Sustainable Development: Disaster Risk Reduction of Forest and Land Fire in Indonesia

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Abstracts: This research aims to understand the collaborative governance and disaster risk reduction of forest and land fires at the ontological and sociological level that are very significant. The problem is very interesting to be analyzed by conducting a descriptive qualitative research based on theory of public policy, collaborative governance, and disaster risk reduction. Data were collected use in-depth interview, observation, and documentation related with forest and land fires cases in Indonesia. Data were analyzed use interactive models are data reduction, data display, data verification, and supported by triangulation. The results were based on ontological and sociological level for reducing risk disaster and improving a disaster management policy and regulation that are needed for providing information to stakeholders regarding regulations and sanctions and produce a clear input for public officials in making better regulations on disaster management.

Keywords: Public Policy, Collaborative Governance, Disaster Risk Reduction.

1. INTRODUCTION

There is some problem related with forest and land fires occur in Indonesia that have to be analyzed based on collaborative governance perspective and disaster risk reduction. Policies and regulations on disaster management have different interpretation.

This study aims to understand the collaborative governance and disaster risk reduction on managing forest and land fires related with disaster management and public policies in Indonesia.

1.1. Background

The forest and land fire disasters in Indonesia occur almost every year on a small, medium or large-scale covering Sumatra, Kalimantan, and Papua as the largest position of forest and land fires in 2019. A survey report conducted by the Ministry of Environment and Forestry in 2019 showed that forest and land fires were caused by human factors. In accordance with the 2019 report that the conditions of forest and land fires in 7 provinces, namely Riau, Jambi, South Sumatra, West Kalimantan, Central Kalimantan, South Kalimantan and Papua, are caused by human activities and the majority occur in forestry and plantation areas.

The major impact of this forest and land fire disaster is a haze disaster which extends to neighboring countries that requires monitoring, mitigation, and disaster risk reduction. Overlapping regulations, unclear regulations, lack of technical capacity, inaccurate mapping, unclear land tenure, and lack of transparency drive to reasons for weak governance.

Managing land and forest fires disaster need a transparent policy making, predictable processes, competent officials, accountable administrators, and laws enforcement. The participation and active involvement of stakeholders from various sectors such as government, private sector, and is fundamental in making policies related to the management of forests and natural resources. Indonesia's forestry sector fails to deliver development

benefits due to lost income, employment opportunities, government revenues such as royalties and taxes, and other local and global environmental services.

The Disaster Management Agency is equipped with various implementing regulations to be effective, efficient and sustainable. The intended disaster management consists of two stages. Before a disaster consisting of mitigation, prevention and preparedness, then after a disaster consists of emergency response, rehabilitation and reconstruction. Understanding of disaster management will be the first step to reduce the risks that arise when a disaster occurs.

Disaster risk reduction is an approach to identify, evaluate, and reduce risks caused by disasters. This includes reducing the possibility of hazard, vulnerability, soil management, environmental management, and increasing preparedness. Disaster management includes disaster risk analysis, disaster mitigation as well as post-disaster rehabilitation and reconstruction.

Disaster risk reduction in forest and land fires is carried out to prevent, alert, extinguish and handle fires. The Disaster Management Agency as a non-departmental government agency is guided by the policy to provide socialization regarding the impacts, dangers, and ways of dealing with forest fires, and disseminating disaster information through electronic media.

Efforts to reduce the forest and land fires risk disasters can cause problems such as the absence of law enforcement and the absence of synchronization, coordination and integration with stakeholders. Collaboration between government and communities is to carry out general preventive activities. Disaster risk reduction requires adapting changes and community-based approaches. Collaboration means working with individuals, groups or organizations. Collaborative governance according to an arrangement of one or more public institutions with stakeholder actors involved in the collective decision-making process oriented to consensus and aims to create, implement and manage public programs. The policies and roles of stakeholders involved in forest and land fire cases that occurred in Indonesia involving political and security interests of the state are important in assessing that the implementation of policies has gone well and does not overlap.

Disaster management requires a multi-stakeholder collaboration towards a serious handling which should ideally be taken in an integrated manner. The disaster management was carried out through several key actors are the government, business, community, academia, and the media. Collaboration in managing disaster need knowledge, skills, attitude, to handle a full treatment for disaster management.

Disaster is an unexpected situation where in that condition there could be damage, death to humans or objects or houses as well as all the furniture that we have and it does not rule out animals and plants to die. Disasters cause panic in the community and cause prolonged suffering and grief such as injuries, deaths, economic pressure, loss of family members and damage to infrastructure and the environment. Disaster management has been changed in multi perspective in line with history of changes of disaster management since 1960 to 2000. There was a change in perspective on disaster impacted reduction strategies from a narrowly technical discipline to a globally comprehensive movement [1].

What is the collaborative governance and disaster risk reduction in forest and land fire disaster management in Indonesia? How is the implementation of collaborative governance based on disaster risk reduction in forest and land fire disaster management in Indonesia?

There is no statutory level of regulation as a legal umbrella in forest and land fires disaster management and it is necessary for implementing the collaborative governance and disaster risk reduction of forest and land fires disaster management. Based on previous explanation about forest and land fires disaster in Indonesia, there are still need to be explored more deeply at the ontological and sociological level. Therefore, this issue is very interesting to be studied.

1.2. Research Objectives

This research is useful for academicians and practitioner in adding knowledge on public policy, collaborative governance, and disaster risk reduction for improving a natural disaster management. This research is also as a recommendation for the public officials to make a revised regulations on disaster management.

1.3. Original Research

There is research using a normative approach to understanding value chain governance in oil palm by paying attention to the case of forest and land fires. . The results showed that good Value Chain Governance was able to reduce forest and land fires. The use of fire in land preparation can be used as an alternative by using coercion and information by the government to farmers and workers. Strong farmer associations and better scenarios can be used to provide alternative uses of fire in land maintenance and acquisition. Palm oil is a solution for sustainable economic development and contributes significantly to economic development but causes environmental damage. Good value chain governance can reduce forest and land fires [2].

There is a case study research in South Korea which undertakes the centralization and decentralization of disaster management. South Korea has succeeded in building a national level management system that is integrated and comprehensive in disaster management by means of decentralization to the regions, but still requires vertical and horizontal collaboration which is a prerequisite for disaster management. As a policy issue, the central government should underline its collaborative role in disaster management rather than taking an approach of simply devolving responsibility to the regions. National governments should seek to design systems that will enable rapid and effective collaboration and work with local governments to unleash disaster management powers. Collaborative action is carried out in dealing with disasters from a governance perspective [3].

There are also other studies evaluating the causes of forest and land fires. The approach used is spatial analysis of hotspots with rainfall used to determine the distribution of fire. Analysis of the spatial distribution between hotspots and causative factors is determined to identify the spatial characteristics of the fires. The results of the study found that there is a strong indication of land fires shown by satellites with a confidence value of more than 50%. The number of hotspots is inversely related to rainfall. The results showed that the density of hotspots increases as distance from the river decreases, the distance to the road decreases, and the highest hotspot density occurs in the village center. Hotspot density by land type and highest values were found mostly in peatland areas. The cause of the fires is due to human activities and mostly from burning swamps and clearing land for agriculture. The number of hotspots is inversely proportional to the rainfall. The number of hotspots does not necessarily indicate a fire. Hotspot density as an indication of fire activity is determined by the presence of peat land, land cover, accessibility, and human activities [4].

There is research using the case study method. Data obtained from interviews and secondary data in the form of non-governmental organization reports. The results of the research show that the Government has made efforts to protect the haze and the public has become increasingly receptive to measures aimed at dealing with environmental problems. However, the government as part of the decentralization process has not led to a more transparent and open environmental policy-making process. Decentralization has created a political space for civil society and the media to engage in environmental politics. The government appears to be more responsive to the demands of powerful plantation companies than the community. In the case of Indonesia, the environmental security process involves many state and non-state actors who often have overlapping and multipolar interests. Future research is recommended to theorize on the factors influencing actors to respond at various stages in order to explain the results [5].

Effective reforestation of land can be carried out by agrarian communities managing forests. Using three different approaches as well as semi-structured interviews it was found that ten years of forest management had created 36% of the area for conservation, 37% for timber production, 5% for restoration, and 22% for agriculture and other uses. On average 39% of the timber production area was logged in the last ten year period leaving 61% of the reserve forest production area under medium-term conservation. Over the past 20 years, forested landscapes have produced nearly 3 million metric tonnes of wood, indicating that community-based reforestation is a viable

option for commodity production and forest conservation. Community-based land tenure is effective governance related to government programs and forestry regulations. The role of the community in managing production forests and conversion forests can be managed properly through community development [6].

Fire policy implementation uses the dominant technical approach for many years elaborating semi-structured data on interviews with forest fire policies. Forest fire management at the national and local levels is not well coordinated. The root of the problem is not only due to the patronage system and the impact of decentralization policies but also about the making and implementation of the policies themselves. Forest fire management at the national and local levels is not well coordinated as can be seen from overlapping management and programs. Forest and land fire cases with several handling matters are not well coordinated [7].

The study found that various actors were involved in and benefited from the fires. These actors influence the decision-making process through their patronage networks for their own benefit. The network provides power, support, protection, and access to various resources. These actors benefit directly and indirectly that is, enjoying the benefits at the expense of environmental quality. These actors exchange information and form complex social networks that can influence decision-making processes at the national and regional levels. Patronage networks, profits, and high market demand resulted in fires and haze that continued every year [8].

The explanation of above previous research on natural disaster and disaster management drives that government and related stakeholders have to manage natural disaster and environmental problems by enforcing of rules and standards to be setup out in laws. This study analyzed a multi policies approach regarding disaster management in Indonesia.

2. RESEARCH METHODS

A qualitative research strategy can be applied if there are research problems that still need to be explored more deeply or followed up on previous quantitative research due to a previous theory or concept is still considered unable to capture the complexity of the problem under study. A qualitative research approach produces descriptive data in the form of words or writings and behaviors that can be observed from the subject and object of the study itself. The qualitative approach was chosen because in accordance with the aims of the research to describe and understand the phenomena, events, social activities, attitudes, beliefs, perceptions of people [9].

Data collection in this research were interviews, observation and documentation. In-depth interview to 10 informants as key member in The National Disaster Management Agency. Participant observation conducted by author and team to obtain records in the field of study. Related documentation was gathered from many sources such as internet media and library documents.

Data analysis in this research were using 3 steps are data reduction, data display and data verification refers to interactive model. Data reduction for sorting out the main data, data display for presenting the data, and data verification for concluding the main themes of the results [10].

The validity in this study uses triangulation based on the observation, in-depth interviews, and documentation analysis to obtain valid and reliable data coping credibility, transferability, auditability, and confirmability. Credibility related to the truth aspect by means of triangulation to compare the results of an interview with the results of interviews with colleagues. Transferability shows the applicability of research to other studies that readers can understand the results of qualitative research. The report is made in a detailed, clear, and systematic manner. Auditability means that it can be tested by examining the entire research process, since researchers design case studies, determine data sources, collect data, conduct data analysis, to make conclusions, must be able to show the stages, processes and results. Confirmability related with the objectivity that the research results are agreed and accepted [11].

3. LITERATURE REVIEW

3.1. Public Policy Theory

The development of the public administration paradigm emphasizes the focus, locus, and value to be achieved. The first is the classical bureaucracy, with a focus on organizational structure and management functions, the locus is the government bureaucracy and business organization, and the values to be achieved are efficiency, effectiveness, economical and rational. The second is neo-bureaucracy with a focus on behavior-based decision-making processes, management, systems, and research, with the locus of government bureaucratic decisions, and the values to be achieved are efficiency, effectiveness, economics and rationality. The third is institutions with a focus on understanding bureaucratic behavior and making decisions that are gradual and incremental in nature. The fourth is human relations with a social-psychological focus and the locus is organization and the values to be achieved are participation in decision making, minimization of differences, status, openness, self-actualization, and increased job satisfaction. The fifth is public choice with a focus on providing services to the community. The sixth is New Public Management (NPM) concerning human values and social justice, with a focus on organizational design based on decentralization, democracy, responsiveness, participation, and providing services needed by the community [12].

The first is the separation between politics and public administration, with a focus on civil service and government budgeting, with political and policy loci. Second are administrative principles focusing on administrative principles, namely planning, organizing, coordinating, reporting and budgeting with a locus in any organization. Third is political science because its focus is in the formulation of public policies which are full of political values and the locus is bureaucracy. Fourth (1956-1970) considers public administration as a part of administrative science that must be developed scientifically with a focus on public administration and business administration. Fifth states that public administration as public administration. With a focus on organizational theory, management theory and public policy, while the locus is public problems and public interests. Furthermore, a new paradigm emerged that public policy as governance with a multi-dimensional approach, with a focus on public affairs that require private parties and society. With the locus of the public, private and civil society sectors [13].

Previous paradigms still show the dominance of the government and it is necessary to re-examine the role of the government. The role of the community in government administration and public services has become increasingly prominent. A new model is needed to improve the performance of public services with results-oriented and competitive dynamics by changing the rules of the game and fostering creativity in providing services. The emergence of the New Public Management was first introduced by Hood (1991) as an important momentum questioning the dominance of the government and providing space for the private sector to participate in public services [14].

The main characteristic of NPMs is the change in the bureaucratic environment based on standardized and hierarchical rules towards a flexible public management system that is more oriented towards the public interest. There are 7 NPM doctrines, namely the use of professional management, the use of standards and performance measures, a greater emphasis on control of output, smaller units, tighter competition, application of private management models to public sector practice, and discipline and resource saving [14].

The development of public policy has experienced a paradigm shift in government. This development studies the behavior of stakeholders and networks that collaborate in policy making. Public policy focuses on collaboration to solve problems and goals. Collaboration has a broad scope and focuses on the substance and process of solving problems effectively. Non-hierarchical mechanisms and participation will contribute better to collaborative public management with practices in the future. Public policy is related to the extent of authority and responsibility of government and stakeholders. Distribution of power in relation to laws and policies. The aspirations of stakeholders and the restructuring of the country's political and economic role need to be considered. Ineffective public services will lead to social, political and economic causes [15], [16].

Based on the epistemological and sociological description of public policy theory for refining the research, it can

be stated that making multi-policies and regulations related with disaster management is a part of public policy theory.

3.2. Collaborative Governance Theory

The concept of governance has a long history and most countries have developed this concept according to their own needs through interactions between rulers and those controlled by historical backgrounds, legal customs and the communities in which this concept was developed [17].

The concept of governance has developed further due to changes in the role of government. Governance is different from government, because governance involves complex interactions among various stakeholders in the public arena [18] whereas government only knits on the role of government as a single actor. Some scholars define governance as a new governing process in which various actors manage the public arena through mutual interactions [19]. There are several definitions of governance which are essentially a governance system involving the government, private sector and society [19].

The decision-making process in collaborative adaptive management of stakeholders uses a decision-making model. The qualitative method was carried out by analyzing transcripts of meetings, stakeholder communication, and physical monitoring data to ask what facilitates and challenges decision makers and how challenges affect stakeholders. The results of the study found that the reduction of uncertainty, knowledge production, and social learning reveals the limitations of ideal cycles and challenges adaptive management. The complexity that occurs is time lag, trade-offs, path dependency, and stakeholder tension in decision making [20].

Collaborative governance brings public and private stakeholders together in collective forums with public agencies to engage in consensus-oriented decision making. Research conducted on collaborative governance to elaborate a model of collaborative governance. The crucial factors are face-to-face dialogue, trust building, and commitment and understanding. A virtuous cycle of collaboration need development when collaborative forums depend on trust, commitment, and understanding [21].

Collaborative processes are carried out to prepare for disasters. Preparedness and actions must be carried out jointly. There should be guidance needed to design activities in collaboration and the results supported can lead to the end goal. The results showed that there was better interaction and relations between parties. Enhanced capacity to assess disaster risk and understanding of processes and practices that enhance disaster preparedness. The effectiveness in achieving objectives is supported by a collaborative process that encourages preparation for natural disasters. More generally, it can contribute to and be oriented towards disaster risk reduction systems and actions that are produced together with many stakeholders [22].

The collaborative framework provides a broad map for locating and exploring a joint system between policy-based and site-based parties with non-governmental stakeholders to public-private partnerships. Integration of knowledge about barriers to collaborative social learning action and conflict resolution is required. The general framework can be applied to analyzes of different scales of policy and of varying degrees of complexity. There is a dynamic interaction between stakeholders [23].

The interaction between social, economic, and environment is often viewed from different perspectives by stakeholders. There are disputes over the interpretation of sustainability. Sustainability requires a plurality of actions. Effective conflict resolution and decision making about sustainability requires collaboration. There are a variety of collaborative governance arrangements that define sustainability that can help to better understand the drivers of conflict resolution and improve sustainability [24].

Collaborative governance emerged in response to ethical concerns about centralized governance. Collaborative governance needs to be done to identify the conditions that support the goals to succeed. Collaborative governance works by involving communities, formal mechanisms, sharing of power, ownership of resources, accountability, building trust, and adaptive approaches to performance. Collaborative governance demonstrates the potential for a

democratic system based on consensus. Collaborative governance is carried out to support sustainability [25].

Based on the epistemological and sociological description of several definitions related with collaborative governance theory above, it can be stated that making multi-policies of disaster management should be analyzed by the collaborative governance theory.

3.3. Disaster Risk Reduction Theory

Disaster Risk Reduction (DRR) is the process of protecting the livelihoods and assets of communities and individuals from the impact of hazards. Hazards can be natural or human, such as earthquakes, floods, droughts, price hikes, conflicts and infectious diseases. DRR limits the negative impact of these events by seeking to reduce the size, strength, or how often they occur, and build the capacity of people exposed to these hazards to anticipate, survive and recover. Disaster Risk Reduction (DRR) is aimed at preventing and reducing existing disaster risks and managing residual risks, which contribute to strengthening resilience and to achieving sustainable development. DRR is the goal of a disaster risk management (DRM) policy, and its goals and objectives are defined in a disaster risk reduction strategy and plan.

Disater Risk Governance (DRG) as a practical and academic matter has not been given the attention it deserves, and as a result, this neglect has damaged the time, money and resources invested in DRR in developing countries. since the late 1970s and early 1980s. Thompson suggested that properly conceptualizing DRG based on context would help overcome some of the shortcomings. Consequently, DRG needs to be a major focus, especially for developing countries [26].

Disaster Risk Governance offers extensive engagement occurring in the Caribbean and Sub-Saharan Africa. In the past decade and a half Kenya, Jamaica, Dominica and Zanzibar have all suffered severe damage from disasters caused by natural hazards. Despite the extraordinary investment in disaster risk reduction, disasters have wiped out the development advantages of these countries.

It is hoped that disaster risk governance can take signals from the social, economic, political and administrative context as well as the imperative development ideals of that context. Concepts such as development, sustainable development, vulnerability, under capacity, and resilience, require several calculations. For example, the concept, both material and conceptual, is controversial, which makes it difficult to sharpen the scope of what constitutes governance or how to define it.

Disaster Risk Reduction requires disaster risk governance to translate risk reduction processes and decisions into collective action among multiple actors. Disaster risk governance uses disaster risk governance, which means specific arrangements made by the community to manage disaster risk in the broader context of risk governance. Weak governance promotes disaster risk linked to other risks, such as poverty, inequality, poor planning. We need to understand it, facilitate it and use it to improve for the better. Although the principles of governance are universal, their implementation is country specific. State institutions play a fundamental role in governance. Healthy institutions create successful service delivery, including disaster risk reduction [26].

DRR concept is also influential in exploring mass media in relation to disaster events in several countries such as India, Germany, Japan, Italy and Australia. Mis-example shows how Twitter worked before, during, and after the disaster in Italy. It focuses on actors, networks and narratives to analyze how microblogging can impact disaster governance and risk communication at multiple levels. Analysis of the use of social media during this critical period will have a relevant and useful impact in assessing the risk communication policy approach to disaster management. Communication is a core issue in disaster and risk governance [27].

Forest is seen as an ecosystem, considering that forest is formed by many components, each of which is independent, inseparable, even influencing and interdependent. Forest is an ecosystem unit in the form of a stretch of land containing biological natural resources dominated by trees in their natural environment, which cannot be separated from one another. Fire is a process that changes the ecosystem and composition of the atmosphere.

Long-term fire trends using multiple satellite data sets found that many areas were burning. Agricultural expansion and intensification are the main drivers of reduced fire activity [28].

Based on epistemological and sociological description of disaster risk reduction, it can be stated that the making of multi-policies on natural disaster management can also be analyzed by disaster risk reduction theory.

4. ANALYSIS AND DISCUSSION

Based on data collection and data analysis, it can be resulted as follows.

Forests are closely related to interconnected natural processes to the water cycle and soil preservation and are called hydrological processes. The process of controlling climate and the influence of climate on the existence of forests. Processes related to soil fertility and biodiversity. Forests are a repository of plasma for genetic sources of various types of plants and animals. Forests are a wealth of natural resources that can be utilized for human welfare as well as natural tourism objects.

Forest is land where trees are close enough to intertwine with one another. Forests are differentiated into boreal forests in the northern part of the earth, tropical forests on the equator and temperet forests between boreal forests and tropical forests in areas with rainfall of more than 1,000 mm / year. Tropical forests are still divided into two, namely wet tropical forests in areas with a lot of rainfall and long and dry tropical forests or deciduous forests in areas with short rainfall.

In Indonesia, this includes wet tropical forests in the west and dry tropical forests in the east. Wet tropical forest is still differentiated into mangrove forest, coastal forest, peat swamp forest, lowland forest, hilly forest and mountain forest. Based on the species composition, it is further differentiated into ebony forest, meranti forest, ramin forest, rasamala forest, and others. Wet tropical forests in Indonesia contain the most types of living things, in other words, the highest biodiversity.

Forest is an ecosystem, where its existence itself is very important in terms of its function, so that a forest management is needed is the practice of applying the principles of biology, physics, chemistry, quantitative analysis, management, economic, social, and policy analysis in facilitating, fostering , utilize and convert forests to achieve certain goals and targets while maintaining productivity. Forest is an ecosystem, so forest management must be based on the principles of ecosystem management, namely the firmness of objectives, implemented based on clear policies, procedures and practical instructions, and is adaptive in nature, namely the existence of an adjustment process towards a more suitable condition.

Forests are managed for multipurpose purposes with the ultimate goal of obtaining value benefits. The objectives of forest management depend very much on the objectives of the forest owner and the economic situation in which the forest area is located. In state areas, the objectives of forest management are largely determined by political factors and the level of importance of the forest area. Whereas privately owned forests, the purpose of forest management is to produce goods and services which are usually focused on the total production and the total benefits that can be obtained from the land.

Forests have decreased due to damage or threats such as illegal logging, conversion of forest functions to plantations, forest fires and unsustainable exploitation of forests for residential development, industry, or as a result of encroachment. Forest ecosystems respond to various disturbances depending on the capacity of the forest to cope with climate change, the structure of vegetation, and the rate of ecosystem processes, namely the resilience of the forest ecosystem. Resilience is the ability of a forest to withstand external pressures when viewed in the appropriate time span a forest ecosystem is able to do, such as taxonomic composition, structure, ecological functions, and process rates. Resilience as the ability of an ecosystem to bounce back after experiencing a major disturbance or to recover after a certain period of time from experiencing a major disturbance.

Forest fires are a process of rapid reaction of oxygen and other elements, and are characterized by heat, light and usually ignite. The fire process spreads freely by consuming fuel in the form of living and dead vegetation, litter, humus, shrubs, and weeds. Regulation of the Minister of Forestry Number 12/2009 concerning Forest Fire Control defines a forest fire as a condition in which a forest is engulfed by fire causing damage to the forest and / or forest products causing economic and / or environmental value losses.

Forest fires are distinguished by land fires. The difference lies in the location where it happened. Forest fires are fires that occur inside a forest area, while land fires are fires that occur outside a forest area. In the past, forest fires were a practical method of clearing land, which was originally practiced by many traditional traders or shifting traders. However, because the cost is very cheap, the practice of burning forests and land is widely adopted by forestry and plantation companies. The forest burning motive itself is considered effective rather than doing it using conventional methods of slashing and chemicals. In addition, burning can increase the suitability for growing oil palms. Large-scale forest fires mean that there is no respect for jurisdictional boundaries. Forest fires, like any other disaster, require collaboration.

In addition to striving to achieve generally identified objectives, success in managing disasters with interdependent collaboration can lead to conflicts that will potentially arise when various institutions and organizations work together in conditions of tension between the need to serve the individual interests of the organization and the desire to serve the whole collectively.

An important task in managing complex collaborations is identifying and managing conflict with learning about disasters. Most of the focus is on the interaction between local and central government. Understanding the conditions that can lead to conflict and managing them is an important thing to do in order to understand the opportunities and limits for collaboration. In-depth understanding of these dynamics can present opportunities for better disaster management and has important theoretical implications.

There are two factors that influence forest and land fires, namely human and non-human factors. The human activity factor around the forest has a significant effect on the incidence of forest and land fires with a positive correlation, namely household expenditure and community activities in the forest area. Increasing human access to forest areas will increase the likelihood of illegal burning. These activities tend to increase during the dry season. This is because the cultivated land in the area around the forest has become unproductive due to drought.

There are direct causes of forest and land fires: fire is used in land clearing, fire is used in land conflicts, fire spreads accidentally, and fires related to the extraction of natural resources. The indirect causes of forest and land fires are land tenure, land use allocation, economic incentives and disincentives, forest and land degradation, the impact of changes in population characteristics, and weak institutional capacity.

The factors that cause forest and land fires from human elements include climate and weather which also affect forest fires which are interconnected. Climate determines the total amount of fuel available. Climate determines the duration and severity of the fire season. Weather regulates the moisture content and the ease with which forest fuels burn. Weather affects the process of igniting and spreading forest fires. Woody peat forest is a good fuel because it contains a very high heating value or high heat capacity, especially during the dry season because there will be a high fuel load on the forest floor.

The water content of the fuel as the water content of the fuel particles is a factor that influences the behavior of forest and land fires. In addition, the high water content of the fuel requires high heat before the fuel is burned by fire so that the fire rate and the fuel ignition power will be reduced. The moisture content of the fuel changes with changing weather conditions, both seasonally and over shorter periods of time. Apart from fuel factors, other environmental factors are weather factors, including wind, temperature, rainfall, groundwater conditions and relative humidity. Time is also closely related to the possibility of a fire.

Forest and land fires are partly due to natural factors, usually occur in the dry season when the weather is very hot and can also be caused by human burning. The main cause of forest fires is land clearing. The uncontrolled

burning spread to the community and companies. Land clearing is often used for plantations, industrial forest plantations, dry land agriculture, and fishing. Use of fire-prone land on ex-forest concession rights and in areas with grassy grass.

Conflict between the government, the company and the community due to the land status of the oil palm companies disputes then hires workers from outside to work and burns the land of local people whose land the company wants to take over by the company to evict the community.

Local residents also set fire to protest the expropriation of their land. The relatively low income level of the community forces them to choose easy, cheap and fast alternatives for land clearing. Lack of law enforcement against companies that violate land clearing regulations as well as natural factors such as lightning strikes, lava from volcanic eruptions and others are also the cause.

Forest and land fires can be grouped into three groups, namely ground fires, surface fires, and crown fires. Ground fire is a type of fire where the fire burns organic matter below the surface. Due to a small amount of air and organic matter, these fires do not see fire but smoke. The spread of fire is also very slow and occurs over a long time. Surface fire is a type of fire where the fire burns surface fuels in the form of litter, shrubs, saplings, stakes, and logging waste. The nature of the surface fire spreads fast, the flame is large and hot, but quickly goes out. A crown fire is a type of fire that burns the tree canopy. These fires will be severe if they occur in plants with tight, flammable leaves.

The form of accountability for burning forests and land based on the Environmental Law, namely the obligation to pay compensation to sufferers whose rights have been violated to a good and healthy environment and also the cost of environmental restoration to the state. Law No. 4 of 1982 emphasizes the types of responsibility given to the perpetrators of pollution and environmental destruction using the principle of strict liability. Compensation usually covers costs, losses and interest and formal sanctions, among others, administrative sanctions, civil sanctions, criminal sanctions, disciplinary sanctions.

CONCLUSIONS

Based on the analysis of the research results above, it can be concluded that reducing the risk of forest and land fires disaster in Indonesia requires collaborative governance which is an efficiency and effectiveness way of forest and land fires management. Forest resilience is the step in reducing risk of forest and land fires disaster in Indonesia.

It is suggested to the legislative and executive in making policies and regulations regarding disaster management to be involved for revising regulation and should be conducted for making better multi-regulation and covering the holistic collaborative governance.

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