

## RESEARCH ARTICLE

## Identification of Potential Geotourism Destination in the River Subayang areas of Kampar, Riau, Indonesia

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### Abstract

The readiness of an area to be able to develop tourism potential as geotourism is seen from various aspects, including the existing geological heritage, as well as the enthusiasm of the local community which is the main focus in creating good geotourism, while the government acts as the main mover. In Kampar Regency, Riau Province, to be precise in the Sushadow River area, the Rimbang Baling area located in the Kampar Kiri Hulu sub-district, there are natural attractions that the Subayang river passes through, in addition to the river being so clear, upstream we can find a stone wall waterfall, possibly having a waterfall. This paper, shows the potential of geotourism from various aspects of geomorphology and community life, such as economic, social, cultural and infrastructure and discusses the role of society and sectors as tourism actors in subayang river using the RAP-fish method. Geotourism studies can be drawn from various integrations of existing theories, conceptual analyzes and practices of nature-based tourism and closer collaboration with relevant social sciences so that they can play a role in the promotion of tourism among the public and professionals.

**Keywords:** Geotourism, Suistanable, Subayang river.

### 1. Introduction

Tourism destinations are developed from geographic areas which include tourism products, services, communities and institutions that all support the potential for tourism development and attract tourists to come to the place (Saeroji et al., 2018; Yacob et al., 2019; Wisudawati et al., 2020). Tourism can increase public awareness to preserve the environment as an effort to increase economic value through tourist villages (Yacob et al., 2019) (Irham et al., 2021).

As it is a relatively new concept in the tourism industry (Heggie, 2009, p. 257), there are two main approaches to the definition of the term, as either geological or geographical tourism (Dowling, 2013, p. 62). Hose defined geotourism as, "provision of interpretative facilities and services to promote the value and societal benefit of geologic and geomorphologic sites and their materials, and ensure their conservation, for the use of students, tourists and other recreationists". The latter approach has been characterized by National Geographic Society. According to the association, the prefix geo in geotourism is related to geography and does not necessarily relate to geology or geomorphology. Geotourism is relatively a new concept in a young stage, approximately two decades years old. However, it has become one of the most important tourism activities performed at geological and geomorphological sites. It is seen as a part of sustainable tourism, as its main objectives are to contribute to natural, social and economic environments of geosites and to provide conservation awareness of these places, as well as to create tourist satisfaction (Prof and Tetik, 2016).

Geotourism utilizes geological heritage as its attraction by being supported by tourism facilities and infrastructure which aims to fulfill geotourism needs as long as they are in geotourism destinations. Geotourism is a concept that was

developed in the 1990s, Understanding geotourism in research refers to the process and form of geology supported by various tourist facilities for geotourism, geotourism refers to two components, namely geo components related to geological, geomorphological and natural resource features and processes involving tourism activities through tourist visits to geological sites with the main goal for recreation, wonder, appreciation, and learning (Wulung et al., 2019). Geotourism also promote wider awareness of geoheritage and its values beyond the geoscience community as a means to gain support for geoconservation at a time when sustainable development and eco- or nature-based tourism were attracting increasing attention (Gordon, 2018).

Geotourism is sustainable tourism with a primary focus on geological features, which promotes environmental and cultural understanding, appreciation and conservation, and it is locally beneficial, and is a form of activity special interest tourism whose main focus on the geological features of the earth's surface as well as those contained therein in order to encourage understanding of environment, nature and culture, more further as a form of appreciation, and activities conservation, as well as having a concern for preservation of local wisdom. (Hermawan, 2018). Geotourism has been added to the mix of sustainable tourism approaches. The common principles across these sustainable tourism frameworks are the respect for the resource base and the environment as well as for the host country and local residents, while providing meaningful and rewarding visitor experiences (Christian, 2018)

The government should also tend to be an active participant in indigenous tourism, which has a role in meeting the needs of the community. The media are also a major player in the indigenous tourism system. Indigenous tourism is influenced by trends in the economic, social, political and physical world.

These trends represent external influences that are largely beyond the control of the local or global tourism industry (Butler, 2007) (Vieira, 2018). The readiness of an area to be able to develop tourism potential as geotourism is seen from various aspects, including the existing geological heritage, as well as the enthusiasm of the local community which is the main focus in creating good geotourism, while the government acts as the main mover.

In Kampar Regency, Riau Province, on the Subayang River, the Rimbang Balling area in the Kampar Kiri Hulu sub-district covers 12 villages, from Tanjung Belit village to Gema village. There are natural attractions in 3 villages that the Subayang river passes, besides the river is so clear, and the scenery is beautiful, in the upper reaches of the river we can find the Batudinding waterfall. In addition, various existing traditions are still carried out every year so that it adds to the value of the beauty of the Subayang river.

The natural beauty and uniqueness of the Subayang river area, may have the potential to make Subayang a geotourism in Riau Province. Therefore, this study aims to identify geotourism potential in Subayang river and through this paper, a more in-depth analysis is carried out on the potential of the Subayang River as Geotourism, both in terms of geology, as well as spatially as well as from a social and economic perspective. So that it will be known the potential and feasibility of the Subang River as a sustainable geotourism destination and maintain local culture, and can encourage the improvement of the economy of the community around the Subayang River.

## 2. The Distribution Of Tourism In The Subayang River Area

The existence of a tourist area must be based on sustainable function based on its development with emphasize development aspects sustainable, regional development tourism is not a stand-alone system, but is closely related to the system other development plans inter-sectoral and inter-regional. The development of tourism areas must based on conditions and carrying capacity with the intention of creating interaction mutual long term profit among achievements tourism development goals, improvement of community welfare local, and sustainable carrying capacity environment in the future (Subhadra & Nadra, 2006).

One of the priority elements in an economic plan is that an area or country has sufficient clean water to support its people and maintain water quality for the needs of the city, industry and energy. Water is also a major component in carrying out life processes, about 3% of electrical energy is used to carry water in the quota required for utilization. Even a country cannot be said to be independent if it does not have sufficient water. (Bamba Bukengu Muhaya et al., 2017)

From historical perspective, the protection of biotic components of nature had the priority. Geological and geomorphological elements of nature were considered to be more resistant and less vulnerable than other elements of the environment (Reynard and Coratza 2007; Farsani et al. 2014). Geotourism, which claim educational, preservative and economic justification, must find its place in the already formed system of territorial nature and landscape protection. Geotourism emphasizes the biotic component, notes the characteristics of the landscape, even the character of the historic settlement as a subject of protection. This does not mean complete absence of references to abiotic values and specific values of geological heritage. Protection of the nature also means care for ecosystems (Tourism, 2016).

Some of the sites are already exploited for geotourism purposes, but some of them (despite its potential) are not. In specific cases, the exploitation for geotourism and recreational purposes is not in accordance with conservation strategies,

(Kubalíková et al., 2021) There are some conflict between geotourism and geoconservation similar to those identified by Williams et al. (2020).

### 2.1 Camping Area

the camp area is located around the edge of the Subayang River, especially on holidays and weekends, the Subayang River will be filled with tents that have been provided by the tour manager, in the morning our eyes will be spoiled with dew covering the hills in the villages around the river. Subayang which can be seen from the river, and the clear and beautiful water of the Subayang River.



Fig 1. Subayang River Camping Area

### 2.2 Batudinding Waterfall

Geotourism initiatives implemented outside. A study conducted by Gladfelter and Mason in Yosemite National Park concluded that while geotourism projects have the potential to influence visitor patterns and congestion problems in popular national parks and can make a positive contribution to stakeholder engagement, they can also increase environmental impact. (Ólafsdóttir and Tverijonaite, 2018)

Batu Wall Waterfall is located in Tanjung Belit, Kampar Regency, has a natural beauty that is not owned by other districts. This waterfall is located a little hidden and access to it can only be reached by foot. The scenery of Batu Wall Waterfall is very beautiful surrounded by heterogeneous forest areas. Batu Wall Waterfall can spoil tourists who come here with its cold, clear and fresh water with a depth of about 4 meters.

Batu wall waterfall can be accessed via the Sushadow river by boat which is also provided by the tour manager.



Fig 2. Batu Dinding Waterfall seen from the Subayang river

### 2.3 Cultural Festival

The tourism potential of an area does not only depend on the number of building sites, or artifacts, but is also supported by cultural heritage (intangible) and cultural identity. The interaction of the two dimensions between urbanization and eternal culture is an inspiration for reflection (Jansen-Verbeke,



2008: 128). According to the official definition, a Geotourism is not just about geology, but includes the relationship between its geological features and all other aspects of the natural, cultural and intangible heritage of the area. The word 'Geotourism' has no official definition, but often refers to a new type of tourism connected with Geoparks, which pursues sustainable local economic development. (Nishitani et al., 2021).

In addition, geotourism is also side by side with stories from the community. every year or every 6 months, cultural festivals are held in the Subayang River area, such as performances of regional dances, harvesting fish in Lubuk Ban with traditional rituals and various other cultural performances.



Fig 3. Batu Dinding Waterfall 3<sup>rd</sup> level

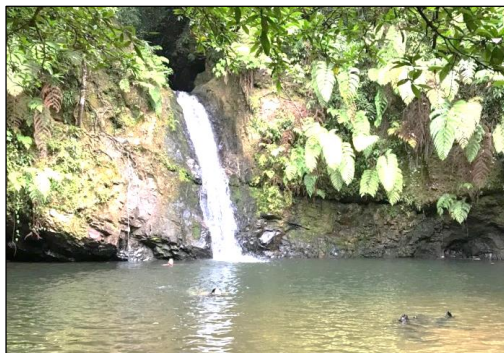


Fig 4. Top level Batu Dinding waterfall

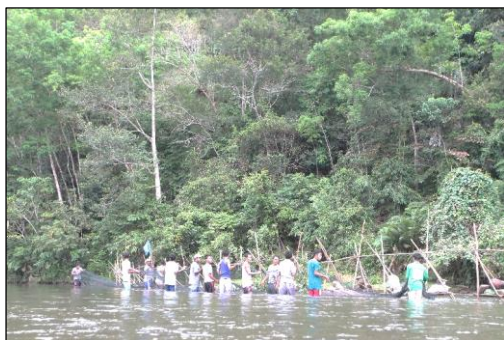


Fig 5. Taking fish with tradition rituals

## 2.4 Subayang River

Odum (1996) states that rivers are flowing waters (lotic) which are characterized by direct and relatively fast currents, with speeds ranging from 0.1 to 1.0 m/second, and are strongly influenced by time, climate, landscape (topography and slope), bedrock type and rainfall. Rivers as reservoirs and distributors of water coming from the upper upstream areas, will be greatly affected by land use and the extent of watersheds, so that the

effect will be seen on the quality of river water. River water quality is affected by all activities man. (Wulandari et al., 2018).



Fig 6. Art show in cultural festival every year



Fig 7. Semah Rantau tradition



Fig 8. Subayang river area



Fig 9. Subayang river area to the Batu Dinding waterfall

## 3. Methods

### 3.1. Research Area

This Research located at 01°00'40" N - 00°27'00" S and 100°28'30" - 101°14'30" E and is traversed by the equator

or the equator which lies at latitude 0°. Kampar Regency consists of 21 sub-districts.

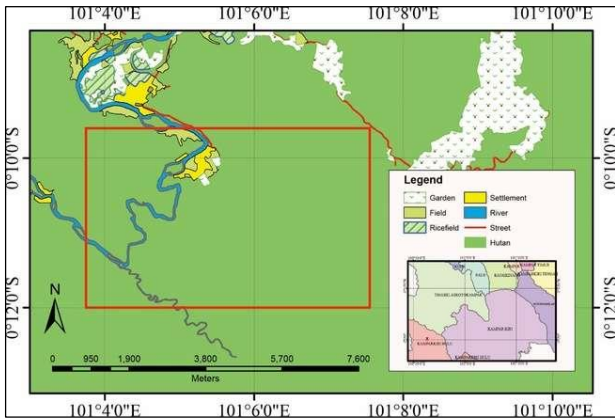


Fig 10. Map Of Study Area

One of them is the Kampar Kiri Hulu sub-district. This research is located in Kampar Kiri Hulu District, which has an area of 85,000 hectares and 24 villages (BPS Kabupaten

Kampar, 2020) and the author's case study in this study is only around the Subayang River which is located in the village of Gema and Tanjung Belit.

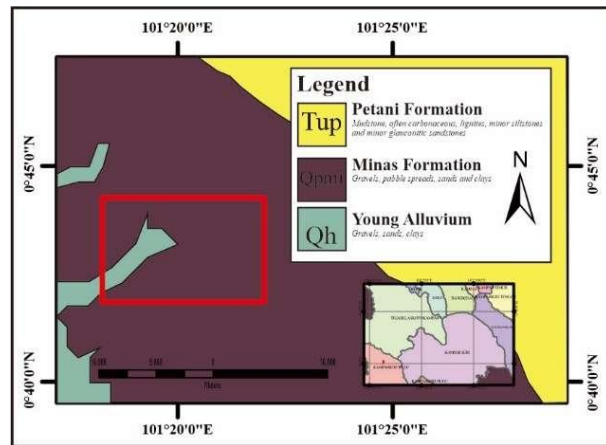


Fig 11. Regional Geological Maps of Kampar District

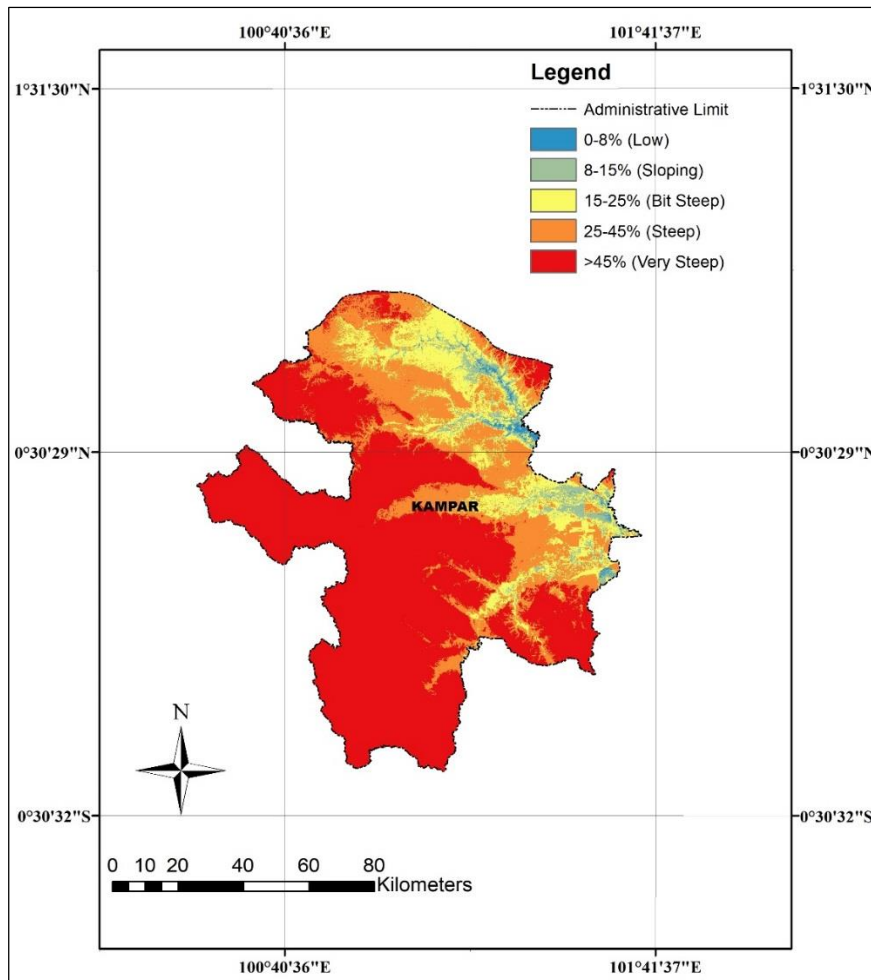


Fig 13. Kampar District slope map

Kampar Kiri Hulu sub-district has an area of 85,000 hectares and 24 villages. The village with the largest area is Kota Lama Village with an area of 8,400 hectares. In 2017, Kampar Kiri Hulu District had the highest number of rainy days in January as many as 20 days. While the highest rainfall occurred in November, namely 363 mm. Kampar Kiri Hulu District is dominated by a fairly low slope between 25% to 45%

## 2.5 Rapid Appraisal (RAP) method for the potential model of the Subayang River Geotourism (RAP-Geotourism)

In this study, the RAP+MDS application was developed for aspects of Geodeversity, Biodeversity and Cultural diversity, so it is called RAP-GEOTOURISM in evaluating the sustainability aspects of the Geotourism potential in the



research area. The stages in this study to analyze Rap-Geotourism were carried out through several stages, namely (Anna et al., 2018). (Pratama, Rahman Aulia, 2020) Rapfish analysis stages as referring to the guidelines operational Rapfisheries Analysis stage includes steps:

- Evaluate and determine attributes of three dimensions tourism area sustainability Mandeh (ecology, economics, and social) (Attribute Review)
- Give an assessment of each attribute that has been compiled from each dimension in the scale ordinal 0 - 3.
- Calculate index value and rate sustainability status
- Determining the lever (leverage factor)
- Assessment of accuracy (goodness of fit) in order to determine the dimensional accuracy and dimensional assessment
- Monte Carlo analysis use predict the effect of level random error (random error) on model generated from analysis Multi-Dimensional Scaling

The RAP-RICE ordination technique through the Multi Dimensional Scaling (MDS) method is a statistical technique that tries to transform multidimensional into simpler dimensions (Fauzi and Anna, 2005).

## 2.6 Rapid Appraisal (RAP) method for the potential model of the Subayang River Geotourism (RAP-Geotourism)

The analytical method in this study uses :

- The RAP-RICE ordinance technique through the Multi Dimensional Scaling (MDS) method to assess the index and identify potential Geotourism aspects in the Subayang area, Rimbang Baling and its sustainability, as well as identify sensitive attributes that affect the sustainability index in each area. -each dimension through leverage analysis, and
- Prospective analysis to determine the dominant potential that greatly influences the feasibility of Subayang as a Geotourism in Riau Province. Each dimension is represented by a variable or attribute.

## 2.7 Live Observation

There are main principles in geotourism (Wulung et al., 2019) , namely:

- Geotourism can encourage economic feasibility, increase community and geoconservation (sustainable).
- Geotourism is an attraction for people who want to interact with the earth's environment in developing knowledge, awareness and appreciation (Geologically informative).
- Local communities can be involved in geotourism activities through the provision of knowledge (interpreters), services, locally beneficial facilities and products; and 4) security, comfort, informative, experience, and service must match or exceed the visitor's realistic expectations (geotourist satisfaction In).

Assessment of geoheritage assets, values and benefits within a cultural ecosystem services framework can enable a more holistic approach to geotourism which acknowledges the connections between people, geoheritage and the landscape. As such, adhering to good geoethical practice is an essential element of geotourism both for providers and for participants (Ólafsdóttir, 2019).

In this study, 5 dimensions will be analyzed consisting of ecology, economy, social institutions, and infrastructure / technology. Determination of attributes on each dimension of ecology, economy, socio-culture, technology and as well as institutions refers to indicators from Rapfish (Kavanagh ; 2001), Tesfamichael and Pitcher (2006), Fauzi and Anna (2002) which are modified.

These data are included in primary data and are carried out using observation methods and direct measurements in the

field, while secondary data are both in the form of quantitative data and qualitative data. obtained from all information relating to several agencies. RAP-Geotourism analysis was carried out in 2 villages, namely: Gema, and Tanjung Belit.,

Table 1. Dimensions Used to Identify Geotourism Potential

Dimensions	Attribute
Geology	Water Resources (Rainwater, River Water, Groundwater)
	Natural Disaster
Ecology	Biodiversity (Animals, Plants)
	Environmental Conservation
	Cultural Diversity
Social	Community Demographics (Total Population, Population Density, Population Classification by Gender, Population Classification by Age Group)
	Community Education
	Type of Community Work
	Public Perception
	Legislation
	Regional Spatial Planning (Provincial RTRW, Regency RTRW, Existing Condition of Land Use, Mining Vusiness Area
	Role of Government (Central Government Agencies, Provincial Government Agencies, District Government Agencies)
	The Role of College
	The Role of Private Sector
	Non-governmental organization
Economy	Geological Diversity (Geotourism, Education)
	Resident Income
Infrastructure /Technology	Supporting Infrastructure (Status, Function and Condition of Roads, and other supporting infrastructure)

## 3.5 Scoring

Scoring Analysis for the RAP method for the potential of the Subayang Geotourism. In this study, the RAP Geotourism Dev application was developed to identify existing standards with conditions of existence in the Geotourism area. For each attribute of the overall 5 dimensions the score is estimated, namely a score of 3 for good condition (good), 0 means bad (bad) and between 0-3 for conditions between good and bad. The definitive score is the mode value, which is analyzed to determine the points that reflect the position of sustainability relative to the good and bad points using the MDS statistical ordination technique. (Anna et al., 2018).

Determination of geological resource potential. The index of geological resource potential in the Sushadow River Geotourism area has a range between 0-100% where 0% is the worst condition "bad" and 100% the best condition is "good".

Fauzi and Anna (2005), divide the status of the sustainability index value into 4 categories: Unsustainable "Poor : not continuous" has a range of 0-25, Less Sustainable "Less Sustainable" between 25.01-50, Fairly Sustainable "Quite Sustainable" the value range is 50.01-75 and "Very sustainable" with a value of 76-100. Giving value to 5 attributes provides an overview of the condition of the sustainability of geological resources, whether good or bad in the Sushadow River Area, Kampar Regency, Riau Province.

## 3. Result

The current of the Subayang River is not too heavy and the depth can still be reached by adults in general. Along the river, there are large rocks on the right and left sides of the river until it finally reaches the rock wall area. These rocks occur due to the natural process of sedimentation.

From the results of the table above, several parameters of statistical test results such as stress values and coefficients of determination indicate that the RAP-Geotourism method is quite well used to assess the potential and feasibility of the Subayang River area, Kampar as a Geotourism.

#### 4.1 RAP-Geotourism Ordinance Analysis Of Potential Geotourism In The Subayang River Area In A Geological Perspective

Table 2. RAP-Geotourism Ordinance Analysis In Geological Prespective

	Index	Status
Geological	66,64	Quite Sustainable
	Stress :	
	0,14	
	R2 :	
	0,95	

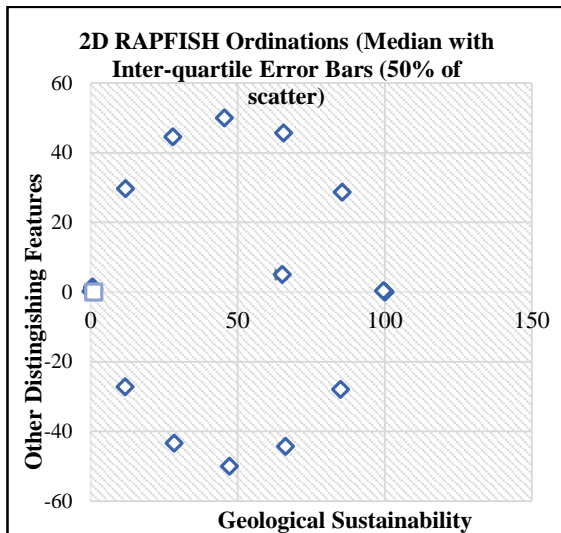


Fig 14. RAPfish chart Geological sustainable dimensions

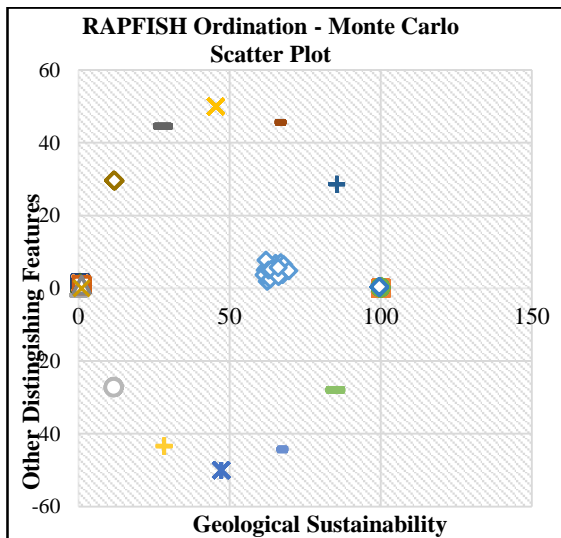


Fig 15. RAPfish chart Geological sustainable dimensions Monte Carlo scatter plot

Judging from the calculations above, from the geological dimensions, namely, groundwater, river water, disasters, to rocks, the Subayang River has the potential to become geotourism in Riau Province.

#### 4.2 RAP-Geotourism Ordinance Analysis Of Potential Geotourism In The Subayang River Area In A Ecological Perspective

Table 3. RAP-Geotourism Ordinance Analysis In Ecological Prespective

	Index	Status
Ecological	74,75	Quite Sustainable
	Stress :	
	0,13	
	R2 :	
	0,95	

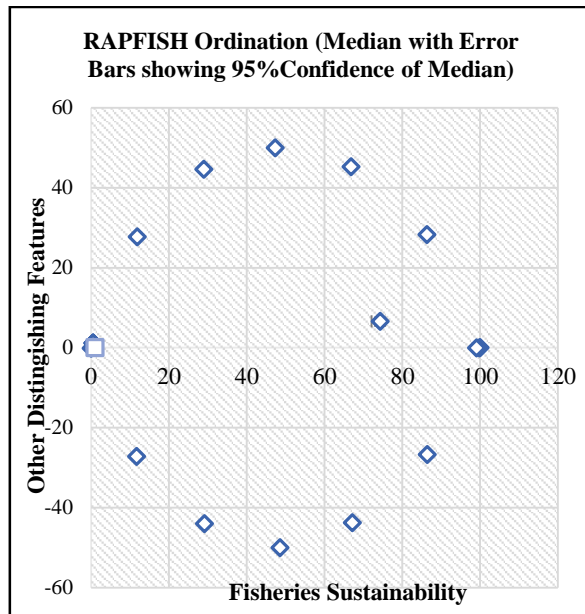


Fig 16. RAPfish chart Ecological sustainable dimensions

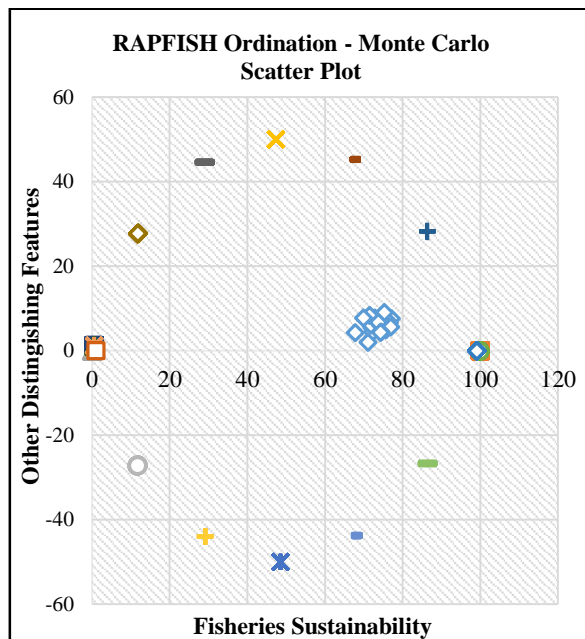


Fig 17. RAPfish chart Ecological sustainable dimensions Monte Carlo scatter plot

In the waters of the Subayang river there are 22 types of vegetation, 81 types of plankton and 24 types of benthos with different diversity index values from the 3 stations observed. The highest index of vegetation diversity was in Tanjung Belit Village with a value of 2,511, while the highest index of plankton and benthic diversity was in Batu Songgan Village with values of 3,342 and 2,682, respectively. (Wulandari et al., 2018)

#### 4.3 RAP-Geotourism Ordinance Analysis Of Potential Geotourism In The Subayang River Area In A Social Perspective

Table 4. RAP-Geotourism Ordinance Analysis In Social Prespective

	Index	Status
Social	55,39	Quite Sustainable
	Stress :	
	0,15	
	R2 :	
	0,94	

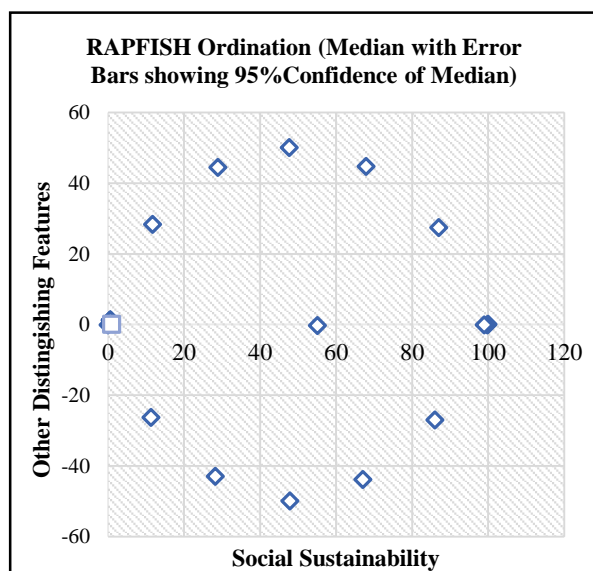


Fig 18. RAPfish chart Social sustainable dimensions

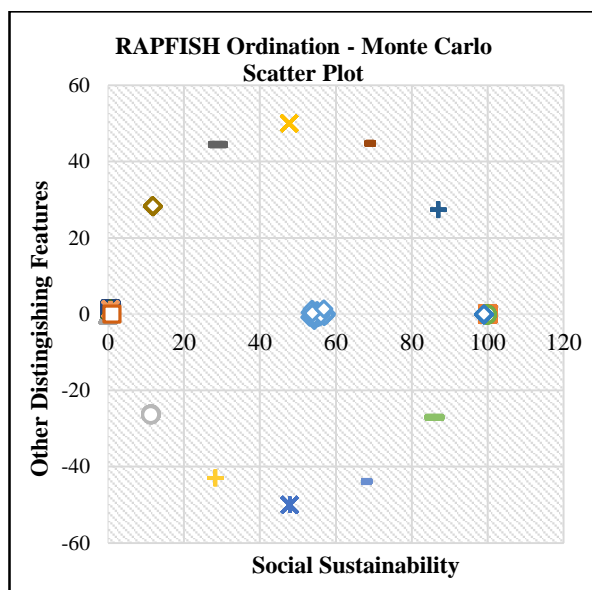


Fig 19. RAPfish chart Social sustainable dimensions Monte Carlo scatter plot

From the results of the calculations above, from the social dimension of the surrounding community, the Subayang River is quite potential even though the value is considered low in the "quite potential" circle.

#### 4.4 RAP-Geotourism Ordinance Analysis Of Potential Geotourism In The Subayang River Area In A Institution Perspective

Table 5. RAP-Geotourism Ordinance Analysis In Institution Prespective

	Index	Status
Institution	46,97	Less Sustainable
	Stress :	
	0,15	
	R2 :	
	0,94	

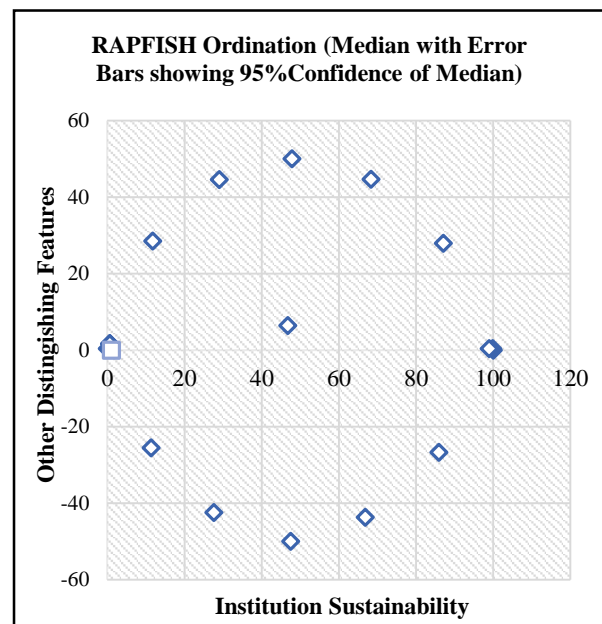


Fig 20. RAPfish chart Institution sustainable dimensions

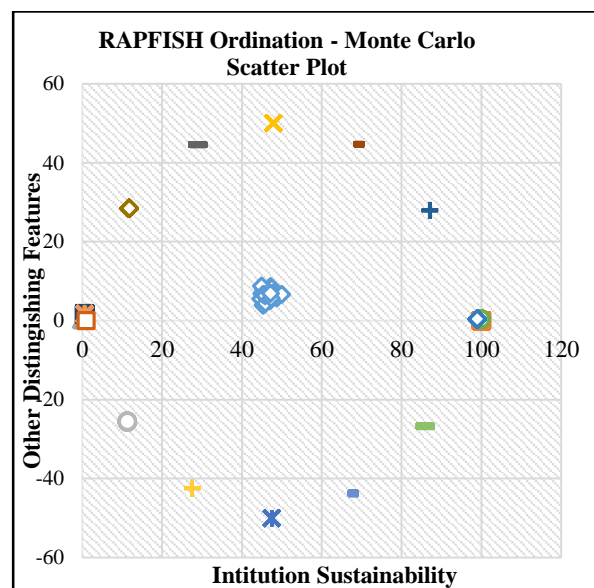


Fig 21. RAPfish chart Institution sustainable dimensions Monte Carlo scatter plot

Seen from the results of the calculations above, the institutional dimensions do not have the potential for geotourism sustainability, because there is still a lack of roles from various sectors

#### 4.5 RAP-Geotourism Ordinance Analysis Of Potential Geotourism In The Subayang River Area In A Economy Perspective

Table 6. RAP-Geotourism Ordinance Analysis In Economy Prespective

	Index	Status
Economy	61,20	Quite Sustainable
	Stress :	
	0,14	
	R2 :	
	0,95	

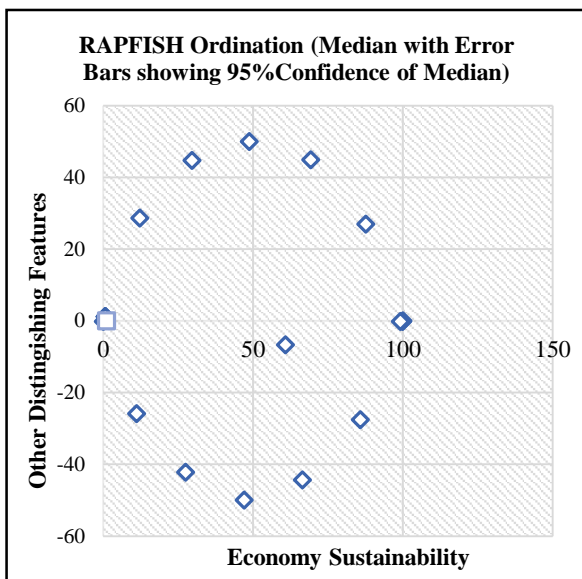


Fig 22. RAPfish chart Economy sustainable dimensions

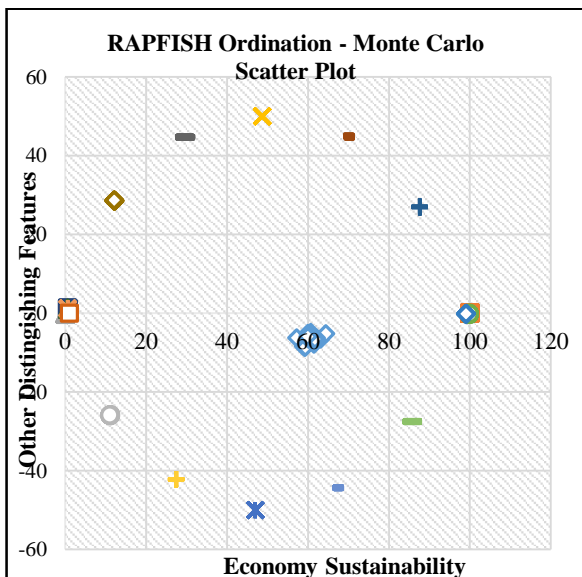


Fig 23. RAPfish chart Economy sustainable dimensions Monte Carlo scatter plot

Sustainability tourism is a complex system that is connected with social systems, environmental access to resources and ecology through tourism activities and actions done. Tourism is

one of the largest industries that lies in services and production that provide high economic returns. (Fennell, 1999) (Khattab and Hagggar, 2015).

From the results of the calculation of the economic dimension, the Subayang River is quite sustainable and feasible to be used as a Geotourism because it is enough to affect the income of local people and is sufficient in terms of serving the needs of tourists.

#### 4.6 RAP-Geotourism Ordinance Analysis Of Potential Geotourism In The Subayang River Area In A Infrastructure/Technology Perspective

Table 7. RAP-Geotourism Ordinance Analysis In Infrastructure/Technology Prespective

	Index	Status
Infrastructure	50,38	Quite Sustainable
	Stress :	
	0,15	
	R2 :	
	0,94	

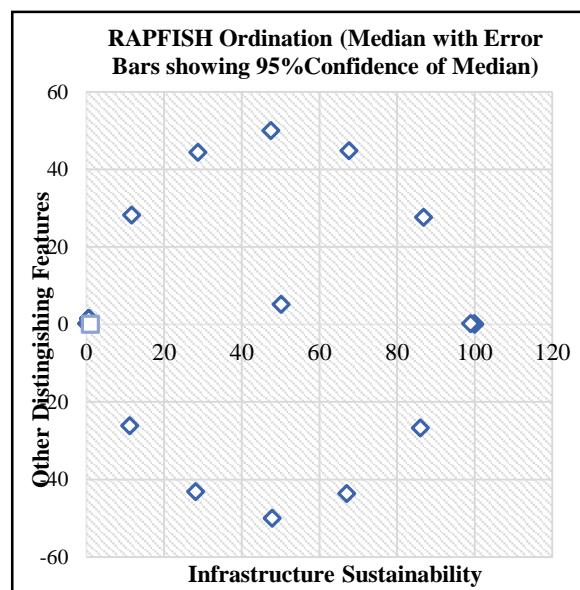


Fig 24. RAPfish chart Infrastructure/Technology sustainable dimensions

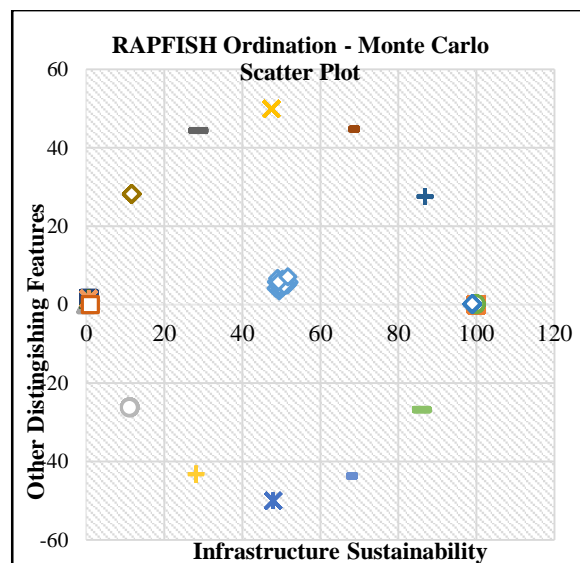


Fig 25. RAPfish chart Infrastructure/Technology sustainable dimensions Monte Carlo scatter plot



From the results of the calculations above, from the Infrastructure dimension, the Subayang River is quite potential even though the value is considered low in the "quite potential" circle.

## 5. Conclusion

The river has very good clarity, even the source of drinking water for the local community also comes from the river. This river has a gentle current and at certain points there is a strong current, and has an island in the middle which forms a forked river. About 80% of the island's surface and surrounding plains are covered with various trees, grasses, and agriculture

Judged from several dimensions and attributes in the method used, most of the dimensions and attributes used to see the potential of the Subayang river are quite feasible and quite sustainable, the ecological and geological dimensions have high values compared to other dimensions, while the lowest dimension is less sustainable and less feasible are the institutional and infrastructure dimensions Rothery, D.A., 2008. *Geology*. McGraw-Hill Companies, Blacklick, OH.

Concluded by Różycka and Migoń, different types of visitors may have different reasons and motivations, not necessarily focusing on geoheritage value. Therefore, they will view the geosite in different ways (Štrba et al., 2020).

In this regard, due to the limited work and collaboration between current biodiversity conservationists and Earth scientists, it is important to integrate and link biotic and geological conservation, for example, by suggesting geoconservation in protected areas already recognized by local authorities and people living and working in the area. In it. If we are to place geodiversity and geological heritage directly in nature conservation programs, the geoconservation community must work to ensure that geodiversity and geological heritage in protected areas become of great importance in local, national and international contexts.

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