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Modeling forest fire mitigation policy through disaster-aware digital tourism villages to support the green local economy in Riau, Indonesia

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Abstract

Riau Province has been identified as one of the regions most severely affected by forest and land fires since 2015. This study aims to (1) analyze the implementation of forest and land fire mitigation policies, (2) measure the level of village preparedness in facing forest and land fires, and (3) examine the impact of Disaster-Aware Digital Tourism Villages on local economic empowerment in Riau Province. The study employs a mixed-method approach, combining quantitative and qualitative techniques. This research develops a Disaster Mitigation Policy Model for forest and land fires through a Disaster-Aware Digital Tourism Village framework based on economic empowerment. The analysis includes policy evaluation, assessment of village readiness levels, and measurement of the contribution of disaster-aware digital tourism villages to community economic activities. The results indicate that Riau Governor Regulation Number 9 of 2020 serves as the legal foundation for the Regional Disaster Management Agency in implementing forest and land fire mitigation. Furthermore, the findings demonstrate that the disaster-aware digital tourism villages model contributes to increasing community preparedness levels and supports local economic empowerment through green economy-based activities grounded in local wisdom.

Keywords: *policy, mitigation, forest fire, tourism village, green local economy*

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Introduction

Forest fires occur frequently in Riau Province and have adverse impacts on the environment and human health. Forest and land fires in Riau Province have a significant economic impact (Arisandi et al., 2022), including damage to oil palm, rubber, and other crop plantations, which reduces farmers' production and income (Arisandi et al., 2020). In addition, the resulting haze reduces tourist visits and incurs high costs for fire suppression from both government and private sectors (Ahmad et al., 2023). The haze also contributes to various health problems, particularly respiratory diseases (Syamsuadi et al., 2022).

In general, the main challenges in mitigating forest and land fires in Riau include the difficulty of controlling haze spread due to weather conditions, weak coordination among stakeholders across government levels, low public awareness related to environmentally harmful land-clearing practices, and limited personnel and equipment for fire suppression (Saharjo & Yungan, 2018; Sidiq, 2019; Syaufina, 2018). However, despite the extensive discussion on the impacts and challenges of forest and land fires, existing studies have primarily focused on environmental, economic, and policy aspects separately, with limited integration of community-based approaches, digital innovation,

and local economic empowerment within disaster mitigation frameworks (Kumar et al., 2024; Tedim et al., 2015). In particular, there is a lack of studies that examine how disaster mitigation can be synergized with the development of Disaster-Aware Digital Tourism Villages as a form of social engineering to enhance both community preparedness and economic resilience.

Therefore, this study aims to fill this gap by developing a disaster mitigation policy model that integrates community empowerment, digital-based tourism villages, and local wisdom in addressing forest and land fire risks in Riau Province.

Forest and land fires in Riau Province not only affect the environment and human health, but also significantly impact the local economy. Therefore, it is important to carry out forest and land fire mitigation assessments in a serious and sustainable manner to reduce their negative impacts on various economic and social sectors (Syafriani et al., 2022). Data from the National Disaster Management Agency shows that during 2015–2021, forest fires continued to occur in Riau, with the largest burned area recorded in 2015, reaching 20,250 hectares (Pratama & Sukaesih, 2020; Ruswandi et al., 2021). Forest fire mitigation policy refers to a series of actions taken by the government and the community to prevent and reduce forest fires and minimize their impacts (Steen-Adams et al., 2017; Stephens & Ruth, 2005; Sukainah, 2024).

However, despite numerous studies discussing the impacts and general mitigation efforts of forest and land fires in Riau, there is still a limited understanding of how existing mitigation policies are implemented at the local level and how effective they are in addressing recurring fire incidents. Previous research has largely focused on the environmental and economic impacts, but has not sufficiently examined the policy effectiveness, coordination between stakeholders, and the practical challenges in implementation. Therefore, this study aims to fill this gap by analyzing the effectiveness of forest and land fire mitigation policies and identifying key factors that influence their successful implementation in Riau Province (Tukiyat et al., 2020).

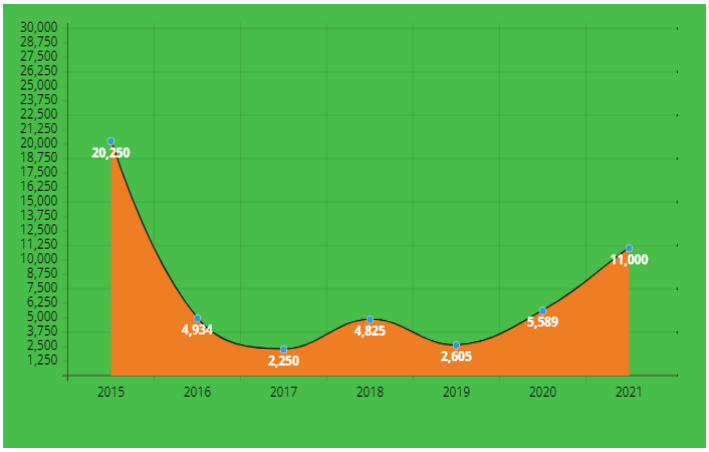

Figure 1. Riau forest fire land area per hectare (ha) 2015-2021
Source: processed by author, 2025

Forest fire mitigation policy is a series of actions taken by the government and communities to prevent and reduce forest fires, and minimize their impact on the environment and communities. Mitigating forest and land fires in Riau is very important to do (Afni et al., 2022). The relationship between policy and forest fire mitigation is to develop appropriate measures to address the problem of forest fires and plan effective policies to prevent and overcome them (Noviana et al., 2020).

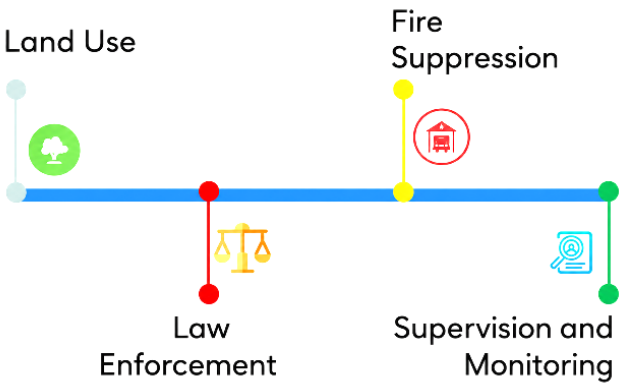

Figure 2. Alternatives for developing forest fire mitigation policies
Source: processed by author, 2025

Forest fire mitigation is an effort made in order to preserve forests and the surrounding environment (Adharani et al., 2020). One way that can be done is through the development of disaster-aware digital tourism villages. Disaster-aware digital tourism village is an innovative concept and strengthens the sustainable management of tourism villages, as well as increasing community preparedness in the face of natural disasters (Oka et al., 2022). Problem solving in the disaster-aware digital tourism villages-based forest fire mitigation policy is carried out with the latest approach through modifications to disaster risk (Nugroho et al., 2020) including hazard identification, vulnerability analysis, and capacity analysis (18). Then develop a scheme to strengthen education about disaster hazards and how to deal with them in an integrated manner. Conceptualize the design of information technology to monitor real-time environmental and weather conditions (Aji et al., 2022). Designing a pentahelix scheme for the role of cross-sector disaster management by increasing the capacity of disaster-aware communities on an ongoing basis.

Research on modeling forest fire mitigation policies has been widely conducted, particularly in the context of environmental management, disaster risk reduction, and community-based approaches. Previous studies emphasize that mitigation efforts are generally dominated by regulatory approaches, community engagement, and climate-related variables without strong integration across sectors (Gusmira et al., 2025). Furthermore, other studies highlight that technological innovations, including remote sensing, early warning systems, and digital-based monitoring, have been developed to improve fire detection and response. However, these technologies are often implemented in isolation from socioeconomic and tourism-based frameworks (Li et al., 2024). In addition, research on ecotourism-based disaster mitigation models has demonstrated the importance of community collaboration and environmental sustainability, but it primarily focuses on governance and stakeholder synergy without integrating real-time digital communication systems into policy modelling (Syamsuadi et al., 2022).

This research offers a clear novelty by integrating three dimensions simultaneously: forest fire mitigation policy modelling, disaster-aware digital tourism villages, and the application of digital technology as a real-time disaster communication system. Unlike previous studies, which tend to separate policy, technology, and tourism approaches, this study develops a comprehensive and integrative model that connects mitigation policies with digital-based disaster notification systems within the tourism village context. This integration not only improves the accuracy of fire risk identification but also enhances community

awareness and participation. Moreover, this study uniquely links mitigation strategies with sustainable economic benefits through tourism development, thereby producing a more holistic and applicable framework for reducing forest fire risks while improving community welfare.

Research Methods

The method in this study uses a mixed-methods approach, which is a combination of quantitative and qualitative approaches (Jaya, 2020). The population of this study consists of stakeholders involved in the implementation of the Disaster Aware Digital Tourism Village in Riau Province, including tourism actors, local entrepreneurs, and the local community, with individuals serving as the unit of analysis. The sampling technique used is purposive sampling, where respondents are selected based on their direct involvement in tourism activities and local economic development within disaster-aware digital tourism villages locations. A total of 60 respondents were involved in this study, representing the three groups proportionally.

The quantitative approach was used to measure the impact of the implementation of the Disaster Aware Digital Tourism Village as a support for the green local economy in Riau. The data collection methods used were surveys, observation, and secondary data analysis. Surveys were conducted using structured questionnaires as the main measurement instrument to assess respondents' perceptions, satisfaction levels, and the economic impact of disaster-aware digital tourism villages. The instrument was developed based on relevant theoretical constructs to ensure content validity, while consistency in data collection procedures supports the reliability of the measurements. The collected quantitative data were analyzed using SPSS version 22 to produce descriptive statistical results. Observations were conducted to obtain visual and contextual data on the use and implementation of disaster-aware digital tourism villages in daily community life. Secondary data analysis was carried out using data from the Central Statistics Agency, the Tourism Office, and the Regional Disaster Management Agency of Riau Province to support and validate primary findings.

The qualitative approach was used to understand how disaster-aware digital tourism villages influences village-based forest fire mitigation policies. Qualitative data were obtained through observation and contextual interpretation of field findings. Data integration was conducted at the interpretation stage by combining quantitative results with qualitative insights, allowing for triangulation and a more comprehensive understanding of the role of disaster-aware digital tourism villages in supporting green local economic development and disaster mitigation efforts.

Results and Discussion

The development of a forest fire disaster mitigation policy model based on social engineering of disaster-aware digital tourism villages that support the green local economy in this study was carried out by describing the condition of forest and land fires in Riau city districts, the level of village readiness in dealing with forest and land fires, analysis of disaster-aware digital tourism villages as a support for the green local economy, policy effectiveness and implications of forest fire mitigation with forest management and community participation in forest fire mitigation policies and relevance and sustainable development goals.

Mapping of Forest and Land Fires in Riau Regencies and Cities

Forest and land fires in Riau Province have continued to occur in recent years. According to the National Disaster Management Agency, during the period 2015–2021, forest and land fires persisted in Riau, with the largest burned area recorded in 2015, reaching 20,250 hectares (Ruswandi et al., 2021). Based on data from the Department of Environment and Forestry of Riau Province in 2022, fire-prone areas are distributed across 346 villages and 99 districts within 12 regencies/cities in Riau Province.

Efforts to mitigate and prevent forest and land fires in Riau Province have been implemented through community-based fire prevention management, coordinated by the Regional Disaster Management Agency and relevant stakeholders. These efforts are carried out in accordance with Riau Governor Regulation No. 9 of 2020 concerning Standard Operating Procedures for Determining Disaster Emergency Status and the Command System for Forest and Land Fire Control in Riau Province.

The distribution of fire-prone areas in Riau Province in 2022, categorized by regency/city, district, and village, is presented in Table 1.

Table 1. Forest and land fire prone areas in Riau Province in 2022

No	District/city	Sub-district	Village
1	Rokan Hulu Regency	5	12
2	Rokan Hilir Regency	13	40
3	Dumai City	6	17
4	Bengkalis Regency	11	53
5	Meranti Islands Regency	6	27
6	Siak Regency	9	33
7	Pekanbaru City	3	17
8	Kampar Regency	11	30
9	Pelalawan Regency	9	32
10	Indragiri Hulu Regency	8	24
11	Indragiri Hilir Regency	12	52
12	Kuantan Sengingi Regency	6	9
	Total	99	346

Source: Riau Provincial Environment and Forestry Service

As for the distribution of burnt land based on the latest data from January to August 2023, the area of burnt land in Riau Province reached 990.59 hectares. For information on the area of burnt land (ha) in the regencies and cities of Riau Province from January to August 2023, please see the following figure:

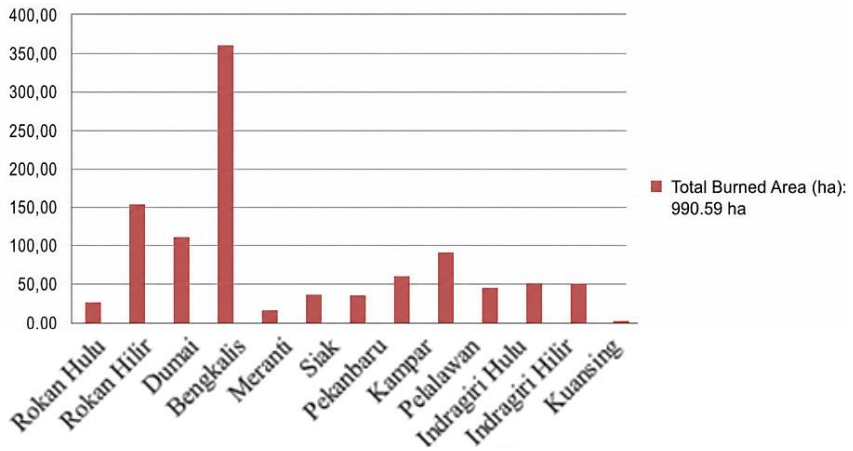

Figure 3. Area of Land Burned (ha) in Regency and City in Riau Province January-August 2023
Source: processed by author, 2025

The areas most affected by forest and land fires in Riau Province include Bengkalis Regency (363.48 hectares), Rokan Hilir Regency (154.10 hectares), Dumai City (110.37 hectares), Pelalawan Regency (92.23 hectares), Kampar Regency (58.77 hectares), Indragiri Hilir Regency (49 hectares), Indragiri Hulu Regency (45.70 hectares), Siak Regency (36.64 hectares), Pekanbaru City (35.15 hectares), Rokan Hulu Regency (26.40 hectares), and Meranti Islands Regency (17.25 hectares). In contrast, the lowest burned area was recorded in Kuantan Singingi Regency, with only 2 hectares affected.

As of August 2023, the total number of hotspots in Riau Province reached 1,173, while the total number of fire incidents was recorded at 360. Despite ongoing mitigation efforts, many areas remain highly susceptible to forest and land fires due to key triggering factors such as oxygen, heat, and fuel. In addition, anthropogenic factors play a dominant role, with approximately 99% of forest and land fires in Riau Province caused by human activities, both intentional and unintentional (Dini et al., 2023).Land needs, conflicts and other activities are the main causes of forest and land fires in Riau Province. If we look at conflict as one of the causes of forest and land fires, Riau Province is an area where there are still many tenurial conflicts. Meanwhile, according to greenpeace, tenurial conflicts are caused by many interested parties, both vertical and horizontal. Where there are disputes or conflicts related to control, utilization of natural resources or forest areas. The typology of conflicts can occur between the community-government, community-community, and companies that are granted forest area management licenses.

The readiness of tourism villages to deal with forest and land fire disasters

A disaster resilient village is a village that is prepared to reduce disaster risk by increasing the ability to recognize threats in its area and being able to organize community resources to increase capacity and reduce vulnerability (Andung et al., 2023). Disaster resilient villages are prepared for the community, where the community is the direct recipient of the disaster and also the first actor who will respond to disasters around them before the arrival of assistance from outside parties both government and private. So it is necessary to equip the community so that the community is not only ready to face disasters but becomes resilient. Disaster Resilient Villages are expected to be able to increase the capacity of community preparedness in the face of disasters, with an active community role or community participation using the Community Base Disaster Management method placing the community as the subject and object of disaster management.

The level of village readiness in facing forest and land fire disasters is in the form of participating in the fire-free village program, forming a Fire Care Community group, and developing an environmentally sound tourism village and also implementing forest and land fire mitigation education. Forest and land fire mitigation education is a series of activities for people living in forest and land fire prone areas who participate in minimizing the impact of forest and land fires by conveying matters related to knowledge, understanding, skills, and awareness of forest and land fires. In its implementation, forest and land fire mitigation education is carried out through formal, non-formal and informal mechanisms. The implementation of forest and land fire disaster education can involve the community or certain groups in the community such as religious leaders, community leaders, women activists, youth, journalists, or community organizations. The active involvement of the community in disaster education will form community-based disaster management.

Based on the implementation of a village preparedness assessment instrument for forest and land fires in 14 villages across Sumatra and Kalimantan, only two villages were classified as having a good level of preparedness (Class A). The majority were categorized as moderate or less prepared (Class B), while no villages fell into the very poor category (Class C) (Pangemanan & Monintja, 2023). However, these findings cannot be directly generalized to villages in Riau due to differences in ecological characteristics, particularly the dominance of peatlands, as well as socioeconomic conditions, institutional capacity, and the intensity of fire risk.

In Riau, efforts to strengthen village preparedness have been carried out through several targeted programs. In 2021, a total of 17 villages participated in the Fire Free Village Program, a collaborative initiative between local governments and the partner company PT RAPP (APRIL) as part of its corporate social responsibility (CSR). This program focuses on protecting peatland areas that are highly vulnerable to forest and land fires. The participating villages included Lalang Kabung, Pangkalan Kerinci Timur, Rantau Baru, Ransang, Sungai Ara, Sering, Pelalawan, Langgam, Penarikan, Pangkalan Gondai, Teluk Meranti, Teluk Binjai, Petodaan, Kuala Panduk, and Pangkalan Terap.

In addition, several of these villages were also involved in the Fire Resilient Community (FRC) program, which aims to enhance community capacity in fire prevention and response. Furthermore, in 2022, the central government designated five villages in Riau as pilot villages for strengthening legal awareness as part of long-term solutions to forest and land fire issues. These villages are Lubuk Kembang Bunga (Ukui District), Teluk Meranti (Pelalawan District), Pangkalan Kerinci Timur (Pangkalan Kerinci District), Petodaan (Teluk Meranti District, Pelalawan Regency), and Peregam (Rupat District, Bengkalis Regency).

At the institutional level, Commission V of the Regional People's Representative Council, which oversees public welfare, also plays a strategic role through its functions in disaster management and community empowerment. These combined efforts indicate that village preparedness in Riau is shaped by region-specific interventions, reinforcing the need for contextualized assessment approaches rather than direct adoption of findings from other regions.

Forest and land fire mitigation is an essential effort to preserve forest ecosystems and the surrounding environment (Adharani et al., 2020). One strategic approach is the development of Disaster-Aware Digital Tourism Villages, an innovative concept that supports sustainable tourism village management while enhancing community preparedness for natural disasters (Oka et al., 2022). The disaster-aware digital tourism village model integrates village-based disaster mitigation infrastructure, such as reservoirs, lakes, and ponds, optimized to meet water needs during the dry season and help prevent forest and land fires. At the same time, these facilities support the development of locally based digital tourism destinations.

Furthermore, land surrounding the reservoirs, which was previously unproductive, has been transformed into tourism village destinations by the Kampung Dayun village government in collaboration with the Siak Regency Regional Disaster Management Agency. The village leadership actively encourages community participation in increasing tourism awareness as a means of enhancing local economic activities. The development of accessibility and amenities in the Dayun Tourism Village has been carried out through government policies and extensive collaboration with tourism awareness groups, the Joint Operating Body PT Bumi Siak Pusako–Pertamina Hulu, and several universities.

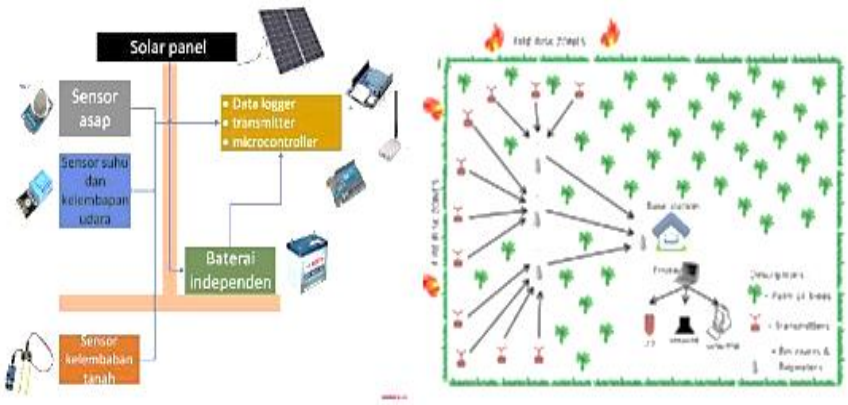

Figure 4. Early detection system for forest and land fire prevention based on the Internet of Things (IoT).
Source: Research Analysis Data, 2025

To enhance public awareness and preparedness for forest and land fire disasters, the Dayun Village Government initiated the establishment of a community-based Fire Awareness Group. This group serves as a local institutional mechanism for strengthening community participation in disaster prevention and response. It works collaboratively with the village administration, the fire department, and the Regional Disaster Management Agency of Siak Regency, Riau Province. Through this collaboration, the Fire Awareness Group is expected to support early detection, community mobilization, and rapid response efforts during periods of increased fire risk. Capacity-building activities provided to the group include organizational leadership, team communication techniques, institutional management, and the use of information technology to improve coordination and support disaster mitigation activities.

In line with these efforts, Kampung Dayun has been developed as a tourism village that integrates reservoir-based infrastructure for forest and land fire mitigation with local tourism potential. Reservoirs and related water-based facilities are not only important for supporting water availability during the dry season, but also function as strategic assets for reducing fire vulnerability in the surrounding area. At the same time, these facilities can be developed as part of the village's tourism appeal, thereby linking disaster mitigation with local economic development. To expand the visibility of Kampung Dayun and attract more visitors, more intensive promotional strategies are needed, particularly through social media platforms. In addition, the development of a digital tourism village website is important to provide integrated information on tourism attractions, village conditions, available facilities, and forest and land fire risks in the Dayun Village area.

The development of disaster-aware digital tourism villages requires synergy among the government, community, and private sector. Government actors at the provincial, district or municipal, and village levels provide policy support, coordination, infrastructure, and disaster mitigation planning. The community serves as the main local actor in tourism management and forest and land fire prevention, while the private sector contributes through corporate social responsibility programs supporting empowerment, promotion, digital infrastructure, and fire prevention. Through this collaboration, the model can strengthen disaster resilience and sustainable local tourism development.

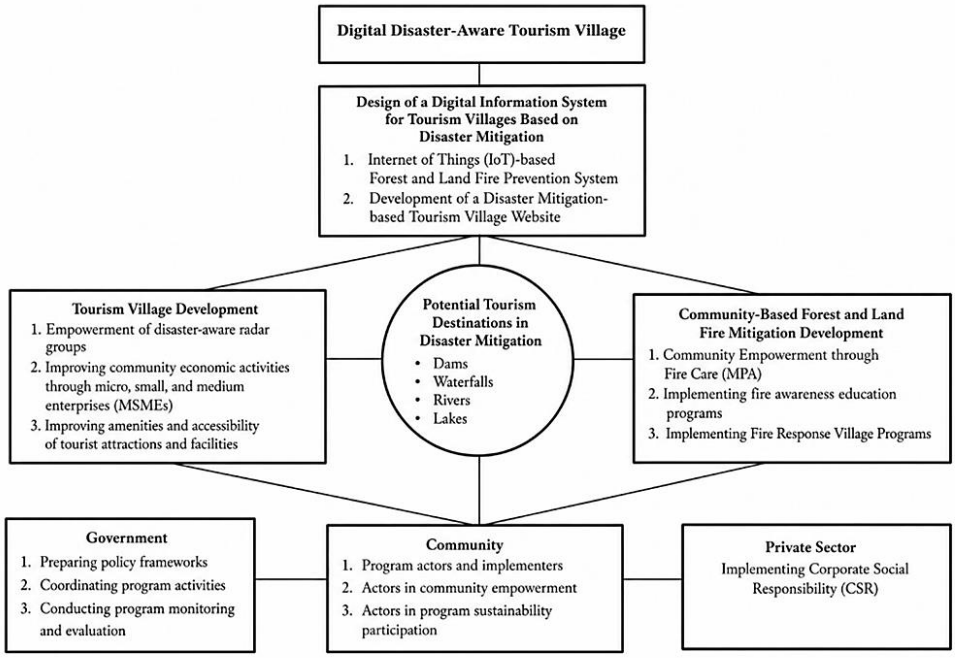

Figure 5. Schematic Synergy Modeling of Policy Aspects of Forest Fire Mitigation Based on Digital Disaster Aware Tourism Village
Source: research analysis results, 2025

Disaster-Aware Digital Tourism Village as a Green Local Economy Support

Regulations governing tourism in Riau Province are stipulated in Regional Regulation of Riau Province Number 5 of 2022 concerning the Master Plan for Provincial Tourism Development for 2021–2035. This regution covers key aspects, including tourism destination development, tourism industry development, tourism marketing, institutional arrangements, as well as the implementation and control of tourism activities in Riau Province. In this regard, Abdul Kasim, S.H., a member of Commission I of the Regional People's Representative Council in the field of government and law, emphasized the importance of a strong legal framework to ensure effective and sustainable tourism management in the region.

The impact analysis of the implementation of Disaster-Aware Digital Tourism Villages as a support for the green local economy was conducted in 12 tourism villages across regencies and cities in Riau Province. These villages were selected purposively based on their recognition as recipients of the 2023 Tourism Village Awards in Riau Province, which indicates their strong performance in tourism development and management. This selection is supported by official documentation published by the Riau Provincial Government Media Center, which reports that 12 tourism villages in Riau achieved top assessment rankings in 2023. This criterion ensures that the selected villages represent.

A purposive sampling technique was employed to select respondents who have direct involvement and adequate understanding of tourism activities and the disaster-aware digital tourism villages program. A total of 60 respondents participat.ed in this study, comprising tourism actors, local entrepreneurs, and community members. While this approach enables a more focused and in-depth analysis, the findings remain context-specific and are not intended to be statistically generalizable to all tourism villages in Riau. The twelve disaster-aware digital tourism villages examined in this study are as follows:

Table 2. Disaster Aware Digital Tourism Villages in Riau Province

No	Name of Tourist Village	Regency/City
1	Kampung Bandar	Pekanbaru City
2	Buluh Cina	Kampar Regency
3	Bukit Batu	Bengkalis Regency
4	Dayun	Siak Regency
5	Aliantan	Rokan Hulu Regency
6	Bangko Mukti	Rokan Hilir Regency
7	Bono	Pelalawan Regency
8	Rantau Langsat	Indragiri Hulu Regency
9	Teluk Dalam	Indragiri Hilir Regency
10	Sungai Kelelawar	Kuansing Regency
11	Bokor	Meranti Regency
12	Mundam	Dumai City

Source: Data processed by researchers, 2023

To measure the level of user satisfaction with the Disaster-Aware Digital Tourism Village program and its impact on the local economy, this study employed a mixed-method data collection approach, including surveys, observations, and secondary data analysis. The survey targeted respondents consisting of tourism actors, local entrepreneurs, and community members who are directly involved in or affected by tourism activities.

The survey instrument was developed in the form of a structured questionnaire consisting of several indicators, including: (1) perceived economic benefits (income increase, business opportunities), (2) accessibility and digital tourism services, (3) disaster awareness integration, and (4) overall satisfaction with the disaster-aware digital tourism villages program. Responses were measured using a Likert scale ranging from 1 to 5, where 1 indicates "very low impact" and 5 indicates "very high impact." This scale was selected to capture the intensity of respondents' perceptions and allow for quantitative analysis of subjective evaluations.

The collected data were processed and analyzed using the SPSS 22 application to generate descriptive statistics, particularly frequencies and percentages. The results show that 25 respondents (41.7%) perceived that disaster-aware digital tourism villages has a positive impact on the development of local economic potential, while 35 respondents (58.3%) stated that the program has a very significant impact. These findings indicate a strong positive perception among stakeholders regarding the effectiveness of disaster-aware digital tourism villages in enhancing local economic development.

Although the analysis is primarily based on perceptual data, it is considered sufficient to support claims regarding policy effectiveness because the respondents represent key stakeholders who directly experience the program's implementation and its economic implications. Their perceptions provide valuable insights into the program's practical outcomes, particularly in contexts where quantitative economic data (e.g., income statistics or regional GDP contribution) may be limited or not yet systematically recorded. Therefore, perception-based evaluation serves as an important proxy for assessing early-stage policy impact, especially in community-based tourism development initiatives. The survey results can be illustrated in the following figure.

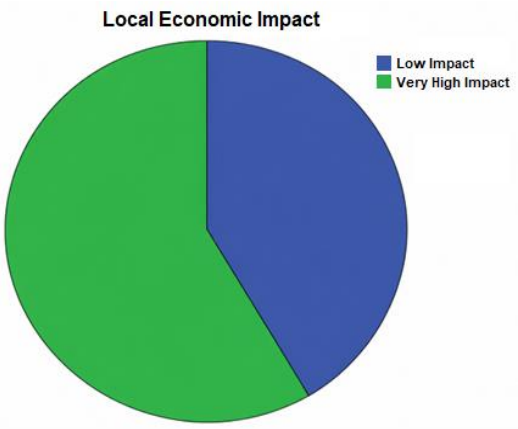

Figure 6. Disaster Aware Digital Tourism Village Perception Survey regarding the development of local economic potential

Source: Process research data using SPSS 22

Regarding the public's perception of satisfaction with the disaste-aware digital tourism village and the development of local economic potential, as many as 5 people or 8.3% of respondents said they were quite satisfied, as many as 23 people or 38.3% of respondents said they were satisfied and 32 people or 53.3% of respondents said they were satisfied. Expresse dvery satisfied. The survey results can be depicted in the following figure:

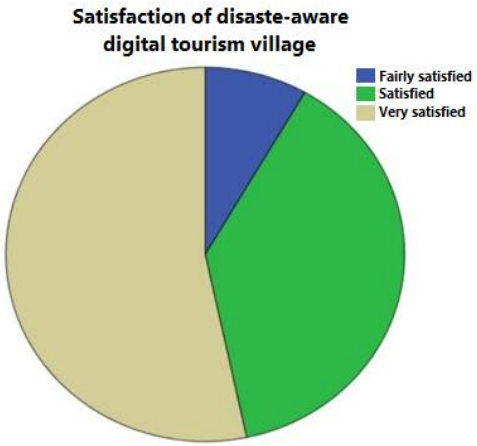

Figure 7. Survey of the level of satisfaction of disaste-aware digital tourism village regarding the development of local economic potential

Source: Process research data using SPSS 22

The results of the analysis of community perceptions and levels of satisfaction with disaster-aware digital tourism villages as a support for the green local economy confirm that the disaster-aware digital tourism villages concept can be a potential alternative for developing disaster mitigation-based policies through community empowerment activities that support economic activities and aspects of community locality.

Policy Effectiveness and Implications of Forest Fire Mitigation with Forest Management

Program evaluation is considered effective when it fulfills five key criteria: (1) the extent to which government implementation aligns with predefined objectives, (2) cost efficiency in program execution, (3) the degree to which actual outcomes correspond with targeted results, (4) cost-effectiveness in achieving program goals, and (5) the tangible impact experienced by the community (Kettner et al., 2015). In this study, these

criteria are operationalized into measurable indicators, including: alignment between planned and implemented activities, budget utilization efficiency, comparison between planned and realize

Based on survey data regarding the achievement of forest fire mitigation policies in the context of forest management through tourism villages, 52 respondents (87%) perceived the program as successful, 7 respondents (12%) considered it unsuccessful, and 2 respondent The survey results can be illustrated in the following figure

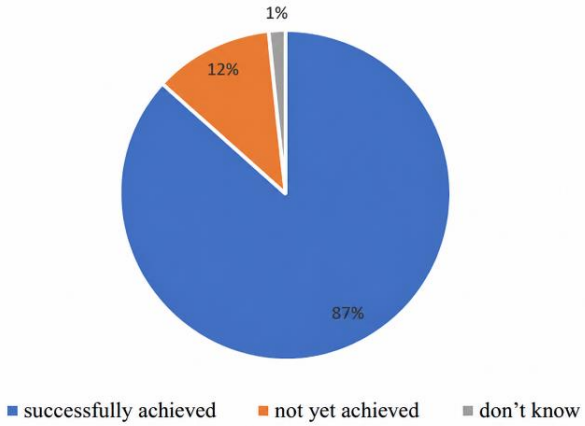

Figure 8. Achievement and success of the Forest Fire Mitigation Policy for Forest Management through tourist villages
Source: Process research data using SPSS 22

Regarding the number of activities needed to achieve the success of the forest fire mitigation policy on forest management through tourist villages, 43 people or 72% of respondents said not a lot, 5 people or 8% of respondents said not a lot, 7 people or 12% of respondents said a lot and 5 people or 8% of respondents said very much. The survey results can be depicted in the following figure:

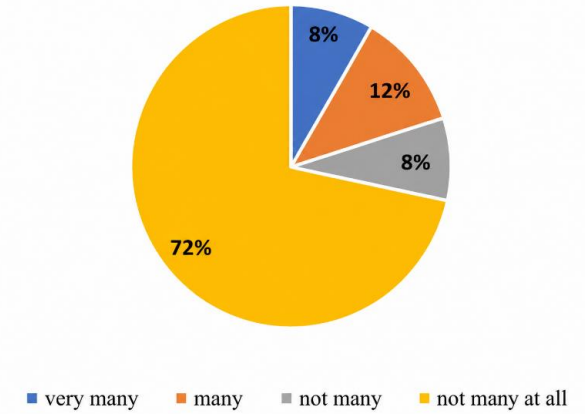

Figure 9. Number of Activities to Achieve Success in Forest Fire Mitigation Policy for Forest Management Through Tourism Villages
Source: process research data using SPSS 22

Based on a survey regarding adequate resource allocation and equitable financing in forest fire mitigation policy activities towards forest management through tourist villages, 50 people or 83% of respondents said it was sufficient and evenly distributed, 9 people or 15% of respondents said it was not sufficient and evenly distributed, and 1 person or 2% of respondents said they didn't know. The survey results can be depicted in the following figure:

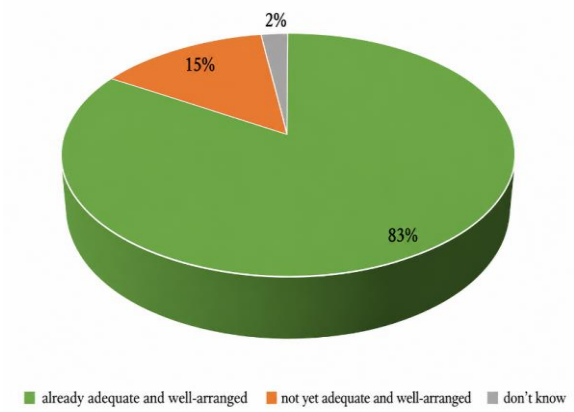

Figure 10. Adequate Resource Allocation and Equal Funding in Forest Fire Mitigation Policy Activities for Forest Management Through Tourism Villages
Source: Process research data using SPSS 22

Analysis of policies and implications of forest fire mitigation with forest management in aspects of achievement and success, aspects of number of activities, and aspects of adequate resource allocation and equal distribution of financing can be categorized as effective, however, it still needs to be considered in relation to increasing the number of activity programs related to forest and land fire disaster mitigation. through forest management and tourist villages both in terms of quantity and program quality.

Community participation in forest fire mitigation policies in the Tourism Village area in Riau

The level of community participation is community participation in the process of identifying problems and potential that exist in the community, selecting and making decisions about alternative solutions to deal with problems, implementing efforts to overcome problems, and community involvement in the process of evaluating changes that occur (Wibowo, 2019). Structuring the form of community participation is seen from 3 basic aspects, namely the form of participation, the people who participate and the way of participating. Community participation consists of 4 stages, namely the decision making stage, the implementation stage, the benefit stage and the evaluation stage (Moch, 2014). Community participation in forest fire mitigation policies in the Tourism Village area in Riau is as follows:

Participation in decision making on forest fire mitigation policy programs

Analysis in decision making regarding the implementation of forest and land fire mitigation programs in the tourist village area which was the research locus, as many as 30 people or 50% of respondents stated that they participated, then at the program initiation stage, 12 people or 20% of respondents stated that they participated in decision making, in During program implementation, 17 people or 28% of respondents participated during program operations and 1 person or 2% of respondents said they did not participate. The survey results can be depicted in the following figure:

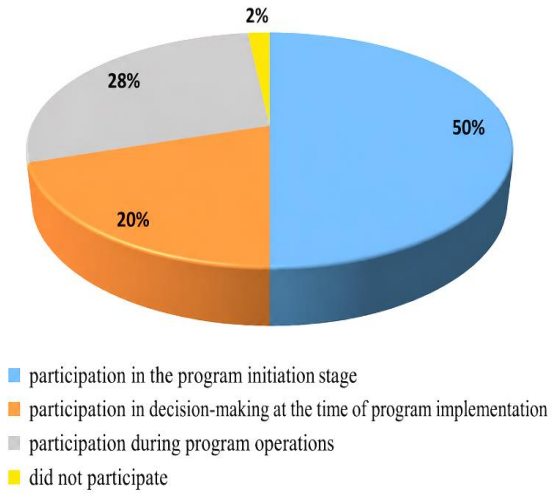

Figure 11. Participation in decision making
Source: Process research data using SPSS 22

Participation in the implementation of forest fire mitigation policy programs

Analysis of participation in implementing the forest fire mitigation policy program: 20 people or 33% of respondents participated through the program created, 28 people or 47% of respondents participated by contributing resources, and 12 people or 20% of respondents participated in administration and coordination. program implementation. The survey results can be depicted in the following figure:

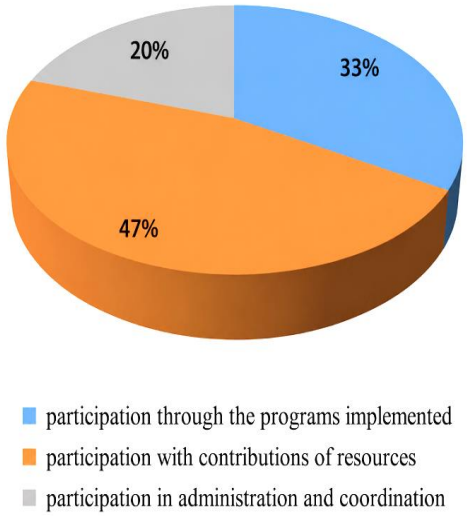

Figure 12. Participation in program implementation
Source: Process research data using SPSS 22

Participation in obtaining benefits from forest fire mitigation policy programs

9 people or 15% of respondents participated in obtaining material benefits from the forest fire mitigation policy program, 50 people or 83% of respondents participated in obtaining social benefits, and 1 person or 2% of respondents participated in obtaining personal benefits. The survey results can be depicted in the following figure:

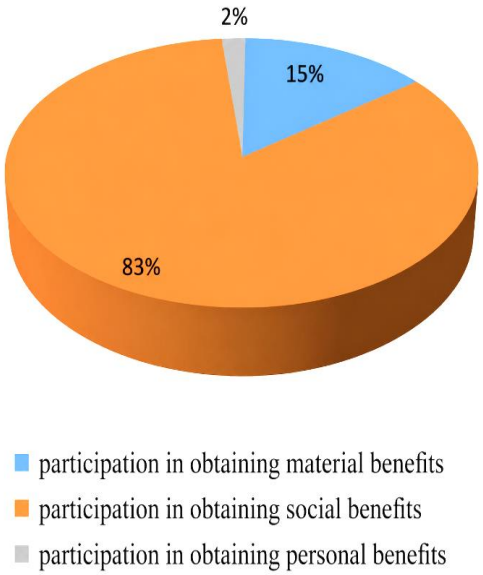

Figure 13. Participation in obtaining benefits
Source: Process research data using SPSS 22

Participation in evaluation of forest fire mitigation policy programs

Participation in the evaluation of the forest fire mitigation policy program was 35 people or 58% of respondents participated through direct evaluation, 15 people or 25% of respondents participated in the evaluation indirectly, and as many as 10 people or 17% of respondents did not evaluate the mitigation policy program forest fires. The survey results can be depicted in the following figure:

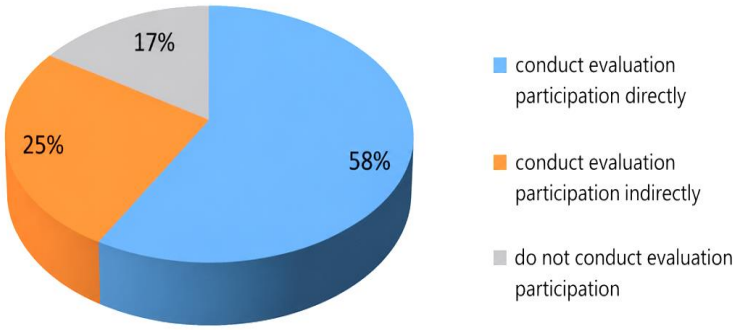

Figure 14. Participation in evaluation
Source: Process research data using SPSS 22

The survey results indicate that community participation is consistently high across all stages of the program. Participation in decision-making reached 98%, while participation in program implementation and in obtaining program benefits both achieved 100%. Participation in the evaluation stage of forest fire mitigation policies in tourism village areas in Riau was slightly lower, at 83%. Overall, the average level of community participation across all stages was 95.25%, indicating a very high level of engagement. However, the comparatively lower participation in the evaluation stage suggests the need to strengthen community involvement in monitoring and assessment processes.

Conclusion

This study finds that community participation in forest and land mitigation policies in tourism village areas in Riau is very high, with an average participation rate of 95.25%. Participation is strongest in program implementation and benefit utilization (both 100%), followed by decision-making (98%), while participation in the evaluation stage is comparatively lower (83%). This indicates that although communities are actively involved in operational aspects, their engagement in monitoring and evaluation processes remains limited. These findings highlight that the development of Digital Disaster-Aware Tourism Villages has been effective in encouraging community involvement, particularly in strengthening awareness, responsiveness, and adaptive capacity toward forest and land fire risks. The integration of digital approaches with community-based tourism also contributes to environmental protection and supports local economic empowerment. Policy implications of this study suggest the need to strengthen participatory mechanisms in the evaluation stage, for example through inclusive monitoring systems, community-based reporting, and the use of digital platforms to facilitate feedback and transparency. In addition, cross-sector collaboration between government, communities, and the private sector should be further institutionalized to ensure the sustainability of disaster-aware digital tourism villages initiatives. This study has several limitations. First, the research focuses only on selected tourism villages in Riau, which may limit the generalizability of the findings to other regions. Second, the use of survey-based data may not fully capture deeper behavioral dynamics and long-term participation patterns. Future research is recommended to explore longitudinal approaches to assess changes in community participation over time, as well as comparative studies across different regions. Further studies could also examine the effectiveness of specific digital interventions in strengthening community participation, particularly in the evaluation and monitoring stages of forest fire mitigation policies.

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