

Prevention and Mitigation of Forest and Land Fires in Riau Province in Support of National Security

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Abstract:- This study aims to analyze cross-sector collaboration in Riau Province in preventing and mitigating forest and land fires. The research methodology used by researchers is qualitative research using in-depth interview data collection techniques in Focus Group Discussions conducted by Disaster Management at the Indonesian Defense University. The results of this study indicate that forest and land fire disaster management in Riau Province has been very good which can be seen from the decrease in the number of forest and land fires in 2015 - 2021. This is due to the cooperation of various parties such as the Riau Provincial Government, the Regional Disaster Management Agency Riau, National Research and Innovation Agency, Indonesian Military, Indonesian Police and Society. Each relevant stakeholder plays their respective duties and roles in preventing forest and land fires in Riau Province.

Keywords:- Prevention; Mitigation; Land Fires; Forest Fires; Riau Province.

I. INTRODUCTION

The concept of defense, expressed in national rules and policies, clearly states that the purpose of defense is not only sovereignty and territorial integrity, but also national security and human security as a whole. The meaning of Indonesia's defense not only adheres to the traditional concept of security/territory, which emphasizes national defense to the nature of military threats and territorial sovereignty, but also means gluing human security against all kinds of threats (Agung, 2019). National security can be defined as a state or a function. When translated as work, national security means the production and creation of a state of security which generally includes a state of comfort, peace and stability. Nature and a sense of security are basic human needs (Darmono, 2010). Indonesian defense not only adheres to the concept of traditional/territorial security with an emphasis on national defense on the nature of military threats and territorial sovereignty, but also on human security from all forms of threats (Agung, 2019). And one form of non-military threat that

can disrupt human life and security, especially in Indonesia, is disaster.

Disaster is an event that can threaten or disrupt the life and livelihood of people due to natural, non-natural and man-made factors resulting in loss of human life, environmental destruction, property loss and harm to people. A sequence of events. psychological effect. (Indonesian Law No. 24 of 2007). Disasters can be classified into 3 types, namely natural disasters, non-natural disasters and social disasters. Natural disasters are disasters caused by events or a series of events caused by natural phenomena which can result in environmental damage, material losses, or human casualties (Kamadhis UGM, 2007).

According to a study by Badan Nasional Penanggulangan Bencana (2020), Riau was ranked 12th in terms of disaster risk level, making it one of the most disaster-prone provinces. According to the 2020 Indonesia Disaster Risk Index, Riau's risk index is 147.27 (high). Riau has an area of 111,228.65 km² and consists of islands and seas. Its presence extends from the foothills of Bukit Balisan to the South China Sea, and geologically it is located in the mountain basin of the Back Arc, and most of the eastern Riau area is dominated by torts. The presence of wide gorges and forests makes the river vulnerable to wildfires and wildfires. These wildfires and forest fires have reduced air quality in Rio, affecting health and aviation. In addition, smoke from the fires in Riau and land fires reached Singapore and Malaysia. Based on the explanation above, it is known that natural disasters that often occur every year in Riau Province are forest and land fires, resulting in haze.

According to UNISDR (2010), The concepts and practices of disaster risk reduction are implemented through systematic efforts to analyze and control the causes of disasters, including reducing exposure to hazards, risk reduction, effective environmental management, and increased preparedness for adverse events. This is consistent with the view of Twigg (2009) who describes disaster risk reduction as a systematic approach to identifying, assessing and reducing disaster risk. Disaster risk reduction aims to reduce the social and economic risks of disasters, as well as to address the

environmental and other hazards that they pose. Another goal of disaster risk reduction efforts conveyed by Widana (2019) is to reduce damage caused by natural disaster threats such as earthquakes, floods, droughts, hurricanes through preventive measures. Disasters often follow natural disasters. The severity of the hazard depends on the severity of the hazard's impact on people and the environment. The exposure situation in turn depends on the lifestyle and environmental choices we make.

Forest fires are different from land fires. Forest fires refer to fires that start inside forest areas, while forest fires are fires that occur outside forest areas, whether intentional or unintentional (Hatta, 2008). A forest fires burns something that causes danger or disaster. Fires can occur through uncontrolled combustion, spontaneous natural processes, or by design. Natural processes such as lightning strikes against trees or buildings, volcanic eruptions that scatter chunks of hot coal, and friction between dry branches of oil-containing plants caused by winds which produces heat or sparks. (Notohadinegoro, 2006). Fires, field work, fields, industrial forest, land preparation for livestock, etc. comes from humans as a result of a series of activities such as (Hatta, 2008).

II. RESEARCH METHODS

The research method used is qualitative research. Qualitative research is a method used to find and understand the meaning of social or human problems of many individuals or groups of individuals (Creswell, 1998). Qualitative research is a method used to explore and understand the meaning of social or human problems of many people or groups of people. The research design used is qualitative descriptive, that is, the collection and analysis of data based on the results of the evaluation in a qualitative way. Literature study using secondary data and information obtained during virtual working class activities in the country (interpretation of source material and answers in question sessions). Then the information obtained will be implemented in the study in the discussion of this research. The researcher then checked the validity of the data to strengthen the research findings.

Based on the source, data is divided into primary data and secondary data (Sujarweni, 2014). The primary data used were the results of interviews and FGD (Focus Group Discussion) with informants, while secondary data was obtained through searching existing research documents and activity reports from the local SKPD. The discussion on data sources will be accompanied by criteria for data sources, namely details on the characteristics of subjects and objects that are considered suitable for answering research problems.

III. RESULT AND DISCUSSION

Disaster risk assessment is an effort to produce information related to the level of disaster risk in an area. The level of risk is obtained from a combination of 3 (three) components, namely hazard, vulnerability and capacity. The three components are determined based on their respective parameters. The hazard component is determined through analysis of probability (chance of occurrence) and intensity (magnitude of event). The vulnerability component is

calculated based on four parameters, namely social vulnerability (exposed population), economic vulnerability (loss of productive land), physical vulnerability (losses due to damage to houses and buildings), and environmental vulnerability (environmental damage). Finally, the capacity component is determined using regional (government sector) resilience parameters. The result of combining these three components is in the form of risk which provides information regarding the comparison between regional vulnerability and capacity in dealing with disasters. In other words, the level of risk shows the ability of the region to reduce the impact of losses arising from disasters.

Forest and land fires are situations where forests and land are full of fire, causing economic damage and environmental value due to loss of forest and land. Wildfires and wildfires often cause smoky disasters that can disrupt the operation and safety of the surrounding area (Ministry of Forestry Regulation No P.12/Menhut/-II/2009 concerning Forest Control).

Forest and land fires usually occur in areas where vegetation is prone to fire, for example in peat areas. Factors causing forest and land fires include prolonged drought, lightning strikes, and land clearing by humans. Analysis of the growing forest and land fire hazard (karhutla) is a multi-criteria analysis that combines several parameters that have a relationship as a factor causing the threat of karhutla. In this study, the karhutla hazard mapping method was carried out using a statistical approach that takes into account the probability of karhutla events using the Weight of Evidence (WoE) method as presented in Figure 1.

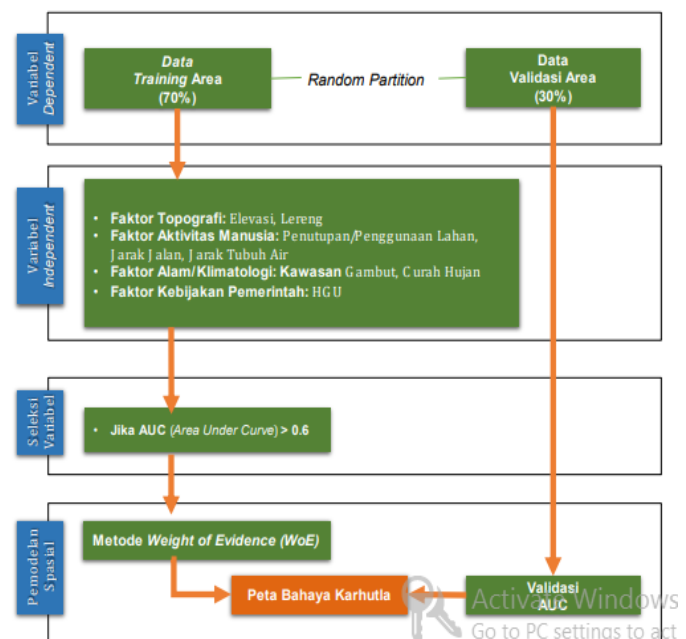


Fig 1. Flowchart of the Process of Compiling a Forest and Land Fire Hazard Map Index

Source : Badan Nasional Penanggulangan Bencana, 2021

WoE is a data-driven quantitative technique, using a number of combinations of data to produce maps of weighted data, both continuous and categorical, based on prior (initial) and posterior (after) probabilities (Carter 1994; Westen, 2003;

Sterlacchini 2007). WoE can be calculated using the following equation:

$$W_{ji}^+ = \ln \left(\frac{P\{F_{ji}|K\}}{P\{F_{ji}|\bar{K}\}} \right) = \frac{\left(\frac{P\{F_{ji} \cap K\}}{P\{K\}} \right)}{\left(\frac{P\{F_{ji} \cap \bar{K}\}}{P\{\bar{K}\}} \right)} = \ln \frac{\frac{Npix_1}{Npix_1 + Npix_2}}{\frac{Npix_3}{Npix_3 + Npix_4}}$$

The parameters that make up the hazard of forest and land fires consist of parameters of land cover, burnt areas/hot spots, soil type, forest area and forest utilization permits/HGU. Each parameter is identified to obtain a parameter class and is assessed based on the level of influence/importance of each class using the scoring method.

$$W_{ji}^- = \ln \left(\frac{P\{\bar{F}_{ji}|L\}}{P\{\bar{F}_{ji}|\bar{L}\}} \right) = \frac{\left(\frac{P\{\bar{F}_{ji} \cap L\}}{P\{L\}} \right)}{\left(\frac{P\{\bar{F}_{ji} \cap \bar{L}\}}{P\{\bar{L}\}} \right)} = \ln \frac{\frac{Npix_2}{Npix_1 + Npix_2}}{\frac{Npix_4}{Npix_3 + Npix_4}}$$

$$W_{contrast_{ji}} = W_{ji}^+ - W_{ji}^-$$

$$P_{total}^{(K)} = \sum_{j=1}^m W_{C_{jL}(K)}$$

a: W_{ji}^+ : probability ratio which states that the ratio in the case of the existence of a F_{ji} factor then a forest and land fires occurs/appears or does not appear/occurs

W_{ji}^- : probability ratio which states that the ratio in the case of the absence of the F_{ji} factor then forest and land fires occurs/appears or does not appear/occurs

P : Probability

F_{ji} : The existence of class j factor

\bar{F}_{ji} : There is no factor j class i

\bar{K} : There is no forest and land fires

K : There is forest and land fires

To find out how forest and land fire prevention and mitigation efforts are being done, the researchers ask some questions about forest and land fire prevention efforts in Riau province. Disaster management done right. Karhutla's Disaster Monitoring technology has been developed in the form of a real-time dashboard accessible to the public and government and interacts with government agencies via satellite. There is also a working group TNI/POLRI assistance in the province of Riau for the control of forests and forest fires (Irwansyah, 2022).

Structural mitigation to overcome karhutla is in the form of peat restoration through the construction of irrigation (water structures) to maintain the water table. Apart from that, the Public Works and Public Housing Agency is also making efforts to conserve peatlands through the construction of irrigation network canals or a canal gate system(Yufendri, 2022). The Job Creation Law allows burning with a maximum of 2 hectares with a note that there is a firebreak. Actually the concern is more about the uncontrolled burning, so the solution offered by the government is to provide heavy equipment assistance. In addition, independent patrols and integrated patrols are also carried out as a form of karhutla mitigation (Dwiyana, 2022).

Sensors are installed at hotspots as an effort to prevent forest and land fires. In addition, weather modification technology (TMC) is also used to control the condition of peatlands so they don't dry out when the weather is hot (Prayoga, 2022). Form of prevention and mitigation efforts carried out through activities patrols on hotspot information from satellites. However, the existence of integrated communication and coordination, not only special fire monitoring flights, but also through commercial airplane flights that pass through Riau can provide information about field conditions. Apart from that, the Indonesian Air Force also formed Babinopdirga whose duty is to go around the airfield \pm 5 km every day by visiting the community, establishing good relations and educating the community to change behavior that is more environmentally friendly (Nurjadin, 2022).

The Riau Provincial Government has taken various mitigation measures in the province, establishing forest fire prevention and wildfire prevention policies. The presence of provincial laws regulating the reduction of the risk of natural disasters caused by forest and forest fires. which has a positive impact on reducing the number of accidents Losses in the event of forest and land fires and can reduce the effects of forest fires in the province of Riau. The Ryokan prefectural government has developed several policies. In terms of mitigating the effects of forest fires and land fires, in accordance with regional regulations concerning Technical Guidelines for Forest and/or Land Fire Management, Pergub No. 9 of 2020 concerning Standard Procedures for Establishing Disaster Emergency Status and Command of the Task Force for Control Forest and land fires in Riau Province, as well as Governor Decree No. 286/III/2021 concerning the Establishment of the Task Force for Forest and Land Fire Control in Riau Province in 2021.

Through the Riau Province Environment and Forestry Service, the Regional Government of Riau Province is carrying out a series of prevention efforts by preparing strategies and programs such as the Riau Province Environmental Protection and Management Plan (RPPLH) Document for 2022 - 2051 which contains two policy directives, namely 1) utilization plan and/or reserve natural resources with a strategy of building and developing infrastructure in protected areas taking into account conservation, and 2) a plan for maintaining and protecting the quality and/or function of the environment with a strategy of increasing the preparedness of all parties in controlling land and forest fires, and increasing awareness and law enforcement against land and forest burners. In addition, the Riau Province Environment and Forestry Service has also prepared a Peat Ecosystem Protection and Management Plan (RPPEG) for 2021 - 2050, and implemented 12 strategic policies for controlling forest and land fires in Riau Province. Forest and land fire disaster mitigation in Riau Province requires several related data such as weather forecasts, rainfall intensity, seasonal forecasts, groundwater levels, areas prone to forest and land fires, Hotspots, coordinate points, as well as data on all villages and districts in Riau Province. To meet this need, DLHK utilizes information system data and early warning applications created by related institutions, including Sipongi, Lancang Kuning Dashboard (POLRI), SIPALAGA (BRGM), and data sources from BMKG.

Activities carried out in the framework of preventing and mitigating forest and land fires include building firebreaks and preparing facilities and infrastructure, such as making posts for the task force, patrol lines, and preparing fire extinguishers. The purpose of making firebreaks is to divide a large expanse of fuel into several parts/fragments, so that in the event of a fire the fire does not engulf the entire expanse of fuel or plants. Karhutla is usually caused by damage to the hydrology/water system in peatlands due to uncontrolled human activities, such as cutting down forests, burning fields and so on. The prevention that can be done so that the peat does not burn is by building an embankment around it. The existence of this embankment is cultivated not far from rivers or water reservoirs so that during the dry season water can be pumped from rivers or other water reservoirs into the expanse of peat land.

IV. CONCLUSSION

Forest fire management in Riau Province is very good. This can be seen from how much forest and field fires have decreased in 2015-2021. This reduction is due to the role of the Riau Provincial Government in combating severe natural disasters related to forest and land fires. How serious the provincial government of Riau is in solving this problem can be seen in the 2015 Officials of 2019 Fire Forest Fire Fighting Technical Guidelines and 2015 Metamorphoses No. 01 of 2019. 9th of 2020 "Procedures of flagging in determining information standards and managing forest and land fires in Riau Province" and other Orders of the Governor. The provincial government of Riau also educates the public about the importance of protecting forests and land for the environment. The Riau State Government should also establish an institution to create a Firefighter Village so that the public can know the importance of participating in the protection of forests and surrounding lands. One part of the Riau state government is the National Agency for Research and Innovation (BRIN), which can be seen installing sensors in hot spots to prevent fires and forest fires. In addition, climate change technology (CMT) is being developed to control peatland desiccation to reduce the risk of forest fires.

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