat soil structure and climate. The nature of peat soil resembles a sponge, where under normal conditions, it will absorb and retain water optimally, but in the dry season, this land will dry out to a certain depth and easily catch fire.

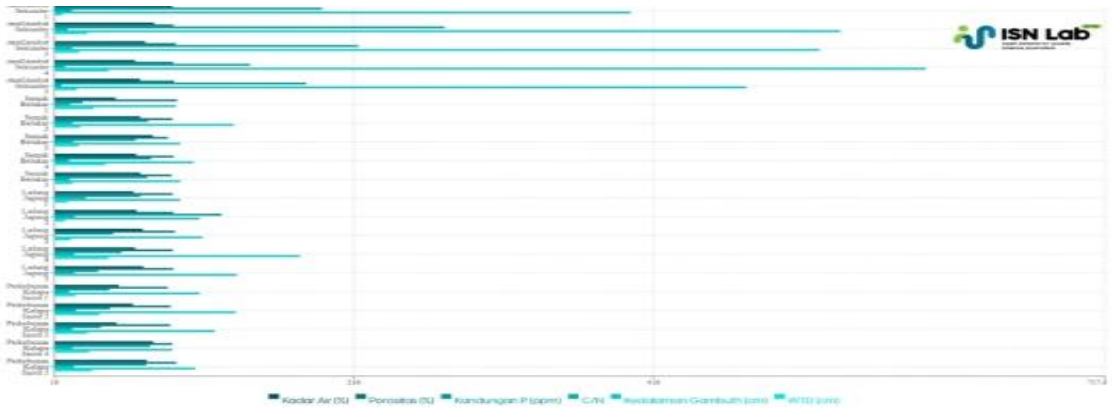


Figure 1. Physical and chemical parameters of peat soil in West Kalimantan

Source: ISN Lab, 2023

The graph above shows that changes in land use from natural peatlands to agricultural land also cause changes to the physical and chemical conditions of peat soils. The deepest peat is found in secondary peat (598 cm), while in oil palm plantations, it is 94.5 cm deep (Yohanes et al., 2023). Peat contains fuel in the form of plants that remain below the surface of the soil, so if a fire occurs, the fire will spread slowly below the surface of the soil, be challenging to detect, and cause thick smoke.

Meanwhile, from July to September 2023, the climate elements that stand out in supporting forest and land fires in West Kalimantan are wind direction, rainfall, and the El-Nino phenomenon (Purbowaseso, 2004).

Based on the report from the Pontianak Maritime Meteorology, Climatology and Geophysics Agency (2023), from July to September 2023, the rainfall value in West Kalimantan Province was meager. This is because the wind towards the north carries clouds containing water. This condition results in a relatively long dry season in West Kalimantan. Because they directly affect ecosystems, contribute to rising carbon emissions, impact biodiversity, and cause harm to people's health, large-scale forest fires are one of the factors contributing to forest degradation. They have also been shown to cause damage and loss in social, ecological, and economic domains. As such, they may pose a threat to sustainable development.

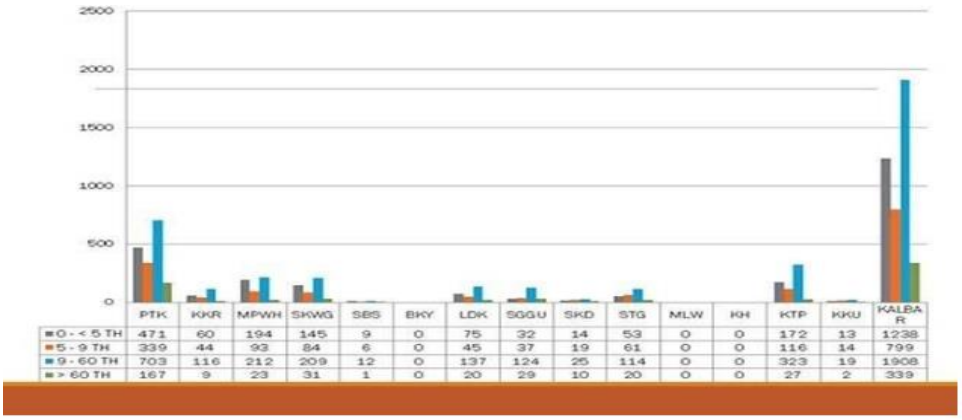
Impact of Forest and Land Fires on Community Health in Sungai Raya District, Kubu Raya Regency

One of the environmental changes that is a result of forest and land fires is air pollution by particles, which have an impact on human health. Health cases that arise can include direct illness, severe illness, or death. Another impact is the emergence of limitations in daily activities and lost work days (Salamatus, 2003). Estimates of cases and health impacts were obtained from calculating the dose-response of increasing levels of PM 10 in ambient air on increasing asthma attacks, bronchitis attacks in children, increasing deaths, increasing hospitalizations for respiratory diseases, increasing outpatient visits for respiratory diseases, loss of working days and limited daily activities (Jamaliah & Elyta, 2022). Estimated economic losses from the estimated health impacts are obtained from economic calculations due to the increase in the number of health cases expected to occur in the form of increased costs incurred for treatment, plus losses due to lost productive time (Martoyo et al., 2020).

The health impacts of smoke from forest and land fires include eye disease, respiratory tract irritation, and more serious disorders, including decreased lung function, bronchitis, and death. One of the pollutants in forest and land fire smoke is particulate matter (PM10). Particulate matter from smoke from forest and land fires can also hurt healthy people, causing symptoms of respiratory problems, temporary decrease in lung function, and pneumonia. Particulates can also adversely affect the immune system and physiological mechanisms that eliminate inhaled foreign material such as bacteria. Smoke from forest and land fires also contain pollutants that significantly irritate the respiratory system, such as formaldehyde and acrolein, which cause irritation to the eyes and respiratory tract and increase the potential for

asthma. The factor that has the most influence on the respiratory system is primarily the size of the particulates because the length determines how far the particulates penetrate the respiratory system.

Particulate matter measuring 0.5-5.0 microns in diameter can collect in the lungs and reach the bronchioles; only a small portion reaches the alveoli. The cilia will remove most particulates in the bronchioli within a certain period. Particulates measuring less than 0.5 microns in diameter can come and stay in the alveoli (Elyta et al., 2023). The removal of these tiny particulates from the alveoli is prolonged and incomplete compared to the larger channels; some of the particulates that remain in the alveoli can be absorbed into the blood.



	PTK	KKR	MPWH	SKWG	SBS	BKY	LDK	SGGU	SKD	STG	MLW	KH	KTP	KKU	KALBAR
0 - < 5 TH	471	60	194	145	9	0	75	32	14	53	0	0	172	13	1238
5 - 9 TH	339	44	93	84	6	0	45	37	19	61	0	0	116	14	799
9 - 60 TH	703	116	212	209	12	0	137	124	25	114	0	0	323	19	1908
> 60 TH	167	9	23	31	1	0	20	29	10	20	0	0	27	2	339

Figure Acute Respiratory Infections Disease data in 14 regencies and cities in West Kalimantan throughout August – September 2023
Source: West Kalimantan Provincial Health Service, 2023

August – October 2023 is the most severe period due to haze in West Kalimantan. The increasing smoke haze is making several residents anxious, especially those with toddlers. Even though they are used to the presence of smoke, it still makes mothers feel overwhelmed. One of the informants, FA (33), is a young mother with three asthma children. They live in the Kubu Raya district, prone to smoke haze caused by forest and land fires.

> *FA said: "In 2019, there was a very severe haze so his first child had to be treated in hospital for quite a long time due to experiencing shortness of breath; FA's second daughter also had to experience acute respiratory infection in mid-August 2023 due to the haze."*

This Kubu Raya resident has to go back and forth to the hospital twice a month. This district, the fourth most significant area of oil palm plantations in West Kalimantan, is not immune from attacks by forest and land fires and smoke haze. Children in West Kalimantan are among those who cannot escape this threat because West Kalimantan is one of the provinces that has unhealthy air pollution. Based on the latest air quality monitoring, throughout August-October, air quality in West Kalimantan entered the Unhealthy category. Net Air Pollution Standard Index Application. BMKG data recorded that on Sunday (3/9) at 20.00, the air quality in Kubu Raya entered dangerous levels. The PM 2.5 figure was

recorded at 276.2 micrograms per cubic meter. On Monday at 03.00, the air quality was at an unhealthy level. The amount of dust caused by forest fires cannot be avoided, especially for people who live around areas where forest and land fires occur.

So that there is not too much dust in their environment, people often water their yards in the morning and evening. Other ingredients in smoke and dust have been proven to have a detrimental effect on human Health (Elyta & Rahman, 2019). The role of central and regional governments in overcoming the impact of haze on public health is stated in Law Number 36 of 2009 concerning HealthHealth. Article 82 of the Law, for example, states that the government, regional governments, and communities are responsible for the availability of resources, facilities, and implementation of health services. Comprehensively and sustainably during disasters (Ningrum et al., 2024).

Government Efforts to Overcome Forest Fires in Sungai Raya District, Kubu Raya Regency

To anticipate forest and land fires, the Forestry Department has taken anticipatory steps as early as possible with the principle that prevention is better than extinguishing fires. For this reason, it is hoped that the participation of all parties (stakeholders) in activities to prevent and control forest and land fires, because fire incidents, which are often followed by smoke pollution and cover cross-districts, provinces, and even cross-country areas, are the responsibility of all of us. This includes coordination between the West Kalimantan regional government, the Ketapang Regency Regional Government, and the Kubu Raya district government. Since fire locations are generally located in remote areas far from residential areas, tiered reporting on fire incidents must be disseminated to be responded to and complied with by government officials, communities, and companies. In principle, no matter how small a fire in the forest must be reported to the authorities, such as the land owner, village head, village head, ranger, police, etc., to be immediately extinguished and reported to the level above. This report prepares for mobilization for response and law enforcement (Tacconi, 2003).

Efforts to overcome and overcome forest and land fires can be grouped into two ways. The first way is extinguishing from the surface. The second way is killing from the air. The relevant agencies, namely the Forestry Department and the Regional Government, can implement the first countermeasures. The second method of countermeasures, namely from the air, can be done by flying water bombers, for example, the US-1A Water Bomber and the CL-415M aircraft. Countermeasures using water bombers are not recommended because they are unlikely to be successful. Water dropped onto the location of a forest fire can cause fires to spread even more if the amount of water that falls per unit area of the fire is not appropriate. Moreover, visibility is very low and almost zero in burning forests, so flying small planes at low altitudes in the smoke and looking for fire spots is virtually impossible. The second effective method that has been carried out several times and was successful (1997, 1998, and 2001) is using Weather Modification Technology (TMC).

The application of TMC to overcome forest and land fires is an alternative technology if smoke has accumulated. It is impossible to extinguish widespread forest fires from the surface because road facilities to the fire location in the forest are minimal, so the mobilization of fire trucks and fire brigades is limited. Therefore, extinguishing forest fires from the air by applying

TMC is very possible. This technology takes advantage of opportunities that exist in nature, where these opportunities will stimulate processes that occur in nature. For example, by implementing TMC, the energy found in nature can be utilized effectively and efficiently to extinguish fires. This energy includes wind flow energy, solar radiation energy, and the available energy of the moisture content of the air (potential clouds). The government's efforts to resolve West Kalimantan forest fires still need improvement. A shortcut solution is a solution that goes straight to the core of the problem. Efforts to resolve forest fires are generally divided into repressive methods, namely efforts when or after a fire and preventive strategies to avoid or reduce the possibility of a fire. So far, forest fires have been resolved chiefly through repressive methods (Budiman, 2007).

Conclusion

Based on the description of the results and discussion of this research, it can be concluded as follows:

1. Forest and land fires in the Sungai Raya area of Kubu Raya Regency impact environmental pollution, and the air outside the house becomes hot, and inside the house becomes stuffy, and the hot temperature increases in the forest and land fire area.
2. Forest and land fires hurt people's health, and if forest fires last more than one month, people will experience diseases such as acute respiratory infections.
3. Apart from the local government, the community is also obligated to protect forests and land to anticipate fires.
4. Efforts made by the regional government in collaboration with the central government and local communities in overcoming forest and land fires that occurred in Sungai Raya, Kubu Raya Regency.

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