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Review

EFFORTS TO ENHANCE PREPAREDNESS FOR FOREST AND LAND FIRE DISASTERS

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ABSTRACT

Efforts to Enhance Preparedness for Forest and Land Fire Disasters. *Forest and land fires (karhutla) represent a global issue with serious impacts on the environmennt, economy, and public health, particularly in developing countries such as indonesia. In Indonesia, forest and land fires predominantly occur in peatland areas due to climate change, land-clearing practices, adn natural factors such as the El Niño phenomenon. The research employed a Systematic Literature Review (SLR) method following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework, encompassing the stages of identification, screening, eligibility assessment, and analysis. The literature search and selection process resulted in 10 Indonesian-language scholarly articles published between 2014 and 2024 that were relevant to forest and land fire preparedness. The findings of the SLR indicate four primary strategies for improving preparedness: (1) education through disaster awareness programs and disaster literacy, (2) disaster simulations to enhance rapid response capabilities, (3) optimization of the role of task forces in preventive actions, and (4) technological innovations such as monitoring applications, weather modification, and business intelligence–based dashboards. Community-based approaches and policy support were also found to be effective, although challenges related to resource limitations and inter-institutional coordination remain. In conclusion, these findings emphasize that enhancing preparedness for forest and land fire disasters requires an integrated approach involving multi-stakeholder collaboration, sustained policy support, and the strengthening of community and institutional capacities.*

INTRODUCTION

Recently, forest fires have increasingly attracted international attention as both environmental and economic issues worldwide[7,26]. At the beginning of 2025, a notable event occurred when a forest fire in Los Angeles (LA), California, United States, captured international media coverage. The fire started on Tuesday, January 7, 2025, and expanded by Thursday, January 9, 2025, local U.S. time. The affected area reached 17,234 hectares, and according to local authorities, there were five fatalities. Beyond the loss of life, the fire also caused economic damages and property losses. According to Tirto.id, forest fires in Los Angeles are a persistent issue, particularly during the summer and fall seasons[7]. [Source:

https://egsa.geo.ugm.ac.id/2025/01/31/tragedi-kebakaran-hutan-los-angeles-tantangan-di-tengah-perubahan-iklim/]

Forest and land fires (karhutla) represent a serious environmental problem in Indonesia, particularly in regions with extensive peatlands that are prone to burning[8]. South Kalimantan is one of the regions with vast peatland areas, making it frequently susceptible to forest fires, whether due to land clearing practices involving fire or extreme climatic conditions[23]. Currently, karhutla in Indonesia can be considered both a regional and global disaster because its impacts extend to neighboring countries, and the combustion gases emitted (such as CO_2) contribute to global warming. Forest and land fires in Indonesia occur not only on dry lands but also on wetlands, including peatlands, especially during the dry season when these wet areas experience drought. Large-scale peatland clearing through canal or ditch construction has further increased the risk of fires during the dry season[8].

Forest and land fires are caused by two main factors: natural factors and uncontrolled human activities. Natural factors include the influence of El Niño, which can lead to prolonged droughts and dry vegetation. Recently, forest and land fires (karhutla) have increasingly disrupted social and economic life. Environmental pollution is inevitable and has even affected political relations with neighboring countries[1,30].

Mitigation efforts for forest fires and environmental management require an integrated approach involving prevention, risk management, and rehabilitation. Early prevention can be implemented through public education to raise awareness of fire hazards and by limiting high-risk activities in fire-prone areas, especially during the dry season. Technologies such as satellites, drones, and real-time sensors can be utilized to monitor vegetation conditions and detect fire hotspots at an early stage[2]. In addition, vegetation management should involve clearing dry shrubs and creating buffer zones composed of vacant land or fire-resistant plants. Strengthening infrastructure is also crucial, including providing evacuation routes, sufficient water sources, and enhancing firefighting capacity.

In the long term, environmental management can be achieved by preserving forest ecosystems, rehabilitating degraded lands, and afforesting with drought-resistant plants. Strict environmental policies and incentives for community participation in forest conservation form an essential foundation for sustainably preventing forest fires. All of these efforts must be supported by research and innovation to develop more effective solutions for tackling forest fires while maintaining environmental balance. Although numerous studies have addressed forest and land fires in Indonesia, most remain partial, focusing on specific regions or approaches[3]. To date, few studies have systematically synthesized various strategies to enhance preparedness for forest and land fire disasters. Therefore, a Systematic Literature Review is necessary to identify patterns, dominant approaches, and challenges in improving karhutla preparedness, which can provide a scientific basis for policy development and disaster management practices in Indonesia.

MATERIALS AND RESEARCH METHODS

The methodology employed in this study is a Systematic Literature Review (SLR) using the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) method, consisting of four stages: identification, screening, eligibility, and inclusion of final results. The identification stage was conducted by searching scientific articles in electronic databases online, specifically Google Scholar (https://scholar.google.com/), using the keywords “forest and land fires” and “disaster preparedness.” During the screening stage, articles were selected based on their titles and abstracts. Subsequently, the eligibility stage involved assessing the suitability of articles according to predefined inclusion and exclusion criteria. Articles that met these criteria were then thematically analyzed to answer the research questions.

The SLR method was chosen because it allows the integration and synthesis of literature in a systematic, transparent, and replicable manner. Through SLR, this study aims to identify, evaluate, and synthesize relevant literature, as well as to explore the effectiveness of community-based forest and land fire risk management.
The PRISMA-based systematic literature review was conducted using data obtained from Scopus and ScienceDirect. The data were subsequently evaluated using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework, as illustrated in Figure 1.

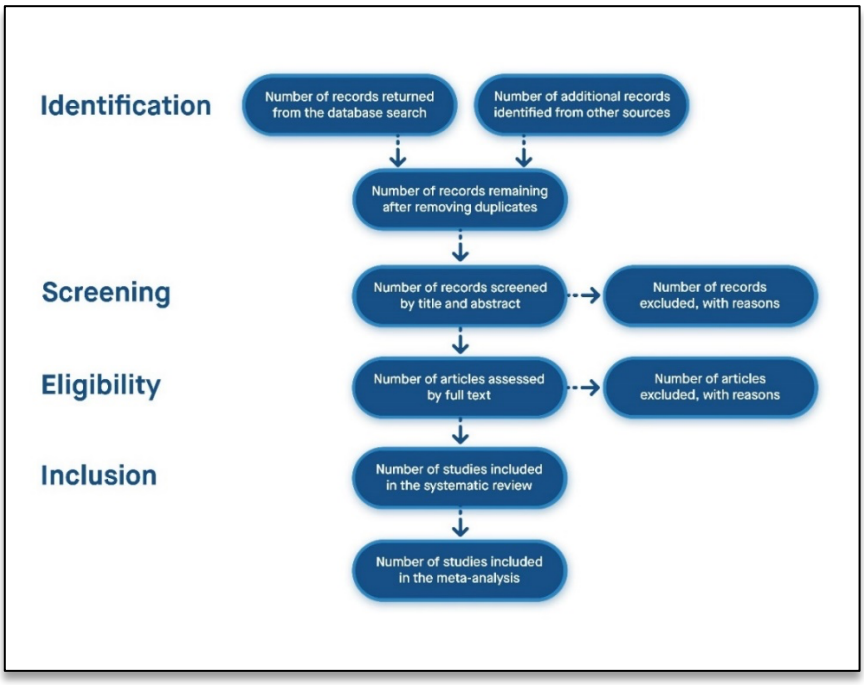

Figure 1. PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) flow diagram for the Systematic Literature Review.

Research Question
The research questions (RQs) were formulated according to the needs related to the study theme. To clarify the focus of the analysis and the synthesis of the literature review results, the research questions were grouped into four thematic clusters, as presented in the following table:

Table 1. Grouping of Research Questions (RQs) into Thematic Clusters

Thematic Cluster	RQ Code	Research Question	Analysis Focus
Characteristics of Forest and Land Fire Threats	RQ 1	What are the characteristics of forest and land fire threats and preparedness measures discussed in the literature from 2014–2024?	Type of threats, vulnerable areas, causal factors
Actors and Institutions	RQ 2	Does the literature discuss efforts to enhance preparedness for forest and land fires, and which actors and institutions play a role in disaster preparedness?	Role of Regional Disaster Management Agency (BPBD), task forces, government, community
Community Preparedness Strategies	RQ 3	What strategies are employed to improve community preparedness for forest and land fire disasters?	Education, simulations, community-based approaches
Technology and Innovation	RQ 4	How do technology and innovation contribute to supporting preparedness for forest and land fire disasters?	Applications, dashboards, weather modification

Search Strategy

After formulating the research questions, the next stage was the search process, which involved identifying literature relevant to the research questions. This stage was conducted by searching for literature on Google Scholar (https://scholar.google.com/) using keywords aligned with the research theme, specifically "Forest and Land Fires."

Inclusion and Exclusion Criteria

The inclusion and exclusion criteria were established to determine whether the collected data were suitable to be used as sources. The detailed inclusion and exclusion criteria are presented in the following table:

Tabel 2. Kriteria Inklusi dan Eksklusi Literatur

Aspect	Inclusion Criteria	Exclusion Criteria
Study Type	Qualitative, quantitative, and mixed-methods studies	Opinions, essays, non-scientific reports
Geographical Context	Indonesia (national and regional)	Outside Indonesia
Study Focus	Forest and land fire preparedness (education, simulations, institutional, technology)	Forest and land fires without preparedness aspects
Publication Type	Scientific journals	Proceedings, reports
Language	Indonesian	Languages other than Indonesian
Publication Year	2014–2024	Outside this range

Quality Assessment

The quality assessment stage was intended to ensure that the data collected for this study were of high quality. To determine whether the collected data were of sufficient quality, the evaluation was conducted based on the following questions:

- QA1: What are the characteristics of forest and land fire threats and preparedness measures discussed in the literature from 2014–2024?
- QA2: Does the literature discuss efforts to enhance preparedness for forest and land fires, and which actors and institutions play a role in disaster preparedness?
- QA3: What strategies are employed to improve community preparedness for forest and land fire disasters?
- QA4: How do technology and innovation contribute to supporting preparedness for forest and land fire disasters?

Data Collection

During this stage, the data required for the study were collected for subsequent analysis. The data collection process involved opening https://scholar.google.com/ in a web browser and entering relevant keywords in the search menu, specifically "Forest and Land Fires," to identify journals addressing this topic. The filter option was then used to limit the search to articles published between 2014 and 2024. From the filtered results, journal articles within this publication period were retrieved and prepared for further analysis.

Data Analysis

In this stage, the collected data were analyzed. The results of the analysis aimed to answer all research questions (RQs) formulated earlier.

Documentation

The collected and analyzed data were documented in the form of a paper, following the prescribed formatting guidelines.

RESEARCH RESULTS AND DISCUSSION

The search process yielded 10 journal articles that met the inclusion and exclusion criteria, specifically articles published between 2014 and 2024 that addressed preparedness for forest and land fire disasters (karhutla). The collected journals were then categorized based on the type of journal, as presented in the following table:

Table 3. Categorization of Articles by Journal Type

No	Journal Type	Year	Number of Articles
1	INNOVATIVE: Journal of Social Science Research	2024	1
2	Journal of Social Science	2020	1
3	Journal of Education and Teaching	2023	1
4	Journal of Nursing Science	2021	1
5	Journal of Administration and Management	2024	1
6	Journal of Communication Research	2024	1
7	Journal of Social and Political Studies	2022	1
8	Journal of Social Science Research	2023	1
9	Journal of Government Policy	2021	1
10	Pro Health: Scientific Journal of Health	2020	1

Subsequently, the research questions (RQs) were addressed through the stages of quality assessment and data analysis regarding preparedness for forest and land fire disasters (karhutla) during the period 2014–2024. The results of the quality assessment and data analysis are presented in Table 4 and Table 5.

Table 4. Results of Quality Assessment

No.	Authors	Research Title	Year	QA1	QA2	QA3	QA4	Result
1	Fenty Kurnia Oktorina, Aldri Frinaldi, Rembrandt, Dasman	Community-Based Forest Fire Risk Management Analysis in Kampar Regency	2024	Yes	Yes	Yes	Yes	Accepted
2	Siti Aisyah	Application of Green Economy Principles in Controlling Forest and Land Fires (Karhutla) in Central Kalimantan Province	2017	Yes	Yes	Yes	Yes	Accepted
3	Nurdin, Muhammad Badri, Dewi Sukartik	Effectiveness of Forest and Land Fire Prevention Socialization in the Community of Sungai Buluh Village, Bunut District, Pelalawan Regency, Riau	2018	Yes	Yes	Yes	Yes	Accepted
4	Hani Syarifah, Diane Tanti Poli, Miftah Ali, Hayatul Khairul Rahmat, I Dewa Ketut Kerta Widana	Capability of the Regional Disaster Management Agency (BPBD) of Balikpapan City in Handling Forest and Land Fire Disasters	2020	Yes	Yes	Yes	Yes	Accepted
5	Ari Putra Pratama, Enok Maryani, Darsiharjo	Effect of Disaster Literacy on Student Preparedness for Forest and Land Fire Disasters in Ogan Komering Ilir Regency	2022	Yes	Yes	Yes	Yes	Accepted
6	Puteri Anggraini Oktavianty, Erwin Maulana, Maulidin Akbar	Management of Forest and Land Fire Disaster Handling at the Regional Disaster Management Agency (BPBD) of Hulu Sungai Utara Regency	2024	Yes	Yes	Yes	Yes	Accepted
7	Amir Syamsuadi, Diki Arisandi, Seri Hartati, Liza Trisnawati	Forest and Land Fire Mitigation Policy Based on Village Empowerment through Digital Disaster-Aware Tourism (DWDSB) in Riau	2023	Yes	Yes	Yes	Yes	Accepted
8	Kunto Arief Wibowo	Forest and Land Fire (Karhutla) Management for Enhancing People's Economy	2019	Yes	Yes	Yes	Yes	Accepted
9	Irman Effendy, Qoriani Widayati, Robi Sepriansyah	Utilization of Software in Creating Forest Fire Disaster Dashboards at BPBD South Sumatra	2021	Yes	Yes	Yes	Yes	Accepted
10	Syafrudin Fathoni, Nabella, Virana Fatwa Nurmala, M. Bayu Rizky Prayoga	Application of Technology in Mitigating Peatland Forest and Land Fires in Riau Province to Support National Security	2020	Yes	Yes	Yes	Yes	Accepted

Table 5. Findings of the Systematic Literature Review

No.	Authors	Research Title	Year	Review Findings
1	Fenty Kurnia Oktorina, Aldri Frinaldi, Rembrandt, Dasman	Community-Based Forest Fire Risk Management Analysis in Kampar Regency	2024	The analysis indicated that a community-based approach is effective in raising public awareness, but faces challenges such as limited resources, insufficient training, and lack of coordination with external parties. Recommendations include strengthening policy support, enhancing community capacity, and developing an early warning system. Overall, this approach has significant potential to reduce forest fire risks if supported by sustainable policies and multi-stakeholder collaboration.
2	Siti Aisyah	Application of Green Economy Principles in Controlling Forest and Land Fires (Karhutla) in Central Kalimantan Province	2017	The implementation of green economy principles in Palangka Raya has been carried out through policies prohibiting land burning, public awareness campaigns about fire hazards, and preparedness drills. Government solutions include promoting **Land Clearing Without Burning (PLTB)** and providing land allocation programs for the community. The approach demonstrates that policy implementation has been running effectively. Fire control measures follow three phases: pre-disaster, preparedness, and recovery, and in recent years (2016–2017) control measures have shown improvement.
3	Nurdin, Muhammad Badri, Dewi Sukartik	Effectiveness of Forest and Land Fire Prevention Socialization in the Community of Sungai Buluh Village, Bunut District, Pelalawan Regency, Riau	2018	The study found that socialization programs conducted by government, private sectors, and NGOs in Sungai Buluh Village were not fully effective. However, these programs significantly influenced community knowledge and actions for forest fire prevention, although they did not significantly affect community motivation. This was due to the socialization sessions being attended mainly by village representatives rather than the entire community.
4	Hani Syarifah, Diane Tanti Poli, Miftah Ali, Hayatul Khairul Rahmat, I Dewa Ketut Kerta Widana	Capability of the Regional Disaster Management Agency (BPBD) of Balikpapan City in Handling Forest and Land Fire Disasters	2020	During disasters, BPBD forms a task force based on the governor's decree. BPBD, under Commission E, receives political and budgetary support and coordinates with multiple parties. Balikpapan BPBD has 310 employees, but not all are deployed in the field. Human resources skilled in firefighting are crucial. Disaster management funds are jointly shared between central and local governments, promoting community participation (Law No. 24/2007). BPBD operates 16 fire trucks, 9 operational vehicles, 8 water supply trucks, and 7 trail motorcycles.
5	Ari Putra Pratama, Enok Maryani, Darsiharjo	Effect of Disaster Literacy on Student Preparedness for Forest and Land Fire Disasters in Ogan Komering Ilir Regency	2022	Disaster literacy positively influenced student preparedness: higher literacy led to better readiness. Literacy involves identifying, evaluating, organizing, integrating, and effectively communicating information. Geography lessons on disaster mitigation also contributed, although the effect was moderate. Students gained knowledge through the internet and social media, and teachers combined theoretical knowledge with real-life events, making preparedness education highly effective.
6	Puteri Anggraini Oktavianty, Erwin Maulana, Maulidin Akbar	Management of Forest and Land Fire Disaster Handling at BPBD Hulu Sungai Utara Regency	2024	The study concluded that disaster management at BPBD Hulu Sungai Utara was not yet optimal, with issues in early warning, risk reduction, preparedness, budget allocation, damage evaluation, recovery, and reconstruction. Challenges included insufficient equipment, personnel shortages, multiple fire incidents, limited socialization, and inadequate recovery funding.
7	Kunto Arief Wibowo	Forest and Land Fire (Karhutla) Management for Enhancing People's Economy	2019	The study emphasized the need for coordinated management among all stakeholders, including previously inactive agencies. Understanding community-based economic approaches is crucial for effective implementation.
8	Irman Effendy, Qoriani Widayati, Robi Sepriansyah	Utilization of Tableau Software in Creating Forest Fire Disaster Dashboards at BPBD South Sumatra	2021	The use of Tableau as a business intelligence application provided visual and analytical information on fire-prone areas. In 2019–2020, the most vulnerable regions in South Sumatra were OKU, Palembang, and Lahat, with 38, 34, and 29 incidents respectively. Dashboards help authorities and communities plan preparedness and mitigation measures before, during, and after disasters.
9	Syafrudin Fathoni, Nabella, Virana Fatwa Nurmala, M. Bayu Rizky Prayoga	Application of Technology in Mitigating Peatland Forest and Land Fires in Riau Province to Support National Security	2020	Three applications were used by the Riau local government: weather modification technology, SIPALAGA app, and Lancang Kuning app. Since 2020, burned areas in Riau decreased by 91%. Multi-actor collaboration, including civil, military, and community sectors, contributed to successful fire mitigation and national security.
10	Tri Anggraini, Dimas Agustian	Role of the Regional Disaster Management Agency (BPBD) in Preventing Forest and Land Fire Disasters in Musi Banyuasin Regency	2020	BPBD Musi Banyuasin performed its duties by assessing fire-prone areas through three main stages: determining area conditions, assessing land vulnerability and hotspots, and informing local authorities and the community through socialization activities.

RQ1: What are the characteristics of forest and land fire threats and preparedness measures discussed in the literature from 2014–2024?

The data analysis related to this research question (RQ1) focuses on disaster preparedness for forest and land fires (karhutla).

Table 6. Types of Detected Disasters

No.	Disaster Type	Journal Reference	Number of Articles
1	Forest and Land Fire (Karhutla) Management	(6), (7)	2
2	Utilization of Technology and Software in Enhancing Forest Fire Disaster Mitigation	(8), (9)	2
3	Effect of Disaster Literacy on Preparedness	(5)	1
4	Forest Fire Risk Management Analysis	(1)	1
5	Effectiveness of Forest and Land Fire Prevention Socialization in the Community	(3)	1
6	Role of Regional Disaster Management Agency (BPBD) in Forest and Land Fire Prevention	(4), (6), (10)	3

From Table 6, it can be observed that there are 10 journals discussing forest and land fires. The most frequently studied topic is the role of the Regional Disaster Management Agency (BPBD) in disaster prevention, covered in 3 research journals, followed by research on fire management and the utilization of technology in disaster mitigation, each addressed in 2 research journals.

RQ2: Do these literatures discuss efforts to improve forest fire preparedness, and which actors and institutions play a role in forest fire disaster preparedness?

Based on Table 6, all literatures discuss how each preparedness measure is implemented in handling forest and land fires and which institutional actors are involved in responding to forest fire disasters. One of the efforts to minimize disaster impacts is by enhancing preparedness capacity. In addition to reducing disaster impacts, improving disaster prevention capacity can also accelerate post-disaster recovery. To be resilient in the face of disasters, communities must also be responsive and adaptive to ongoing changes, such as globalization and climate change[17][19].

Forest and land fires have extensive impacts on communities, including disruption of daily activities, reduced transportation access, health threats due to poor air quality, and decreased social life quality in affected areas[3][23]. Additionally, accusations from neighboring countries, particularly Singapore and Malaysia, labeling Indonesia as a source of haze, disrupt bilateral relations. According to the 2016 Forest and Land Fire Task Force report, the causes of forest and land fires include: (1) agricultural land clearing that still relies on burning methods, (2) neglected lands, especially peatlands, which are left unmaintained, (3) high temperatures due to prolonged droughts, and (4) drying of wetlands, particularly peat swamps, whether due to intentional or unintentional actions.

These forest and land fire disasters threaten national security and weaken the state defense system. Forest and land fires represent a serious threat to the state and society due to their widespread impact on the environment, social, economic, and national development aspects[12]. This is evident from the Astagatra concept review. On the other hand, external pressures, especially regarding environmental issues and haze, have intensified, adversely affecting Indonesia's diplomacy and contributing negatively to national resilience.

Until now, management has primarily focused on response during fire events. Fire management that emphasizes suppression without prioritizing prevention neglects important mitigation and pre-disaster aspects in reducing disaster risk[14]. Government capabilities are crucial in this regard. Capability reflects the competencies required for the government to face challenges and problems. Continuous fires indicate that the government has not been able to control forest fires, highlighting the need for effective preparedness capabilities supported by stakeholders and the community.

Disaster preparedness refers to a series of activities conducted to anticipate disasters through proper organization and measures to reduce risks before disasters occur[32]. The goals of disaster preparedness are to prevent disaster threats, reduce community vulnerability, mitigate disaster consequences, and establish cooperation with relevant parties[35]. Community preparedness remains low due to limited knowledge and awareness of natural phenomena and the resulting disasters[36].
The Indonesian government and society have traditionally focused disaster management on emergency response and post-disaster rehabilitation and reconstruction. Preparedness has not been prioritized. According to Oktavianty and Puteri Anggraini, the disaster management of forest and land fires at the Regional Disaster Management Agency (BPBD) of Hulu Sungai Utara Regency is still not optimal, as indicated by: disaster warnings, risk reduction, preparedness, disaster relief budgets, damage assessment, recovery, and reconstruction[21]. The challenges faced include insufficient equipment, limited personnel, multiple fire hotspots, suboptimal socialization, and constraints in recovery and reconstruction budgets.

RQ3: What strategies are used to enhance community preparedness for forest and land fire disasters?

Several methods are required to enhance community preparedness. Literature demonstrates that different interventions can effectively increase community preparedness. Before intervention, community preparedness is often low; however, after training or emergency response interventions, preparedness significantly improves[33]. Methods identified in the literature include:

Education and Awareness Campaigns
Education or awareness campaigns on disaster preparedness have been proven effective in increasing knowledge, understanding, and readiness of the community, while delivering clear and widely applicable information[11][18]. Through such campaigns, participants actively engage in the learning process, improving both theoretical knowledge and practical skills for disaster response[13][27]. These programs particularly target household heads, enabling them to devise family disaster response strategies[16].
Pratama Ari Putra's study showed a positive influence of disaster literacy on student preparedness: the higher the literacy level, the better the preparedness. Disaster literacy comprises four indicators: identifying and finding information, evaluating information, organizing and integrating information, and using and communicating information effectively, legally, and ethically[24]. Another widely used medium is leaflets, which are designed to be visually appealing and concise, and can be taken home to other family members[20]. Although effective, not all participants may fully absorb the information due to factors such as educational background, age, social-economic level, traditional beliefs, and environmental conditions[20].

Disaster Simulation Methods
Disaster simulations are tools to test participants' knowledge, understanding, responses, and actions before, during, and after disasters. Simulations help assess participants' comprehension of roles, responsibilities, and authority at each disaster stage. These exercises increase skills and knowledge for timely and appropriate responses, particularly for earthquake-induced tsunamis[15].
Simulation, derived from "simulate" (to imitate), involves presenting learning experiences through artificial situations to understand concepts, principles, or skills[6]. Simulations enhance imagination, discussion, interaction, and communication in group learning. Active participation is encouraged, enabling learners to practice disaster preparedness, not just through lectures but through field exercises. Sociodrama, which requires social interaction

to solve social problems, is one effective simulation approach, covering pre-disaster, emergency response, and post-disaster stages.

Optimization of Task Force in Preventive Actions

a) Research by Kunto Ari Wibowo based on documentation and direct experience as Sumsel Task Force Commander revealed several key points[34]:
b) Establishing Governor's Decree on Task Force formation;
c) Regular task force meetings to assign duties, typically discussing fire preparedness during dry seasons;
d) Synchronization of task force programs with other institutions;
e) Coordination meetings with external parties (local government, companies, community groups) to discuss roles in handling ongoing or potential fire threats;
f) Coordination with Regional Peat Restoration Team (TRGD) and Peat Restoration Agency (BRG);
g) Establishment of fire management posts according to area size, staffed by TNI, Polri, BNPB, regional SKPD, Manggala Agni, Tagana, TRGD, BMKG, and in some cases, private companies. Task force structure demonstrates the coordination chain, with the main command held by the task force leader, guided by policies formalized in Governor's Decrees.

RQ4: How do technology and innovation support forest and land fire disaster preparedness?

Technological innovation and socio-economic-cultural community empowerment approaches remain minimal and underutilized, particularly in addressing root causes strategically. Technological innovation should emerge as a response to forest fire events, driven by creativity and problem sensitivity. Effective implementation requires strong coordination among all stakeholders.

Irman Effendy's research highlighted the use of Tableau, a business intelligence software, to analyze data and visualize high-risk areas for forest and land fires in South Sumatra Province during 2019–2020. Oku experienced 38 events, Palembang 34, and Lahat 29[10]. Tableau dashboards help government and public stakeholders plan and execute disaster preparedness and mitigation measures during and after incidents.

Syafrudin Fathoni's study showed that Riau provincial government used three technologies to prevent forest and land fire hazards: weather modification, SIPALAGA application, and Lancang Kuning application[31]. These technologies contributed to a 91% reduction in burned areas since 2020, effectively preserving air quality. Collaboration among civilian, military, and community actors has proven crucial in achieving successful fire suppression and mitigating ongoing fire hazards in Riau.

CONCLUSIONS AND RECOMMENDATIONS

This study synthesizes strategies for forest and land fire preparedness in Indonesia through a Systematic Literature Review (SLR) approach. The findings indicate that disaster education, disaster simulations, institutional strengthening, and the utilization of technology constitute the main pillars for enhancing forest fire preparedness. The primary contribution of this research is the presentation of a comprehensive thematic synthesis, serving as a basis for strengthening disaster preparedness policies and practices in Indonesia. Awareness of fire hazards and appropriate response measures can reduce the risk of injury and mortality. When communities understand the actions to take during a fire, they can respond quickly and appropriately to protect themselves and others.

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