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# Community-Based Participatory Mapping for Tourism Development in Tuwed Village, Bali

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**Abstract:** Tuwed Village, located in Melaya, Jembrana, Bali, has rich natural and cultural resources with strong potential for sustainable tourism development. However, it has not yet been officially designated as a tourism village. Based on interviews with local community leaders, Tuwed Village holds various tourism potentials, such as a mangrove forest that serves as a habitat for diverse biota and a forest area that functions as a birdwatching site with various bird species that attract tourists. In addition, the village has agricultural potential, including extensive rice fields, cocoa, and avocado plantations. Tuwed Village offers unique local traditions, such as the traditional buffalo racing, which is distinctive and promising to be developed as part of cultural tourism. Despite these strengths, tourism development in Tuwed Village remains underutilized due to the absence of structured, data-driven zoning and spatial planning, and limited community involvement. This research aims to identify and mapping the tourism potential in Tuwed Village through direct community participation. The research methods include identifying existing potentials by engaging directly with the local community, conducting focus group discussions to plan the mapping process and developing a digital map using Geographic Information System. This research result is a tourism potential map that can be utilized by the Tuwed Village management for the sustainable development of the village towards becoming a tourism destination. Furthermore, involving the community in the mapping process enhances the spatial data accuracy, strengthens social capacity, and fosters sense of ownership, consequently, it becomes a strategic instrument for strengthening community-driven tourism initiatives.

**Keywords:** community participation, potential mapping, tourism potential, Tuwed village.

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## Introduction

The tourism industry has huge potential improve economic sector including rural tourism (Rodrigues et al., 2023) (Kitole & Sesabo, 2024) (Li et al., 2025). Rural tourism denotes tourism practices situated in rural settings, characterised by visitor involvement in locally embedded activities such as agriculture, nature-based experiences, indigenous traditions, and social interaction with host communities (Soták-Benedeková et al., 2025). The expansion of tourism activities in rural settings is frequently viewed as a catalyst for regenerating the social, cultural, and economic foundations of long-established village settlements (Reina-Usuga et al., 2024) (Hussain et al., 2024). While it holds considerable potential to enhance the quality of life of local communities, it may simultaneously threaten their livelihood systems, weaken long-standing cultural practices, fracture social

cohesion within the village, and, in extreme circumstances, lead to the displacement of established traditional settlements (Yanan et al., 2024). Evaluating the acceptability of tourism development requires a careful examination of community perceptions toward industry expansion, as, despite its capacity to stimulate employment, increase income generation, enhance living standards, upgrade infrastructure, and attract external investment, local residents may still respond with scepticism or resistance (Khasawneh et al., 2023). Numerous scholars acknowledge that active involvement of local communities constitutes a fundamental prerequisite for ensuring the long-term sustainability of tourism destinations (Idris et al., 2021) (Obradović & Stojanović, 2022) (Mmeko et al., 2023). They argue that actively involving local residents helps to enhance the benefits of tourism development while reducing its potential adverse impacts (Boonsiritomachai & Phonthanukitithaworn, 2019). Community-based tourism is widely regarded as a practical approach to community empowerment, based on the expectation that active participation of local residents in tourism activities can generate economic opportunities and sustainable livelihoods, while simultaneously fostering a commitment to environmental protection (Burton et al., 2025) (Aunchistha, 2025).

Tuwed Village is situated in Melaya Sub-district within Jembrana Regency, Bali Province. The village holds a strategically significant position and is endowed with a wide range of economic potentials, particularly in the sectors of agriculture, plantations, farm, and small and medium-sized enterprises (SMEs). Across the farming sector, Tuwed has extensive rice fields, with rice being the primary crop. In addition to agriculture, the plantation sector is also highly prominent, with the cultivation of coconut, cocoa, and coffee being the dominant commodities. Farming also significantly contributes to the village's economy, with cattle, pigs, goats, and poultry being the dominant types. Beyond its economic resources, Tuwed Village is also rich in natural and cultural tourism assets that remain largely underdeveloped but show great potential. According to interviews with local community leaders, the village is home to ecotourism attractions such as mangrove forests that serve as essential ecological habitats for diverse plant and animal species, including both migratory and endemic birds. Mangrove ecosystems function as natural buffers along coastlines, foster rich biological diversity, generate environmentally sustainable livelihood options, and contribute to the economic resilience of surrounding communities (Malik et al., 2025). These areas have the potential to be developed into birdwatching destinations, which could attract nature-based tourism enthusiasts. Additionally, the presence of forested zones around the village adds to its ecological appeal, offering opportunities for hiking, biodiversity observation, and environmental education. From a socio-cultural perspective, Tuwed Village maintains a strong cultural heritage, marked by traditional practices and rituals that are still actively observed by the local population. One of the most unique and culturally significant traditions is the buffalo racing, which is not only a community festivity but also a potential cultural tourism attraction due to its uniqueness and local wisdom (Yogantara et al., 2024) (Sarka, 2025).

Despite the abundance of natural beauty and cultural heritage, Tuwed Village has not yet been formally recognized or designated as an official tourist village. This condition stems from the suboptimal governance and underutilisation of the village's existing tourism assets. In addition, the village has yet to develop a structured, data-driven zoning map of its tourism assets that actively involves community participation in the planning process. Existing tourism asset identification remains largely descriptive and fragmented, resulting in limited information for evidence-based decision-making related to tourism zoning, infrastructure planning, environmental conservation, and tourism investment prioritisation. This situation creates a clear urgency: without a systematic,

spatially explicit, and community-engaged inventory, Tuwed Village risks either missing economic opportunities or experiencing unplanned tourism growth that may lead to environmental degradation, land-use conflicts, and social tensions within the local community. Furthermore, the village has not yet established a participatory spatial database that integrates tourism potential, environmental conditions, accessibility, and community perspectives into a unified tourism planning framework.

Research focusing on community engagement in the process of village development has been carried out by (Mteti et al., 2025) which explores the interrelationship between local residents' awareness and perceptions and the potential of cultural heritage resources (CHRs) in the Katavi Region, located within Tanzania's southern tourism circuit. The study underscores the pivotal importance of active community participation in positioning Katavi as an emerging cultural tourism destination. It further emphasises that meaningful community participation in tourism planning is essential for safeguarding local interests and cultural heritage, while cultivating a strong sense of ownership and pride among residents. Another study conducted by (Alamineh et al., 2023) found that community views were generally supportive, as residents recognised tourism as contributing positively to the expansion and enhancement of social services in the destination area. Research by (Mir et al., 2024) stated that sustainable development in rural and regional areas depends largely on informed and proactive community involvement in tourism-related activities. Research related to Geographic Information System (GIS) implementation development has been carried out by (Salminen et al., 2025) investigated the application of Geographic Information Systems (GIS) by employing an online Public Participation GIS (PPGIS) platform to map and analyse areas of concern linked to the rapid growth of the aquaculture and tourism industries in Northern Norway. With a participation level of 9.4%, the findings indicate that most mapped spatial issues were located near aquaculture sites and tourism zones. Respondents largely supported scaling back salmon aquaculture, while maintaining neutral views toward other aquaculture activities. In addition, attitudes toward tourist fishing and cruise tourism were either neutral or inclined toward reduction, whereas perceptions of other coastal tourism activities were comparatively more favourable. Research by (Hognogi et al., 2025) state that PPGIS serves as an effective mechanism for integrating citizen involvement with environmental conservation efforts, while also enhancing cultural ecosystem services.

However, previous research primarily focused on community perceptions or participatory mapping separately, while limited research integrates community participation with data-driven GIS-based tourism zoning specifically for rural tourism planning at the village level. Most previous studies also emphasised qualitative participation without providing a replicable and verifiable spatial decision-support framework. Therefore, the urgency and novelty of this research lie not merely in producing a tourism map or simple tagging of tourism locations, but in developing a participatory and data-driven digital spatial database that can support evidence-based tourism planning and sustainable village development. The core value of this paper is that it moves beyond simply identifying tourism points of interest by integrating spatial information, tourism potential classification, environmental characteristics, accessibility, land-use conditions, and community knowledge into a GIS-based digital mapping system. This approach produces spatially accurate and attribute-rich data layers that can support strategic tourism zoning, conservation planning, tourism route development, infrastructure prioritisation, and sustainable tourism governance (Abdullah et al., 2025) (Cxınar et al., 2025). In addition, the research generates measurable outputs such as zone classifications, spatial overlays, and participatory mapping results, thereby

providing verifiable and updatable tourism planning data rather than subjective descriptive inventories. Thus, this research addresses the gap between rhetorical community participation and actual spatial decision support for rural tourism planning.

To overcome the identified issues, namely the absence of a structured, data-driven, and community-engaged tourism planning framework, this research developed a village potential digital map that can be used by Tuwed Village managers in the sustainable development of Tuwed Village towards a tourist village using GIS. In contrast to previous studies that rely mainly on generic surveys or simple location tagging, this research adopts a data-driven PPGIS approach by integrating participatory tourism asset mapping, GPS-based field data collection, and spatial analyses such as proximity, overlay, and density analysis to produce verifiable and updatable spatial map layers. Mapping applications based on GIS technology allow users to alternate among multiple base layers, including satellite views and marine charts, enabling diverse stakeholders to gain clearer insight into the designated area (James, 2025). This research result is a tourism potential map that can be utilized by the Tuwed Village management for the sustainable development of the village towards becoming a tourism destination. Furthermore, involving the community in the mapping process enhances the spatial data accuracy, strengthens social capacity, and fosters a sense of ownership, making it an effective strategy for community-based tourism planning and development. The unique value of this paper lies in demonstrating how a data-driven PPGIS framework can transform local community knowledge into actionable spatial information for sustainable tourism planning. Consequently, this research contributes not only academically through the integration of participatory GIS and community-based tourism planning, but also practically by providing a replicable spatial decision-support model for rural villages facing similar tourism development challenges.

## Methodology

This section outlines the stages of the research to be conducted. The research methodology problem identification includes identifying existing potentials by engaging directly with the local community, literature review, data collection by doing focus group discussions to plan the mapping process and developing a digital map using Geographic Information System. The stages carried out in this research are illustrated in Figure 1.

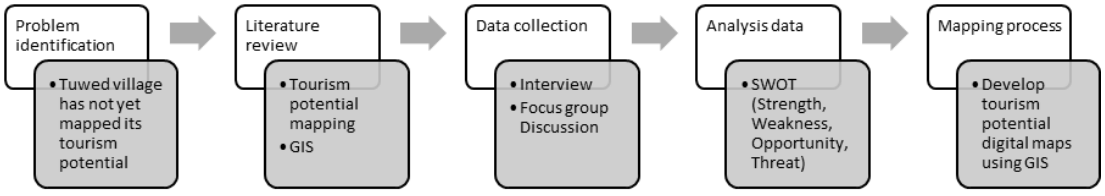


**Figure 1.** Research Methodology

Figure 1 illustrates the research stages which are explained as follows:

1. Problem identification
   At this stage, the existing problems are identified. Tuwed Village possesses considerable tourism potential, both cultural and natural. However, to date, there has been no development master plan or mapping of the village's potential to support sustainable development initiatives.
2. Literature review

At this stage, a literature review is conducted on village potential mapping and the GIS application to support this research.

3. Data collection
   At this stage, data is collected using two methods: interviews with village administrators and focus group discussions with local leaders and community representatives. For the interviews, a total of 7 representatives from the village administration were purposively selected based on their direct involvement in village planning, tourism development, land management, and community empowerment activities. The participants included the Village Head, Village Secretary, representatives from village development and community empowerment divisions, as well as representatives from the Village-Owned Enterprise (BUMDes). These participants were selected because they possess strategic knowledge and decision-making roles related to village development planning, tourism potential management, and community-based economic programs in Tuwed Village. For the focus group discussions (FGDs), a total of 20 participants were involved and divided into two discussion groups. Participants were selected using purposive sampling combined with snowball sampling to ensure representation from key community stakeholder groups with direct knowledge of local tourism potential and environmental resources. The participants consisted of representatives from farmer groups, mangrove management groups, BUMDes, village cooperatives, youth organisations, customary village leaders, women's community groups, and general village community representatives. Specifically, the FGD participants included: 5 representatives from agricultural and plantation groups (rice, coconut, cocoa, and coffee sectors), 3 representatives from livestock groups, 3 representatives from mangrove conservation and management groups, 2 representatives from BUMDes and village cooperatives, 3 youth organisation representatives including tourism awareness groups, 2 customary and cultural leaders, and 2 representatives from women's and local community groups involved in SME activities. The participant selection criteria required that individuals were actively involved in social, environmental, cultural, or economic activities within the village, possessed adequate knowledge regarding local tourism assets such as mangrove ecosystems, forest areas, agricultural landscapes, and buffalo racing traditions, and were willing to participate in participatory spatial mapping activities and group discussions. The diversity of participants ensured that ecological, agricultural, cultural, social, and economic perspectives were comprehensively integrated into the data-driven GIS and participatory mapping process.
4. Analysis data
   At this stage, the gathered data are systematically evaluated using the SWOT (Strengths, Weaknesses, Opportunities, and Threats) analytical framework.
5. Mapping process
   At this stage, the mapping of tourism potential in Tuwed Village is carried out using Geographic Information Systems (GIS). The mapping process involved several stages, including field data collection, spatial data validation, digitisation, and spatial analysis. Field data regarding tourism assets, environmental features, accessibility, and cultural sites were collected through direct observations, participatory discussions, and GPS-based location recording using mobile mapping applications. The collected spatial data were then processed and analysed using QGIS software as the primary GIS platform. Several spatial analysis techniques were applied, including overlay analysis, proximity analysis, and tourism potential

zoning. Satellite imagery and OpenStreetMap base maps were utilised to identify land use, road accessibility, mangrove areas, agricultural landscapes, forest zones, and tourism attraction distribution. In addition, participatory mapping activities were conducted by involving local stakeholders in validating tourism locations and spatial boundaries to ensure the accuracy and relevance of the generated spatial information. The final output of the mapping process was a digital tourism potential map containing multiple spatial information layers, including tourism attraction points, environmental conservation areas, accessibility routes, agricultural and cultural tourism zones, and supporting village infrastructure. This GIS-based mapping process enabled the development of a structured, verifiable, and updatable spatial database to support sustainable tourism planning and decision-making in Tuwed Village.

## Results and discussions

### *Results*

During the initial data collection stage using interviews with village officials, several tourism potentials in Tuwed Village were identified, consisting of both natural and cultural assets. One of the prominent natural potentials is the mangrove forest, while a notable cultural tradition is Mekepung, a traditional buffalo racing event unique to Tuwed Village. Subsequently, additional data were obtained through a Focus Group Discussion (FGD) conducted with village authorities and key community representatives. The FGD was conducted to elicit views and recommendations from local stakeholders concerning tourism development in Tuwed Village. The participation of community leaders generated substantial insights into various local assets that could be strategically leveraged for tourism development. The FGD subsequently resulted in the classification of Tuwed Village's principal tourism potentials, as presented in Table 1.

**Table 1.** Tuwed Village's Main Tourism Potentials

| Type of Tourism | Tourism Potential | Potential Activities/Schedule |
|---|---|---|
| Conservation, Ecotourism, and Education Areas | Mangrove forests and turtle habitats | Mangrove trekking, birdwatching, turtle observation, mangrove planting, environmental education (year-round; turtle observation during nesting season) |
| Agrotourism | Rice harvesting, coconut farming, and local vegetable cultivation | Rice planting and harvesting experiences, plantation tours, agricultural education (harvesting season: 2–3 times/year) |
| Cultural Tourism | Mekepung (buffalo racing), culinary traditions, and handicrafts | Mekepung festivals, culinary experiences, handicraft workshops (conducted during local festivals and cultural events) |
| Ecotourism | Biodiversity and coastal landscapes | Nature photography, biodiversity observation, coastal tours, conservation campaigns (year-round) |

Source: Authors' elaboration based on focus group discussion (FGD) results (2025)

The tourism potentials identified through focus group discussions (FGDs) indicate that Tuwed Village possesses diverse attractions that can support sustainable tourism development. The mangrove forests and turtle habitats offer significant opportunities for conservation-based ecotourism and environmental education. According to stakeholders, potential activities in this area include mangrove trekking, birdwatching, turtle habitat observation, environmental interpretation, and mangrove planting programs involving

visitors and students. These activities can be conducted throughout the year, while turtle observation activities are recommended during nesting seasons to minimize disturbances to wildlife.

Agrotourism in Tuwed Village is primarily associated with rice fields, coconut plantations, and local vegetable cultivation. Visitors may participate directly in farming activities, such as rice planting and harvesting, coconut processing demonstrations, and educational tours related to sustainable agricultural practices. Based on information provided by local farmers, rice harvesting activities generally occur two to three times annually, depending on seasonal conditions, whereas plantation activities can be visited throughout the year.

Cultural tourism in Tuwed Village is represented by Mekepung (traditional buffalo racing), local culinary traditions, and handicraft production. Mekepung is recognized by stakeholders as one of the village's most distinctive cultural attractions and is usually organized during particular ceremonial periods or local festivals. In addition, visitors may experience traditional culinary preparation, local food tasting, and observe or participate in handicraft-making activities conducted by community members.

The village's biodiversity and coastal landscapes also provide opportunities for ecotourism development. Stakeholders suggested several potential activities, including biodiversity observation, nature photography, coastal interpretation tours, educational excursions, and environmental conservation campaigns. These activities are generally feasible throughout the year, particularly during favorable weather conditions.

Following the identification of Tuwed Village's key tourism potentials during the data collection phase, the information was further examined using the SWOT framework to evaluate its strengths, weaknesses, opportunities, and threats. The findings of this assessment were then utilised as a basis for establishing tourism zoning, which was subsequently visualised in a digital map, as presented in Table 2.

**Table 2.** SWOT Analysis

| Strengths | Weaknesses | Opportunities | Challenges |
|---|---|---|---|
| Diverse tourism potential: mangrove, protected areas (home range) for endangered wildlife such as turtles, and local handicrafts. | Inadequate accessibility | Regulatory support: spatial planning (RTRW), mangrove conservation, BRIDA | Mangrove forest management status |
| Rich local culture and community-based conservation wisdom | Limited supporting facilities | Increasing trends in educational and sustainable tourism | Coastal abrasion threats and damage to coastal ecosystems |
| Strategic location with sufficient road access – TNBB (West Bali National Park) | Lack of supporting creative industries | Partnership opportunities | Potential land use conflicts with other sectors |
| Active local community participation | Lack of Master Plan and Governance System | | |

Source: Authors' elaboration based on focus group discussion (FGD) results (2025)

## *Discussions*

Based on interviews with village officials and focus group discussions (FGDs) with community leaders, several tourism potentials were identified in Tuwed Village. The involvement of community leaders played a crucial role in uncovering village potentials

that are considered suitable for sustainable tourism development. To support future village planning and development, these tourism assets were subsequently mapped digitally using GIS. The digital representation of Tuwed Village's tourism map is displayed in Figure 2.

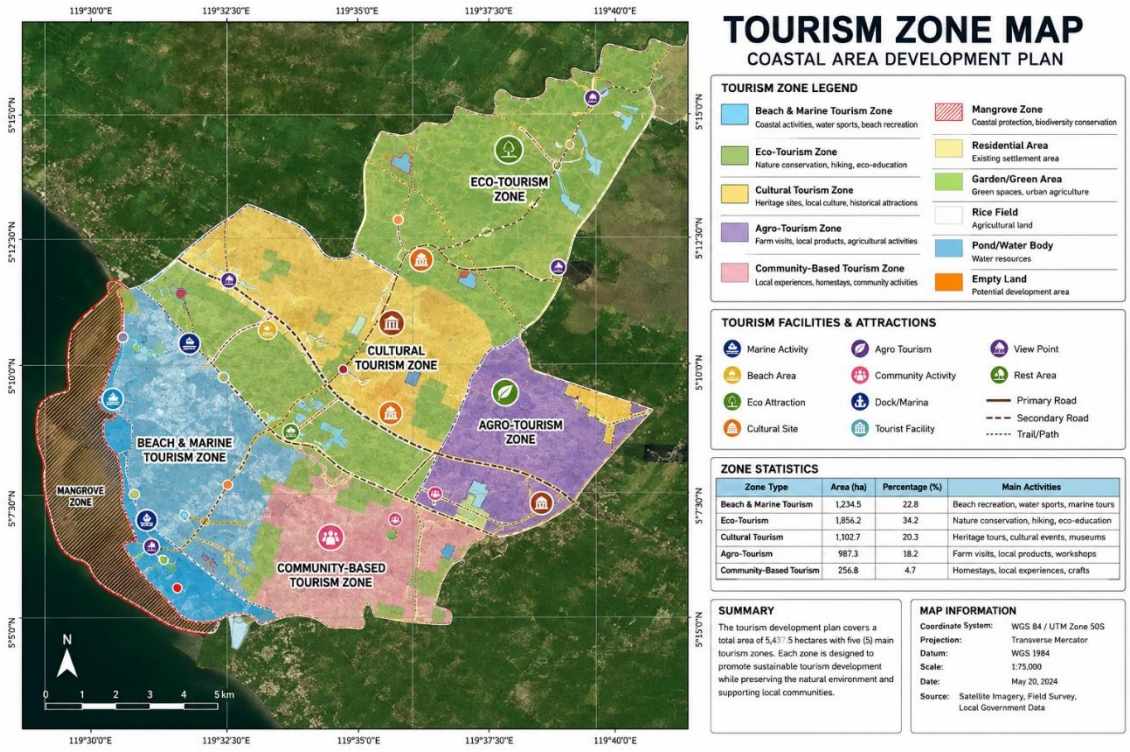


**Figure 2.** Tuwed Village Digital Map
Source: Processed by researchers (2025)

In Figure 2 can be seen that Tuwed Village has the potential of a mangrove forest area with an area of 67 Ha, residential areas, gardens consisting of cocoa and avocado gardens, rice fields with abundant water considering that Tuwed Village is located in the lowlands near the beach, several ponds and there is a little empty land visible. The digital map of Tuwed Village reveals several areas that can be categorized into specific tourism zones. The tourism zone map illustrates the spatial distribution of tourism development areas based on the natural, agricultural, and socio-cultural resources of the coastal region. The proposed tourism development is divided into four main tourism categories, namely conservation, ecotourism and education areas, agrotourism, cultural tourism, and ecotourism, each representing specific tourism potentials and activities.

The Conservation, Ecotourism, and Education Area is located primarily within the coastal mangrove ecosystem and turtle habitat zones along the western coastline. This area is designated for environmentally sustainable tourism activities, including mangrove trekking, birdwatching, turtle observation, mangrove planting programs, and environmental education. These activities can be conducted throughout the year, while turtle observation is recommended during the nesting season to minimize ecological disturbance.

The Agrotourism Zone, situated in areas dominated by rice fields, coconut plantations, and local vegetable cultivation, offers opportunities for agricultural-based tourism. Visitors can participate in rice planting and harvesting experiences, plantation

tours, and agricultural education programs. Seasonal activities are concentrated during harvesting periods, which generally occur two to three times annually.

The Cultural Tourism Zone is developed in areas with strong local cultural characteristics and community activities. This zone promotes traditional attractions such as *Mekepung* (buffalo racing), local culinary experiences, and handicraft production. Tourism activities include cultural festivals, culinary tourism, and handicraft workshops, which are primarily organized during local cultural events and festival periods.

The Ecotourism Zone encompasses areas with high biodiversity value and attractive coastal landscapes. This zone supports nature-based tourism activities such as nature photography, biodiversity observation, coastal exploration tours, and conservation campaigns. These activities are designed to operate throughout the year while maintaining ecosystem integrity and promoting environmental awareness among visitors. The classification of tourism zones in Tuwed Village is presented in Table 3.

**Table 3.** Tuwed Village Tourism Zone

| Zone | Function | Location |
|---|---|---|
| Conservation | Mangroves & turtle protection | Coastal area |
| Edu-tourism | Agriculture, training | Village center |
| Culture & Culinary | Cultural attractions and MSMEs | Community hall |
| Accommodation & Services | Homestays & supporting facilities | Main road |
| Thematic Events | Festivals, training sessions | Open field |

Source: Authors' elaboration based on focus group discussion (FGD) results (2025)

Table 3 shows Tuwed Village tourism zone where it intended to regulate spatial utilization in a responsible manner, ensuring that tourism activities are carried out sustainably, safely, and in a controlled way without causing harm to the environment or compromising local cultural values. Through proper zoning, visitors can appreciate the village's natural beauty and cultural uniqueness while minimizing the risk of environmental degradation resulting from tourism (Skiniti et al., 2024) (Salciccia-frezza et al., 2025). Moreover, the implementation of tourism zoning is essential for safeguarding the destination's local identity and cultural heritage.

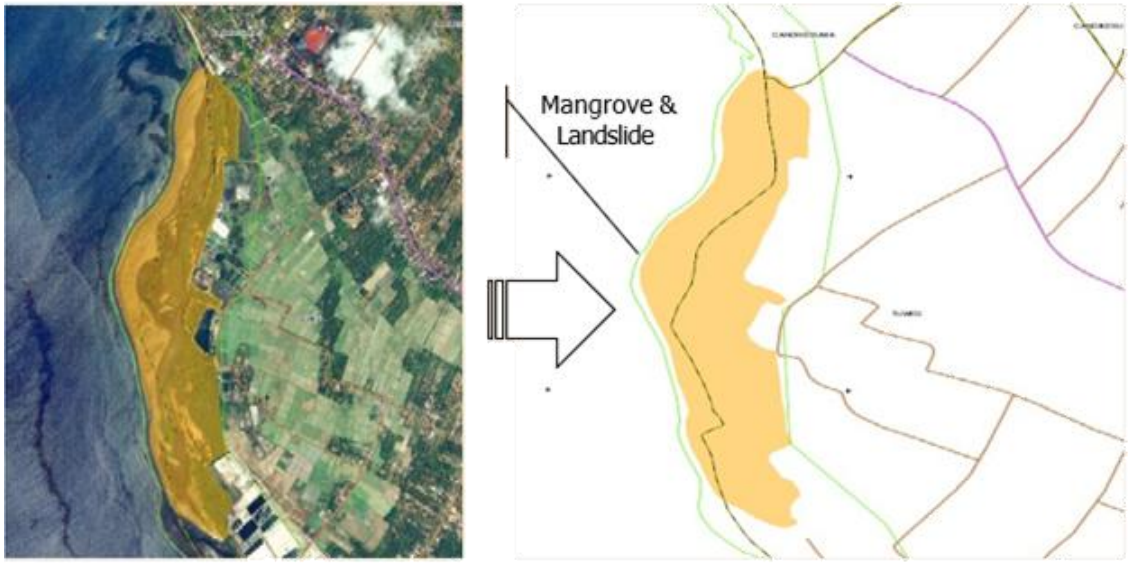


**Figure 3.** Tuwed Village Digital Map
Source: Processed by researchers (2025)

Figure 3 presents a digital map generated using Geographic Information Systems (GIS), highlighting the mangrove forest area in Tuwed Village. Among the identified tourism potentials, the mangrove forest has been selected as the central area for tourism development in the village, highlighting edu-tourism as its principal attraction. This site is intended to function both as a recreational destination and as an educational platform to promote awareness of environmental conservation and the sustainable management of natural resources.

The emphasis on mangrove ecosystems as a core ecotourism asset in Tuwed Village is consistent with evidence provided by (Malik et al., 2025)., who showed that such environments offer sustainable economic opportunities for local populations while supporting ecological resilience. Additionally, the zoning categories established for this village—covering conservation, educational tourism, cultural activities, accommodations, and special events—mirror the sustainable destination management principles advocated by (Reina-Usuga et al., 2024), particularly regarding the importance of cooperative governance and perceived community value.

With respect to methodology, the participatory mapping strategy adopted here aligns closely with the PPGIS framework described by (Hognogi et al., 2025), which facilitates the integration of local input into environmental management and cultural ecosystem services. Likewise, (Salminen et al., 2025) found that PPGIS can successfully identify spatial concerns associated with tourism expansion, offering a basis for evidence-based coastal management. In Tuwed Village, this participatory process enabled residents to confirm the locations and boundaries of tourism assets, ensuring that the final digital map accurately represents local knowledge rather than external prescriptions.

The instrumental role of community leaders in recognizing viable tourism resources supports the conclusions of (Mteti et al., 2025), who argued that genuine community engagement in tourism planning helps protect local heritage and fosters a collective sense of responsibility and pride. Furthermore, the discovery of both natural attractions (mangroves, biodiversity) and cultural assets (Mekepung buffalo racing, local cuisine) in Tuwed Village reinforces the broader characterization of rural tourism by (Soták-Benedeková et al., 2025)., which highlights visitor participation in agriculture, nature-based activities, indigenous customs, and social interactions with residents.

From a theoretical standpoint, the zoning framework implemented in this study can be interpreted through community-based tourism (CBT) theory. As noted by (Burton et al., 2025) and (Aunchistha, 2025), CBT represents a widely recognized pathway for community empowerment, founded on the premise that local engagement in tourism generates economic benefits and sustainable livelihoods while encouraging environmental stewardship. The five designated zones in Tuwed Village operationalize this theory by allocating specific areas for distinct forms of community participation, ranging from mangrove preservation to cultural performances and homestay operations.

The SWOT analysis summarized in Table 2 indicates that Tuwed Village possesses considerable tourism potential (strengths) but continues to struggle with poor accessibility, insufficient facilities, and the lack of a formal master plan or governance structure (weaknesses). These observations are comparable to those reported by (Khasawneh et al., 2023) in rural Jordanian destinations, where residents exhibited skepticism toward tourism development despite its potential to create jobs and raise incomes. In the case of Tuwed Village, the absence of systematic, spatially explicit zoning has constrained tourism growth, confirming the assertion by (Mir et al., 2024) that rural sustainability depends heavily on informed and proactive community participation in tourism-related decisions.

The digital map produced in this research directly addresses the deficiency identified by (Idris et al., 2021) and (Obradović & Stojanović, 2022), both of whom emphasized that local community involvement is a fundamental condition for long-term tourism destination sustainability. By combining GPS-based field data collection, participatory validation, and GIS-based spatial analysis, this study goes beyond simple point-of-interest tagging to generate a verifiable, updatable, and data-informed spatial database. This approach responds to the warning by (Boonsiritomachai & Phonthanukitithaworn, 2019) that active resident involvement enhances the benefits of tourism development while mitigating potential negative consequences, including environmental harm, land-use disputes, and social friction.

In conclusion, the experience of Tuwed Village demonstrates that participatory GIS mapping, when grounded in CBT principles and supported by spatial analytical techniques, can effectively convert local knowledge into actionable geographic information for sustainable tourism planning. This study provides empirical validation of the PPGIS framework in a rural Balinese setting, showing that community-driven spatial data collection and zoning classification can underpin informed decision-making for tourism development while preserving local cultural and environmental assets. The alignment between the Tuwed Village case and earlier research (Mteti et al., 2025), (Alamineh et al., 2023), (Salminen et al., 2025), (Hognogi et al., 2025) confirms that participatory mapping is not merely a technical exercise but rather a social process that builds community capacity, nurtures ownership, and enhances the credibility and applicability of tourism planning outcomes.

## Conclusions

Tuwed Village holds significant and diverse tourism potentials, encompassing both natural and cultural assets. However, the lack of structured zoning and spatial planning has hindered optimal tourism development. Through participatory methods and the application of GIS technology, this research successfully identified and mapped tourism asset that can guide the village's transition toward becoming a sustainable tourism destination. The digital tourism map produced serves as a strategic planning tool for village authorities, enabling informed decision-making and long-term development. Importantly, the involvement of local community leaders played a critical role in the research process. Their insights and local knowledge significantly enriched the identification of village potentials and contributed to shaping a more context-specific and sustainable tourism development plan. Their engagement not only enhanced the reliability of the collected data but also promoted a sense of community ownership, ensuring that tourism development initiatives reflect local values and priorities. These findings affirm that participatory spatial mapping is a valuable and effective approach for fostering inclusive, community-based tourism development for Tuwed Village.

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