PARTICIPATORY ENVIRONMENTAL COMMUNICATION IN FOREST AND LAND FIRE CONTROL: A CASE STUDY IN SOUTH SUMATRA INDONESIA

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ABSTRACT

Objective: The aim of this research is to analyze the phenomenon of forest and land fire (FLF) and the DNA of participatory environmental communication in FLF’s control.

Theoretical Framework: In order to advance the process of dialogue and collaboration in FLF’s control, this research uses The Participatory Environmental Communication (PEC) framework developed by Harris (2021) which consists of three interrelated components: diversity (D), network (N), and agency (A) (DNA)

Method: The research adopts a constructivist paradigm with a case study approach. The informant were selected by a snowball method involving all actors engaged in the communication process of FLF’s control. Data collection in this study employs semi-structured interview techniques and group discussions.

Results and Discussion: The diversity of characteristics and challenges faced by the three villages, Gelebak Dalam, Jejawi, and Deling, highlights the necessity for contextual dialogue and collaboration, respecting local wisdom, and involving community participation. The participatory environmental communication DNA approach reflects its crucial role in FLF’s control in these villages. Gelebak Dalam excels with a favorable DNA, particularly in diversity and network, facilitating smooth dialogue and collaboration processes. Although Jejawi has a limited network, its high diversity and agency remain key drivers for effective dialogue and collaboration. In contrast, Deling exhibits good diversity but faces difficulties in achieving optimal collaboration due to low network and agency.

Research Implications: The implementation of this DNA approach indicates that achieving effective dialogue and collaboration in FLF’s control requires acknowledgment of diversity aspects and the enhancement of networks and agencies at the village level. Strengthening communication networks is necessary to boost active community involvement in forest fire control efforts.

Originality/Value: This study contributes to the environmental communication literature by using participatory environmental communication in the forest and land fire control in Indonesia.

Keywords: Collaboration, Dialogue, Forest and Land Fire Control, Participatory Environmental Communication.
RESUMO

Objetivo: O objetivo desta pesquisa é analisar o fenômeno do incêndio florestal e terrestre (FLF) e o DNA da comunicação ambiental participativa no controle do FLF.

Estrutura teórica: Para avançar o processo de diálogo e colaboração no controle da FLF, esta pesquisa utiliza a estrutura da Comunicação Ambiental Participativa (PEC) desenvolvida por Harris (2021), que consiste em três componentes inter-relacionados: diversidade (D), rede (N) e agência (A) (DNA).

Método: A pesquisa adota um paradigma construtivista com uma abordagem de estudo de caso. Os informantes foram selecionados por meio de um método de bola de neve envolvendo todos os atores envolvidos no processo de comunicação do controle da FLF. A coleta de dados neste estudo emprega técnicas de entrevista semiestruturada e discussões em grupo.

Resultados e discussão: A diversidade de características e desafios enfrentados pelos três vilarejos, Gelebak Dalam, Jejawi e Deling, destaca a necessidade de diálogo e colaboração contextual, respeitando a sabedoria local e envolvendo a participação da comunidade. A abordagem de comunicação ambiental participativa do DNA reflete seu papel crucial no controle da FLF nesses vilarejos. A Gelebak Dalam se destaca com um DNA favorável, principalmente em termos de diversidade e rede, o que facilita os processos de diálogo e colaboração. Embora Jejawi tenha uma rede limitada, sua alta diversidade e agência continuam sendo os principais impulsionadores do diálogo e da colaboração eficazes. Por outro lado, a Deling apresenta boa diversidade, mas enfrenta dificuldades para obter a colaboração ideal devido à baixa rede e agência.

Implicações para a pesquisa: A implementação dessa abordagem de DNA indica que a obtenção de diálogo e colaboração eficazes no controle da FLF exige o reconhecimento dos aspectos de diversidade e o aprimoramento das redes e agências no nível da aldeia. O fortalecimento das redes de comunicação é necessário para impulsionar o envolvimento ativo da comunidade nos esforços de controle de incêndios florestais.

Originalidade/valor: Este estudo contribui para a literatura sobre comunicação ambiental ao utilizar a comunicação ambiental participativa no controle de incêndios florestais e terrestres na Indonésia.

Palavras-chave: Colaboração, Diálogo, Controle de Incêndios Florestais e Terrestres, Comunicação Ambiental Participativa.

COMUNICACIÓN AMBIENTAL PARTICIPATIVA EN EL CONTROL DE INCENDIOS FORESTALES Y TERRESTRES: UN ESTUDIO DE CASO EN EL SUR DE SUMATRA, INDONESIA

RESUMEN

Objetivo: El objetivo de esta investigación es analizar el fenómeno de los incendios forestales y terrestres (IFT) y el ADN de la comunicación ambiental participativa en el control de los IFT.

Marco teórico: Con el fin de avanzar en el proceso de diálogo y colaboración en el control de los FLF, esta investigación utiliza el marco de la Comunicación Ambiental Participativa (PEC) desarrollado por Harris (2021), que consta de tres componentes interrelacionados: diversidad (D), rede (N) y agencia (A) (ADN).

Método: La investigación adopta un paradigma constructivista con un enfoque de estudio de caso. Los informantes se seleccionaron mediante un método de bola de nieve en el que participaron todos los agentes implicados en el proceso de comunicación del control de FLF. La recogida de datos en este estudio emplea técnicas de entrevista semiestructurada y discusiones en grupo.

Resultados y debate: La diversidad de características y retos a los que se enfrentan las tres aldeas, Gelebak Dalam, Jejawi y Deling, pone de manifiesto la necesidad de diálogo y colaboración contextuales, respetando la sabiduría local e implicando la participación de la comunidad. El enfoque de comunicación ambiental participativa del ADN refleja su papel crucial en el control de la FLF en estas aldeas. Gelebak Dalam sobresale con un ADN favorable, sobre todo en diversidad y red, lo que facilita los procesos de diálogo y colaboración. Aunque Jejawi tiene una red limitada, su elevada diversidad y agencia siguen siendo factores clave para un diálogo y una colaboración eficaces.
INTRODUCTION

Forest and land fires (FLF) in Indonesia have been a recurring issue over the last three decades. South Sumatra Province is one of the regions that experiences fires almost every year, particularly during the dry season. In 2015, total brunt area was approximately 2.6 million hectare and South Sumatra Province had the widest burned area, 646,298.80 hectare (MoEF, 2022). Ardiansyah et al., (2017) estimated that the forest fires in South Sumatra from July to December 2015 covered 422,718 ha, with 163,143 ha on mineral soil and 260,575 ha on peatlands. The 2015 FLF incident was recorded as the largest in Indonesia (Field et al. 2016), and similar large-scale incidents occurred in 2019 and 2023. According to data from the Ministry of Environment and Forestry (MoEF), the burned land area in Indonesia in 2019 was 1,649,258 hectare, with South Sumatra become the widest, 336,798 hectare.

Numerous studies related to FLF’s control have been conducted, but many focused on causes, institutional aspects, land governance, and law enforcement (Akbar et al., 2011; Carmenta et al., 2019; Marlier et al., 2015; Nurhidayah & Djalante, 2017; Purnomo et al., 2017; Suhendri & Purnomo, 2017; Tacconi et al., 2019; Uda et al., 2020; Varkkey, 2017). Research on effective communication in the context of forest fires is relatively limited, especially regarding communication between institutions and communities. Therefore, more research is needed to understand the most effective and commonly used forms of communication (Remenick, 2018).

Some studies on FLF’s control with a communication approach have also been conducted by a disaster perspective. The communication on FLF’s control that occurs is mainly...
instructional (top-down) and does not involve the community at the ground level significantly (Arandas & Ling, 2020; Langer & McGee, 2017; Matlock et al., 2017; Minarni et al., 2020; Nurjanah et al., 2021). Badri et al. (2018a) research results showed that the risk communication process for FLF prevention does not involve all stakeholders. According to Ansell dan Gash (2007), the multitude of collaboration processes that fail is due to differences in perspectives among stakeholders, unequal of resources and knowledge, and concerns about conflicts arising from collaboration.

In order to advance dialogue and collaboration among stakeholders for environmental problem-solving, Harris (2019) introduces a new framework in environmental communication studies namely Participatory Environmental Communication (PEC). PEC is an approach that combines environmental communication and participatory communication (Harris, 2020). PEC integrates three interconnected elements: diversity (D), network (N), and agency (A), collectively referred to as DNA PEC. The DNA framework expedites the dialogue and collaboration process in solving environmental issues through diverse understandings and experiences, utilizing networks to catalyze ordinary people's agency towards collective action. The aim of this research is to analyze the phenomenon of FLF and the DNA of participatory environmental communication in FLF’s control.

2 RESEARCH METHOD

This research employs the constructivism paradigm with a case study approach. The selection of research informants is purposive, but it does not rule out the possibility of adding new informants in the field determined through a snowball approach involving all actors involved in the FLF’s control communication process. Data collection techniques in this study include semi-structured interviews and group discussions.

The research was held in the Gelebak Dalam Village, Rambutan Subdistrict, Banyuasin Regency, Deling Village, Pangkalan Lampam Subdistrict, Ogan Komering Ilir (OKI) Regency, and Jejawi Village, Jejawi Subdistrict, OKI Regency. This research was conducted from February to June 2023. The research employs the interactive components of the data analysis model (Miles et al., 2014), which consists of three main parts in the data analysis process: (1) data condensation, (2) data presentation, and (3) conclusion/verification drawing. Data processing was carried out through coding the data using Nvivo 12 Plus software.
3 RESULT AND DISCUSSION

3.1 PHENOMENA OF FOREST AND LAND FIRES

FLF in the South Sumatra region have been occurring for centuries. The practice of land clearing through slash-and-burn has long been carried out by the community in South Sumatra, as evidenced by regulations regarding burning procedures outlined in the *Oendang-Oendang Simboer Tjahaja (UUSC)*. UUSC is a customary law prevailing in South Sumatra (SumSel) since the 17th century (1629) until 1979 when the customary legal system was abolished in Indonesia. The phenomena of forest and land fires in the South Sumatra Province are illustrated in Figure 2.
In the 1970s, timber logging on the east coast of South Sumatra, particularly in the Air Sugihan area, Ogan Komering Ilir Regency, increased significantly. The local residents in that area used fire for fishing and wood gathering, although there is no recorded data on the extent of the burned land (Baharuddin, 2004).

In the period of 1993-1994, forest fires grew larger, resulting in smoke impact spreading to neighboring countries. During this period, the government's policy to boost income from palm oil exports led to the conversion of forests into palm plantations, with the Department of Forestry issuing conversion permits for 6.7 million hectares in 1997. The haze from forest fires extended to Singapore and Malaysia, prompting the Indonesian President to apologize to ASEAN countries in September 1997. The forest fires were first declared a national disaster that year (KLH and UNDP 1998).

According to data from KLHK in 2023, FLF have been occurring more frequently almost every year since 1998. In the period from 1999 to 2011, forest fires were widespread in Sumatra, Kalimantan, and Papua. In South Sumatra province, forest fires became most extensive from 2012 onwards, recurring annually and reaching their peaks in 2015, 2019, and 2023, with areas of 646,298.8 hectares, 336,798 hectares, and 132,082.86 hectares respectively. FLF incidents in South Sumatra province from 2015 to 2023 mostly occurred along the east
coast in Ogan Komering Ilir Regency (OKI), Banyuasin Regency, and Musi Banyuasin Regency.

Land clearing is the main cause of FLF in South Sumatra Province. The use of fire for land preparation has been a traditional practice among the community due to its speed, simplicity, and cost-effectiveness. The lands cleared by the community are mostly abandoned lands. Those usually consist of swampy areas, referred to by the community as "rawang." Based on in-depth interviews with several informants, rawang is typically peatland located between two highlands. Rawang often comprises peatlands ranging from shallow to deep peat. The method of using slash-and-burn for rawang clearance contributes to smoke-related issues. According to Hein et al. (2022), one of the impacts of peatland fires is the smoke that increases long-term exposure to air pollution for the community.

The indirect cause of FLF is extreme drought, particularly associated with El Niño events. El Niño events have been identified as contributing to the increase in FLF (Kasoar et al., 2023). High sea surface temperature anomalies in the Equatorial Pacific Ocean during El Niño years lead to warm and dry conditions in fire-prone areas globally, resulting in an expansion of burned areas and increased fire emissions (Burton et al., 2020). Nicewonger et al. (2022) further note that the El Niño event in 2015/16 led to a 13% increase in burned areas and emitted carbon in South America, with temperature being a key driver of the increase in burned areas.

Another factor contributing to forest and land fires is unclear land ownership status, land conflicts, and law enforcement issues. According to Resosudarmo et al. (2023), law enforcement is a crucial determinant in preventing forest and land fires. The community perceives law enforcement as being unfair, only individuals conducting small-scale burning being apprehended while companies escape legal consequences.

3.2 STAKEHOLDERS IN FOREST AND LAND FIRE CONTROL

FLF in the South Sumatra Province are a complex phenomenon involving human activities and nature, particularly related to land clearing for various purposes. The massive FLF events in 2015 garnered significant attention from both the central and local governments. The South Sumatra Provincial Government then collaborated with the central and regional governments, the Indonesian Military, the National Police, and received support from various parties, including community leaders, environmental activists, companies, NGOs, and foreign
countries. Efforts to FLF’s control need to consider this complexity by implementing strict regulations, fair law enforcement, effective land conflict resolution, and strengthening communication aspects. A holistic approach covering technical, regulatory, and communicative aspects is key to effectively addressing the FLF issue. The stakeholders involved FLF’s control in three villages are presented in Figure 3.

The actors involved in FLF’s control, starting from 2016 in Gelebak Dalam Village, include military, specifically from the 044 Garuda Dempo Regional Military Command, the village government (Village head), the community, the police, and private entities around the village (Figure 3 (a)). The program implemented in the village is a trial of non-burning land clearing using Bios 44 decomposer from the 044 Gapo Regional Military Command. The trial was conducted in area around the village that were affected by the 2015 FLF. These lands are thin peat swamp areas that frequently catch fire during the dry season.

Figure 3 (b) shows that stakeholder involved in the FLF’s control in Deling Village. The government in term of MoEF, plays a crucial role in firefighting on the ground with trained teams and equipment. The Fire ranger, Manggala Agni is the main actor involved in fire control in the village. The community participates in forest fire control through the Community Fire Care (CFF) and the Farmer Fire Care Group (FFCG). CFC is formed by MoEF, while FFGC is formed by the plantation department. The village head plays a role in coordinating and mobilizing the community at the village level, especially in recruiting members of CFC and FFGC to participate in firefighting. Non-Governmental Organizations (NGOs) provide support through education, community assistance, and policy advocacy. Since the occurrence of forest and land fires in 1997 in Deling Village, efforts to control forest fires have been the main focus for several NGOs operating in the region, including projects from the South Sumatra Forest Fire Management Project (SFFMP) and the United Nations Development Programme (UNDP). This project aims to enhance the capacity of local-level forest fire control by actively involving the community of Deling Village.
Figure 3
Stakeholders involved in forest fire control.

Figure 3 (c) shows the actors involved in FLF’s control efforts in Jejawi Village include the International Tropical Timber Organization (ITTO) in collaboration with the MoEF, government (village head), CFC and FFCG, and the community. The international organization ITTO plays a crucial role in Jejawi Village. Through the project "Capacity Building in Forest and Land Fire Management in Indonesia" ITTO PP–A/56–340–1 from 2021 to 2022. The project provided technical training to the community, increases awareness of FLF dangers, and supports research and development of fire prevention technology through non-burning land clearing demonstration plots (demplots).

3.3 DNA PARTICIPATORY ENVIRONMENTAL COMMUNICATION

The results of the analysis of dialogue and collaboration process data with the DNA framework reveal that there are diversities in their way of thinking on smoke haze, as depicted in Figure 4. It is evident that there is a divergence in perspectives regarding smoke haze. All
parties, including the government, the military, and the village community, acknowledge that smoke poses a health hazard, with only the government considering it as a disaster. The village community perceives smoke as a common occurrence, and although they recognize the danger, it is not a significant issue for them. This diversity may pose a threat to the sustainability of FLF’s control efforts because, basically, the community still relies on fire for land clearing.

Figure 4
The way of thinking stakeholders about smoke haze

Source: The data analyzed by the author using Nvivo 12 Plus

The collaboration process is a process in which there is a dialogue involving the participation of various stakeholders, ultimately leading to jointly agreed-upon decisions. Ansell & Gash (2008) describe the collaborative process as a cycle that includes various stages, such as face-to-face dialogue, building trust, establishing commitment, and sharing understanding.

The differences in DNA at three locations, namely Gelebak Dalam, Jejawi, and Deling, are the main focus in the context of PEC (Diversity, Network, Agency) for forest fire control, as presented in Table 1. Gelebak Dalam Village shows overall better DNA, creating a strong
foundation for relational connections and cross-fertilization. Diversity, encompassing various elements, allows this village to be more responsive to forest fire issues and provide holistic solutions.

Jejawi Village exhibits moderate diversity and network, but its high agency still enables relationships and cross-fertilization. Active community involvement, especially through the Chairman of the CFC, creates strong connectivity in forest fire control efforts. High agency serves as a primary driver for achieving collaboration and problem-solving.

Table 1  
DNA PEC in three villages

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<th>DNA Elements</th>
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<td>Gelebak Dalam</td>
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<td>Relational</td>
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<td>Cross Fertilization</td>
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<td>Problem Solver</td>
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Remark: +++ Good; ++ Moderate; + Poor (Source: based on analysis using NVivo 12 plus)

Deling Village has the lowest DNA, where local wisdom is utilized but with low networks and agencies. Despite possessing valuable traditional knowledge, the lack of involvement and strong relationships makes it challenging for this village to effectively address forest fire issues. The resolution of forest fire problems is hindered by the minimal coordination and active engagement of various parties at the village level. Communication networks are a crucial element in the dialogue and collaboration process for controlling forest fires in rural areas. The networks that occur in rural areas are informal communication networks between the village and external parties. Sajogyo dan Sajogyo (2013) refer to these informal communication networks as traditional communication networks.

Traditional communication networks are considered crucial means of communication to mobilize rural communities as they occur face-to-face, resulting in deep interpersonal relationships. Lubis (2015) adds that traditional communication is heavily influenced by the culture and social structure of the community. Social status is closely related to the communication process. The person delivering the message is often more important than the content of the message itself. Even if the message is important and of high quality, if the messenger is not known, the community will find it difficult to trust, and vice versa. Traditional communication networks are still very effective in disseminating information in rural areas.

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the case of the forest fire control program in this village, the messenger, in this case, the military, is considered more influential than the content of the message. The military is still respected and trusted in the village.

3.4 DIALOGUE AND COLLABORATION PROCESS

Dialogue is a crucial first step in the planning of FLF’s control projects, aiming to identify the problem and needs. It fosters trust and agency. The initial important step in finding effective solutions is understanding the aspirations of the community, which is useful in recognizing the diversity of their understanding and capacity (agency) (Harris, 2021).

In the village of Gelebak Dalam, dialogue begins with the close relationship between the village head and the military commander (Danramil). They frequently interact and discuss various matters, including solutions to open unproductive land without using fire, which is prohibited by the government. This interconnectedness and partnership represent a relational aspect involving networks and agency among individuals based on mutual understanding and trust (Harris, 2019).

Figure 5
The process of dialogue and collaboration in Gelebak Dalam Village

Collaboration is facilitated through face-to-face interactions, where direct meetings among the actors take place (Figure 5). Through face-to-face dialogue, a shared space is created...
for the exchange of information. This direct communication serves as a means to establish commitment and trust in the collaborative process, focusing on shared understanding among the actors. A dialogical approach is prioritized at each stage, from problem identification to the determination of common agreements. Dialogical communication between the village head and the military allows for the exchange of ideas, perspectives, knowledge, and different experiences. Interpersonal communication between the village head and the military officials is a form of interpersonal communication. Interpersonal communication plays a crucial role in building closeness among individuals (DeVito, 2016)

Within the framework of the DNA PEC, this is referred to as cross-fertilization between diversity and network. This process will encourage mutual understanding. Mutual understanding will enhance the potential for cooperation and collaboration in addressing forest fire issues. The village community faces the challenge of the prohibition of burning, while the government is responsible for resolving it by providing alternative solutions.

The dialog and collaboration process in controlling forest fires in Deling Village face significant challenges, primarily due to low agency among the village residents (Figure 6). This condition creates a gap in understanding and community involvement in the risks of forest fires. Additionally, the lack of openness from the Village Head, who is closed-off and has limited communication networks, further complicates the dialog process. The community, including the village head, tends to underestimate the impact of smoke, considering it as something ordinary, which hinders awareness of the seriousness of the forest fire threat.
Figure 6

The process of dialogue and collaboration in Deling Village

![Diagram showing the process of dialogue and collaboration in Deling Village](image)

Source: The data analyzed by the author using Nvivo 12 Plus

The process of dialogue and collaboration in forest fire control in Jejawi Village reflects a diverse journey, with several prominent dynamics as seen in Figure 7. Despite the community's culture decay, the tradition of fire usage persists to this day. The agency of the village community tends to be low, requiring a change agent capable of motivating behavioral changes. In this context, the role of the Chairperson of the Community Fire Care (CFC) as a change agent becomes crucial.
Aspects of recognizing local culture related to the use of fire in land preparation involve continuous shared understanding. Land-based dialogue becomes a crucial point in the collaborative fire control management strategy. Recognition of local culture involving the use of fire in land preparation is a key element. This requires a profound understanding of traditional practices that have become an integral part of the local community's life. Incorporating local cultural values into collaborative strategies can lead to more sustainable policies that align with the local context, reduce potential conflicts, and strengthen community involvement.

Continuous mutual understanding is an essential principle in the context of fire control. Ongoing changes in the environment and societal dynamics necessitate continuous adjustments in collaboration. Sustained mutual understanding processes enable adaptation to changing conditions, strengthen collaboration, and minimize the potential for disagreement.

Land-based dialogue is a highly relevant aspect in the context of fire control. Land Use Dialogue (LUD) is a dialogical process supporting multi-stakeholder decision-making on key socio-environmental issues at the landscape level (The Forests Dialogue, 2020). Involving stakeholders such as farmers, landowners, and local community groups in LUD to discuss and formulate policies acceptable to all parties can sustain fire control efforts. LUD requires a focus on a deep understanding of farming practices, land governance, and joint efforts in fire prevention.
4 CONCLUSION

The diversity of characteristics and challenges faced by the three villages, Gelebak Dalam, Jejawi, and Deling, indicates the need for contextual dialogue and collaboration, respecting local wisdom and involving community participation. The DNA of participatory environmental communication reflects its crucial role in forest fire control in these three villages. Gelebak Dalam has a strong DNA, especially in diversity and networks, facilitating smooth dialogue and collaboration processes. Jejawi has a less extensive network, but high diversity and agency remain key drivers for effective dialogue and collaboration. Deling exhibits good diversity, but its low network and agency make it challenging to achieve optimal collaboration.

The implementation of this DNA approach shows that recognizing diversity and enhancing networks and agency at the village level are essential to achieving effective dialogue and collaboration in forest fire control. Strengthening communication networks is necessary to increase active community involvement in forest fire control efforts. Further in-depth research is needed to understand how the private sector engages in dialogue and collaboration with communities in the context of FLF’s control.
REFERENCES


