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Research Paper

From Extractive Mining to Green Tourism: A Case Study of Open Pit Nam Salu Geosite Through Local Community Development

Tri Wibowo[1*], Arry Aditsya Yoga[2], and Kharisma Rinandyta[3]

[1]Faculty of Law, Universitas Diponegoro, Semarang, Indonesia
[2] School of International Studies, Universiti Utara Malaysia, Kedah, Malaysia
[3] Faculty of Mathematics and Sciences, IPB University, Bogor, Indonesia

***Correspondence author**: triwibowo260602@gmail.com*

Abstract

Extractive mining has long been central to Belitong Island's economy, particularly tin exploitation since 1908 during the Dutch East Indies period. With Belitong's designation as part of the UNESCO Global Geopark (UGGp), a new opportunity arises to transition toward sustainable economic practices. This research examines the transformation of the Open Pit Nam Salu geosite from a mining-focused economy to an environmentally sustainable green tourism model, emphasizing local community development. Employing a mixed-methods approach, including observations and in-depth interviews with communities and stakeholders, the study explores the geosite's geological and socio-economic potential. It identifies key opportunities and challenges in adopting green tourism while highlighting the critical role of local community involvement in fostering economic resilience. The findings provide a development model that integrates environmental conservation with economic growth. Open Pit Nam Salu's transformation exemplifies how ecological preservation and local economic enhancement can coexist, offering insights for broader application across Indonesia.

Keywords: Green Tourism; Local Community; Sustainable Economy; Open Pit Nam Salu; Former Mining.

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Address: Jalan Proklamasi 70, Central Jakarta, Indonesia 10320
Phone: +62 21 31928280/31928285
Fax: +62 21 31928281
E-mail: journal.pusbindiklatren@bappenas.go.id

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1. Introduction

Former mining site have undergone drastic changes, significantly altering the natural landscape. These changes are driven by key factors such as mineral extraction, which damages soil structure and vegetation, as well as erosion and runoff that accelerate land degradation (Pukowiec & Apollo, 2024). This process is often worsened by the formation of water-filled pits, which create mining lakes that not only alter the geomorphology but also pose risks of groundwater contamination and environmental hazards. Additionally, this ecological damage disrupts the hydrological cycle, affecting both surface and groundwater flows, and contributes to microclimate changes, such as increased local temperatures and decreased humidity. The lack of adequate reclamation efforts by mining companies further exacerbates these conditions, hindering ecosystem recovery and long-term sustainability (Everingham et al., 2022).

The impact of this degradation extends to social, economic, and environmental aspects. The loss of natural resources that sustain local livelihoods and the damage to biodiversity disrupt the entire ecosystem, raising concerns about whether former mining activities will affect the sustainability of local communities and how these communities will respond to these challenges. In the socio-economic context, this impact is reflected in the shift in livelihood practices in Belitung. Historically, the community depended on the fisheries and agriculture sectors; however, these traditional livelihoods have been increasingly replaced by illegal mining activities. This shift has significant social implications, as it leads to a transformation in the community's way of life. While illegal mining may offer short-term economic gains, it undermines sustainable practices and introduces instability. The depletion of natural resources exacerbates these economic vulnerabilities, as industries like fishing and farming, once essential to the local economy, are directly affected. Environmentally, illegal mining causes severe degradation, including land erosion and water pollution, which further harms biodiversity and the overall ecosystem. This environmental damage, combined with the social and economic disruptions, threatens the long-term sustainability of local communities.

Looking at the current status quo, the sustainability of former mining sites in Belitong Island is not yet being seriously addressed, particularly due to the vast areas of illegal mining that have not undergone any reclamation efforts. The abandoned mining land in Belitong spans 45,675 hectares, consisting of 42,515 hectares of land, or 93.53% of the island's area, and 3,160 hectares of water bodies, or 6.47% of the island (Sukarman & Gani, 2017). It is estimated that most of the land damaged by illegal mining has not been proposed for any restoration efforts, contributing to further ecosystem degradation (Wibowo, 2018). The lack of reclamation leads to severe soil erosion, surface water pollution, and the loss of mangrove forests, which harms biodiversity and reduces the quality of life for local communities who rely on natural resources, particularly in fishing and farming. This situation also disrupts the hydrological cycle, causing floods and decreasing the quality of clean water.

Historically speaking, mining exploitation in Belitong was first conducted by Billiton Maatschappij Company, which began exploration in 1890 and officially started operations in 1908. The open-pit mining methods employed by the company, including blasting and underground tunneling, drastically altered the landscape, leaving environmental damage that persists until these days. This land transformation not only disrupted the natural ecosystem but also posed a threat to the socio-economic impact of the local communities. After more than 50 years of operation, mining companies in Belitung ceased their activities, leaving behind a legacy that changed the natural shape of the Kik Karak hills, located in Senyubuk Village, Kelapa Kampit District, East Belitung Regency. This area experienced significant changes to its natural topography due to mining exploitation.

Over time, the government planned to repurpose this former mining site as a landfill. However, further exploration of the Open Pit Nam Salu area revealed highly unexpected and fascinating geological discoveries. This exploration uncovered that the Open Pit Nam Salu area holds geological diversity of international value. These findings enabled scientists to uncover the geological age of Belitong Island, which was previously not well understood.

This geological discovery emerged during the process of Belitong's proposal to be recognized as a UNESCO Global Geopark, at a time when Belitong was in the process of applying for National Geopark status. Through this recognition, various initiatives began to emerge to preserve the high-value areas of Belitong, including rehabilitation efforts for the Open Pit Nam Salu. One of the most effective approaches

in these efforts is through the development of sustainable tourism. This approach, according to various literature such as Scott et al. (2023), is considered a significant pro-environmental step, as future tourism will be heavily influenced by climate change.

According to a study conducted by Kurda & Apollo in 2024, which discusses the transition of former coal mining sites into the tourism sector, it is explained that this transformation has been successfully implemented by developed countries, whereas developing countries tend to struggle in fully understanding the concept of such transformation. Therefore, the case study of Open Pit Nam Salu seeks to explain how Indonesia, as one of the developing countries, has contributed and, with a visionary approach, recognizes the need for better conservation efforts to address environmental damage caused by open-pit mining by transforming it into a sustainable tourism sector.

What differentiates it from developed countries is that the success of this transformation effort is heavily influenced by the support of the local community around Open Pit Nam Salu, who play a key role in driving the initiative. The local residents have initiated and supported the development of green tourism, which not only focuses on environmental preservation but also recognizes the international significance of the site in terms of geology and eco-tourism. This study aims to highlight the importance of local communities in creating environmentally-friendly tourism in former mining sites, which have great potential as conservation-based tourist destinations.

Thus, tourism can serve as a means of transitioning toward a more environmentally-friendly development model, as emphasized by the Sustainable Development Goals (SDGs), which include economic growth, decent job creation, poverty alleviation, and the development of sustainable communities (SDGs, 2024; Kurda & Apollo, 2024). Therefore, sustainable tourism not only contributes to environmental conservation but also supports broader economic and social goals, particularly for those living in the area.

2. Methods

This study employs a mixed-methods approach, combining descriptive analytical methods to explore the dynamics of the Open Pit Nam Salu geosite as a community. Both qualitative and quantitative data were collected using observations, in-depth interviews, checkbox-short-answer surveys, and literature reviews. The mixed-methods design ensures a comprehensive understanding of social satisfaction regarding the geosite's sustainability, while optimizing research efficiency under time and field data constraints (Nistor, 2024). Numerical data, strengthened by online survey responses via Google Forms, complements the manual observations to capture insights from a broader audience effectively.

The integration of qualitative and quantitative techniques facilitates cross-verification of findings, ensuring a solid foundation for analysis and conclusions (Akutey & Tiimub, 2021). The method captures the complexity of managing the geosite, considering environmental, socio-cultural, and economic dimensions. Qualitative research focuses on uncovering social phenomena through personal emotions and experiences, while quantitative data provides measurable insights, contributing to a well-rounded exploration of the site's dynamics (Byrd, 2020).

Data sources include primary information gathered through interviews with geosite managers and local community members, alongside secondary data from geosite management documents and academic literature. Indexed scientific articles and research papers provide additional scholarly context, enabling the researchers to combine firsthand stakeholder perspectives with documented evidence. This comprehensive methodology supports a nuanced and well-supported investigation of the Open Pit Nam Salu geosite's social and environmental role.

Data collection commenced with a preliminary quantitative phase, while qualitative methods, including interviews and analytical description, became essential, supported by a literature review related to Nam Salu and its dynamics (Arundell et al., 2021). Although quantitative data was not utilized as a primary method for data provision, the integration of literature employing quantitative data is anticipated to offer a comprehensive perspective and minimize bias in interpretation (Benítez et al., 2019). Furthermore, the relevant literature review ensures that the recommendations of this study are informed by best practices and proven strategies from other contexts (Mwita, 2022). The table below serves as a tool to elucidate the simplified concepts of this research methodology.

Table 1: Methodology on this Research.

Research Methodology	
Concept	**Indicators**
Research Approach	Focus on capturing complexity, emotions, and experiences related to the transformation of Nam Salu from former mining site.
Research Method	Analyze interactions within the geopark site community, focusing on green tourism implementation, local community empowerment, socio-cultural, and economic paradigms.
Data Collection Techniques	In-depth Interviews: Local community members, geosite managers, and stakeholders. Literature Review: Local community development, green tourism, sustainable tourism, geosite management, environmental conservation.
Analysis Method	Opinions and changes in social paradigms. Minimize interpretation bias through deep analysis.
Rationale for Qualitative Approach	Avoid limitations of quantitative methods. Provides holistic views of the physical, social, and economic impact.
Supporting Tools: Quantitative	Not the primary method but provides a broader understanding when combined with qualitative insights to support the understanding of research framework (Kay, 2022).

3. Results and Discussions

3.1 Implementation of Green Tourism

Tourism has emerged as one of the most dynamic sectors in the global economy (Ariyanto, 2022), now ranking as the third-largest economic activity worldwide and growing at the second-highest rate, following the oil and auto industries (Thommandru et al., 2023). Green tourism in Nam Salu encourages the community to repurpose former mining sites sustainably. This approach includes various practices aligned with green tourism principles: reusing materials, exploring underground tunnels with safety checks, educating visitors on environmental damage, empowering the local community, and fostering cross-sector collaboration. Green tourism, in essence, integrates tourism with environmental stewardship, where decisions are guided by environmental ethics.

The field of environmental ethics concerns human beings' ethical relationship with the natural environment (Hourdequin, 2024). Although there is a lot of debate among philosophers about what environmental ethics is and its limits, there are also many "centers" that are used as markers, such as anthropocentric environmental ethics that considers human existence, or animal rights to deep ecology (Tresca, 2020). However, broadly speaking, partiality towards the environment is the basis of environmental ethical thinking. Then, this thinking is used in the concept of sustainability, including green tourism.

Green tourism is defined as environmentally friendly tourism activities with various focuses and meanings. In a broad term, green tourism is about being an environmentally friendly tourist or providing environmentally friendly tourist services (Al Fahmawee & Answerreh, 2023). Green tourism is used interchangeably with such terms as sustainable tourism, nature tourism, and rural tourism. Green Tourism satisfies the requirements of environment and its protection from pollution through programmes in which entertainment and protection complement each other. If authorities can use this strategy to promote the growth of Green Tourism, it can serve as an environmentally friendly and sustainable management solution to address climate change concerns (Saleh & Faisal, 2024).

Green tourism implementation at the Nam Salu Open Geosite is a strategic effort to manage tourism in a way that supports sustainability. The concept of green tourism is in the same realm as sustainable development in the field of tourism, especially to pair it with the perspective of Community-Based Tourism (CBT), this has gone through fierce debate (Dangi & Jamal, 2016). In recent years, sustainable tourism has emerged as a significant approach to balancing economic growth with environmental preservation and cultural conservation (Khan et al., 2020).

This concept aligns with the goals of the UNESCO Global Geopark, which emphasizes conservation. It promotes responsible tourism practices that reduce negative impacts on the environment and local communities while enhancing positive economic outcomes (Fretes et al., 2023). To assess how the community in Open Pit Nam Salu has contributed to green tourism and its alignment with the Belitong Geopark's principles under UNESCO Global Geopark standards, we can examine four key components according to Dodds and Joppe in Furqan (2010) in the table below.

Table 2: Nam Salu Perform and Prominence by Green Tourism Concept

Component	Actions by the Community in Geosite Open Pit Nam Salu
Environmental Responsibility	Initiatives to preserve the geosite by reducing waste and promoting eco-friendly practices. Reforestation efforts and maintaining the natural landscape of the Open Pit area. Conservation of biodiversity and protection of the local environment.
Local Economic Vitality	Involvement of local entrepreneurs and small businesses in tourism-related activities such as food stalls, handicrafts, and guiding services. Creation of job opportunities for locals within the tourism sector. Supporting local markets through the sale of locally made products to tourists.
Cultural Diversity	Promotion of Belitong's traditional culture through storytelling, local arts, and heritage exhibitions at the geosite. Active participation of the local community in cultural festivals and rituals linked to the geosite, through informal school like *Sekolah Alam Bekas Tambang* or called SATAM. Heterogenous collaborative, tolerance campaign, and acculturation promotion.
Experiential Richness	Offering guided tours to provide historical, cultural, and geological insights about Nam Salu and its significance. Organizing cultural events, allowing tourists to engage with local traditions and customs. - Developing adventure tourism, such as hiking and nature trails, to enhance visitor experience.

Based on four key components above, the initiative aims to benefit local communities by drawing on several key theoretical frameworks that offer insights into the development and implementation of effective green tourism practices. The goal of implementing the four components of green tourism is to assess how well the Open Pit Nam Salu has incorporated green tourism principles. This framework evaluates whether the practices at Open Pit Nam Salu align with environmental, economic, cultural, and experiential criteria, all of which are key aspects of a destination focused on sustainable development and community-based tourism. By applying this framework, it becomes possible to determine whether the site's practices contribute to the development of green tourism while benefiting the local community.

Relevant concepts that underpin these efforts include Community-Based Tourism (CBT) and Sustainable Tourism. Nam Salu's shift from an extractive economy to a sustainable sector can be analyzed through the lens of CBT to understand the factors behind its success. CBT emphasizes active local participation in tourism development (Giampiccoli & Saayman, 2018), promoting an approach where local populations directly manage tourism activities. This ensures that the economic benefits of tourism are distributed equitably. It advocates moving from a top-down approach to a more holistic perspective, integrating human rights and social justice to foster development across all sectors and levels, such as CBT.

There is also a need to involve communities with special rights and marginalized groups to ensure resource sustainability for future generations (Giampiccoli & Mtapuri, 2019). The focus on sustainability, community participation, and empowering local communities to manage their own resources has gained traction since the United Nations Conference in 1972, followed by the Brundtland Report in 1987, and Agenda 21 in 1992 (Priatmoko et al., 2021). This evolution underscores the importance of local community involvement in economic development to achieve equitable and sustainable outcomes that align with the UNESCO Global Geopark concept. At the Nam Salu Geosite, local community members work as guides, facility managers, and operators, providing an alternative livelihood crucial for a community historically reliant on tin mining.

Community-Based Tourism (CBT) in Open Pit Nam Salu Geosite fosters a strong sense of belonging and responsibility among local residents, empowering them to protect their environment. By encouraging sustainable practices, CBT not only builds pride within the community but also strengthens its resilience to global challenges, including the mounting impacts of climate change on tourism and everyday life (Meirinawati & Pradana, 2018). This model equips residents to become active stewards of their land, resources, and cultural heritage, positioning them as key players in shaping their future while creating a more sustainable local economy.

Climate change poses significant threats to tourism in tropical regions like Nam Salu, where rising global temperatures, shifting weather patterns, and extreme weather events disrupt natural attractions and ecosystems that draw visitors. Increased rainfall variability, for example, can lead to droughts that reduce water supplies, or flooding that damages infrastructure, limiting tourist access to main attractions

and impacting local incomes and economic stability. Additionally, extreme weather events and rising sea levels endanger biodiversity, threatening the local flora and fauna that make Nam Salu unique. Studies like Samreen Siddiqui's 2022 research, Impact of Climate Change on Tourism, highlight similar challenges, emphasizing the critical need for climate-resilient infrastructure and practices to protect tourism from these threats.

In response, the Open Pit Nam Salu Geosite community has embraced green tourism practices that emphasize environmental stewardship. By aligning with green tourism principles, the community aims to reduce tourism's carbon footprint, safeguard biodiversity, and make local attractions more resilient to climate-related disruptions. This shift has been facilitated by academics and environmental leaders working within the Open Pit Nam Salu Geosite, who have introduced a new paradigm focused on sustainability and environmental responsibility. This approach aligns closely with the Sustainable Development Goals (SDGs), creating a framework for long-term, sustainable development (Moutinho et al., 2017).

The integration of CBT with green tourism principles not only strengthens the community's resilience to climate impacts but also fosters a unique ecotourism model that appeals to environmentally conscious visitors. By actively addressing climate change within the tourism sector, Open Pit Nam Salu Geosite is paving the way for a tourism model that prioritizes both community well-being and environmental sustainability, ensuring that the region remains a viable destination for future generations despite the ongoing challenges posed by a changing climate.

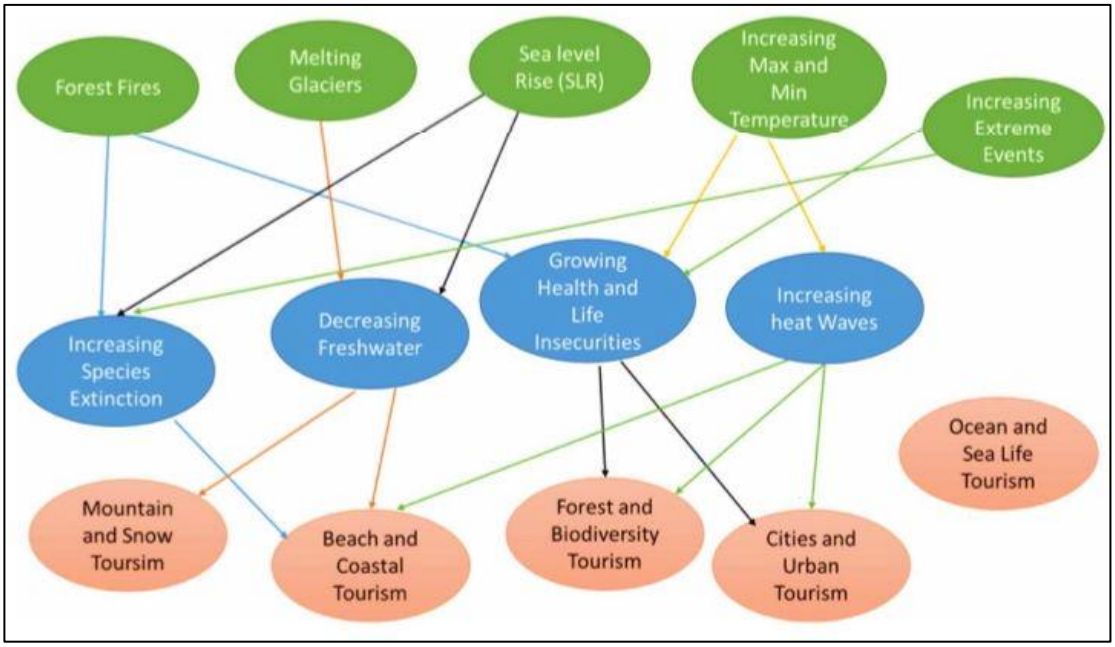

Figure 1: Impact of Climate Change on Tourism.

The idea that the Open Pit Nam Salu Geosite is not only a tourist attraction, but also an environmental education center in the Kelapa Kampit and Belitong Geopark areas, is in line with the development of a global paradigm regarding the role of humans in preserving the environment (Daneshwar & Revaty, 2024). The community at the Open Pit Nam Salu Geosite is beginning to realize that nature-based tourism is not enough to only offer natural beauty as the main attraction but must also build collective awareness about the importance of human involvement in preserving the environment.

This concept is known as geoeducation, where tourists and travelers not only enjoy the beauty of nature, but also gain an understanding of the importance of ecosystem sustainability and their role in safeguarding the environment. Geoeducation is an effort to integrate environmental education in tourism activities (Hernández et al., 2024). At Open Pit Nam Salu Geosite, visitors can learn about the geological

processes that shape the landscape, the history of tin mining, and how environmental change and the exploitation of natural resources have impacted the local community.

By studying these dynamics, visitors can better appreciate the importance of maintaining a balance between resource exploitation and environmental conservation. Open Pit Nam Salu Geosite seeks to position itself as an "agent of change" in environmental issues. They see tourism as a game-changer that can influence the mindset of many people regarding the importance of environmental conservation. This is especially relevant in the midst of the threat of mass extinction caused by human activities, such as deforestation, climate change, and overexploitation of natural resources (Munstermann et al., 2022). By using tourism as a means of education, Open Pit Nam Salu Geosite invites tourists to be more aware of the importance of protecting the environment and supporting conservation efforts.

The environmental learning center at Open Pit Nam Salu Geosite offers an opportunity for visitors to gain deeper insight into the environmental issues faced by the region. They can learn sustainable practices that can be adopted in daily life, such as waste management, the use of renewable energy, and former mining site rehabilitation efforts. This kind of education is very important, because it can have a long-term impact on changes in human behavior, especially in terms of how they interact with the natural environment (Brocx & Semeniuk, 2019). This approach is also in line with UNESCO's geopark goals which emphasize three main pillars, namely conservation, education, and sustainable development.

Through the geoeducation approach, Open Pit Nam Salu Geosite not only focuses on the commercial aspects of tourism, but also commits to making a real contribution to environmental conservation and sustainable development efforts. This kind of education-based tourism also has the potential to create added value for local communities, both from an economic perspective and from increasing environmental awareness. Thus, Open Pit Nam Salu Geosite emphasizes that tourism must be seen as a tool to achieve sustainability goals. Tourists not only come to see and enjoy the beauty of nature, but also to learn, reflect, and contribute to environmental conservation efforts. Through collaboration between local communities, governments, and tourists, Open Pit Nam Salu Geosite hopes to create a significant change in the way people view and treat nature, thus avoiding greater environmental disasters in the future.

3.2 Local Community Development in Open Pit Nam Salu Geosite

The development of green tourism in Open Pit Nam Salu aligns with the concept of spontaneous participation as outlined in the typology of community participation in tourism development studied by Pinheiro (2020). This typology reflects a bottom-up approach, wherein local community members actively engage in decision-making processes and independent planning. Such participation is characterized by its authenticity, with the local communities exercising full control over the tourism development within their region. In this context, the communities surrounding Open Pit Nam Salu Geosite assume the roles of planners, decision-makers, and primary managers of tourism activities, embodying a form of participation that is both inclusive and community-driven.

Community-Based Tourism (CBT) presents itself as an effective framework to be implemented at Open Pit Nam Salu. As noted by Naik (2014), the term "community" within the CBT framework refers to marginalized or underprivileged groups who should act as the primary actors and beneficiaries of tourism development. Hence, the CBT model at Nam Salu must be designed and managed by the local community itself, with full control over decisions, ownership, and the management of tourism development (Terencia, 2018). In this way, the economic benefits derived from tourism will be directly channeled back to the local community.

Community participation is not only a key element but also central to the successful implementation of CBT. Burgos & Mertens (2017) argue that CBT is built upon the foundations of community participation and social organization, grounded in a development approach that is socially just and environmentally responsible. In the context of Open Pit Nam Salu, the participation of local communities in controlling tourism development is crucial. Djou et al., (2017) emphasize that CBT consists of three fundamental aspects: community involvement, equitable economic access, and political empowerment, all of which position the community as the primary decision-makers. Therefore, the CBT model in Nam Salu serves as

an effective mechanism not only to provide economic advantages but also to promote political and social empowerment for the local community.

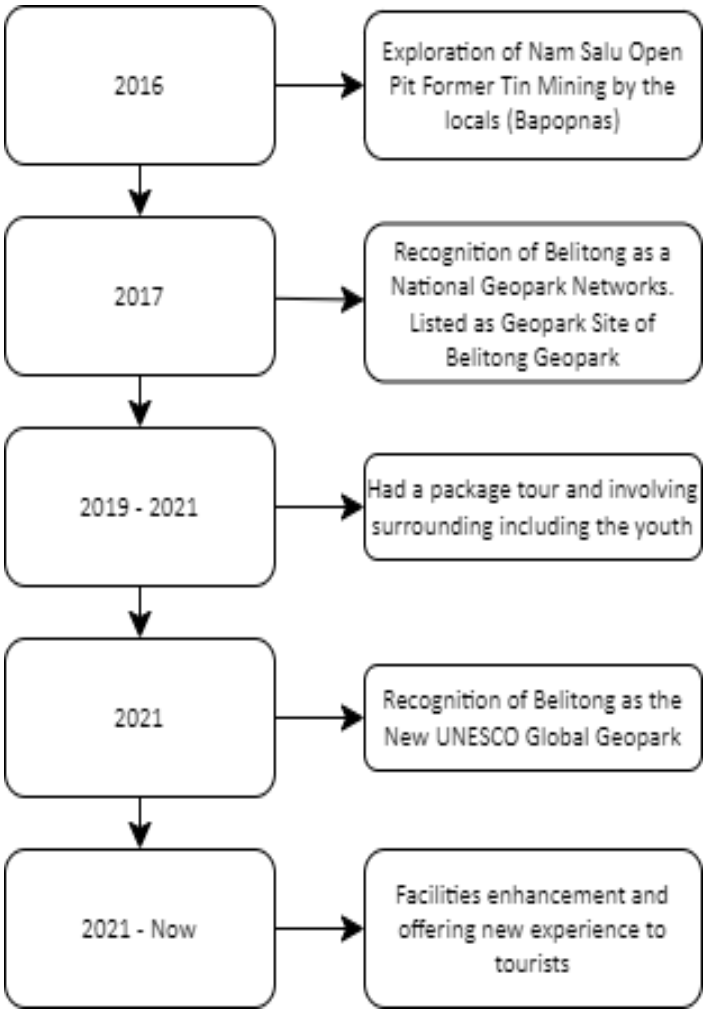

Figure 2: Transformation of Open Pit Nam Salu Geopark Site in History Timeline.

Since 2016, the local community around Open Pit Nam Salu (OPNS) has played a vital role in transforming this site into a sustainable tourist destination. With the support of authorities such as the Indonesian National Armed Forces (TNI) and the National Police (POLRI), the community established the Open Pit Nam Salu Management Body (Bapopnas) to explore this former mining site while also gathering information regarding its history and heritage. In 2017, Belitong was officially designated as a National Geopark, making OPNS one of the main sites focusing on the development of geotourism and geo-education. During the period from 2018 to 2020, Bapopnas began offering tourism packages that could be selected by visitors. Additionally, they collaborated with several universities to organize summer course programs that enhanced the educational aspects of the site.

The year of 2021 marked a significant moment with Belitong's recognition as a UNESCO Global Geopark (UGGp). This motivated Bapopnas to improve infrastructure and strengthen collaborations with experts in tourism, environmental management, and heritage site management. From 2021 to the present, the local community has actively built facilities and infrastructure while enhancing human resource capacity. The goal is to prepare the community to manage ecotourism effectively, emphasizing sustainability and environmental preservation principles. This approach not only enhances the quality of tourism but also ensures community involvement in strategic decision-making related to the future of the area. References from the UNWTO indicate that the Community-Based Tourism (CBT) approach can enhance the well-being of local communities through fair economic distribution while educating tourists about the importance of environmental conservation.

3.3 Challenges and Opportunities

Transforming former mining sites into sustainable tourism destination is not a novel concept in Indonesia. Long before this initiative was introduced, many countries in Europe and America had implemented similar practices to rehabilitate and repurpose former mines for more sustainable and economically viable uses. In practice, tourism has served as a catalyst for change in many countries predominantly located in the Northern Hemisphere, generating profits in the post-industrial era. However, countries primarily situated in the Southern Hemisphere still face challenges in developing such initiatives, necessitating the development of models for knowledge transfer from countries that have successfully undergone this transition (Armis & Kanegae, 2020; Vehbi et al., 2022).

As a form of knowledge transfer, countries that have successfully transitioned should serve as examples for those initiating similar initiatives. Countries such as India, Libya, Algeria, South Africa, Indonesia, and Zimbabwe ought to consider strategic steps towards sustainable reclamation at former mining sites (Maiti & Ahirwal, 2019) Unfortunately, the development prospects of these countries often indicate that scenarios for building and rehabilitating former mining sites are frequently incorporated into short-term development plans, thereby failing to maximize the roles and models oriented towards the social, economic, and environmental conditions exemplified by previous countries (Monosky & Keeling, 2021). Furthermore, in proposing such initiatives, it is crucial to underline that tourism planning approaches will differ between Northern and Southern countries (Timothy, 2021). This difference is related to varying needs, including disparities in economic, cultural, and religious aspects. Nonetheless, in the case studies of these countries, transitioning to sustainable tourism through reclamation emerges as a viable solution for implementation.

In addition to the planning challenges at the national scale, several notable issues at the local scope pose challenges in implementing the concept of green tourism in the former mining landscape of the Open Pit Nam Salu Geosite. These challenges arise sequentially from significant changes in the existence of the Open Pit Nam Salu Geosite. Based on interviews with Head of Bapopnas Community, Christian Tino, several challenges faced by the Open Pit Nam Salu Geosite in developing green tourism were identified. These challenges include overlapping land ownership, illegal mining practices, and inadequate infrastructure, which serve as primary barriers. Additionally, limitations in information technology, vulnerability to natural disasters, and conflicts of interest among stakeholders further complicate the efforts to develop sustainable tourism in this area.

To address these challenges, a comprehensive approach is required that involves collaboration among various stakeholders. Potential solutions include conducting detailed land mapping, enhancing law enforcement against illegal mining activities, and constructing environmentally friendly infrastructure. The utilization of information technology, such as the Internet of Things (IoT), is also crucial for monitoring environmental conditions and optimizing resource management. Additionally, disaster mitigation efforts must be implemented, particularly to respond to threats such as landslides and floods in the vicinity of the Open Pit Nam Salu area, alongside fostering constructive dialogue among stakeholders to reach a mutual agreement.

In response to the existing challenges, numerous opportunities for developing the Open Pit Nam Salu Geosite also arise, facilitating the determination of strategic development directions for this area. As a former tin mining location, this region possesses unique geological formations of international significance, rich biodiversity, and local cultural heritage that can be integrated into tourism development. The involvement of the local community is a key factor in creating community-based tourism that not only empowers the local economy but also preserves existing cultures and traditions (Hariyoko & Puspaningtyas, 2019). Local residents can actively participate in various sectors, such as tour guides, environmental conservators, and traditional artisans, thus providing sustainable long-term economic impacts.

According to Christian Tino, Head of Bapopnas Community during our direct interview at site said that the potential for developing the Open Pit Nam Salu Geosite is significant, particularly in the last five years. This geosite has proven capable of attracting interest from tourists, both local and domestic. Initially, the management did not anticipate that this former mining site would garner such substantial attention from visitors. Tino explained that several tourists he guided expressed a strong interest in visiting the Open Pit Nam Salu Geosite due to its unique offerings that differ from the primary attractions

of Belitong, such as its white sandy beaches and granite rock formations along the coastline. Tourists are eager to explore another facet of Belitong related to its mining history and geological potential. Based on available data below, there is a dominant positive trend in tourism activities at the Open Pit Nam Salu Geosite as an alternative tourist destination on Belitong Island.

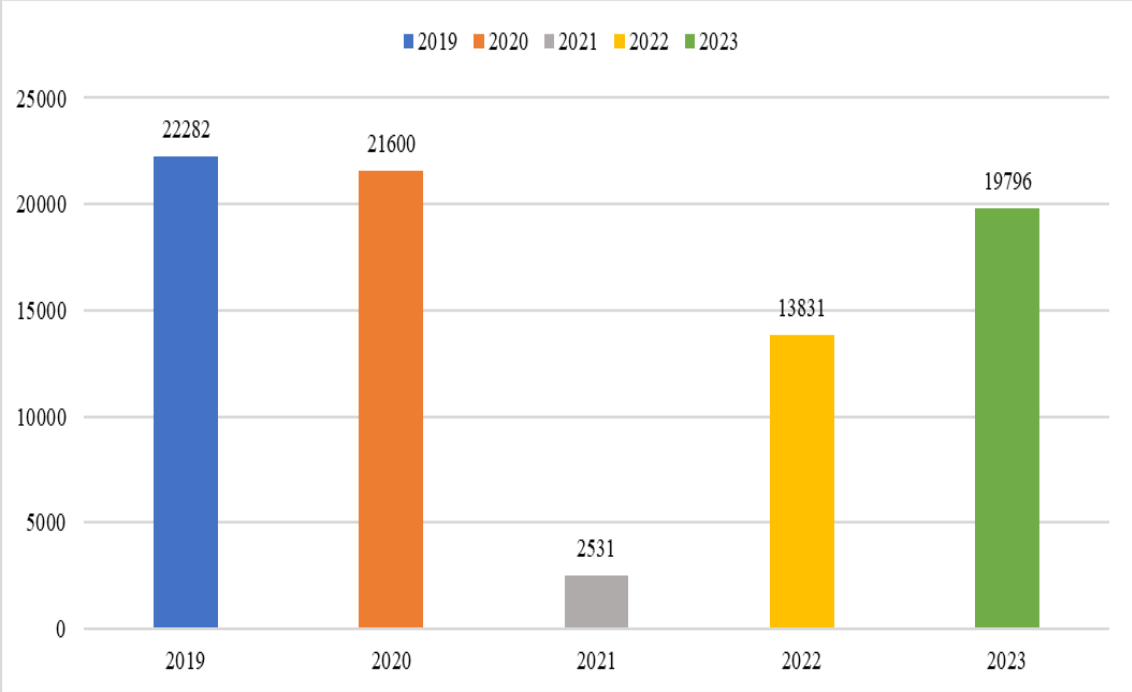

Figure 3: Visitor in Open Pit Nam Salu 2019-2023 (Badan Pengelola Open Pit Nam Salu, 2024).

Based on the figure above, the trend of visitors to the Open Pit Nam Salu Geosite since it was opened to the public until 2023 can be observed. In its early stages, the Open Pit Nam Salu Geosite primarily attracted local visitors from both Belitung and Belitung Timur. Until 2020, visitors were charged a relatively low entrance fee of IDR 5,000 (Bapopnas, 2024). However, in 2021, there was a decline in visitors due to the COVID-19 pandemic. Starting in 2021, the recognition of Belitong as a UNESCO Global Geopark highlighted its significant potential to develop the region and introduce new tourist alternatives. Despite this, national social restrictions hindered growth. In response, Bapopnas began to improve its offerings, setting new prices that matched the experiences available at the site, introducing various packages for visitors to enjoy. These packages gained recognition in 2022, attracting not only domestic tourists but also international tourists.

International tourists from various regions across the world, including North and South America, Europe, Africa, as well as East Asia and the Middle East, have witnessed the rapid development of the Open Pit Nam Salu Geosite. Following the pandemic, in 2022, Bapopnas began to expand their global promotional efforts, which significantly increased visits from international tourists. These visitors are eager to experience firsthand and learn about the mining history of Belitong, thereby establishing the Open Pit Nam Salu Geosite as both an educational destination and an alternative tourism site that offers a unique perspective on the island's mining heritage.

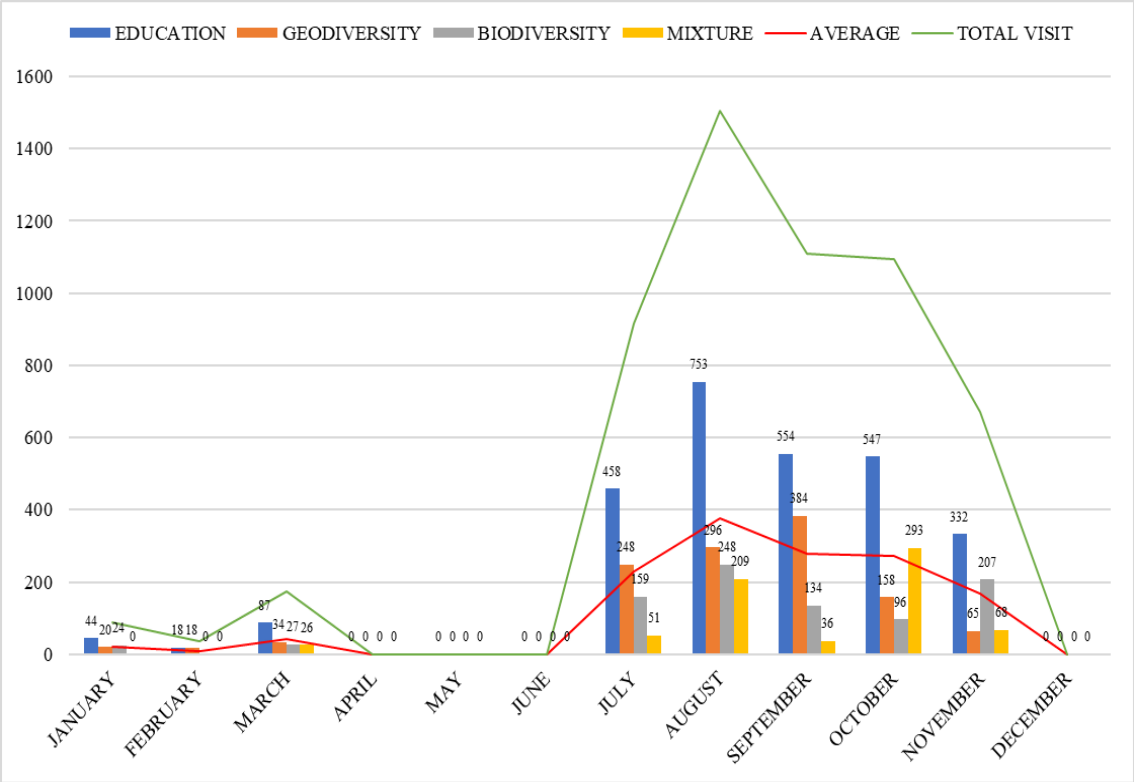

Figure 4: Objectives of Visits to the Open Pit Nam Salu in 2023 (Badan Pengelola Open Pit Nam Salu, 2024).

In the promotional scheme implemented by Bapopnas in 2023, visits to the Open Pit Nam Salu Geosite were categorized into four main types: educational tourism, geodiversity exploration, biodiversity exploration, and a combination of these three. Based on the visitation data, educational tourism emerged as the most dominant category, peaking at 753 visitors in May. This popularity was supported by various collaborative programs between the Open Pit Nam Salu Geosite and educational institutions, such as Summer Courses and Summer Camps, which have been held regularly in recent years. For instance, the Department of Biology at IPB University consistently organized Summer Camps in this area from 2020 to 2022. These programs not only boosted visitation but also enriched participants' knowledge about Belitung's mining history and natural wealth. Additionally, Rudi Candra, a resident geologist of Belitong Geopark stated that the Open Pit Nam Salu has become a preferred destination for geology and biology researchers, who utilize the area as a scientific research laboratory due to its high geological value and biodiversity. These programs not only boost visitation but also enrich participants' knowledge about Belitong's mining history and natural wealth.

The geodiversity and biodiversity categories displayed similar fluctuation patterns. Visits to the geodiversity category peaked at 296 visitors in June, while the biodiversity category recorded its highest visitation at 248 visitors during the same month. However, a sharp decline followed after June, with biodiversity visits dropping to only 134 visitors in July and continuing to decrease until the end of the year. Meanwhile, the combination category recorded its highest visitation at 209 visitors in June, before dropping to 96 visitors in September and remaining low in subsequent months. These fluctuations can be associated with the mid-year school and university holidays, which increased interest in educational and research programs in the area.

The potential of the Open Pit Nam Salu Geosite to develop as a geo-educational tourism destination is significant, given the high interest in educational programs and ecotourism. The unique geodiversity and biodiversity of this area present substantial opportunities for further development, especially through the support of educational and scientific research programs. For instance, the Open Pit Nam Salu has served as a research laboratory for geology and biology researchers, who take advantage of the area's high geological and biodiversity values. To optimize these opportunities, holistic and sustainable management strategies are essential.

Strategic steps include enhancing collaboration in educational programs such as Summer Courses and scientific research, expanding eco-friendly adventure-based tourism facilities, and implementing green and circular economy principles to maintain ecosystem sustainability. Research on tourist carrying capacity and periodic ecosystem monitoring is also crucial to ensure a balance between conservation and economic growth. Additionally, diversifying tourism experiences that integrate education, nature, and culture will enhance the area's appeal to both domestic and international tourists. With proper management, the Open Pit Nam Salu Geosite can become a successful example of ecotourism that supports environmental preservation, local community empowerment, and economic growth. This strategy will not only improve the competitiveness of the area as a geo-educational destination but also strengthen its position as a leading site for educational tourism and scientific research in Indonesia.

3.4 Conceptual Framework in Developing Open Pit Nam Salu through Green Tourism

3.4.1 Project Plan I: Development Into New Function

The framework suggested by Pukowiec-Kurda & Apollo (2024) outlines three potential scenarios for the transformation of former mining sites: leaving the land as a mining relic, removal and demolition, and fully utilizing the land for new functions. Of these, the third scenario, which involves fully utilizing the former mining site for sustainable tourism, is the most appropriate for the Open Pit Nam Salu. This model offers benefits in terms of space reclamation, environmental restoration, and the creation of new functions that can generate economic benefits for the surrounding community.

In line with this, the authors suggest that the current situation at Open Pit Nam Salu calls for a more advanced and strategic approach to the development of the site. The first step is to understand the existing conditions on the ground and involve the local community in a bottom-up process. This can be achieved by mapping out the specific development needs of the area and engaging the local population in the transformation process. The idea is to ensure that any new function introduced aligns with both the community's needs and the principles of sustainable tourism.

The authors argue that a dual approach is required to successfully develop the new functions of the former mining site. The first approach involves addressing the question of how to develop the new functions of the site, taking into account both environmental and socio-economic considerations. The second approach emphasizes the importance of engaging and motivating the local community, fostering a grassroots movement rooted in sustainable environmental values. This will not only empower the community but also ensure that the transformation of the site is both locally supported and environmentally responsible. Therefore, the authors propose that these strategies should be implemented in order to create a sustainable and economically viable tourism destination, benefiting both the environment and the local people.

In the beginning, to develop the Open Pit Nam Salu Geosite as a pilot model for former mining land utilization, the involvement of three main pillars is required: conservation, education, and sustainable economic empowerment. These pillars are derived from the principles of Geopark development by UNESCO Global Geopark, allowing Open Pit Nam Salu Geosite to serve as a conceptual framework for other regions in Indonesia with similar characteristics. This framework will later be used to explain the transition idea from a former mining sites towards sustainable tourism, prioritizing local community participation.

The initial step in achieving this goal is comprehensive rehabilitation of the former mining sites, considering spatial, environmental, social, and economic consequences (Worlanyo & Jiangfeng, 2021). All these elements must be rehabilitated equally and fairly. Scholars agree that successful mining rehabilitation requires not only surface protection and drainage water management (Skousen & Zipper, 2014) but also comprehensive technical care and design that points to new functions (Hendrychová et al., 2020). Proper protection of former mining sites includes land reclamation and reforestation with selected pioneer species (Pietrzykowski, 2019). Former mining infrastructure can be transformed into museums, galleries, restaurants, and hotels. Once adequate protection measures have been implemented, this area can be opened for tourism by offering underground tours, recreational reservoirs, and public parks. This

scenario allows for economic utilization of the area while preserving the historical mining traditions embedded in the community.

The utilization of former mining site as an ecotourism destination at Open Pit Nam Salu aims to restore the ecological balance disrupted by mining activities. The environmental rehabilitation process is conducted by restoring the local ecosystem, which involves replanting native vegetation, restoring local fauna habitats, and managing water resources wisely. Additionally, the development of tourism infrastructure is carried out while adhering to sustainability principles, such as using environmentally friendly materials, employing renewable energy through solar panels, implementing effective waste management, and applying renewable energy systems. Thus, this area can serve as a tangible example for other regions in managing former mining land.

Role of green tourism with Open Pit Nam Salu not only focuses on environmental restoration but also offers educational and recreational opportunities. Tourists can learn about the importance of environmental preservation through educational programs designed to introduce them to ecosystem restoration efforts. Activities such as hiking, fauna watching, and visits to environmental education centers serve as means to educate visitors about the negative impacts of mining on the environment and the significance of rehabilitation efforts. Consequently, green tourism not only provides enjoyable travel experiences but also fosters awareness of the importance of environmental sustainability.

Economically, ecology-based tourism at Open Pit Nam Salu positively impacts the local community through the creation of new job opportunities and increased income. The development of the green tourism sector can enhance the living standards of local communities by encouraging their active participation in managing the tourism destination, whether as tour guides, facility managers, or suppliers of local products. Furthermore, the existence of green tourism also promotes the development of micro, small, and medium enterprises (MSMEs) related to tourism, such as handicrafts, culinary offerings, and accommodations.

The integration of the green tourism concept with Open Pit Nam Salu reflects a commitment to sustainable development. The transformation of this former mining site into an environmentally conscious tourism destination is a crucial step in mitigating the negative impacts of mining, while simultaneously serving as a best practice example in former mining land management. By continuously promoting ecosystem recovery and sustainability, the Open Pit Nam Salu Geosite can become a tourism destination that is not only attractive but also provides long-term benefits for the environment and the surrounding community.

Examining the pilot model at Open Pit Nam Salu, the direction of green tourism development is more focused on geo-educational experiences, complemented by the introduction of biodiversity, as well as the history of mining and local culture. Consequently, the tourism packages that can be planned should be integrated with the interests of tourists. Additionally, supporting facilities such as a Geological Information Center can be an appealing scheme for tourists interested in learning about the geology of Belitong Island.

3.4.2 Project Plan II: Local Community Development by CBT Approach

After establishing the strategic direction for transforming former mining sites, the subsequent phase involves adopting an inclusive approach aimed at fostering local community participation and empowerment through the Community-Based Tourism (CBT) framework. This approach is recognized as an effective strategy that emphasizes active community engagement in the management and development of tourism destinations, adhering to a bottom-up planning model. The local community assumes a pivotal role as the primary stakeholder in the planning, execution, and evaluation of tourism-related activities within the rehabilitated former mining sites. The underlying objective of this framework is to ensure that the local population derives direct economic and social benefits from tourism development.

Within the CBT framework, the local community retains complete autonomy over the management and utilization of tourism resources, thereby enabling them to shape the development trajectory in a manner that aligns with their socio-economic interests and cultural values. This participatory approach ensures the equitable distribution of economic benefits, particularly focusing on marginalized and

disadvantaged groups, thus fostering inclusive growth and contributing to social equity. Furthermore, this model serves as a sustainable tourism development strategy that not only maximizes short-term gains but also promotes long-term resilience and self-sufficiency within local communities. By ensuring the fair distribution of resources and benefits, CBT contributes to the overall well-being of the community while preserving cultural heritage and environmental integrity.

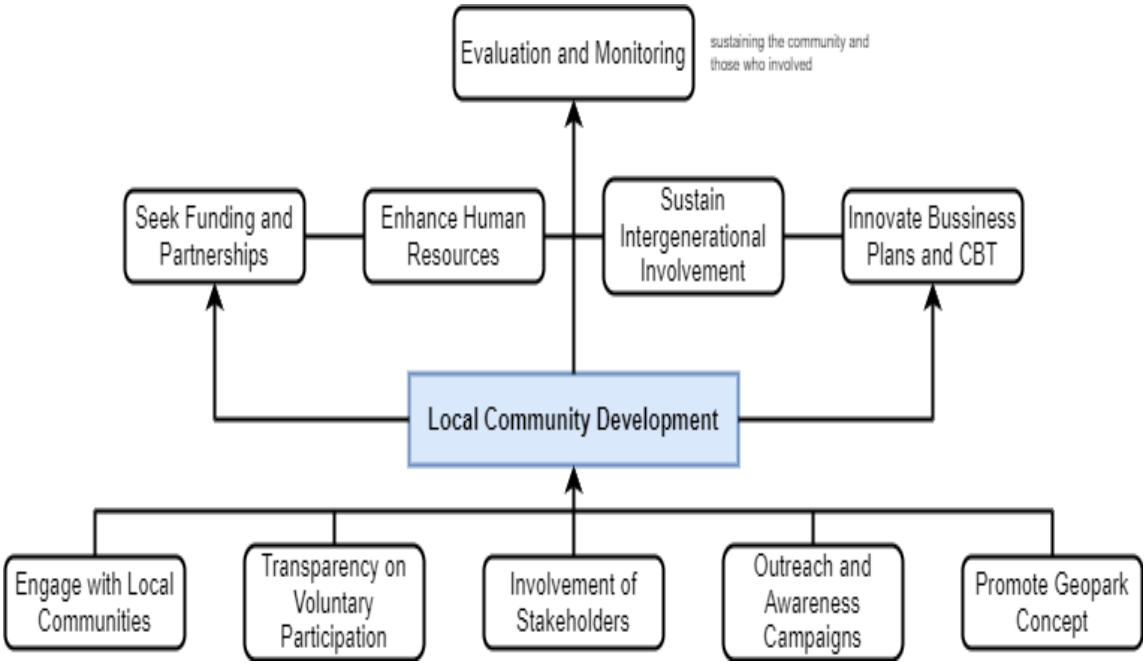

Figure 5: Local Community Development by CBT Approach in Geosite Open Pit Nam Salu.

Beyond its economic benefits, the Community-Based Tourism (CBT) approach places significant emphasis on the preservation of cultural heritage and the natural environment as integral components of sustainable tourism. As tourism is managed by the local community, the development process is inherently aligned with maintaining the authenticity of local wisdom practices and ensuring the sustainability of the environment, both of which are recognized as key assets in attracting and retaining tourism. This commitment to safeguarding cultural and environmental resources fosters a more responsible and sustainable tourism model.

Moreover, CBT plays a crucial role in enhancing the social and political empowerment of local communities. By actively involving community members in the decision-making process, this approach strengthens their capacity to manage local development autonomously. The inclusion of diverse stakeholders in governance promotes participatory democracy and ensures that tourism development reflects the community's aspirations and needs, fostering a sense of ownership and agency.

This approach is not merely focused on achieving short-term economic benefits, but also prioritizes long-term sustainability by establishing mechanisms that ensure tourism continues to provide enduring benefits to the community for future generations. By integrating cultural preservation with environmental stewardship, CBT strengthens the community's ability to protect their cultural heritage and natural environment while fostering greater self-reliance and resilience. This holistic model ensures that tourism becomes a tool for sustainable development, enhancing the community's capacity to adapt to changing economic and environmental conditions while preserving the core values and assets that define their identity.

Table 3: Project Plan for Green Tourism with Community Based Tourism (CBT) approach.

Key Activities	Actions	Targeted Output
Engage with Local Communities	· Conduct community gatherings to introduce the green tourism concept. · Create a task force composed of local leaders, tourism experts, and environmental advocates to guide the community involvement. · Set up regular consultation sessions for community feedback.	Established trust and cooperation with the local community, ensuring their role as key stakeholders.
Transparency on Voluntary Participation	· Establish clear guidelines for participation, emphasizing voluntary involvement. · Share the project's vision, benefits, and long-term goals in local forums and media. · Create a transparent decision-making process where all participants can access information on project developments.	Transparent and inclusive participation from local community members, ensuring ethical engagement.
Involvement of Stakeholders	· Identify key stakeholders (government, local businesses, NGOs, environmental organizations, etc.). · Organize stakeholder meetings to align goals and expectations. · Form working groups for specific areas like infrastructure, marketing, and conservation.	Strong collaboration among stakeholders to support the project's sustainable development.
Outreach and Awareness Campaign	· Launch awareness campaigns highlighting the ecological and economic benefits of sustainable tourism. · Use social media, local radio, and community events to disseminate information. · Create educational programs for schools and community members on environmental conservation and tourism.	Increased awareness and support for the project within the community and broader audience.
Promote the Geopark Concept *(Case for area under geopark's designation)*	· Develop interpretive materials (signage, brochures, guided tours) focused on the geological, biological, and cultural significance of the site. · Organize workshops on how the geopark concept can benefit the community economically and socially. · Integrate local culture, biodiversity, and history into the tourism packages.	Full understanding and promotion of the geopark concept among locals and tourists, creating a unique attraction.
Seek Funding and Partnership	· Apply for grants and funding opportunities from environmental organizations, government, and international agencies. · Form strategic partnerships with eco-tourism operators, universities, and NGOs for technical and financial support. · Develop a local investment plan to involve local businesses and entrepreneurs.	Sufficient funding and strategic partnerships to implement and sustain the project.
Enhance the Quality of Human Resources	· Organize training programs on eco-tourism, hospitality, guiding, and small business management. · Provide environmental education on how to balance tourism with conservation. · Offer scholarships or training exchanges with other successful geoparks or ecotourism sites.	A well-trained local workforce capable of managing and promoting sustainable tourism.

Key Activities	Actions	Targeted Output
Sustain Intergenerational Involvement	· Create youth-focused programs to involve younger generations in the development of community (e.g., eco-tourism clubs, internships). · Organize cultural and heritage events that connect older generations with younger ones to pass on local knowledge and traditions. · Foster a sense of ownership by involving youth in decision-making processes.	Intergenerational involvement that sustains the project's long-term viability.
Innovate Business Plans and Community-Based Tourism (CBT)	· Design business models that integrate local crafts, food, and cultural experiences into the tourism offering. · Establish community-based tourism (CBT) ventures, where locals run eco-friendly accommodations, guided tours, and cultural experiences. · Encourage sustainable business practices such as zero-waste operations, renewable energy usage by traditional practices and wisdom, and responsible resource management.	Thriving community-based tourism enterprises that align with green tourism principles and create sustainable livelihoods.
Evaluation and Monitoring	· Collecting data related to tourist satisfaction, socio-economic impacts, and environmental sustainability monitoring. · Providing a platform for development and recommendations based on feedback from visiting tourists. · Improving strategies and policies according to current trends and needs.	Maintaining a balance between economic benefits, environmental preservation, and the empowerment of local communities.

By engaging the local community, promoting transparency, involving stakeholders, and advancing education through outreach, Geosite Open Pit Nam Salu can be transformed into a sustainable tourism hub. The development will not only preserve the area's unique geological and cultural heritage but also foster economic growth through community-based tourism initiatives.

Conclusion

The development of green tourism at Open Pit Nam Salu reflects an inclusive community-based approach that aligns with the Spontaneous Participation (Bottom-up) model. This method empowers local communities to actively engage in decision-making processes, fostering ownership and accountability. However, the initiative is not without challenges, including land ownership conflicts, persistent illegal mining activities, and limitations in infrastructure and technology. Addressing these obstacles is crucial to achieving sustainable tourism that balances economic growth, environmental preservation, and cultural heritage. By tackling these barriers strategically, Open Pit Nam Salu can fully realize its potential as a model for sustainable green tourism.

Focusing on geo-educational tourism offers a promising pathway to promoting biodiversity conservation while preserving the mining history and cultural heritage of the region. By integrating educational and recreational experiences, Open Pit Nam Salu can attract a wide range of visitors while fostering environmental awareness. From an economic perspective, the shift toward eco-tourism presents opportunities for job creation and income generation, directly benefiting the local community. This model underscores the importance of community empowerment and environmental sustainability as pillars for long-term development, enhancing both the quality of life for residents and the conservation of natural assets.

The transformation of Open Pit Nam Salu demonstrates how community participation, when paired with sustainable practices, can serve as an example for regions with similar socio-economic and environmental contexts. By prioritizing environmental conservation, cultural preservation, and local economic development, this model provides insights into balancing growth and sustainability. Formalizing the community as a legal entity and adopting innovative strategies, such as exclusive high-cost, low-

impact tourism, will ensure that this transformation remains economically viable and environmentally sustainable over time. Furthermore, continued research into success indicators and the roles of key stakeholders will provide a data-driven foundation for refining and replicating this model in other former mining sites.

Limitation

This research is limited to examining the practices, development, and initiatives of the local community around Open Pit Nam Salu in supporting the sustainability of this former mining site. The study focuses on the specific context of Open Pit Nam Salu, exploring its potential as a green tourism destination, and does not extend to analyzing broader factors or external influences that might affect similar transformations in other regions. Consequently, the findings and recommendations, while insightful, may have limited applicability to areas with different socio-economic or environmental conditions.

The research also does not provide a comprehensive analysis of the roles and contributions of key stakeholders—such as the local government and private sector in facilitating the shift toward sustainable tourism. Understanding the interplay among these actors is crucial for developing collaborative strategies and targeted policies. Future research should aim to fill these gaps by adopting data-driven approaches that assess success indicators and stakeholder contributions. Such studies would enhance the ability to create transferable frameworks for balancing economic growth with environmental conservation and community empowerment, both at Open Pit Nam Salu and other similar sites.

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