



Disaster Prevention Through Environmental Management and Developing Biodiversity Conservation Areas (Case Study in the Upang River, Bangka Belitung Islands Province)

Dwi Jati Marta

Universitas Pertahanan Republik Indonesia, Indonesia

dwijati73@gmail.com

Article Info

Article History:

Received: January 19, 2024

Revised: April 22, 2024

Accepted: April 29, 2024

Keywords:

Biodiversity,
Conservation,
Environmental
Management,
Disaster Prevention,
Mitigation

DOI:

<http://dx.doi.org/10.33172/jp.v10i1.19480>

Abstract

The Upang Forest and River area in Tanah Bawah Village, Bangka Belitung Islands Province, has developed into a biodiversity conservation and ecotourism area in the last eight years, aiming to reduce the risk of natural and man-made disasters. The development of this forest and river is an effort to prevent disasters due to changes in people's lifestyle patterns, with illegal tin mining activities, logging, and monoculture plantations. This study aims to increase the knowledge capacity of the community in terms of awareness of maintaining biodiversity, preserving the environment, and disaster prevention to provide the potential for ecotourism in the Upang Forest and River area to be developed properly. This study uses a qualitative research method with data collection through observation, direct interviews with research participants, and a literature review. This study finds the development of Upang River ecotourism with the concept of biodiversity has a positive impact on the surrounding community by involving the Upang River Nature Friends Tourism Awareness Group in developing the Upang River Ecotourism Area in four activities, namely conservation, education, social and economic. The collaborative role of Bangka Flora Society and the village government through Friends of Nature Tourism Awareness Group (*Pokdarwis Salam*) Upang River, Youth Organization (*Karang Taruna*), and Village-owned Enterprise (*BUMDesa*) Tanah Bawah in developing ecotourism destinations can create wealth and develop sustainable environmental management so the concept of biodiversity can be implemented following existing regulations. The government's role in regulating the governance and provision of natural resources in the Upang River has been carried out in setting appropriate policies to create sustainable natural resource management as a basis for maintaining a balance between environmental sustainability.

INTRODUCTION

Indonesia is one of the countries that have earned the nickname "Mega Biodiversity" (Latupapua & Sahunilawane, 2023) due to its rich biodiversity of flora and fauna based on its geographical location in the Wallacea Line region. The unique geographical and ecosystem conditions also support a large number of endemic fauna and flora found only in Indonesia, so, in this case, it becomes something valuable and must be maintained for its continued existence, as damaged habitat will affect the balance of the existing ecosystem (Setiadi, Pritanto, Sri, & Sofiana, 2023). Biodiversity refers to the variety of living species on Earth, including plants, animals, bacteria, and fungi. Earth's biodiversity is so rich that there are many species yet to be discovered. However, many species are threatened with extinction due to human activities. Scientists estimate that there are about 8.7 million species of plants and animals on Earth. However, only about 1.2 million species have been identified and described, most of which are insects. This suggests that millions of other organisms are still a mystery (Maghfira, 2021).

There are three types of biodiversity (Maghfira, 2021) namely (1) genetic biodiversity refers to each individual of a particular species differing from each other in terms of genetic material; (2) species biodiversity is the most basic level, including all species ranging from plants to different microorganisms; and (3) ecological biodiversity, refers to the variety of plant and animal species that live together and are linked by food chains and food webs and that are observed among different ecosystems in a region, such as deserts, rainforests, mangroves, etc., including ecological diversity. All species on earth interact with each other in an interdependent relationship to survive and maintain the ecosystem. For example, cows eat grass in the field and then defecate, producing manure that fertilizes the soil and grows more grass. Many species provide very important benefits to humans, including food, clothing, and medicine.

An ecosystem is a complete order of unity between all elements of the environment that affect each other. Ecosystems are complex interrelationships between living things and their environment, both living and non-living (soil, water, air, or physical chemistry) that together form an ecological system. However, much of the earth's biodiversity is in potential danger due to the consumptive nature of humans and other activities that disrupt and even destroy ecosystems. Pollution, climate change, and population growth are all threats to biodiversity. These threats have led to an unprecedented increase in species extinction rates. Some scientists estimate that half of all species on Earth will be wiped out within the next century. Therefore, conservation efforts are needed to preserve biodiversity and protect endangered species and their habitats.

Ecological biodiversity refers to the variety of plant and animal species that live together and are linked by food chains and food webs. The diversity observed in different ecosystems in a region, such as deserts, rainforests, mangroves, and others, includes ecological diversity. However, much of the world's biodiversity is under potential threat from human consumption and other activities that disrupt and even destroy ecosystems. Air pollution, climate change, and population growth are three environmental issues that threaten biodiversity. This threat has led to an unprecedented increase in the rate of species extinction. Some scientists estimate that half of the world's species will disappear within the next century. Efforts are therefore needed to conserve biodiversity and protect endangered species and their habitats (Jaime, et al., 2016).

Development is a process that brings about growth, progress, positive changes, or additions to physical, economic, environmental, social, and demographic components. Development aims to improve the level and quality of life of the population and to create or expand local income and employment opportunities without destroying

environmental resources (Wiryokusumo, 2014). In line with this, Sugiyono (2014) argues that development means deepening and expanding existing knowledge, and there is a process to make existing potential into something better and useful. For ward having high capacity, but also the stability of human life will be better, on the contrary, the high human need in life needs to be supported by carrying capacity of the environment that can serve as a good life support system. In this case, there is one important aspect that is visible and also affected by sustainable development, which is the environment. Ecologically, in terms of environmental conditions and functions in the area, it can be said that environmental management efforts still need to be optimized.

Regional development is an attempt to establish and strengthen the interdependence and interaction between the economic system of the community and the environment and its natural resources in an ecosystem. One form of management and development of natural resources in the form of forestry potential and biodiversity is through protected areas. Therefore, a development approach is needed that prioritizes the environment and biodiversity, i.e. biodiversity development. The development of biodiversity in the implementation of ecologically based regional planning is a wise solution strategy as part of the concept of sustainable development. Biodiversity development will affect the sustainability of the environmental system, biodiversity, and social and economic aspects. Protected areas with a biodiversity concept can be developed to prevent environmental damage and also as disaster management in the context of structural disaster prevention which in this research is related to the development of the tourism sector or ecotourism destination.

Previous research that has been conducted by Retno & Mutiara (2022), which examines the development of mangrove forest ecotourism in Baros Hamlet over the past 15 years. The aim is to reduce the risk of coastal disasters such as tsunamis, erosion, and coastal abrasion through mitigation that focuses on environmental management carried out in the Baros Mangrove Area, Bantul Regency, Yogyakarta Province. The development of mangrove forest ecotourism in Baros has a positive impact on the surrounding community. The role of KP2B in developing ecotourism areas can create prosperity and sustainable environmental management. Meanwhile, this research focuses on the Upang River, Bangka Belitung Islands Province by examining disaster prevention through environmental management and the development of biodiversity conservation areas in the Upang River. Therefore, the research conducted will be up-to-date and relevant to fill the gap between previous studies.

Furthermore, Handayani et al. (2022) may have different environmental and social conditions where research on Mount Merapi focuses more on empowering buffer village communities as part of disaster risk reduction strategies. The research to be conducted emphasizes more on environmental management and the development of biodiversity conservation areas as the main strategy in disaster prevention. Although, both have similarities in focusing on disaster prevention efforts, although through different approaches and recognizing the important role of conservation areas in disaster risk mitigation. One of the main gaps is the different strategic approaches. This study emphasizes more on environmental management and conservation area development as the main strategy, while the research on Mount Merapi focuses more on village community empowerment.

Compared to those previous studies, this study will focus on the problem of forest fire disasters every year due to dry peat forest conditions, illegal tin mining, and illegal logging of forests in the Upang River Border, a place that is an ecotourism area that has been developed for 8 (eight) years by the community and government agencies related

to disaster prevention efforts in Bangka Regency. The Upang River Border is a river on Bangka Island, Bangka Regency, Bangka Belitung Islands Province, which has begun to be affected by the activities of tin mining pollution and large-scale monoculture plantations. The Upang River is a source of clean water and fish for the residents of Tanah Bawah Village, Puding Besar District, Bangka Regency, who are mostly gardeners and farmers. Since 2017, the Upang River has been designated by the local government as a biodiversity conservation area, which is managed with the involvement of the local community group, Bangka Flora Society, representatives of local community elements, namely the Friends of Nature (*Salam*) Upang River. There are two main threats to the sustainability of the Upang River area, namely forest and land fires, water pollution from illegal tin mining, large-scale oil palm plantations, and illegal logging (Ismi, 2020).

The landscape of the Upang River is dominated by a peat swamp ecosystem, which makes it vulnerable to fire during long dry seasons. Fires occurred around this river in 1998, 2017, and 2019. According to the observations and narratives of one of the respondents, during the 1998 fire, the heat of the fire burned the forest on the west, east, north, and south sides and at that time many fish were floating due to fire ash poisoning. Meanwhile, fires in 2019 caused the death of several orchid species on Anggrek Island, a delta used as an orchid sanctuary on the Upang River. Another threat is the increase in water pollution caused by illegal tin mining downstream of the river, and illegal logging around the Upang River forest, which is targeting several high-value trees such as swamp tea, birch, guava, and mahogany. Environmental damage, both forest fires and illegal mining, is caused by a lack of awareness of collective disaster prevention and the importance of understanding the concept of biodiversity for future generations to enjoy existing natural resources. Based on the above description, it is important to carry out research related to increasing community knowledge capacity in terms of awareness of environmental conservation, biodiversity, and disaster prevention in the Upang River.

METHODS

The method used in the research is a qualitative research method. According to Moleong (2018), this method is used based on a scientific background to interpret phenomena that occur by involving various other methods. The reason for using a qualitative method with an analytical descriptive approach is that researchers want to understand and explain problems that are based on existing facts by interpreting the phenomena that occur by involving various other methods. In addition, this approach is used in conducting research as a basis for explaining, interpreting, and analyzing the concept of biodiversity as the development of conservation areas and ecotourism as well as efforts to preserve the environment and reduce natural and non-natural disasters. Data collection techniques used for the research included observation, interviews, and review of appropriate literature to gain a deep understanding of the context and phenomena under study.

The location of the research was Sungai Upang, which is located in the administrative area of Tanah Bawah Village, Puding Besar Subdistrict, Bangka Regency. In collecting data, the researcher was directly involved in both direct observation in the field, searching for data in accordance with the focus of the research both through documentation and literature, and conducting structured interviews directly. There were 4 informants in this study, namely the village head of Tanah Bawah, the director of Village-owned Enterprise (*BUMDesa*) Tanah Bawah, the head of Bangka Flora Society, and the head of Friends of Nature Tourism Awareness Group (*Pokdarwis Salam*) Upang

River. The four informants were chosen because they are individuals or groups that have in-depth knowledge of the topic under study.

The data analysis technique used is the data triangulation technique using data from different times, regions, and people to increase the validity and credibility of the findings and reduce research bias in line with what Sugiyono (2014) stated. When discussing the development of community welfare, disaster management, and sustainable environmental management, the concept of biodiversity can be used appropriately so that it can be implemented following existing regulations.

RESULT AND DISCUSSION

The main cause of environmental (ecosystem) damage occurs due to excessive and uncontrolled human activity, which then creates a threat to the human survival cycle itself. Activities such as illegal mining and illegal logging are responsible for the ecosystem damage that occurs. The consequences include environmental damage, loss of agricultural land, reduced surface water discharge, landslides, loss of river and marine biota, and socio-economic impacts. Planning for mining in an area should be carried out in a systematic way to anticipate environmental protection and human safety. Development and conservation of natural resources must be immediately recognized and understood to maintain a balanced system, where conservation will support development and guarantee future needs (Manan, 2010). Therefore, it is necessary to have disaster management, which is an activity from the aspects of disaster planning and management in pre-disaster (before a disaster occurs), disaster emergency response (when a disaster occurs), and post-disaster (after a disaster occurs) which includes prevention, preparedness, emergency response, and recovery (Wicaksono & Pangestuti, 2019).

The definition of a disaster is based on Article 1 Number 1 of Law Number 24 of 2007 concerning Disaster Management is an event or series of events that threaten and disrupt people's lives and livelihoods caused by either natural factors and/or non-natural factors or human factors, resulting in loss of life, humans, environmental damage, property loss, and psychological impacts. Meanwhile, Law Number 24 of 2007 concerning Disaster Management Article 4 explains that the purpose of disaster management is to provide protection to the community from the threat of disaster, harmonize existing laws and regulations, and guarantee the implementation of disaster management in a planned, integrated, coordinated manner and comprehensive.

In the National Medium-Term Development Plan (*Rencana Pembangunan Jangka Menengah* or RPJMN) for the 2020-2024 period, disaster management programs are a priority for the Indonesian government because Indonesia is a country prone to disaster events. This statement is supported by Anies (2021) based on data released by the United Nations International Strategy for Disaster Reduction (UNISDR), Indonesia is ranked 12th out of 35 countries with the highest risk of death in the world due to the threat of disaster hazards. Indonesia is indeed the most disaster-prone country in the world. The high position of Indonesia is calculated from the number of people who are at risk of losing their lives when natural disasters occur. Indonesia ranks highest for tsunami, landslide, and volcano hazards.

Nabila (2023) discusses the World Risk Index that has been released in a report by Bündnis Entwicklung Hilft and the Institute for International Law of Peace and Armed Conflict (IFHV) from Ruhr-University Bochum entitled World Risk Report 2022. The study assesses the level of disaster risk in several countries around the world. The assessment is based on five indicators consisting of exposure, vulnerability, insecurity,

lack of handling capacity, and lack of adaptation to disasters in the world. The World Risk Index (WRI) score is 43.50 points out of 100. The higher the WRI score, the riskier the disaster. Meanwhile, the first-ranked country most at risk of disasters is the Philippines with an index score of 46.86 points. Below Indonesia or ranked third is India with a score of 41.52 points. In addition, the country with the lowest WRI score is Andorra, which is 0.22 points in 2022. This small European country is considered the safest from disaster threats.

As an archipelagic country that has the longest coastline in the world, Indonesia has the potential for a tsunami disaster that cannot be prevented but can be reduced risk. UNISDR data that in terms of population exposure or the number of people in the area who may lose their lives due to disasters, the risk of disasters faced by Indonesia is very high. Based on Sutopo's statement in the Nurdiansyah (2022) article explained, Indonesia ranks first out of 265 countries in the world surveyed by the UN agency for the potential for tsunami disasters. The risk of the tsunami threat in Indonesia is even higher than the 5,402,239 people affected in Japan in UNISDR estimates.

In this case, this research activity focuses on environmental impact prevention and disaster prevention where Article 1 paragraph (9) of Law Number 24 of 2007 concerning Disaster Management defines disaster mitigation as an effort to reduce disaster risk, both through physical development and awareness and by increasing the ability to face the threat of disaster. Therefore, based on the provisions of this article, disaster mitigation consists of two patterns, namely (1) structural mitigation, efforts to minimize disasters carried out through the construction of various physical infrastructure and using technological approaches; and (2) non-structural mitigation, efforts to reduce the impact of disasters, apart from physical efforts such as those in structural mitigation. Meanwhile, the definition of mitigation in the Annex of the Minister of Home Affairs Regulation Number 33 of 2006 on General Guidelines for Disaster Mitigation is an effort aimed at reducing the impact of disasters, both natural disasters, man-made disasters, and a combination of both in a country or community with four important things, namely (1) available information and maps of disaster-prone areas for each type of disaster; (2) socialization to increase public understanding and awareness in facing disasters, because they live in disaster-prone areas; (3) knowing what needs to be done and avoided, and knowing how to save themselves if a disaster arises, and (4) regulation and arrangement of disaster-prone areas to reduce disaster threats.

Through the two regulations related to mitigation above, based on the results of the interview, the disaster mitigation measures taken in the Upang River Basin Area are non-structural mitigation. Article 30 paragraph (3) of the Bangka Regency Regional Regulation No. 01 of 2013 on the Bangka Regency Regional Spatial Plan 2010-2030 states that the Upang River Boundary Area is included in the protection area and nature reserve area which aims to maintain river borders to protect rivers from human activities that can disturb and damage river water quality, the physical condition of the banks and riverbed and secure river flow. Other non-structural mitigations that are carried out are more about efforts to reduce disaster risk without the need to make physical modifications to the environment around the Upang River. This includes non-development strategies that are more about the preventive aspects carried out in the Upang River Area such as increasing public awareness, developing protection strategies, and developing disaster monitoring systems. Non-structural mitigation can be an effective solution in reducing the negative impacts of irregular mining activities.

In the context of the research focused on the Upang River Forest and Border Area, Tanah Bawah Village, Puding Besar Sub-district, Bangka Regency. Mining activities

nowadays are very developed with the results provided and are said to be very profitable for miners. However, this promising activity also has a detrimental impact on humans and the environment if the activity is carried out not based on established regulations. There are often and even many incidents that lead to environmental damage. This fact can be seen from the practice of tin mining and large-scale monocultural palm oil plantations in Bangka Regency, especially in this research which is focused on the Forest Area and Upang River Border, Tanah Bawah Village, Puding Besar District, Bangka Regency, Bangka Belitung Islands Province. By Bangka Regency Regional Regulation Number 01 of 2013 concerning Bangka Regency Spatial Planning for 2010-2030, it is stated that the Upang River Border Area is included in the protected area and natural reserve area.

Illegal logging cases are the highest crime handled by the Ministry of Environment and Forestry in the last five years, where logging activities themselves are logging activities to obtain logs. Meanwhile, illegal logging is the activity of logging, transporting, and selling wood which is a factual threat around borders that is illegal or does not have permission from local authorities (Rabbani, 2022). In cases of illegal logging in the Upang River area, which often occurs, it is carried out by a handful of people who earn a living by using wood from swamp tea, birch, guava, and mahogany trees which have economic value as basic materials for making houses and fish cages/cages in the sea. Another problem exists in the Sungai Upang area where many small-scale plantations owned by local communities have been turned into large-scale private plantations. There is massive land clearing being carried out to plant oil palm where previously people planted land with pepper or rubber. In this activity, there is environmental pollution that occurs through palm fertilizer waste that is carried away when heavy rain hits and pests on palm oil that attack orchid flowers.

In Bangka Regency Regional Regulation Number 01 of 2013 concerning Bangka Regency Spatial Planning for 2010-2030 Article 1 Number 35, where the river border is the area along either side of the river, including artificial rivers/canals/primary irrigation channels which have important benefits to maintain the sustainability of river functions. Meanwhile, in Article 1 Number 36, a natural reserve area is an area that represents a typical ecosystem which is a natural habitat that protects the development of unique and diverse flora and fauna. Based on the Regional Spatial Plan of Bangka Regency 2010-2030, the Upang River area in Tanah Bawah Village has been organized with provisions regarding river boundaries and nature reserve areas. The arrangement of the Upang River Boundary includes the regulation of land use along the left and right sides of the river to maintain the sustainability of the river's function. Efforts to restore riparian vegetation (vegetation around the river), and checking and improving river water quality are always considered. In addition, in 2020, a road was built access to the river by taking into account the regulations that have been established to maintain the sustainability of the ecological function of the river and reduce the risk of flooding and erosion.

Certain parts of the Upang River area that have high ecological value and biodiversity can be recognized as nature reserve areas. This is by the definition of a nature reserve area which refers to a natural habitat that protects the development of distinctive and diverse flora and fauna. The establishment of a nature reserve area requires an in-depth study of the biodiversity around the Upang River and the protection efforts needed to preserve its ecosystem. Suhadi, Gustomi, & Supratman (2020) stated that people in Tanah Bawah Village, Puding Besar Subdistrict, recognize and mention the Upang River in their daily activities. This river is one of the foundations of the community's livelihood and economy, especially in fishing activities in the vicinity and as

one of the rivers on Bangka Island, precisely the Bangka Regency area. Through spatial planning, there is a determination of zoning and appropriate land use for the Upang River area. This zoning may include conservation zones, protected zones, and sustainable use zones. Land use planning must prioritize environmental sustainability and consider the needs of the local community. The implementation of the Upang River area arrangement in Tanah Bawah Village with the established regional spatial plan, is expected to preserve the river ecosystem and provide benefits for the local community and environmental preservation.

The condition of the Upang River aquatic ecosystem is closely related to the type and intensity of activities of the surrounding community, including plantation and tourism activities around the Upang River. The impacts resulting from these activities can affect the river ecosystem. Increasing community needs, especially tourist and plantation activities, can spur pollution and increase the degradation of the aquatic environment which ultimately affects aquatic biological resources (Suhadi, Gustomi, & Supratman, 2020). The Upang River is a potential area for deeper study because there are few efforts to utilize and pay attention to it. The Upang River is a river that is rich in various river or freshwater biota. To minimize negative impacts in environmental management, on the contrary, to involve positive impacts, an approach to environmental management is needed.

According to Otto Soemarwoto as cited in Harahap (2020), nowadays there are at least two approaches and three instruments used and both are needed in environmental management. The two approaches are Common and Control (ADA or *Atur dan Awasi*) and Self-Manage (ADS or *Atur Diri Sendiri*). In the context of this research, the Common and Control approach has been applied through strict regulation and supervision of mining and plantation activities around the Upang River area. For example, the village government issued an appeal to mining actors prohibiting the use of mercury in the mining process to prevent the pollution of river water with hazardous substances. On the other hand, the self-regulation approach can be applied by encouraging the active participation of local communities in managing their environment. For example, by encouraging reforestation programs by local communities along the Upang River, such as planting trees that serve as erosion barriers and habitats for local flora and fauna.

Meanwhile, there are three environmental management instruments in the research analyzed and developed from Zairin's (2020) opinion, among others:

1. Regulatory and Supervisory Instruments, one of the instruments used in environmental management in the Upang River area is regulation and supervision which aims to reduce environmental pollution. An example is the implementation of a ban on illegal mining activities using hazardous chemicals in the mining process that can pollute river water quality and prohibit forest logging activities.
2. Economic Instruments can be applied in environmental management in the Upang River area, for example by providing incentives to companies or individuals who implement environmentally friendly agricultural or mining practices, such as the use of more energy-efficient technologies.
3. Persuasive Instruments are also important in changing people's behavior towards more environmentally friendly practices. An example is through environmental education programs and community outreach on the importance of preserving the Upang River as a valuable natural resource.

Risks posed by development (Yasminingrum, 2018) can be in the form of (1) damage to various vital life support systems for humans, both biophysical and social systems; (2) the emergence of new dangers due to human creation, such as dangerous

and toxic materials and biotechnology products; (3) transferring the risk burden to the next generation or other areas, and; (4) lack of functioning of the social organization system in society.

Environmental issues are currently a serious concern for many groups, including government, business people, academics, environmental organizations, and society itself. The Upang River Conservation Area was prepared as a means for educational purposes so a collaboration was formed to form the management of the Friends of Nature Tourism Awareness Group (*Pokdarwis Salam*) Upang River, Youth Organization (*Karang Taruna*) and Village-owned Enterprise (*BUMDesa*) Tanah Bawah, led by the Bangka Flora Society. Hence, the importance of environmental awareness and cross-sector collaboration in addressing environmental issues, especially in the Upang River Conservation Area.

In this study, more depth is found on this matter, where awareness of the importance of protecting the environment is increasing in various circles of society. Factors such as climate change, environmental degradation, and ecosystem damage are the main concerns in triggering this awareness. Cross-sector collaboration is key in addressing complex environmental issues. In the case of the Upang River Conservation Area, a collaboration between the local government, non-governmental organizations (Bangka Flora Society), Youth Organization (*Karang Taruna*), and Village-Owned Enterprises (*BUMDesa Tanah Bawah*) form a unity in sustainable environmental management efforts. This shows the importance of synergy between various parties in achieving a common goal to preserve the environment.

The use of the Upang River Conservation Area as an educational destination is a very appropriate step. Education is an important instrument in increasing public awareness and understanding of the importance of environmental conservation. By utilizing this area as an educational facility, the community can better understand the ecological value and importance of preserving the Upang River and its surrounding ecosystems. Involving local communities in the management of conservation areas is a strategic step. Collaboration with the Friends of Nature Tourism Awareness Group (*Pokdarwis Salam*) Upang River and Youth Organization (*Karang Taruna*) strengthens community participation in environmental conservation efforts. Thus, the community is not only the object but also the subject in the process of environmental management, which will ultimately create a sense of ownership and responsibility for environmental sustainability.

The involvement of the Youth Organization (*Karang Taruna*) and Village-Owned Enterprises (*BUMDesa Tanah Bawah*) shows the important role of youth and the local economy in sustainable development. In addition to contributing to environmental conservation efforts, this collaboration can also have a positive impact on local economic development through sustainable tourism and wise management of natural resources. Thus, collaboration between various parties, continuous environmental education, active community participation, and the utilization of local economic potential are key to overcoming environmental challenges and maintaining the sustainability of the Upang River Conservation Area and the environment in general.

The Upang River has been managed to be a means of environmental conservation, especially the conservation of peat swamp forests and the surrounding Upang River borders. Management is carried out independently with the principle of empowerment of community working groups in managing ecotourism areas using the biodiversity concept. The Friends of Nature Tourism Awareness Group (*Pokdarwis Salam*) Upang

River is a youth organization whose focus is on environmental issues in its area, namely in the Tanah Bawah Village area.

Based on the interview, show that the environmental potential in the Upang River area of Tanah Bawah Village can currently be said to be very adequate, especially now that the biodiversity of orchids is being intensively replanted after the forest fires that occurred in 2019 and the spread of wildlife in the river area. Apart from that, illegal tin mining activities and illegal logging carried out by members of the public have been well managed so that no more activity can be seen. The conservation efforts carried out by Friends of Nature Tourism Awareness Group (*Pokdarwis Salam*) Upang River are divided into protection efforts which have coverage efforts to save the ecosystem as a whole, and preservation efforts which have a more specific scope of saving species and utilization through a zoning system that has coverage of ecology, economics and social. To protect the river border area and prevent illegal mining and illegal logging activities, Friends of Nature Tourism Awareness Group (*Pokdarwis Salam*) Upang River carries out supervision by carrying out patrol activities in turns every day.

The Village Government also facilitated a stilt house which was used as a guard post and two motorboats to facilitate security monitoring and protection around the river. Another form of prevention is by installing prohibition boards and information boards which are carried out to protect river areas from all activities destroying the ecosystem and providing education or information to the public. The board installation locations are spread across several strategic points. Prohibition boards are located in the forest area and on Orchid Island, while information boards are scattered both within the ecosystem area and outside the area.

Community empowerment carried out in developing ecotourism has a direct impact on the community's economy. So far, community members have obtained results from the agriculture and fisheries sectors. With ecotourism, residents will get additional income from selling services. From here, researchers saw the existence of a Business Model Canvas introduced by Alexander Osterwalder which is a business model with the main function to make it easier for entrepreneurs to pour business ideas into a simple framework and understand business goals. This model is a management strategy in the form of a simple business framework to present important elements. The nine elements are value proposition, customer segments, customer relationships, channels, key activities, key resources, key partners, cost structure, and revenue streams. The preparation of this business framework will help businesses that will or are being developed (Retno & Mutiara, 2022).

Research that has been carried out proves that the elimination of illegal mining and illegal logging activities as well as the increase in ecotourism businesses in the Upang River area play an important role in saving the environment and the welfare of people's lives. Disaster prevention through counseling and outreach can further increase the role of the Friends of Nature Tourism Awareness Group (*Pokdarwis Salam*) Upang River with the assistance of the Bangka Regency Regional Disaster Management Agency in empowering the community in terms of environmental protection and the community's economy. The activities carried out are evidence that the community has applied the principles of sustainable development. Where an empowered community is the basic capital of sustainable development that allows it to process and manage the potential of natural resources properly, precisely, efficiently, and maximally while maintaining environmental sustainability. Therefore, an empowered community will have a better mindset in carrying out activities that coexist with the environment. The development of Upang River ecotourism with the biodiversity concept has a positive impact on the

surrounding community. Where biodiversity is the diversity of living organisms in an ecosystem which plays an important role in the continuity of life on earth because it plays an important role in maintaining natural balance and creating a healthy environment. Biodiversity also helps prevent disease and protect ecosystems from human disturbances such as deforestation, land degradation, and others.

Biodiversity is part of the life cycle of nature. Ecosystems consist of various organisms that interact with each other, and biodiversity allows the food chain to function smoothly. Without biodiversity, this life cycle will be disrupted and could cause a severe ecological crisis. Apart from that, biodiversity also provides economic benefits. Some organisms can be used as a food source for humans, and some can be used as medicine. Biodiversity also plays a role in increasing land productivity and providing natural resources that can be utilized by humans. Biodiversity is also important for plant and animal life. Several different organisms can create a healthy environment and provide a safe place to live for animals and plants. Without biodiversity, the ecosystem will become unbalanced and the natural balance will be disturbed. So, biodiversity is very important for the survival of life in the world. If biodiversity is damaged, survival will also be damaged, which will also impact the security of human life itself. By conserving and protecting biodiversity, we can ensure that the world's ecosystems remain healthy and sustainable. This is important so that in the future we can also enjoy the natural benefits offered by ecosystems forever.

CONCLUSIONS, RECOMMENDATIONS, AND LIMITATIONS

Biodiversity is biological diversity, referring to the diversity of all forms of life on Earth, including various types of organisms, ecosystems, and genetics. It includes diverse species of plants, animals, microbes, and more. Biodiversity is a sign of complex natural balance and is very important for environmental sustainability. Biodiversity underpins many aspects of human life, including natural resources, food, medicine, and more. Biodiversity and environmental sustainability are inseparable. The loss of biodiversity can have a huge impact on human life and the environment while preserving biodiversity is one of the keys to the sustainability of life in the future. As such, humans have an important role to play in conserving biodiversity and keeping our planet a viable place for future generations. Efforts to protect and conserve biodiversity and protect the environment are the right actions for the sustainability of life on earth.

Environmental management, including prevention, management of damage and disasters as well as pollution, and restoration of environmental quality, has required the development of various policy tools and programs as well as activities supported by other environmental management support systems. The development of Upang River Ecotourism with a Biodiversity concept has a positive impact on the surrounding community. The role of the Friends of Nature Tourism Awareness Group (*Pokdarwis Salam*) Upang River in developing the Upang River Ecotourism Area is divided into four activities, namely conservation, education, social, and economic. Development can only be sustainable if there is a harmonious relationship between the economy, the environment, and the management of its resources. Furthermore, it is hoped that the government, as a formal institution that regulates governance and the supply of natural resources in Indonesia, will need to establish appropriate policies in the future to create sustainable management of natural resources as a basis for maintaining a balance between environmental sustainability.

In the process of conducting this research, some limitations may affect the results of the study, namely the limited research time and ability of researchers. This study only

assesses the implementation of increasing community knowledge capacity in terms of awareness of environmental conservation, biodiversity, and disaster prevention in the Upang River. The conclusions drawn only based on the acquisition of data analysis, it is expected that further research on the quality of service on patient satisfaction with different research methods, wider samples, and the use of different and more complete research instruments.

REFERENCES

- Anies. (2021). Indonesia, Negara Sejuta Bencana. Retrieved December 20, 2023, from Kompas website: <https://www.kompas.id/baca/opini/2021/01/20/indonesia-negara-sejuta-bencana>
- Bangka Regency Regional Regulation Number 01 Year 2013 concerning Bangka Regency Spatial Planning for 2010-2030. (2013).
- Handayani, D. A., Kurniadi, A & Bahar, F. (2022). Strategi Pengurangan Risiko Bencana Berbasis Pemberdayaan Masyarakat Desa Penyangga Kawasan Konservasi Taman Nasional Gunung Merapi. *Jurnal Litbang Sukowati: Media Penelitian dan Pengembangan*, 6(1), 84-97. <http://dx.doi.org/10.32630/sukowati.v6i1.328>
- Harahap, Z. (2020). *Penegakan Hukum Lingkungan Indonesia*. Yogyakarta: FH UII Press.
- Ismi, N. (2020). Sungai Upang dan Masa Depan Konservasi Pulau Bangka. Retrieved December 14, 2023, from Mongabay website: <https://www.mongabay.co.id/2020/11/19/sungai-upang-dan-masa-depan-konservasi-pulau-bangka/>
- Jaime, R.G.M., Tobias, K., Carlos, A.P., Cesar, A. R., Patricia, B., Titi, M & Fabio, A. (2016). Effectiveness Of Conservation Areas For Protecting Biodiversity And Ecosystem Services: A Multi-Criteria Approach. *International Journal of Biodiversity Science, Ecosystem Services & Management*, 13(1), 1-13. <https://doi.org/10.1080/21513732.2016.1200672>
- Latupapua, L., & Sahunilawane, J. (2023). Upaya Perlindungan Satwa Liar Untuk Mempertahankan Keanekaragaman Hayati Di Negeri Hutumuri, Kecamatan Leitimur Selatan, Kota Ambon. *Jurnal Pengabdian Kepada Masyarakat Dewantara*, 1(1), 461-468. <https://doi.org/https://doi.org/10.54082/jipm.171>
- Law Number 24 of 2007 concerning Disaster Management*.
- Maghfira, N. S. (2021). Apa Itu Biodiversity? Retrieved December 20, 2023, from Biodiversity Warriors website: <https://biodiversitywarriors.kehati.or.id/artikel/apa-itu-biodiversity/>
- Manan, R. . (2010). Pengembangan Kawasan Pasca Pertambangan Timah: Pendekatan Konsep Eco-Development. *Jurnal Lanskap Indonesia*, 2(1), 8-14. <https://doi.org/https://doi.org/10.29244/jli.2011.3.1.%25p>
- Minister of Home Affairs Regulation Number 33 of 2006 on General Guidelines for Disaster Mitigation.*, (2006).
- Moleong, L. J. (2018). *Metodologi Penelitian Kualitatif* (Translated). Bandung: PT. Remaja Rosdakarya.
- Nabila, M. (2023). Indonesia Negara Paling Rawan Bencana Kedua di Dunia. Retrieved December 12, 2023, from Deepublish website: <https://databoks.katadata.co.id/datapublish/2023/10/17/wri-2022-indonesia-negara-paling-rawan-bencana-kedua-di-dunia>
- Nurdiansyah, M. I. (2022). Peringkat 1 Negara dengan Potensi Tsunami, Indonesia Harus Segera Sadar Bencana Melalui Pentahelix. Retrieved December 12, 2023, from kompasiana.com website:

- <https://www.kompasiana.com/irfannurdiansyah5246/63778c8c7bda0265ba134f%0ad2/peringkat-1-negara-dengan-potensi-tsunami-indonesia-harus-segera-sadar-%0abencana-melalui-pentahelix>
- Rabbani, A. (2022). Pembalakan Liar: Pengertian, Dasar Hukum, Penyebab, Dampak dan Upaya Pencegahannya. Retrieved December 12, 2023, from Sosial79 website: <https://www.sosial79.com/2022/02/pembalakan-liar-pengertian-dasar-hukum.html>
- Retno M, N. W., & Mutiara W, K. (2022). Pengelolaan Lingkungan Hidup Dan Pencegahan Bencana Melalui Konsep Eco-Development (Studi Kasus Di Kawasan Mangrove Baros Kabupaten Bantul Propinsi Yogyakarta). *Jurnal Literasi Hukum*, 3(1), 117–130. <https://doi.org/10.31002/lh.v6i2.6812>
- Setiadi, S., Pritanto, A. A., Sri, B. F. A., & Sofiana, N. K. (2023). Konservasi Keanekaragaman Hayati Endemik Melalui Ecology, Socio-Economic, Dan Socio-Cultural Approach (Studi Pada Taman Kehati Kokolomboi, Sulawesi Tengah). *Jurnal Program Studi Pendidikan Masyarakat*, 4(1), 244–254. Retrieved from <https://jurnal.fkip.unmul.ac.id/index.php/l/article/view/2313/1208>
- Sugiyono. (2014). *Metode Penelitian Kuantitatif, Kualitatif dan R & D*. Bandung: Alfabeta.
- Suhadi, M., Gustomi, A., & Supratman, O. (2020). Struktur Komunitas Plankton Sebagai Bioindikator Kualitas Air Di Sungai Upang Desa Tanah Bawah kecamatan Puding Besar. *Jurnal Sumberdaya Perairan*, 4(1), 26–32. <https://doi.org/10.33019/akuatik.v14i1.2014>
- Wicaksono, R. D., & Pangestuti, E. (2019). Analisis Mitigasi Bencana Dalam Meminimalisir Risiko Bencana (Studi pada Kampung Wisata Jodipan Kota Malang). *Jurnal Administrasi Bisnis*, 7(1). Retrieved from <http://administrasibisnis.studentjournal.ub.ac.id/index.php/jab/article/view/2824>
- Wiryokusumo, I. (2014). *Teori Pengembangan*. Surabaya: Universitas Negeri Medan.
- Yasminingrum. (2018). Peran Serta Masyarakat dalam Perlindungan dan Pengelolaan Lingkungan Hidup. *Jurnal Hukum Dan Dinamika Masyarakat*, 5(1). Retrieved from <http://jurnal.untagsmg.ac.id/index.php/hdm/article/view/687/646>
- Zairin, H. (2020). *Penegakan Hukum Lingkungan Indonesia*. Yogyakarta: FH UII Press.