Land Suitability Analysis for Bathing Tourism in Kunyi Village, Polewali Mandar Regency

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Abstract

Land Suitability Analysis for Bathing Tourism in Kunyi Village Polewali Mandar Regency. Kunyi Village in Anreapi District, Polewali Mandar Regency, has potential for bathing tourism, particularly in Patipo and Kampung Rumede. This study analyzed land suitability for bathing tourism based on biophysical and social parameters. A descriptive quantitative approach supported by qualitative interpretation was applied using scoring and weighting. The biophysical parameters included water depth, current velocity, clarity, temperature, and pH, while the social parameters included accessibility, supporting facilities, and community perception. The results show suitability values ranging from 70% to 88%, indicating suitable (S2) to highly suitable (S1) classes. The strongest supporting factors are current velocity, temperature, pH, and accessibility. The main limiting factors are variation in river depth and limited sanitation capacity during peak visitation. Kunyi Village is feasible for bathing tourism development with priorities on zoning, sanitation improvement, safety measures, and community-based management.

Keywords: land suitability, bathing tourism, biophysical, social, Kunyi Village

INTRODUCTION

Nature based tourism has become increasingly important in regional development because it can generate economic opportunities while encouraging environmental stewardship and local participation. In freshwater environments, tourism activities such as bathing, swimming, river recreation, and camping have gained attention as forms of low- to medium-intensity tourism closely tied to landscape quality and public safety. Recreational freshwater environments provide benefits for health and well-being, but they also require proper management related to water quality, hazard control, and safety measures. The development of bathing tourism should not rely solely on scenic attractiveness. It also requires a land suitability assessment to determine whether the physical condition of the site and the surrounding social environment can safely and sustainably support tourism activities. Suitability analysis is important because it provides a practical basis for identifying both supporting factors and limiting factors in tourism development.

In the context of bathing tourism, biophysical parameters are fundamental because they directly affect visitor safety and comfort. Water depth influences the safety of bathing and swimming activities, current velocity affects physical stability and risk level, water clarity contributes to visual attractiveness and visitor confidence, and temperature and pH indicate the appropriateness of the water body for recreational contact. Besides environmental factors, social parameters are also important because accessibility, supporting facilities, and community support determine whether a site can function as a tourism destination rather than merely as a natural attraction.

Kunyi Village in Anreapi District, Polewali Mandar Regency, West Sulawesi, is one of the local areas with promising potential for freshwater tourism. The most active tourism sites are Patipo Nature Tourism and Kampung Rumede, both characterized by rocky river channels, relatively clear water, and a natural atmosphere suitable for bathing, recreation, and camping. The area is accessible by road and supported by basic facilities such as parking areas, bathrooms, a prayer room, gazebos, and food stalls. Field observations also indicate favorable water conditions, although some limitations remain, particularly related to variation in depth and sanitation capacity during peak visitation.

Based on these conditions, a systematic land suitability assessment is needed to determine the extent to which Kunyi Village can be developed as a safe and sustainable bathing tourism destination. Therefore, this study aims to analyze land suitability for bathing tourism development in Kunyi Village based on biophysical and social parameters.

METHODS

This study employed a descriptive quantitative approach supported by qualitative interpretation. The quantitative component was used to assess land suitability through a scoring and weighting system, while the qualitative component was used to explain field conditions and interpret analytical results in the local context. Quinta-Nova and Ferreira (2024) provide a recent example of this logic in spatial tourism assessment. The study area was Kunyi Village, Anreapi District, Polewali Mandar Regency, with analysis focused on the bathing tourism sites of Patipo and Kampung Rumede. The data consisted of primary and secondary sources. Primary data were collected through field observations of water conditions, accessibility, supporting facilities, and community-related aspects. Secondary data included tourism information, regulations, and relevant scientific literature.

To strengthen the analytical output, the study also presented spatial outputs in the form of a study area map and an indicative land suitability map. The study area map shows the location of Kunyi Village, Patipo, and Kampung Rumede within Polewali Mandar Regency, while the indicative suitability map illustrates the distribution of suitability classes across the observed bathing tourism segments based on field observations and weighted scoring results. The variables were divided into two groups. The biophysical parameters consisted of water depth, current velocity, water clarity, water temperature, and pH. The social parameters consisted of accessibility, supporting facilities, and community perception. This combination was selected because bathing tourism depends not only on environmental safety and comfort, but also on destination readiness and local support.

The analysis used a scoring and weighting method. The weights applied in this study were: water depth 15%, current velocity 15%, clarity 15%, temperature 10%, pH 10%, accessibility 15%, facilities 10%, and community perception 10%. Suitability classes were defined as S1 = highly suitable, S2 = suitable, S3 = conditionally suitable, and N = not suitable. The suitability index was calculated by multiplying the score of each parameter by its weight and summing the results, after which the total score was converted into percentage form.

This study employed a descriptive quantitative approach supported by qualitative interpretation. The operational interpretation of temperature and pH was informed by Indonesia's Government Regulation No. 22 of 2021, while the broader emphasis on user protection, hazard awareness, and recreational safety followed the framework proposed by the World Health Organization (2021).

Table 1. Operational criteria for bathing tourism suitability

No.	Parameter	Weight	S1 (3)	S2 (2)	S3 (1)	N (0)
1.	Water depth	15%	Safe and comfortable for bathing/swimming	Sufficiently safe but variable	Limited to certain activities	Unsafe
2.	Current velocity	15%	Slow and safe	Moderate, still usable	Rather strong	Dangerous
3.	Water clarity	15%	Clear	Fairly clear	Somewhat turbid	Turbid
4.	Water temperature	10%	Comfortable for recreation	Fairly comfortable	Less comfortable	Uncomfortable
5.	Water pH	10%	Within normal range	Slightly deviating	Moderately deviating	Unsuitable
6.	Accessibility	15%	Very easy to reach	Easy to reach	Somewhat difficult to reach	Difficult to reach
7.	Facilities	10%	Complete and adequate	Available but limited	Very limited	Unavailable
8.	Community perception	10%	Highly supportive	Supportive	Less supportive	Rejecting

RESULTS AND DISCUSSION

General Characteristics of the Site

Kunyi Village has the characteristics of a natural freshwater tourism destination. The main attraction lies in the rocky river morphology, relatively clear water, and a natural atmosphere that supports bathing, light water recreation, camping, and photography. The site is accessible by road and supported by basic facilities such as parking areas, toilets, a prayer room, gazebos, and food stalls. However, sanitation capacity remains limited during peak visitation periods.

Biophysical Parameter Assessment

Field observations show that water depth varies across river segments. Some segments are shallow to moderately deep and suitable for bathing activities, while other segments are deeper and require caution. Current velocity ranges from 0.2 to 0.3 m/s, indicating relatively calm water conditions. Water clarity is generally good under normal conditions, although it decreases during rainfall. Water temperature ranges from 27.8°C to 29.5°C, while water pH ranges from 6.7 to 8.2. Based on the scoring results, current velocity, water temperature, and pH fall into the highly suitable category (S1). Water depth is classified as suitable (S2) because of variation among river segments. Water clarity can be placed between S1 and S2 depending on hydrological conditions.

Social Parameter Assessment

Accessibility is one of the strongest supporting parameters because the site can be reached easily through the main Kunyi road and is relatively close to Polewali Mandar. Supporting facilities are already available, including toilets, prayer rooms, parking areas, food stalls, camping spaces, and photo spots. Nevertheless, sanitation facilities are still limited in capacity during peak visitation. Community perception toward tourism development is generally positive, as reflected in local involvement and support for tourism activities.

Overall Suitability Level

The weighted scoring results indicate that the land suitability value ranges from 70% to 88%. This shows that the bathing tourism area in Kunyi Village falls into the suitable (S2) to highly suitable (S1) classes. The strongest supporting parameters are current velocity, water temperature, pH, and accessibility. The main limiting factors are variation in water depth and limited sanitation capacity.

Spatial Output of Suitability

The spatial output shows that the more suitable zones are concentrated in river segments with calmer flow, comfortable depth, easier accessibility, and proximity to existing facilities. In contrast, the less suitable zones are found in segments with greater depth variation and lower service support. This pattern indicates that the site should be managed through segment-based zoning rather than as a uniform tourism area.

Table 2. Suitability assessment results of Kunyi Village (Processed from field observation data.)

No.	Parameter	Weight	Indicative Class	Score	Explanation
1	Water depth	15%	S2	2	Depth varies across river segments
2	Current velocity	15%	S1	3	0.2–0.3 m/s, generally safe
3	Water clarity	15%	S1–S2	2–3	Clear under normal conditions, reduced during rainfall
4	Water temperature	10%	S1	3	27.8–29.5°C, comfortable
5	Water pH	10%	S1	3	6.7–8.2, suitable
6	Accessibility	15%	S1	3	Good road access and easy reachability
7	Facilities	10%	S2	2	Basic facilities are available but limited in capacity
8	Community perception	10%	S2–S1	2–3	Community support is generally positive

Discussion by Parameter

1. Water depth**.**
   Water depth in Kunyi Village varies across river segments. Some areas are appropriate for bathing and light water recreation, while other sections may contain deeper pools that require caution. Therefore, this parameter was classified as S2, indicating that the site is suitable but requires zoning and clear designation of safe bathing areas.

This finding is consistent with the World Health Organization (2021), which notes that physical hazards in recreational water areas are an important part of risk management, alongside water quality considerations.

2. Current velocity.
   The observed current velocity of 0.2–0.3 m/s indicates relatively calm flow conditions. This makes the site generally safe for light bathing activities and family-based freshwater recreation. Accordingly, current velocity was classified as S1, making it one of the strongest supporting biophysical parameters of the area.

3. Water clarity.
   Water clarity is one of the main attractions of the site. Under normal conditions, the water appears clear, which enhances visitor comfort and the visual appeal of the destination. However, clarity decreases during rainy conditions. This parameter was therefore classified between S1 and S2. In line with this, the World Health Organization (2021) emphasizes the importance of monitoring environmental conditions and communicating risk to users in recreational water settings.

4. Water temperature
   The recorded water temperature of 27.8–29.5°C is comfortable for freshwater recreation in tropical environments. This condition supports bathing and leisure activities and places this parameter in the S1 category.

5. Water pH
   The observed pH range of 6.7–8.2 indicates that the water is within a generally acceptable range for recreational use. This parameter was therefore classified as S1**.** The World Health Organization (2021) similarly highlights the importance of maintaining acceptable water conditions to protect public health in recreational freshwater environments.

6. Accessibility
   The site can be accessed by both motorcycles and cars, and it is located only about 20 minutes from Polewali Mandar. This makes accessibility one of the area's main strengths and justifies its S1 classification. From a tourism development perspective, accessibility is a key factor in destination readiness and visitor convenience.

7. Supporting facilities
   Basic facilities such as parking areas, toilets, prayer rooms, food stalls, camping areas, and photo spots are already available. However, their capacity, especially sanitation facilities, is still limited during periods of high visitation. Therefore, this parameter was classified as S2. This result suggests that facility improvement should be prioritized in future development.

8. Community perception.
   Community support for tourism in Kunyi Village appears to be positive, as reflected in local promotion, tourism village recognition, and the active involvement of local actors in tourism development. This parameter was therefore placed between S2 and S1. In tourism planning, social support is essential because community acceptance strongly influences the sustainability of destination development.

The results indicate that Kunyi Village has strong potential for bathing tourism development because its environmental and social conditions generally support safe and attractive freshwater recreation. Calm current velocity, comfortable water temperature, acceptable pH, and good accessibility strengthen the suitability of the site for bathing activities. These findings suggest that the environmental base of the area is favorable for recreational use, particularly for light freshwater tourism. Variation in water depth is the main limiting factor because it directly affects visitor safety and the type of activities that can be carried out in each river segment. This indicates that tourism development in Kunyi Village should not treat the entire area as equally suitable. Instead, river sections need to be differentiated according to their physical characteristics and safety levels. In this sense, suitability analysis does not only classify the land, but also provides a planning basis for identifying priority areas for tourism use and management.

The social dimension also plays an important role in destination feasibility. Good accessibility and positive community support indicate that Kunyi Village already has a strong foundation for tourism development. However, the limited capacity of sanitation facilities may reduce visitor comfort and service quality, especially during peak visitation periods. This means that environmental suitability alone is not sufficient; adequate facilities and local management readiness are equally necessary to support sustainable tourism development.

The spatial implication of the findings is that future development should prioritize river zoning based on depth and safety, the expansion of sanitation facilities, the installation of warning and information signs, and routine monitoring of water conditions. In addition, community-based management should remain central because local participation is essential for routine maintenance, visitor supervision, and long-term tourism sustainability. With this approach, bathing tourism in Kunyi Village can be developed in a safer, more organized, and more sustainable manner.

Overall Land Suitability

Based on the scoring and weighting analysis, the overall land suitability value for bathing tourism in Kunyi Village ranges from **70% to 88%**. The lower value represents a conservative assessment and falls within the **S2 (suitable)** category, whereas the upper value represents more favorable river segments and falls within the **S1 (highly suitable)** category. These findings indicate that Kunyi Village has strong potential for bathing tourism development. Nevertheless, because the assessment is still preliminary and partly indicative, future development should be supported by more detailed field measurements across specific river segments. In this sense, the role of suitability analysis is not only to classify the area, but also to identify priority improvements, which is consistent with the planning function described by Quinta-Nova and Ferreira (2024).

Development Implications

The results indicate that future bathing tourism development in Kunyi Village should focus on:

1. detailed mapping of river depth and segment characteristics;
2. designation of safe bathing and swimming zones;
3. expansion of toilet and sanitation capacity;
4. installation of safety signs and warning boards;
5. periodic monitoring of water condition and current flow;
6. strengthening community participation in destination management.

These recommendations are consistent with the risk-based approach to recreational water management promoted by the World Health Organization (2021), which stresses hazard control, safety communication, and public protection in freshwater recreation areas.

CONCLUSION

This study shows that Kunyi Village has promising potential for bathing tourism development because its environmental and social conditions generally support safe and attractive freshwater recreation. The suitability range from S2 to S1 indicates that the area is feasible for development, but not all river segments have the same level of readiness.

The main insight of this study is that bathing tourism development in Kunyi Village should be based on a segment-specific and risk-aware approach. The most important recommendations are the preparation of river zoning based on depth and safety, the expansion of sanitation facilities, the installation of warning and information signs, and the strengthening of community-based management. Future studies are recommended to provide more detailed spatial mapping and segment-based measurements to support more precise tourism planning.

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