

## THE ECONOMIC, SOCIAL AND ECOLOGICAL POTENTIAL OF GEROKGAK RESERVOIR AS A NEW TOURISM DESTINATION IN NORTH BALI

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**Abstract:** The development of Gerokgak reservoir as a tourism destination in Buleleng regency requires a wise strategy. Besides having great potential, Gerokgak reservoir has a strategic role to play for the community. Efforts to develop Gerokgak reservoir as a tourism destination must be done carefully to minimise the negative impacts that may be caused. This study aims to analyse Gerokgak reservoir's potential as a tourism destination, especially through the economic, social, and ecological aspects using the Rapid Impact Assessment Matrix (RIAM) method. Based on the analysis, it was found that the EO (Economic and Operational Implementation aspects) reached a value of 31.11, followed by the BE (Biological and Ecological aspects) with 22.16, so both are at the same unit level (C +) of changes/very positive impacts. However, the SC (Sociological and Cultural aspects) only shows a value of 8.65 with a range of units (A +) showing changes/slight positive impact. Therefore, the development process must optimise the implementation of EO without disrupting the existence of BE. Whereas the SC development can be deferred in advance because the impact and benefits that may occur are not as large and as significant as the other two aspects.

Keywords: Gerokgak Reservoir, tourism destination, RIAM.

### Introduction

Buleleng is one of the regencies in Bali province, and it has natural and artificial tourism potentials. This regency has the charm and appeal of natural and man-made attractions that can lure in local and foreign tourists. Even so, the potential for the development of tourism areas in the regency of Buleleng has not been maximised yet (Margi, 2013). Buleleng, which has a coverage of 1,365.88 km<sup>2</sup> and a population of about 638,3000, is the largest area and the most populous regency in the Province of Bali. Unfortunately, this northern regency of Bali has a low economic growth rate when compared to the Gianyar and Badung areas, which are located in the southern island of Bali. Badung regency, which has an area of less than 450,000 km<sup>2</sup>, has a higher GRDP (Gross Regional Domestic Product) than Buleleng regency, which is only around 10,022.37 billion rupiah (Astuti, 2018). This number is still lower than that of Denpasar and Badung, and it is not even half of Badung's GRDP, which have reached 20,988.88 billion rupiah.

The unequal development of South Bali and North Bali can be seen from the focus on tourism development in South Bali (Wirawan & Sunarya, 2013). These problems can have an impact on equitable development in Buleleng regency. If it is allowed to continue, the potential for tourism in the northern area of Bali will be squandered and not have a positive effect on people's lives (Wiranatha & Pujaastawa, 2018). Moreover, the tourism sector is recognised as a driving sector for other sectors. Development of tourism in one area will bring many benefits to the community, such as economically, socially and culturally (Nurhadi, 2015). The development of tourism areas in Buleleng regency is very promising. Tourism has been stated as one of the new style industries, which is able to provide rapid economic growth in terms of employment opportunities, income, standard of living and in activating other production sectors in tourist-receiving countries (Sitohang, 2014).

One potential tourist attraction in Buleleng regency that still needs to be developed is

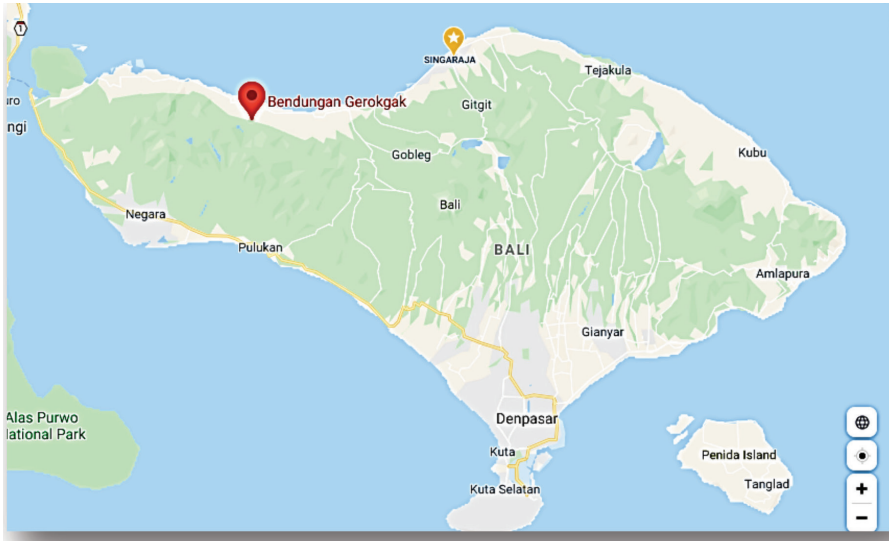


Figure 1: Research location of Gerokgak reservoir  
Source: Google Maps (2020)

Gerokgak reservoir. It has beautiful natural sceneries and wonderful hills. The average water volume of Gerokgak reservoir is 3,750,000 m<sup>3</sup> and it fluctuates according to season. Although at the beginning of the reservoir construction, it only functioned as a supply of irrigation water, but the beauty and modest panorama attracted the attention of local and foreign tourists.

Nevertheless, “development” activities have often caused environmental damage (Kuitunen, 2007; Prasetya, 2013). If exploration and exploitation of natural resources are carried out without regard to the rules of ecosystems and nature’s continuity, various negative impacts, like destruction of nature, endangerment of the lives of plants and animals, illegal logging, and the reduction in water absorption areas, will affect the dryness of the land during the long dry season. Those possible problems should be considered, and preventive action and solution

should be formulated. The development of a tourism destination should be directed not only to the orientation of enjoying natural, environmental panoramas, and cultural arts, but it also should be developed in the orientation of preserving, protecting, and maintaining the nature and ecosystem (Sujali, 2018).

One of the assessment methods that can be used to analyse the development of Gerokgak reservoir as a tourism destination in Buleleng regency is the RIAM (Rapid Impact Assessment Matrix) method. This method is a rapid and precise assessment of environmental impacts. Although many other methods are available for conducting environmental impact assessments, the RIAM method is preferred because it is a very flexible method (Pastakia & Jensen, 1998; Araujo & Haie, 2007; Gibuena *et al.*, 2013; Suthar, 2014). RIAM is able to present various parameters and alternatives to the Analysis

Table 1: Characteristics of Gerokgak reservoir

No.	Reservoir	District	Haul Area (Ha)	Surface Area (Ha)	Depth (m)	Water Volume
1	Bendungan Gerokgak	Gerokgak	2.85	350	42	3.75

Source: Suarta (2019)

on Environmental Impact in a structured, environmentally friendly and transparent way (Li Wei *et al.*, 2014; Ruiz, 2017). Moreover, RIAM overcomes criticism that arises because of subjective assessments and reduces the lack of transparency of other methods (Kuitunen, 2007).

In addition, problematic things that have the potential to influence environmental quality can be identified and evaluated quickly using the RIAM method (Pandey & Sinha, 2013). When compared with other analysis methods, such as the SWOT method, research results in the development of reservoirs as a tourism destination only state what potentials, strengths and opportunities they have so they need to be further developed (Prasetia, 2013). The AHP (Analytical Hierarchy Process) method can also be used in designing regional development strategies (Sumiyati, et.al, 2011). However, it needs to begin with a SWOT analysis first, which is then calculated using the Criterium Decision Plus program software. It does not stop there. The AHP method must be followed by a calculation process with a certain formula or application to obtain the final result. Therefore, analyses using the AHP method require a relatively longer time compared with analyses using the RIAM method.

The RIAM method can be used to analyse three main potential aspects of Gerokgak reservoir (economic, social, and ecological potentials) as a new tourism destination in north Bali. Those three aspects are chosen as it is believed they will bring more benefit and positive impacts to the development of Gerokgak reservoir. For the limitation of this study, it is only focus on the analysis of Gerokgak reservoir in north Bali. So, the design for the development of the tourism areas will only focus on Gerokgak reservoir, not the whole Gerokgak district or Buleleng regency. The development design of the tourism area was based on the results of the analysis using the RIAM (Rapid Impact Assessment Matrix) method and any other analytical methods or tools were not used.

This research is important as part of efforts to develop tourism in north Bali. It is hoped that by focusing on the tourism development of Gerokgak reservoir economically, socially and ecologically. the quality of life and welfare of Buleleng residents can be improved. The tourism sector has been shown to be able to improve the economy of a community (Margi, 2013; Wirawan & Sunarya, 2013). By developing the tourism sector in north Bali, people's quality of life can be improved as well.

### Research Method

The aim of this study is to analyse Gerokgak reservoir's potential as a new tourism destination, especially through the economic, social, and ecological aspects using the Rapid Impact Assessment Matrix (RIAM) method. In order to conduct the analysis of those three potential aspects, one of the rapid assessments that is perfect for this study is the RIAM (Rapid Impact Assessment Matrix) method. The RIAM method is a tool to organise, analyse, and present the results of a holistic environmental impact assessment (Pastakia & Jensen, 1998). It considers four main categories of environmental problems, namely:

1. Natural and chemical problems (NC)
2. Biological and ecological problems (BE)
3. Sociological and cultural problems (SC)
4. Economic and operational implementation problems. (EO)

In accordance with the three potential aspects of Gerokgak reservoir, only 3 of the 4 main categories of the environmental problems were used, namely: BE, SC, and EO. The data of this study were divided into 2 groups, namely: the Important and Valuable criteria. The Important criterion refers to (A) as an important criterion in the situation (the score can be changed/adjusted), whereas the Valuable criterion refers to (B) as a criterion that is valuable for the situation (the score cannot be changed/adjusted). For more details, the formula is presented as follows:

$$A1 \times A2 = AT \quad (1)$$

$$B1 + B2 + B3 = BT \quad (2)$$

$$AT \times BT = ES \quad (3)$$

BT : The sum of all (B) scores.

ES : Evaluation score for the condition.

Information:

A1 & A2 : Individual criteria score for group (A).

B1, B2 & B3 : Individual criteria score for group (B).

AT : Multiplication result of all (A) scores.

**Assessment Criteria**

In order to assess the RIAM aspects, each component in this analysis should be checked by using the criteria and scales in the Assessment Criteria (Table 2).

The data analysis techniques in this study involved a qualitative descriptive approach. The initial data, in the form of observations,

Table 2: The RIAM Assessment Criteria for Gerokgak reservoir

Criteria	Scale	Description
A1: Important developments in Gerokgak reservoir	4	Very important, covers the interest of the national/ international community
	3	Important, covers the interest of the regional/ national community
	2	Important for the inside and outside areas of Gerokgak village
	1	Important only for the local community in Gerokgak village
	0	No importance
A2: The magnitude of change / effect of Gerokgak reservoir	+ 3	Major positive benefit for the community in Gerokgak district
	+ 2	Significant improvements for the society
	+ 1	Improvement for the society
	0	No change
	- 1	Negative change to the life of Gerokgak society
	-2	Significant negative changes to Gerokgak district community
B1: Permanent Situation in Gerokgak district	-3	Major negative impact on the Gerokgak district community
	1	No change / no impact on the conditions in Gerokgak district
	2	Changes that occur temporarily in Gerokgak district
B2 : Reversibility of conditions in Gerokgak district	3	Changes that occur permanently in Gerokgak district
	1	There is no change in conditions in Gerokgak district
	2	Conditions are improving but can still be changed in Gerokgak district (can be changed)
B3: Cumulative	3	Conditions in Gerokgak Subdistrict are fixed (cannot be restored)
	1	There is no change/not applicable
	2	Non-cumulative/single
	3	Cumulative/synergistic

Source: Adapted from the RIAM Assessment Criteria Table (Pastakia & Jensen ,1998)

interviews, and RIAM assessment data, were analysed by looking for the percentage of each item of the observed dimensions. The RIAM method is used to determine the quality of nature and the environment in Gerokgak reservoir, which are developed as a tourism destination. Analysis using the RIAM method provided an overview of the impacts and effects of the implementation of Gerokgak reservoir development and strategies or approach that can be taken to develop its potentials. Careful planning and preparation can make a positive contribution to the development process. In addition, the potential for negative impacts can be suppressed so that they do not affect and interfere with the development of Gerokgak reservoir as one of the tourism destinations in Buleleng regency.

**Results and Discussion**

**RIAM Analysis of BE, SC, & EO**

The three potential aspects of the main categories of the RIAM analysis in this study show different scores. The Biological and Ecological (BE) aspects, Sociological and Cultural issues (SC), Economic and Operational implementation (EO) were analysed separately using the RIAM method. The method can provide a clear picture of the impacts associated with the implementation of a development project, such as the development of AMDAL in the Philippines (Gibuena *et al.*, 2013). It is not only able to provide a quick calculation of environmental impacts but is also able to provide an overview of the importance and level

of change in temporary or permanent impacts that may occur. The results are then determined based on the table of Environmental Score Conversion to see the level of their Range Bands description. Based on RIAM analysis, the three main categories show the following results.

Based on the final assessment of the RIAM score, the highest position is obtained by EO, followed by BE and then SC. Based on the Environmental Score Conversion table, the EO and BE are the third highest, with a range of units (C+) with the description of “changes/very positive impacts”, whereas the SC is fifth with the description of “changes /slightly positive impacts” in the range of unit (A+).

This data revealed that the next plan of development strategy should emphasise the aspects of the EO as this aspect will bring significant impact on the development of Gerokgak reservoir as a tourist destination. By developing Gerokgak reservoir as a tourist destination in Buleleng regency, it is predicted that the positive impact will not only be received by the locals, but the people of Buleleng and Bali as well. The tourism sector is able to improve the economy of the community so that the development and improvement of people’s quality of life can be supported (Margi, 2013; Wirawan & Sunarya, 2013). Nevertheless, planning and developing tourist destinations is a dynamic process (Parma, 2011). Therefore, various components need to work together to support the development of an area. Moreover, the development of Gerokgak reservoir has potential asset issues. The planning for the

Table 3: RIAM Analysis Result of BE, SC, and EO

No.	Statement	Total Score								
		A1	A2	B1	B2	B3	AT	BT	ES	RV
1	Biological and Ecological (BE) aspects	2.49	1.65	1.99	1.37	2.05	4.10	5.40	<b>22.16</b>	+C
2	Sociological and Cultural issues (SC)	1.53	1.18	1.73	1.25	1.85	1.79	4.83	<b>8.65</b>	+A
3	Economic and Operational implementation (EO)	2.69	1.95	2.10	1.66	2.16	5.26	5.92	<b>31.11</b>	+C

development of tourist destinations can be executed if there is a good approach and good coordination.

In line with the synergy process with other supporting aspects, the strategy for developing the EO aspects should be supported by the BE (Biological and Ecological) aspects, which has the second highest value in this study. Public works, such as building roads, cities, recreation areas, tourism or other similar activities, always have an impact on the environment (Ruiz, 2017). If people do not treat nature and maintain the environment, it can have a bad effect on people's quality of life. Therefore, the development strategy regarding the EO aspect can be coupled with the BE aspect. The difference between the two aspects is also not large enough. Hence, based on the Table of Environmental Score Conversion, the BE aspect is also in the (C +) range of unit with the description of "*change/very positive impact*". The development of the Gerokgak reservoir tourism destination should implement strategies that emphasise the development and strengthening of the Economic and Operational aspects without conflicts or damage to the Biological and Ecological aspect. The BE aspect is the natural quality of Gerokgak reservoir that can attract the attention of tourists and visitors, even though it has not been developed into a tourism destination yet. The reservoir's beautiful natural environment and abundance of water source can be used for agricultural and plantation irrigation purposes alongside the development of the tourist destination.

The SC (Sociological and Cultural) aspect can still be developed, but it should not be a top priority in the development strategy, as based on the results of rapid analysis of RIAM, the SC points only show a range of units of (A +), "*change/ a slight positive impact*". This means that if the development strategy is focused on the SC aspect only, achieving the development targets will be slow, and faced with more challenges and obstacles.

The results of the RIAM analysis in this study can be carried out quickly and effectively.

RIAM is not only able to provide information on points that need attention but is also able to provide information on priority points on development strategies that need to be carried out. This method is also able to map and even sort the right approaches and strategies that can be done to maximise the potential of an area and wisely minimise environmental losses and damage.

## Conclusion

Based on the analysis, it can be concluded that: the implementation of the three main aspects shows the EO (Economic and Operational Implementation) aspect has a significant and positive impact value, followed by the BE (Biological and Ecological) and SC (Sociological and Cultural) aspects. The appropriate strategy to develop Gerokgak reservoir as a better tourism destination in north Bali is by focusing on the economic and ecological aspects. Meanwhile, the strategy for the social part can be done after those economic and ecological aspects are well developed. This approach should be taken to overcome and minimise the obstacle in preparing the new tourism destination. This strategy is the appropriate way to promote and upgrade the level of tourism quality, especially in north Bali.

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