

A Model of Development Mitigation Disaster Based on Digital Eco-Tourism as a Prevention Effort of Forest and Land Fire Disaster Management

Amir Syamsuadi¹, Diki Arisandi², Liza Trisnawati³, Seri Hartati⁴, Luluk Elvitaria⁵,
Ardian Adi Putra⁶

Universitas Abdurrab^{1,2,3,4,5,6}

Riau Ujung No. 73, Pekanbaru City, 2829, Riau-Indonesia

Corresponding Email: diki@univrab.ac.id

ORCID ID: 0000-0002-6795-6133

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ABSTRACT

In 2020, one of the regencies in Riau, Siak, was the second-largest forest and land fire disaster area, which occurred by acute intercourse inspection (ISPA) patients, and reached 4321 suspected. The subject of this research was in Dayun District, Siak Regency, as a pioneering area to develop ecotourism based on disaster mitigation. The disaster mitigation system is an effort to minimize the impact caused by disasters caused by forest and land fires. Effective disaster mitigation has three main elements, namely hazard assessment, warning, and preparation. Ecotourism is a specific tourism activity that deliberates the environmental area and complies with the balance and preservation of nature principles. Ecotourism-based disaster mitigation efforts using the Penta helix model approach, namely strengthening synergy and collaboration of various related parties. The research was descriptive and qualitative by collecting the interview data by data triangulation techniques in describing the information authenticity. The results of this work showed that ecotourism-based disaster mitigation is conducted by utilizing a large and artificial pond called "embung", as a rainwater reservoir, and also a natural public tourism facility. The government issues this policy by cooperating with Universities and companies through Corporate social responsibility (CSR) programs.

Keywords: Disaster, Ecotourism, Mitigation, Forest, Synergy

INTRODUCTION

Forest and land fires are an annual issue that frequently occurs in Indonesia (Purnomo et al., 2017). Forest and land fires are important issue that concerns the sustainability of ecosystems and human life. The Factors causing nature might originally be lightning, the friction of branches on dry land, or hot weather that provokes fires. Meanwhile, a fire which by human carelessness can be due to accidentally by throwing away cigarettes, or the encouragement of economic motivation in utilizing the area after land burning. Forest and land fires are a threat to all aspects of social life and become a national issue. Of course, some of the negative impacts that occur such as health, economic development, social relations, relations between countries, and so on, including the production of greenhouse gas emissions produced during fires, especially on peatlands (Saharjo, 2022).

Deteriorating air quality due to forest and land fires can trigger an increase in various diseases. The largest proportion of diseases caused by forest and land fires are respiratory disorders, skin diseases, eye diseases, asthma, and pneumonia. Forest and land fires are disasters caused by natural factors and the human factor. Environmental damage from forest and land fires becomes a national issue (Oja, Samderubun, Laode, Maturan, & Betaubun, 2019). Forest and land fires result in serious and direct impacts on public health, the economy, disruption of human activities, ecological balance, and environmental damage. Siak Regency is among the top three regions with the most acute intercourse inspection (ARI) sufferers in Riau Province by 2019. Forest and land fire control policies in Siak Regency are bumped on overlapping policy implementing elements (Putra, Saharjo, & Wasis, 2019). Riau Province has natural wealth and cultural diversity in the potential tourism sector, where in recent years, tourism in Riau Province has developed rapidly so that many new tourism spots have emerged (Yulisman, Irawan, & Ramadhini, 2021).

The forest and land fire phenomenon that occurs every year encourages people in Dayun, one of the districts in the Siak Regency, to initiate disaster mitigation efforts integrated with ecotourism. Disaster mitigation does not only focus on disaster prevention but also focuses more on another potential's aspect, such as community empowerment and improving the creative economy of rural communities. Disaster mitigation by utilizing ecotourism reveals the opportunities for tourists to visit Dayun. The development of government programs based on community empowerment and economy such as ecotourism management by using information technology has become a trend of tourism based on local wisdom in the recent era of regional autonomy. Ecotourism is a specific tourism activity that deliberates the environmental area and follows the principles of balance and preservation of nature (Kristiana, 2019). Ecotourism and tourist destinations apart from being industries in economic growth, job opportunities, income, living standards, and production sector activation might also have a function as a mitigating aspect for forest fire disasters and land. Siak Regency is an area prone to haze disasters because almost 70% of the area is covered by peatland and more than 4000 hectares of abandoned land (Arisandi, Trisnawati, & Syamsuadi, 2022). In 2020, Siak Regency occupied a forest and land fire disaster area with the second-largest respiratory distress in Riau Province, reaching 4321 cases. Dayun Subdistrict, Siak Regency is a pioneer area that came up with the program to develop ecotourism based on the mitigation of forest and land fire disasters and haze.

LITERATURE REVIEW

1. Forest and Land Fires

Forest and land fires are natural disasters that frequently occur in Indonesia, particularly in the dry season. These fires cause enormous environmental damage, economic losses, and social problems. Large forest and land fires resulted in devastating haze impacts beyond the administrative boundaries of the country (transnational disaster) (Yusuf, Hapsoh, Siregar, & Nurrochmat, 2019). Forest and land fires cause public health issues, especially among at-risk groups, such as pregnant women, toddlers, children, and the elderly, also resulting the casualties (Yuningsih, 2009). Wildfires can occur due to uncontrolled burning, natural processes, or by accident. Natural processes include lightning that strikes the trees or buildings, volcanic eruptions that scatter chunks of embers, and friction between dry plant branches containing oil due to wind wobbles that generate heat or sparks.

Forest fires are fires that occur within a forest area, while land fires are fires that occur outside the forest area and both can occur either intentionally or unintentionally (Wahyudi, 2021). Burning peatlands activity to be used as oil palm plantations is a quick and cheap solution, even though the effects of the haze that arises can interfere with the health and activities of the residents. As a result, many social and economic activities of residents were disrupted. Thus, the disaster management that is delivered by the local Government is to strengthen the law enforcement period or when a fire occurs. The treatment of forest and land fires that focus on law enforcement, ignores the essence of disaster management that aspects of disaster prevention or mitigation must be a top priority. (Syarifah, Poli, Ali, Rahmat, & Widana, 2020). Disaster mitigation is a series of efforts to reduce disaster risk, both through physical development and awareness and improvement of the ability to deal with disaster threats. A treatment for forest and land fires has a larger portion than the prevention aspect so effective mitigation of forest and land fire disasters is needed (Tan, Carrasco, & Taylor, 2021). Now, there has been a decline in forest and land fire rates in the last half-decade after policy corrections and actions that changed the paradigm of forest and land fire control from prevention to extinguishing (Zulkifli, Ariyanto, & Dulhakim, 2021).

1. Disaster Mitigation

Natural disasters are disasters caused by a series of cases caused by nature, including earthquakes, tsunamis, volcanic eruptions, floods, droughts, forest fires, hurricanes, and landslides. (Widianto, Maisyaroh, Fibriansaridst, Kurnianto, & Novyanto, 2022). Non-natural disasters are disasters caused by non-natural cases which include technological failures, modernization failures, epidemics, and disease outbreaks. A social disaster is a disaster caused by humans which includes social conflicts between groups, communities, and terrorism. Mitigation is an effort to reduce the impact of environmental damage due to disasters (Hartini, 2017). Four treatments can be done in the mitigation process, namely mitigation, readiness, response, and normalization. Mitigation is a series of efforts to reduce disaster risk, both through physical development and awareness, and improvement of the ability to encounter the disaster. The disaster mitigation in the Government Regulation of the Republic of Indonesia Number 21 of 2008 regarding the implementation of disaster management is a series of efforts to reduce disaster risk, both through physical development and awareness and increasing the ability to face disaster threats. The purpose of disaster mitigation is to reduce the impact, become fundamental for development planning, and enhance the community knowledge in facing and reducing disaster risk. Disaster mitigation activities such as introduction and monitoring of disaster risks, disaster management planning in physical or non-physical implementation, and disaster management arrangements as well as resource management monitoring.

Disaster mitigation includes planning and implementing actions to reduce the risks and impacts of a disaster that was carried out before the disaster occurred, including readiness and long-term risk reduction measures. Effective disaster mitigation has three main elements, namely hazard assessment, warning, and preparation. Forest and land fire disaster mitigation systems are an effort to minimize the impacts, such as pollutants and haze (Faturahman, 2018).

2. Tourism Development Policy Concept

Development activities including tourism development cannot be able to run well without a good policy. A good policy can be illustrated by a single person who organizes the playing of an orchestra consisting of many music players with different types of musical instruments of different types, sounds, and times, resulting in a beautiful song. Thus, every tourism person, and bureaucrat, both in the government and regional government, must have a deep understanding of the importance of formulating and implementing good policies in tourism (Saputra, Lendra, Destrilia, & Wahyuni, 2022).

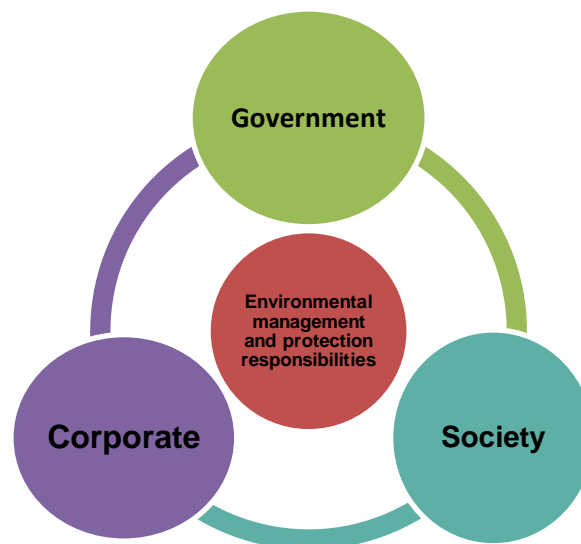


Figure 1. Responsibility for environmental management and protection (Adharani, Zamil, Astriani, & Afifah 2020)

The Penta helix collaboration in tourism development model is contained in the regulation of the Minister of Tourism of the Republic of Indonesia Number 14 of 2016 concerning Guidelines for Sustainable Tourism Destinations that to create, ensure the quality of activities, facilities, services, and create experiences and value benefits of tourism to provide benefits and benefits to the community and the environment, it is necessary to encourage the tourism system through optimizing the role of entrepreneurs, government, society/community, academia and media (Duadji & Meutia, 2021).

Tourism development policies in general will automatically focus their attention on activities carried out by the Government and local governments in classifying tourism (Utama, 2015). Development policy is an officially recognized parameter that is used as a fundamental or guideline by the Government to do or not do the process of change based on national concern (Joppe, 2018). The Policies in tourism are divided into various rules, strategies, and targets for the development or promotion of tourism as a guideline for decision-making in the short and long term (Arsana, Sunarta, & Arida, 2019). This policy must assure that the main goal is to make the people concerned who live in tourism get optimal benefits in the social and economic aspects as progress and quality of life (Raharjo, 2019). When the policy is related to the concept of development, it means

that the rules, strategies, and goals of the development or promotion of tourism must lead to changes based on national concerns.

3. Digital Ecotourism

Ecotourism aims to enjoy the beauty of nature by involving elements of education and support for conservation efforts and increasing the income for the local community. Ecotourism can be observed from three perspectives. First, ecotourism is an ecotourism product, it means that ecotourism is all attractions based on natural resources. Secondly, ecotourism as a market, means ecotourism is a trip directed at efforts to preserve the environment. Third, ecotourism as a development approach, means ecotourism is a method of utilizing and managing tourism resources environmentally (Bahari & Ashoer, 2018). Research on technology in tourism has mostly investigated the benefits and the applications of digitalization (Abbasian Fereidouni & Kawa, 2019).

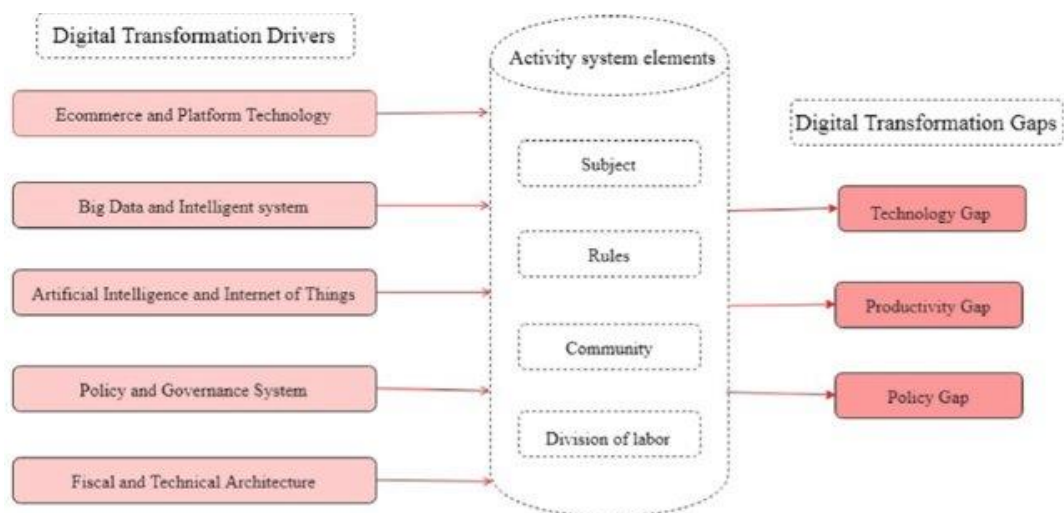


Figure 2. Proposed research model of digital transformation in tourism

Ecotourism has many definitions that are entirely principled in tourism which refers to five important elements, namely providing experience and education, minimizing negative impacts that can damage the environment, involving the community in management and implementation, providing economic benefits to local communities, and sustainable aspect (Ramadhani, Bahari, & Salim, 2018). The development of industry 4.0 in the current era has brought significant changes to tourism. The delivery of digital-based ecological information is needed to support modern tourism because there is no limited space and time in delivering the information to the public. Disaster mitigation based on digital ecotourism can be influenced by the level of community needs (economy), development policies and programs (politics), and community participation (social).

RESEARCH METHOD

The research design was descriptive and qualitative, due to exploring the facts and generating interpretation regarding the Digital Ecotourism-Based Disaster Mitigation Development Model, as a Preventive Effort against Forest and Land Fire Disaster. Qualitative research data is obtained from various sources, such as by using various data collection techniques (triangulation), and conducted continuously (Rejeki, Adnan, & Siregar, 2020). After collecting the data, we examine the data validation before conducting data analysis. Validation is a process to inspect the data to assure there is

"no different" between the reported data and the actual data. Data analysis is performed by organizing data into categories; Describing it into units; Performing a synthesis; Composing the data into patterns; Selecting the prominent data; and Making conclusions (Sugiyono, 2013).

RESULTS

This study illustrates that the instrument for preventing forest and land fires in the Dayun District, Siak Regency, such as reservoirs (embung) for storing water reserves are well-managed and used as a tourist spots. The development of digital ecotourism by the government is to modify the existing reservoirs into a multifunctional disaster mitigation facility by prioritizing the concept of green areas based on an educative and informative environment. To gain the attention of the community, tourism managers have made other supporting facilities such as flying fox, shaky bridge, monkey bridge, mini outbound, water bicycle, carousel, remote toy car, traditional games area, toddler's playground facilities, sports facilities, transit facilities and vehicle parking spaces for forest conservation recreation to the Zambrud Lake area. The Provincial and the local government through the national tourism office also provide support to attract more visitors such as the Homestay facilities, Digital and Creative promotions, Souvenir outlets, Public Toilets, Safety, and Environment Sustainability, and the establishment of an ecotourism management agency.



Figure 3. An integrated reservoir (Embung) in Dayun as Ecotourism-based mitigation for forest fire disaster

The development of tourism spots starts from the initiative of government-owned land utilization, by convincing them to secure their assets for supporting the development of tourism spots and engaging the public to be aware of the importance of the creative economy in ecotourism. The land around the reservoir, was originally unproductive, then the local government of Dayun tried to convince the board of Siak Regional Disaster Management Agency to develop the reservoir area as a tourist spot. The local government through the headman invites the community to raise tourism awareness to increase economic activities

The development of the accessibility and amenities of ecotourism objects is conducted by the government through local government policies in collaboration with environmental awareness groups (Pokdarwis) in Dayun, and collaboration with the Joint Operations Agency of PT. Bumi Siak Pusako Pertamina Hulu, higher educational institutions inside and outside Riau Province. The funding for developing the reservoir was from the village budget, CSR funding, and Intensive Work funding for local government. For tourism

promotion, the management uses the internet and social media services such as Instagram, Facebook, and a website portal. The following is the number of local tourists visiting the integrated reservoir during 2022:

Table 1. Dayun Village Ecotourism Visitors From January-May 2022

Month	Jan	Feb	Mar	Apr	May
Number of Visitors	14.519	7.210	5.520	557	32.976

Based on data collected from the tourism object management, during 2020 starting from January to May, the total ecotourism visitors was 47,722. As per month, in January were 14,519 visitors, in February were 7,210 visitors, in March were 5,520 visitors, in April were 557 tourists, and in May 32,976 visitors were recorded.

DISCUSSION

Tourism development including ecotourism in Siak Regency must be managed seriously. The government, tourism business actors, universities, the community, and the media must synergize with each other so that tourism potential can be explored maximally. In supporting ecotourism, related stakeholders such as the Culture and Tourism Office of Siak Regency can work together with the Village Government to develop the ecotourism sector in Siak Regency.

The Village Government and the Siak Regency government collaborate across sectors to build Siak tourism. Collaboration between Penta helix actors in tourism industry development policies in Siak Regency is very important. The important role of the government and local governments in the tourism sector is based on the idea that the bureaucracy has the power to decide all matters relating to the survival of the people of a country.

The bureaucracy also plays an important role in carrying out various anticipatory actions to minimize negative impacts, given the many potential problems that arise from tourism. The role of stakeholders in tourism development cannot be ignored in tourism development policies in Indonesia through empowerment activities carried out, including the collaborative process. The tourism governance process is an adaptive system process and is consensus-oriented. Mapping a collaborative process that starts with face-to-face dialogue, builds trust, builds commitment to the process, shares understanding, and then builds a collaborative tourism management process for tourism, can encourage the fulfillment of several conditions, namely the participation of stakeholders in the form of equality of power and no domination, accountability, and transparency of governance and development of ecotourism potential and the availability of competent human resources in ecotourism governance.

The tourism governance process is an adaptive system process, and consensus-oriented. The Mapping of a collaborative process starts with dialogue, building mutual trust, commitment to the process, sharing mutual understanding, and then it will construct a collaborative tourism management process. These circumstances may encourage the fulfillment of several conditions, such as the participation of stakeholders as equality of power, accountability and transparency of governance in the development of ecotourism, and the availability of competent human resources in ecotourism management.

CONCLUSION

Integrated disaster mitigation efforts with ecotourism. Ecotourism is one of the important sectors of development. Good ecotourism management will deliver several benefits in various aspects. However, if ecotourism is not managed properly, it can potentially cause problems or negative impacts. As an effort to prevent and control forest and land fires, it must be carried out seriously, and collaboratively between the entire community and also the industrial/business world. Ecotourism-based disaster mitigation is carried out by utilizing reservoirs as rainwater reservoirs that function as natural tourism facilities. The government makes policies by cooperating with universities and companies through the Corporate social responsibility (CSR) program.

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DECLARATION OF CONFLICTING INTERESTS

In general, the occurrence of forest and land fires in Riau Province, especially in Siak Regency, is caused by factors such as low public awareness of the dangers of fire, widespread land preparation by burning, coordination of stakeholders and related parties, especially local governments, has not been maximized, forest encroachment that has occurred in Riau Province. In protected forest areas, conservation areas, grand forest parks, national parks, and production forests, the use of high technology in efforts to prevent fire disasters is not available yet, and less implementation for recent innovations in forest and land fire prevention.

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