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Community Participation in Land and Forest Fire Prevention and Mitigation in Indonesia: A Systematic Literature Review

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Abstract

Community participation plays a central role in the prevention and mitigation of forest and land fires in Indonesia. However, the level of participation varies and is influenced by various factors based on local socio-economic and regional conditions. This study uses the *Systematic Literature Review* (SLR) method to examine how community participation influences the effectiveness of forest and land fire prevention and mitigation strategies, as well as identify challenges that hinder it and efforts to overcome them. Of the 328 articles found, 15 were analyzed in depth after going through a selection and quality assessment process. The results showed that community participation has a significant influence on the effectiveness of land and forest fire prevention and mitigation, with a positive correlation to a decrease in fire incidents in some areas with active participation. However, there were challenges that hindered participation, both internal and external factors. Internal factors include low motivation, limited human and financial resources, and minimal facilities and infrastructure. Meanwhile, external factors include lack of training, coaching, data integration, and lack of support from the government. To overcome these challenges, a comprehensive strategy is needed, including capacity building, community empowerment, and strong support and collaboration from the government and related agencies.

1. Introduction

Forest and land fires (Karhutla) have long been a serious problem for Indonesia, leaving a trail of severe ecological damage, massive economic losses, and widespread public health impacts and deteriorating the nation's image in international eyes (Tacconi et al., 2018). The phenomenon of forest and land fires in Indonesia is often triggered by anthropogenic activities, such as land clearing by burning, which are exacerbated by extreme climatic conditions that trigger long droughts (Gaveau et al., 2014). Historical data shows that millions of hectares of forest and land have been destroyed by fire in the last two decades, contributing significant carbon emissions and transboundary haze that harm not only Indonesia but also neighboring countries (World Bank, 2016).

The success of forest and land fire control is supported by three main pillars: First, Collaboration and coordination across sectors, between the center and the regions, as well as between agencies such as BMKG, BNPB, TNI, and Polri. Second, effective law enforcement with a deterrent effect on perpetrators of forest and land burning. Third, community participation, including indigenous peoples, students, NGOs, and businesses, is encouraged to participate in prevention and mitigation efforts (kehutanan.go.id, 2025). However, a comprehensive understanding of the specific mechanisms and impacts of community participation on the effectiveness of forest and land fire prevention and mitigation strategies across different geographical and social contexts in Indonesia still requires further exploration. Persistent challenges that hinder community participation also need to be identified and critically analyzed to formulate more adaptive and sustainable solutions.

This research employs a systematic literature review (SLR) approach that collects, classifies, and analyzes research data sources from various empirical studies across multiple regions in Indonesia. This provides a comprehensive picture of the influence of community participation on the effectiveness of land and forest fire prevention and mitigation strategies in Indonesia, and the challenges that hinder community participation, and how these challenges can be overcome. This research enables the identification of general and specific patterns in community participation that have not been previously revealed. The research problems addressed in this article include two main aspects: how community participation affects the effectiveness of land and forest fire prevention and mitigation strategies in Indonesia, what challenges hinder community participation in land and forest fire prevention and mitigation in Indonesia, and how these challenges can be overcome. This study is expected to make a substantial contribution to the literature by synthesizing empirical findings on the role of community participation, as well as identifying critical areas for future policy interventions and research. A better understanding of the dynamics of community participation will be valuable for policymakers, practitioners, and local communities in designing and implementing more effective and sustainable forest and land fire prevention programs.

2. Method

This research employs the Systematic Literature Review (SLR) approach as its primary method. This approach aims to identify, analyze, evaluate, and interpret various relevant research results in a particular field of study that has interesting phenomena, and answer the research questions that have been formulated. Through the SLR method, the process of reviewing journal articles is carried out in a systematic and structured manner, following predetermined protocols or stages. The findings of this study indicate that the structured method is the most widely used approach in the development of information systems (Shaffril, et.al). This research is divided into four stages: data search strategy, determining inclusion and exclusion criteria, article selection process, and data extraction, followed by data synthesis and analysis. The following is an explanation of each of these stages.

2.1. Data Search Strategy

Pencarian literatur dilakukan pada basis data Google Scholar menggunakan *software publish or perish*. Sumber data tersebut dipilih karena merupakan sumber data yang relevan dalam memberikan akses jurnal ilmiah pada lokasi penelitian di Indonesia dengan ragam topik penelitian luas dan memungkinkan dalam pencarian kata kunci secara spesifik. Kombinasi kata kunci berikut digunakan dalam Bahasa Indonesia memaksimalkan cakupan: ("partisipasi masyarakat" OR "keterlibatan komunitas") AND ("pencegahan kebakaran hutan" OR "mitigasi kebakaran hutan" OR "pengendalian kebakaran") AND ("kebakaran lahan" OR "kebakaran gambut") AND "Indonesia". Filter publikasi dibatasi pada artikel jurnal, prosiding konferensi, dan laporan penelitian. Dalam pencarian dari kombinasi kata kunci tersebut didapatkan hasil pencarian sejumlah 328 article.

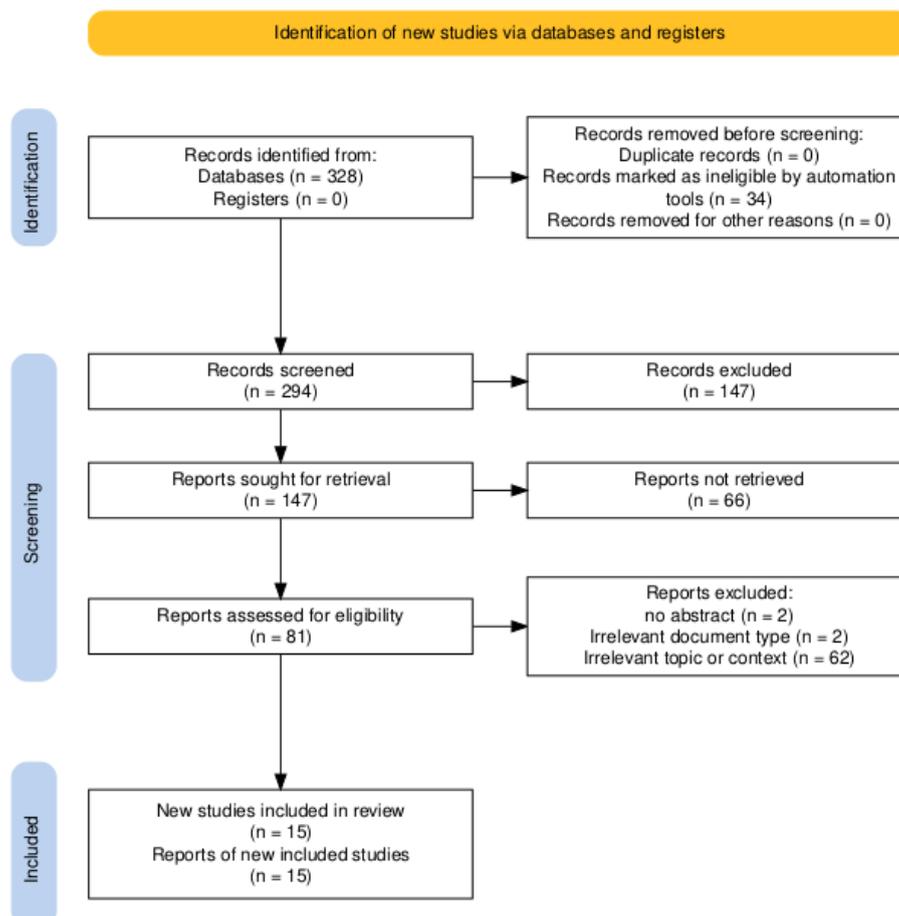### 2.2. Inclusion and Exclusion Criteria

From a total of 328 articles that have been obtained, filter the publication of journal articles, conference proceedings, and research reports published in the last 10 years, namely between 2015 and 2025, to ensure the relevance and actuality of the findings. The results obtained from the filter are 294 articles. The classification

process was then carried out based on criteria relevant to the research topic and objectives. Articles were included if they met the following criteria: (1) focused on community participation in the context of forest and land fire prevention or mitigation in Indonesia; (2) presented empirical findings or conceptual analysis relevant to the research question; (3) were available in full-text format; Articles were excluded if: (1) did not specifically address community participation; (2) focused on emergency fire response without clear prevention/mitigation aspects; (3) were opinions, editorials, or book reviews without original data. The criteria for relevance to the research topic were limited to articles that addressed the topic of community participation in the prevention and mitigation of land and forest fires in Indonesia and were able to answer the following research question:

1. How does community participation affect the effectiveness of land and forest fire prevention and mitigation strategies in Indonesia?
2. What challenges hinder effective community participation in land and forest fire prevention and mitigation in Indonesia, and how can these challenges be overcome?

2.3. Article Selection and Data Extraction Process

The selection process was conducted in two stages. First, the titles and abstracts of all articles found through the initial search were screened to identify potentially relevant studies. Articles that passed this stage were then downloaded and read in full text for final eligibility assessment based on inclusion and exclusion criteria. Reasons for exclusion were recorded to ensure transparency. Relevant data from each included article was systematically extracted and recorded in a summary table. The extracted information included: title, authors, year of publication, methodology, research objectives, and key findings identified by the authors of the original study. To support a systematic and structured review process, this study used the PRISMA (*Preferred Reporting Items for Systematic Reviews and Meta-Analyses*) approach as recommended by Johnson and Hennesy (2019). PRISMA is a reporting guide designed to ensure that the review and meta-analysis process is presented in a clear, transparent and thorough manner (Robert Prill et al., 2021). The PRISMA methodological framework was used in this study to systematically assess the quality of data sources, as shown in the following figure

Source: (Johnson and Hennesy, 2019).
Figure 1. PRISMA Methodology Diagram

From the total number of articles that have been subjected to study selection and quality assessment, a total of 15 articles have been accepted as data sources used in this study.
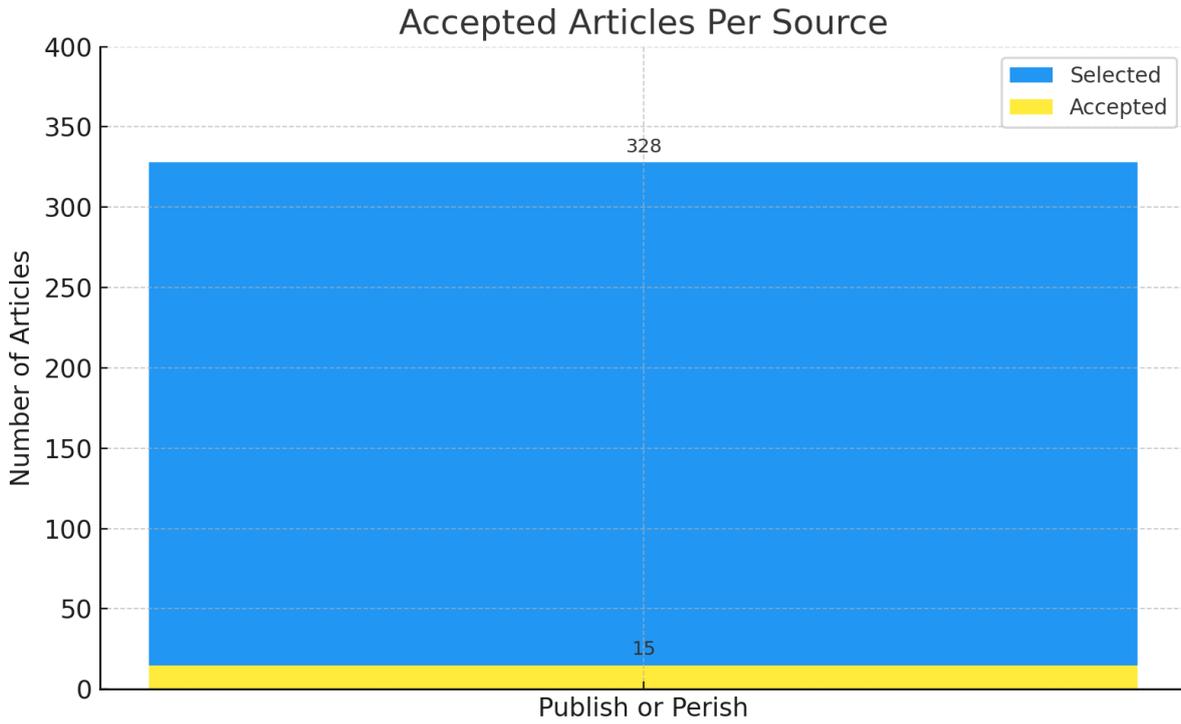
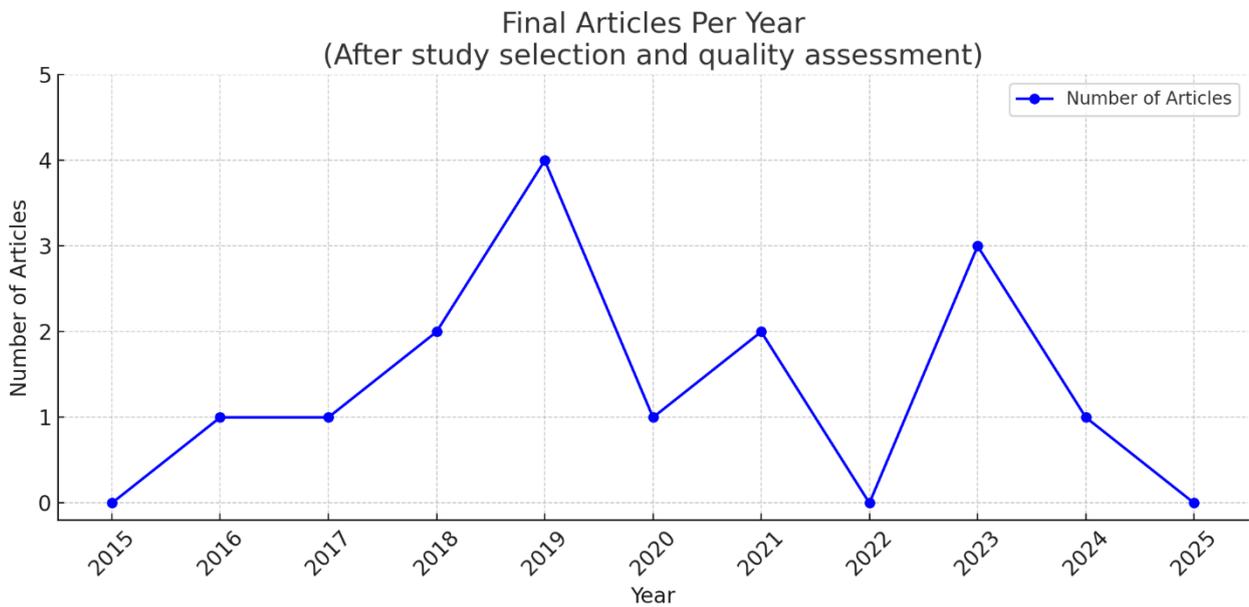Figure 1. Number of Articles that Meet the Criteria

Figure 2. Distribution of Research Years

2.4. Sintesis dan Analisis Data

The extracted data was synthesized through a qualitative thematic and descriptive approach. Key findings were grouped based on their relevance to the research questions. Descriptive analysis was used to identify patterns, trends, successes and barriers reported in the literature. Research gaps identified in each study were aggregated to provide insight into future research directions.

3. Result

Analysis of the available literature revealed key findings on how community participation affects the effectiveness of land and forest fire (Karhutla) prevention and mitigation strategies in Indonesia, as well as the challenges that hinder such participation and efforts to overcome them.

Table. 1: Articles analyzed

Research Title (Author and Year)	Methodology	Research Objective	Main Findings
Partisipasi Masyarakat Dalam Penanggulangan Bencana Kebakaran Hutan Dan Lahan Gambut Di Kota Palangka Raya Provinsi Kalimantan Tengah (Wiyono, N. D. P., & Kusuma, F. K. 2024)**.**	Descriptive qualitative; interview, observation, documentation	Analyzing the forms, obstacles, and efforts of community participation in forest and land fire prevention.	Participation through organizations (Kaltana, MPA, BPK), socialization, and fire-fighting actions. Barriers: minimal socialization, limited access to information, and financial condition. Efforts: training, incentives, "door to door" socialization, and online media.
Partisipasi Masyarakat dalam Mendukung Kebijakan Pengendalian Kebakaran Hutan dan Lahan di Kabupaten Rokan Hilir (2019-2020) (Asra Junanda dkk., 2023)	Descriptive qualitative research; Interview, documentation.	Knowing community participation in supporting the forest and land fire control policy in Rokan Hilir Regency.	Community participation has an impact on reducing the number of fires in Rokan Hilir District, in line with government regulations.
Analisis Tingkat Pengetahuan dan Partisipasi Masyarakat dalam Pencegahan dan Pengendalian Kebakaran Lahan Gambut di Taman Hutan Raya Orang Kayo Hitam (Windra Setiawan Pohan dkk., 2023)	Mixed method (quantitative & qualitative); In-depth interviews, descriptive analysis, cross tabulation, Spearman Rank correlation, independent t-test.	Identifying participation, analyzing the level of knowledge and participation, analyzing the relationship between knowledge and participation.	The level of participation in Seponjen village (partnership level) is higher than Sungai Aur village (manipulation level). Knowledge and participation were higher in Seponjen, with a strong correlation between knowledge and participation.
Evaluasi Kinerja Masyarakat Peduli Api dalam Pengendalian Karhutla di Desa Bontomanurung Maros (Rizka Maullaydia Kusuma Dewi dkk. 2023)	Descriptive qualitative research; Interview, field observation, documentation; Census and *purposive sampling*.	Knowing the performance of MPA groups and the factors inhibiting their role in controlling forest and land fires.	Karhutla control efforts by MPA groups have not been optimal. Inhibiting factors: internal (weak structure, lack of members, minimal infrastructure) and external (lack of training/coaching, unintegrated member data, lack of government support).
Partisipasi Masyarakat Peduli Api Desa Kesuma dalam Penanggulangan	Exploratory qualitative	Knowing the role of community fire care	Community participation in Kesuma Village is

Bencana Kebakaran Hutan dan Lahan (Arif Hermanto dkk., 2021)	research; Observation, interviews, literature review, documents; Data triangulation.	and the challenge factors in overcoming forest and land fires.	effective, as evidenced by the decrease in forest fire cases. Constraints: motivation, human resources, financial resources, infrastructure.
Peran Masyarakat dalam Pengendalian Kebakaran Hutan di BKPH Slarang KPH Pemalang (BH Saharjo dkk., 2021)	Interview with questionnaire; *Snowball sampling*.	Analyzing causal factors, control efforts, and community participation in forest fire control.	Highest fire frequency in 2015. High community participation in prevention and suppression. Human factors (cigarette butts, hunting, intentional burning) as causes.
Strategi Mitigasi Kebakaran Hutan Dan Lahan Melalui Pemberdayaan Masyarakat Di Sungai Pakning Kabupaten Bengkalis Provinsi Riau (Siti Hazar Sitorus dkk., 2020)	Descriptive qualitative methodology; Field research, FORKOMPA formation, hydrant innovation, reservoir construction, utilization of vacant land.	Documents community-led forest and land fire mitigation strategies, explores the role of empowerment, and describes the implementation of specific strategies.	Annual forest and land fires in Riau are caused by peatlands and lack of community understanding. The Sungai Pakning community has implemented mitigation strategies such as FORKOMPA, hydrant innovation, reservoirs, utilization of vacant land.
Partisipasi Masyarakat dalam Penanggulangan Kebakaran Hutan dan Lahan di Desa Limbung Kecamatan Sungai Raya Kabupaten Kubu Raya (Rizha Melgivari dkk., 2019)	Survey method with interviews; Descriptive analysis and Kendall Tau correlation; Slovin formula, *purposive sampling*.	Determined the relationship of community participation with the level of cosmopolitan, knowledge, and dependence on land.	Community participation in Limbung Village is classified as low according to Arnstein's theory. There was no significant difference in participation based on the level of knowledge, cosmopolitanism, or land dependency.
Partisipasi Masyarakat Dalam Pencegahan Dan Pengendalian Kebakaran Lahan Gambut Di Hutan Lindung Gambut (HLG) Londerang Provinsi Jambi (Z. Zainuddin dkk., 2019)	Mixed method (quantitative & qualitative); *purposive sampling*, in-depth interviews, descriptive analysis, cross tabulation, Spearman Rank correlation, independent t-test.	Analyzed the level of community participation and examined the relationship between knowledge and participation in fire prevention and suppression.	The level of community participation in Rawasari village (partnership) was higher than Manis Mato village (information conveyer). Knowledge and participation were higher in Rawasari. Very strong correlation between knowledge and community participation.

Peran Serta Masyarakat Kelurahan Karang Balikpapan Utara Dalam Usaha-Usaha Pencegahan Kebakaran Hutan dan Lahan (Ismail Bakrie dkk., 2019)	Survey method with *purposive sampling* (50 respondents); direct interview, structured questionnaire.	To determine the community's attitude towards land burning, the causes of fires according to the community's perception, and the community's response to the government's efforts to involve them in prevention.	Community-based fire prevention systems are traditionally implemented. Prevention strategies include improved education, minimization of shifting cultivation, and self-funding. Alternative designs for developing suppression systems involve technical measures, integrated farming, participatory, joint ventures, and mentoring.
Partisipasi Masyarakat dalam Mencegah Kebakaran Hutan dan Lahan di Desa Rasau Jaya II Kabupaten Kubu Raya (Nopita Rahmah Nigrum dkk., 2019)	Survey method with questionnaires and interviews; *Purposive random sampling* (116 respondents); Kendall Tau correlation non-parametric statistical test.	Analyze community participation and factors associated with participation in forest and land fire prevention.	Community participation is at a moderate level, influenced by knowledge and understanding. Participation is categorized as "therapeutic" (Arnstein). There is a significant positive correlation between community participation and knowledge level.
Peran Kelompoktani dan Masyarakat Peduli Api (MPA) dalam Mengelola dan Mencegah Kebakaran Lahan di Kecamatan Bukit Batu Kabupaten Bengkalis (W. Saputra dkk., 2018)	Census Method; *Purposive Sampling*; Descriptive Analysis; Likert Scale; Qualitative Descriptive Method; Quantitative Analysis.	Determine the causes of forest fires, analyze the role of farmer groups, and analyze the role of fire conservation communities in forest fire prevention.	Land fires are caused by biophysical, economic, and socio-cultural factors. Farmer groups play an important role in managing and preventing. MPA plays an important role in prevention through information dissemination, socialization, and community meetings.
Mitigasi Bencana Kebakaran Lahan Gambut dan Pemberdayaan Masyarakat Melalui Metode Restorasi (Aulia Rahman dkk., 2018)	Literature review of peatland restoration research	Describes the link between restoration methods and peatland fire mitigation and how restoration methods can empower local communities.	The study examines the relationship between restoration methods and peatland fire mitigation. Community empowerment is crucial in forest fire prevention and a key component of the restoration process.
Pengendalian Kebakaran Hutan Oleh Masyarakat Peduli Api (MPA) di Taman Nasional Gunung Ciremai (Nurul Fadillah dkk., 2017)	Questionnaire, observation, interview.	Describes perceptions and participation of MPA towards forest fire control in TNGC, as	MPA views the dry season and community activities involving fire as significant factors. There is a gap between perception and

	well as the implementation of MPA policies.		participation. Economic factors strongly influence participation, hampering the effectiveness of forest and land fire control.
Partisipasi Masyarakat dalam Pencegahan Kebakaran Lahan Gambut di Kabupaten Mempawah, Provinsi Kalimantan Barat (Siti Sawerah dkk., 2016)	Field research; Census (95 individuals); Descriptive and inferential statistics, Spearman Rank correlation.	Analyzed the level of community participation and identified internal and external factors associated with participation.	The level of community participation is very low. External factors (role of extension workers and social support) were significantly associated. Internal factors (education and income) are positively correlated with participation.

3.1. The Effect of Community Participation on the Effectiveness of Land and Forest Fire Prevention and Mitigation in Indonesia

Community participation shows a varied but often significant influence on the effectiveness of forest and land fire prevention and mitigation strategies. In some cases, community involvement is positively correlated with reduced fire incidence. For example, in Rokan Hilir District, community participation in supporting the Karhutla control policy has contributed to a decrease in the number of land and forest fires between 2019-2020 (Junanda et al., 2023). Similarly, in Kesuma Village, the active participation of the Fire Care Community (Masyarakat Peduli Api, MPA) has proven to be effective in tackling land and forest fires, as shown by a significant decrease in forest fire cases from 21 cases in 2019 to 5 cases in 2020 (Hermanto et al., 2021).

Another study highlighted the important role of farmer groups and Masyarakat Peduli Api (MPA) in land fire management and prevention. In Bukit Batu District, Bengkalis Regency, MPA plays a role in information dissemination, socialization and community meetings for fire prevention, while farmer groups adopt alternative land management practices (Saputra et al., 2018). In addition, peatland restoration involving community empowerment was identified as a crucial method of peat fire mitigation in Indonesia, emphasizing the central role of community empowerment in the restoration process (Rahman et al., 2018). Community participation was also reported to be high in forest fire prevention and suppression activities in the BKPH Slarang area, KPH Pemalang, Central Java (Saharjo et al., 2021).

However, the level of community participation is not uniform across regions. Some studies indicate low levels of participation, such as in peatland fire prevention in Mempawah District (Sawerah et al., 2016) and forest and land fire management in Limbung Village (Melgivari et al., 2019). In contrast, other studies show moderate (Nigrum et al., 2019) to high levels of participation (Saharjo et al., 2021). This variation was also seen between villages, where participation in Rawasari Village reached the partnership level, while in Manis Mato Village it was only at the level of conveying information (Zainuddin et al., 2019). In addition, there is a gap between positive perceptions of fire management and actual levels of participation; strong perceptions do not necessarily guarantee high participation (Fadillah et al., 2017).

3.2. Challenges that hinder community participation and efforts to overcome them

Identifying the factors that influence community participation is a crucial step in designing effective interventions. These factors can be categorized into internal (relating to community characteristics) and external (relating to the environment or external support).

3.2.1. Internal Factors Hindering Community Participation

Low motivation, limited human resources, and financial resource constraints are significant challenges faced by MPA in fire management in Kesuma Village (Hermanto et al., 2021). In Bontomanurung Village, MPA performance has not been optimal due to internal factors such as weak organizational structure, insufficient number of group members, and lack of fire control infrastructure (Dewi et al., 2023). In addition, the gap between perceived and actual participation in MPA in Mount Ciremai National Park shows that economic factors strongly influence participation (Fadillah et al., 2017). The community's lack of understanding of traditional practices is also a cause of peatland fires in Riau (Sitorus & Hidayat, 2020).

3.2.2. External factors inhibiting community participation

Inadequate external support is also a barrier. Lack of training and coaching for MPA groups, unintegrated data on group members, and lack of support from the village government and related agencies were found to hinder the optimal performance of MPA in Bontomanurung Village (Dewi et al., 2023). In addition, community participation in Limbung Village is not significantly related to the level of land dependency (Melgivari et al., 2019). The community in Karang Balikpapan Utara Village, despite having implemented a traditional prevention system, still requires capacity building and assistance from external parties (Bakrie et al., 2019).

3.2.3. Overcoming the Challenges of Community Participation

The literature suggests several approaches to improve community participation:
1. Capacity and Knowledge Building
    Education and income are positively correlated with participation, suggesting that increasing community education levels can increase participation (Sawerah et al., 2016). Understanding of the functions and benefits of prevention also affects community participation (Nigrum et al., 2019).
2. Empowerment and Local Innovation
    Mitigation strategies can be carried out through community empowerment, including the establishment of communication forums (FORKOMPA) and the improvement of innovations such as hydrant wells and water reservoirs (Sitorus & Hidayat, 2020). Utilization of vacant land for pineapple cultivation and peat arboretum are also community-based mitigation strategies (Sitorus & Hidayat, 2020).
3. External Support and Collaboration
    The role of extension workers and social support from community leaders, groups, media, and government are significantly related to community participation (Sawerah et al., 2016). The government and related agencies need to provide training and coaching as well as more integrated support to MPA groups (Dewi et al., 2023). The establishment of joint ventures and intensive mentoring are also recommended for the development of community-based forest fire suppression systems (Bakrie et al., 2019). Forms of participation found in Palangka Raya include the formation of community organizations such as Kaltana, MPA, and BPK, as well as involvement in socialization and suppression, which can be improved through training, coordination, providing incentives, *door to door* socialization, and utilizing online media (Wiyono & Kusuma, 2024). Forms of participation found in Palangka Raya include the formation of community organizations such as Kaltana, MPA, and BPK, as well as involvement in socialization and extinguishing, which can be improved through training, coordination, providing incentives, *door to door* socialization, and utilizing online media (Wiyono & Kusuma, 2024).

4. Discussion

The findings from this literature review strongly suggest that community participation is a critical component in the effectiveness of forest and land fire prevention and mitigation strategies in Indonesia. Empirical data from various locations confirms that when communities are actively involved, both in supporting policies (Junanda et al., 2023) and in field operations (Hermanto et al., 2021; Saputra et al., 2018; Saharjo et al., 2021), fire incidents tend to decrease or are better managed. This underscores the position of communities not only as beneficiaries of the program, but as key actors who empower themselves and their communities to overcome the challenges of forest and land fires. Community-based approaches, including peat restoration through empowerment (Rahman et al., 2018) and local initiatives such as FORKOMPA and hydrant innovations (Sitorus & Hidayat, 2020), reflect the recognition of local knowledge and community capacity in designing contextually relevant solutions.

However, critical analysis reveals that the varying levels of community participation across locations (Sawerah et al., 2016; Melgivari et al., 2019; Nigrum et al., 2019; Saharjo et al., 2021) are an indicator of complex barriers. Internal factors such as lack of motivation, limited human and financial resources, and inadequate infrastructure fundamentally limit the capacity of communities to engage optimally (Hermanto et al., 2021; Dewi et al., 2023). The gap between positive perceptions of the importance of prevention and actual participation (Fadillah et al., 2017) suggests psychological or structural barriers. People may be aware of the risks and the importance of action, but practical barriers or lack of adequate incentives may prevent them from moving beyond passive awareness.

External factors also play a crucial role in shaping the dynamics of participation. The lack of structured support from the government and relevant agencies, including training, coaching and data integration of MPA members, significantly weakens the effectiveness of these community groups (Dewi et al., 2023). Although communities already have traditional practices of prevention, the lack of capacity building and professional mentoring may limit their effectiveness in the modern era (Bakrie et al., 2019). Low levels of community awareness, despite existing participation structures, are also barriers that need to be overcome (Wiyono & Kusuma, 2024).

To address these challenges, future strategies must be multisectoral and adaptive. Improved education and outreach is fundamental to building a deeper understanding of the risks and benefits of prevention (Sawerah et al., 2016; Nigrum et al., 2019). Real empowerment, not just instruction, through initiatives such as self-funding and

developing local mitigation infrastructure (Sitorus & Hidayat, 2020; Bakrie et al., 2019), can create sustainable incentives and capacity. Most importantly, external support should be designed to reinforce, not replace, local initiatives. This includes the active role of extension agents, comprehensive social support from various parties, and government policies that explicitly support and empower community participation (Sawerah et al., 2016). In addition, efforts to increase participation should include training, coordination, incentives, door-to-door socialization, and the use of online media (Wiyono & Kusuma, 2024).

Substantively, a paradigm shift is needed from a "top-down" approach that focuses on control, to a "bottom-up" approach that empowers. This means recognizing communities as strategic partners with unique knowledge and capacities. However, there needs to be more rigorous evaluation of how different interventions affect the level and quality of participation, as well as their impact on long-term Karhutla outcomes.

5. Research Limitations and Future Research Directions
5.1. Research Limitations

This systematic literature review has several limitations:
1. Although all articles addressed community participation, the varied research methodologies (qualitative, quantitative, mixed) may make direct comparison and generalization of findings difficult.
2. Some articles identify barriers, but not all provide an in-depth analysis of the mechanisms by which these factors interact or how to address each challenge specifically.
3. The levels and forms of community participation described in the articles vary (active, passive, partnerships, informers), which can make standardization in the interpretation of effectiveness difficult.

5.2. Future Research Directions

Based on these findings and limitations, future research directions may include:
1. Conducting long-term intervention studies to evaluate the effectiveness of specific community empowerment programs or forest and land fire prevention strategies involving active community participation, with more standardized impact measurements.
2. Further research could explore in greater depth how socio-economic (e.g. poverty levels, access to alternative resources) and cultural (e.g. traditional beliefs, social structures) factors specifically influence the level and quality of community participation.
3. Develop and test models of community participation that are more inclusive and adaptive to different local contexts, taking into account the diversity of communities and specific challenges in each region.
4. Explore how modern technologies (e.g. mobile apps, social media, geographic information systems) can be utilized to enhance community participation in monitoring, reporting and preventing forest and land fires.
5. Conduct research focused on evaluating existing policies and developing evidence-based policy recommendations to enhance community participation, including supportive legal frameworks and incentives.
6. Conduct a comparative study between areas with high and low levels of community participation to identify best practices and drivers of success.
7. Conduct more in-depth qualitative research to understand the motivations behind community participation or lack of participation, including risk perceptions, trust in government, and local power dynamics.
8. Evaluate the effectiveness of training and coaching programs for MPA groups and the general public, and identify the most relevant and effective training modules.

Conclusion

Community participation has a significant influence on the effectiveness of land and forest fire prevention and mitigation strategies in Indonesia, as evidenced by the reduction in fire cases in areas with high community engagement. However, this level of participation varies and is faced with various barriers, both internal and external. Internal factors include low motivation, limited human and financial resources, lack of infrastructure, and a gap between perceived and actual participation. Meanwhile, external factors include a lack of training and coaching, unintegrated data on group members, and inadequate support from the village government and related agencies. To increase effective community participation, these challenges must be addressed through a comprehensive and strategic approach. This includes capacity building and community empowerment through education, training, provision of resources, and development of innovative mitigation practices. In addition, strong support and collaboration from the government and relevant agencies is essential to ensure the sustainability of community participatory efforts in forest and land fire prevention and mitigation in Indonesia.

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Conflict of Interest

The authors confirm that there is no conflict of interest related to the publication of this scientific article.

Author Contributions

This research was written by Amir Syamsuadi as the main author, and other colleagues participated in assisting the collection and processing of data for this scientific article.

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