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Article

Community Driven Approaches To Sustainable Settlement Planning

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Abstract: The housing and settlement sector encounters considerable technical and social obstacles, especially in coastal and rural regions where irregular construction patterns, excessive population, insufficient infrastructure, and minimal community involvement result in unsuitable living circumstances. These concerns are intricately linked to poverty and the constrained ability of local communities to fulfil basic housing standards. This study proposes an integrated, community-based settlement planning model that combines participatory SWOT analysis, spatial zoning, and tourism-oriented development to upgrade traditional Bajo over-water settlements while preserving the existing settlement footprint. Following this research, a sustainable settlement planning strategy was developed without modifying the current settlement footprint. Two primary development models were proposed: (1) a shift towards a tourism-centric village model and (2) spatial zoning comprising a seaside recreation/tourism zone, a transition zone, and a residential zone. The proposed plan amalgamates environmental sustainability, socio-cultural preservation, and economic development via marine and culinary tourism. The results indicate that participatory settlement planning can improve living circumstances, preserve coastal environmental integrity, and bolster local economic resilience.

Keywords: settlement, slum, design, village, zoning

1. Introduction

Housing and settlement development are essential human necessities that promote social stability and intergenerational sustainability. The availability of sufficient housing indicates both community welfare and the effectiveness of spatial governance and regional development planning. The proliferation of slum communities continues to be a chronic global concern, especially in emerging nations. Slum areas are typically defined by uneven spatial configurations, elevated building density, insufficient infrastructure, and restricted access to essential services, leading to poor living circumstances. (Alam et al., 2020). At the global level, slum upgrading and sustainable settlement development align with Sustainable Development Goal 11 (SDG 11), specifically Target 11.1, which aims to ensure access to adequate, safe, and affordable housing. In Indonesia, government measures like the 100-0-100 program (100% access to safe drinking water, 0% slums, and 100% access to adequate sanitation) were executed from 2015 to 2019; however, these objectives remain unfulfilled, particularly in rural and coastal areas.

Settlement development is fundamentally a multi-sectoral endeavour that directly fulfils essential human needs while concurrently promoting economic growth (UN Habitat, 2014). On the other hand, fast urbanisation and insufficient planning have led to the proliferation of slum settlements and housing shortages in numerous areas (Prasad and Ramanjee, 2012; Cities Alliance, 2021). These conditions are intricately associated with poverty, especially in coastal and rural areas, where constrained economic resources hinder access to sufficient housing (Dewi, Happy Ratna and Ima, 2015). In coastal regions, unregulated urban expansion has led to increased environmental stressors, including coastal

deterioration, marine pollution, and declining environmental health. These conditions adversely impact community well-being and diminish the area's tourist potential (Dewi, Happy Ratna and Ima, 2015; Habib, Jamil and Ahmed, 2021). Confronting these issues necessitates a methodical and phased strategy that includes preparation, planning, implementation, management, maintenance, and long-term development (Zubaidah *et al.*, 2023).

Indonesia, as an archipelagic nation with vast coastal areas, confronts considerable challenges associated with uninhabitable settlements marked by irregular configurations, high density, insufficient public infrastructure, and violations of spatial planning regulations (Mohammad Hasyir, Suryawan Murtiadi and Akmaluddin, 2023; Gani Juniar *et al.*, 2024). Socioeconomic factors, especially poverty and constrained institutional capacity, substantially intensify these situations (Habib, Jamil and Ahmed, 2021). Consequently, sustainable settlement planning must be executed consistently and perpetually, incorporating active stakeholder involvement and community participation (Wianti *et al.*, 2021). Collaborative and network-oriented governance frameworks that incorporate intra-community resources, governmental entities, and non-governmental participants have demonstrated enhanced efficacy in slum management techniques (Arsyad *et al.*, 2024; Pakka *et al.*, 2024).

Despite ongoing efforts, technical issues endure in numerous coastal communities, encompassing inferior housing quality, inadequate sanitation and drainage systems, insufficient fire prevention measures, and limited infrastructural assistance.(Almutairi *et al.*, 2020; Adshead *et al.*, 2024) Furthermore, settlement planning frequently exhibits insufficient community engagement and misalignment with regional spatial frameworks. The issues are most obvious in Kapota Village and Mola Raya, traditional Bajo coastal settlements situated in Wakatobi Regency, South-east Sulawesi, Indonesia. This project seeks to create a community-oriented settlement planning framework for Kapota Village that incorporates ecological sustainability, spatial organisation, and coastal tourism growth while minimally impacting the current settlement footprint. The proposed planning framework is aligns with the Wakatobi Regency Housing and Settlement Strategic Plan and the 2021–2026 Regional Medium-Term Development Plan (RPJMD). The primary objective is to erase settlement liveability through infrastructure enhancement, spatial reconfiguration, and participatory governance, while also promoting marine-based tourism activities.

Accordingly, this study addresses the following main research question: How can participatory, community-based settlement planning be designed to improve living conditions, environmental sustainability, and economic resilience in the coastal Bajo communities of Kapota Village and Mola Raya, Wakatobi Regency? To answer this question, the project seeks to create a community-oriented settlement planning framework for Kapota Village that incorporates ecological sustainability, spatial organization, and coastal tourism growth while minimally impacting the current settlement footprint. The proposed planning framework is aligned with the Wakatobi Regency Housing and Settlement Strategic Plan and the 2021–2026 Regional Medium-Term Development Plan (RPJMD). The primary objective is to enhance settlement livability through infrastructure improvement, spatial reconfiguration, and participatory governance, while also promoting marine-based tourism activities.

This research specifically examines community-based slum upgrading solutions that incorporate effective design principles to facilitate waterfront development. (Wang *et al.*, 2021; Olaniran and Aule, 2025). The planning framework evaluates local socio-cultural identity, environmental carrying capacity, and economic potential, with a focus on fisheries and culinary tourism. This comprehensive approach aims to enhance sustainable coastal settlement development, fostering environmental protection, socio-economic resilience, and enduring regional prosperity in Wakatobi Regency. This study offers several important contributions to the field of coastal settlement planning and slum upgrading. First, it develops an integrated community-based planning framework specifically tailored to traditional Bajo over-water settlements—contexts that remain underrepresented in the existing literature. Second, the study introduces a dual development approach that simultaneously combines tourism-oriented village transformation with functional spatial zoning (seaside tourism zone, transition zone, and residential zone) within a single planning model. Third, unlike many upgrading strategies that rely on relocation or major physical restructuring, this research demonstrates a settlement improvement pathway that preserves the existing settlement footprint while enhancing livability and infrastructure performance. Fourth, the study operationalizes participatory planning through a structured SWOT-based methodology that links community knowledge with spatial planning decisions. Collectively, these contributions provide a replicable model for sustainable upgrading of dense coastal and small-island settlements, particularly in archipelagic developing countries.

2. Materials and Methods

This research employed a qualitative–quantitative (mixed-method) approach using participatory planning principles. The study combined spatial analysis, field observation, stakeholder engagement, and SWOT analysis to formulate a sustainable settlement planning model. This study involved 42 participants, including 12 interviewees and 30 FGD participants, selected through purposive sampling. Participants included residents, community leaders, and relevant stakeholders, chosen based on their knowledge and involvement in settlement issues, and local government agencies relevant to this research. The research was conducted in four main stages:

1. Preliminary assessment and data collection
2. Settlement condition analysis
3. Participatory SWOT analysis
4. Formulation of settlement development model

Data Collection Methods

1. Field Observation

Direct site surveys were conducted to document settlement morphology, building density, sanitation conditions, drainage, fire risk, and supporting infrastructure. Observations were recorded using checklists, photographs, and GPS-based mapping.

2. Interviews

Semi-structured interviews were carried out with purposively selected respondents, including community leaders, fishermen households, women's groups, and local government representatives. The interviews explored housing conditions, community needs, tourism potential, and local constraints.

3. Focus Group Discussions (FGDs)

FGDs were conducted to validate field findings and to capture collective community perspectives. These discussions also supported the identification of local strengths, weaknesses, opportunities, and threats.

4. Participatory Mapping

Community members were involved in identifying functional zones, important community assets, and environmental risk areas. This process ensured local knowledge was incorporated into spatial planning.

SWOT analysis is used to examine internal and external factors in the settlement of Mola - Kapota, South Wangi-Wangi District. Using SWOT analysis, internal factors affecting the settlement, which are its strengths and weaknesses, and external factors, which are opportunities and challenges, can be evaluated. The chosen strategy must be in line with internal and external capabilities. The results of this SWOT analysis are highly dependent on the level of knowledge and understanding of the users regarding the settlement being analyzed. The more detailed the users' understanding, the more accurate the analysis results will be.

Step-by-step SWOT Analysis:

1. Identify opportunities and threats that will be faced, as well as the strengths and weaknesses of the Mola-Kapota region, by examining the settlement environment and the potential of each village to set realistic goals and formulate strategies.
2. Collecting the necessary types and quality of internal and external data and information.
3. Standardizing the steps (procedures) in conducting external and internal analysis.

In this study, a livable settlement is defined as: A socio-spatial residential environment that ensures minimum service adequacy, environmental safety, livelihood accessibility, and participatory governance capacity, enabling households to sustain well-being and adaptive resilience within their specific ecological context. This definition integrates: Socio-ecological resilience theory, Livability frameworks in urban studies, Settlement upgrading literature, and Coastal vulnerability perspectives. Importantly, livability is treated not as a normative aesthetic condition, but as a measurable socio-spatial performance condition.

The geographical location of Wakatobi Regency is in a group of islands in the southeastern peninsula of Southeast Sulawesi, precisely to the southeast of Buton Island. Astronomically, it is located south of the equator, stretching from north to south at a latitude of 5º12' – 6º25' South (approximately 160 km long) and longitude 123º20' - 124º39' East (approximately 120 km long), as shown in Figure 1.

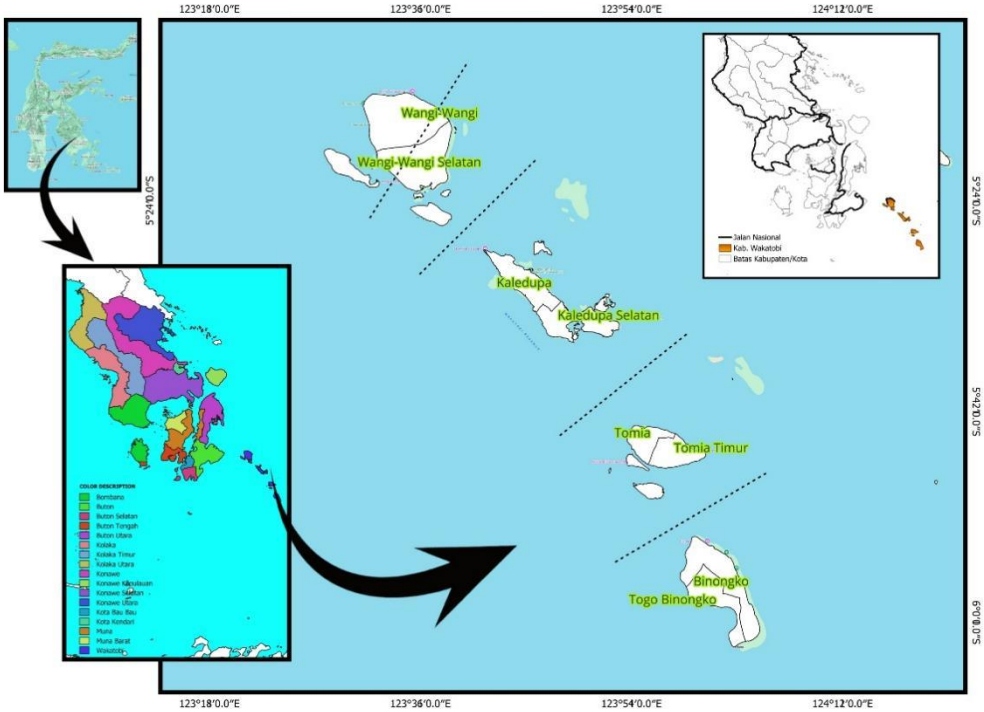


Figure 1. Geographic Location of Wakatobi Regency

The strategic geographical position of Wakatobi Regency is very important because: (1) The waters of Wakatobi Regency are traversed by shipping lanes in eastern and western Indonesia; (2) From a bioregional perspective, the geographical location of Wakatobi Regency is very important because it is located in a highly potential area, flanked by the Banda Sea and the Flores Sea, which have considerable potential in terms of marine biodiversity and fishery resources; and (3) Wakatobi Regency is located in the Coral Triangle Center, which covers six countries, namely Indonesia, Malaysia, the Philippines, Papua New Guinea, the Solomon Islands, and Timor Leste. The location of Wakatobi Regency in the Coral Triangle Center is shown in Figure 2.

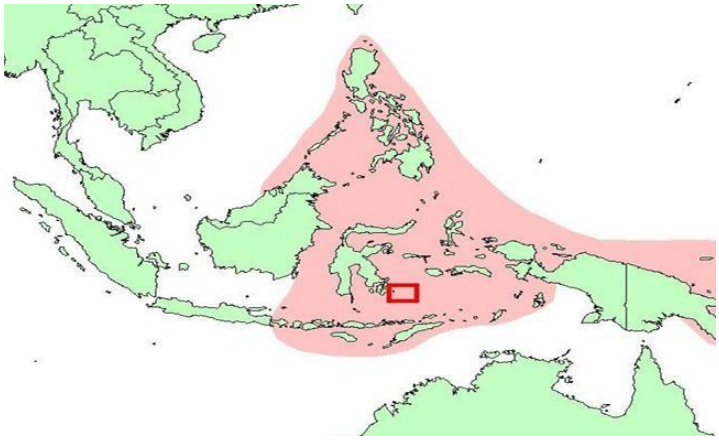


Figure 2. The Position of Wakatobi in the Center of the World Coral Triangle

Wakatobi Regency is an archipelago of 39 islands, consisting of 4 (four) large islands, namely Wangi-Wangi, Kaledupa, Tomia, and Binongko (WAKATOBI). All four islands are easily accessible within the Southeast Sulawesi Province region, Eastern Indonesia region, nationally and internationally. On Wangi- Wangi Island there is Matahora Airport, Panggulu Belo National Seaport, and the Kamaru-Wanci ASDP ferry line, and on Tomia Island there is Maranggo Airport, a special transportation mode for tourists from Bali and Singapore. Inter-island sea transportation in Wakatobi Regency is quite smooth. Access from the regency capital (Wangi-Wangi) to Kaledupa and Binongko Islands is available every day by speedboat. The only small island that is relatively difficult to reach but is inhabited is Runduma Island, which is part of the administrative district of Tomia, located in the

eastern part of Tomia Island, right in the middle of the Banda Sea.

3. Results

3.1. Internal Environmental Factor Analysis

Environmental Analysis is an analysis that looks at the internal conditions of the planning area by looking at the strengths and weaknesses of the area to be developed for tourism activities, in Table 1. Strengths are everything good that can be done or characteristics that have important capabilities. Strengths can include skills, core competencies, competitive abilities, etc. Weaknesses are anything that is a deficiency or an unfavorable condition.

Table 1. Identification of Strengths and Weaknesses

Strength	Weakness
The area of Mola is the city center, just minutes away from the ferry port.	The Mola residential area is irregular and appears shabby
Accessible areas for the entire community	Neighborhood roads are mostly damaged and broken, especially in the Mola area, and have not been paved/concreted
Ocean products are readily available and of good quality, making it possible to create a culinary tourism area.	There is no environmental drainage system in the residential area, i.e., tertiary and/or local drainage channels
Water access is available through PDAM.	Access to clean water from the municipal water company (PDAM) is insufficient to meet demand, and wastewater management in residential areas lacks an adequate system, namely, toilets that are not connected to septic tanks, whether individual/domestic, communal, or centralized
The strong bonds between residents enable them to help each other in their daily lives	There are no waste collection sites (TPS) or 3R (reduce, reuse, recycle) TPS on an environmental scale
	Unavailability of fire protection facilities and infrastructure
	Inadequate number of boat moorings for the community in the Mola area

Source: Researcher data processing results

3.2. External Environmental Factor Analysis

The external analysis is an analysis of the external environment. This is done to see how much appeal it will have, how many opportunities can be seized, and how much of a threat it could pose to the Belawan waterfront tourism planning area now and in the future.

Table 2. Identification of Opportunities and Threats

Opportunity	Threat
Considerable support from the Wakatobi district government to make the Mola and Kapota areas a model for settlement planning	Anticipation of uncontrolled settlement development.
Accessibility for tourism activities is easy to reach because it is close to the city center	The behavior of people who still litter
The existence of tourism market opportunities in the culinary and marine tourism sectors	There are no other sources of financing other than the APBN and APBD
Port location, especially the Ferry Port, which is adjacent to the	Increasingly competitive

Mola Area Village as a sea transportation route as a potential market for visiting Wakatobi tourism. The number of tourism spots around the area, the arrangement of the mola and kapota residential areas makes one of the activities that provide tourism opportunities in the city center	business competition in tourism activities

Source: Researcher data processing results

Based on the results of identification through surveys and monitoring, which are then identified as strengths, weaknesses, opportunities, and threats as in Table 1 and 2, an analysis of the relationship between the four things is made (Table 3).

Table 3. Analysis Matrix TOWS

	Strength	**Weakness**
Internal factor	Mola area is the city center area, which is 8 minutes away from the ferry port	The Mola Kapota residential area is irregular and appears shabby
	Areas that are easily accessible to the entire community	The condition of many roads that have not been paved/concreted, and many neighborhood roads are still damaged, has even cut off access.
	Ocean products are readily available and of good quality, making it possible to create a culinary tourism area	The unavailability of environmental drainage channels in residential or settlement areas, namely, tertiary and/or local channels
	Water access is available through PDAM	Wastewater management in residential areas or settlements often lacks an adequate system, particularly in cases where toilets are not connected to septic tanks, whether individually or communally.
External Factor	The strong bonds between residents enable them to help each other in their daily lives	There are no waste collection sites (TPS) or 3R (reduce, reuse, recycle) TPS on an environmental scale
		Unavailability of fire protection facilities and infrastructure
		Inadequate number of boat moorings for the community in the Mola area
Opportunity	**Strategies (SO)**	**Strategies (WO)**
Considerable support from the Wakatobi district government to make the Mola-Kapota area a model for settlement planning	The Mola-Kapota area has become a well-planned residential area that supports the existing tourism potential	Local government support in organizing mola-kapota settlements
Accessibility for tourism activities is easy to reach because it is close to the city center	Reconstruct and maintain road infrastructure leading to the Mola area and Kapota transportation infrastructure to support tourism activities	Improve damaged neighborhood roads by paving and concreting them
Tourism market opportunities in the culinary tourism sector	Improve damaged local roads by paving and concreting them. Make the Mola-Kapota area a resource area for	Developing and improving drainage systems in accordance with applicable standards to support tourism activities so that they do not

	marine fish catches, ocean views, and culinary tourism	appear shabby
Location of the Ferry Port adjacent to the Mola Area as a sea transportation route and a potential market for culinary tourism	Utilizing the location of the Mola-Kapota area, which is close to the port, to develop tourism activities by providing adequate, clean water	Construction of adequate and centralized wastewater and sewage treatment facilities in accordance with applicable regulatory standards
There are many tourist spots in the city center, and the development of the Mola-Kapota area into a culinary tourism destination is one of the activities that support tourism and provide tourism opportunities in the city center	Applying the waterfront city concept approach to residential planning with a Based Approach (community participation) for culinary tourism activities	Provision of waste collection points and creation of 3R waste collection points in the neighborhood to maintain the cleanliness of residential areas as a tourist destination Providing fire protection facilities and infrastructure in each hamlet

Source: Researcher data processing results

a. **Inter-sector Linkages**

Regional development views sectors as an interconnected system. The main economic sectors in a region need to be developed within a framework of complementarity and mutual support with other sectors. Tourism is highly multisectoral and cannot progress and develop on its own without support from other sectors. On the other hand, other sectors can also utilize tourism to create positive synergies so that they support and benefit each other. With creativity and innovation in planning, tourism can be developed alongside other sectors without causing conflict. Therefore, the development of Coastal and Water Tourism Areas must:

1. Associated with and aligned with the basic economic sectors that are developing or have potential in the region concerned, such as the development of water tourism, culinary, and cultural activities in Wakatobi.
2. Strategically exploring the potential, both tangible and intangible, of the resource potential of sectors in the region.
3. Collaborate and coordinate with other sectors in various stages of planning, implementation, and supervision of development.

b. **Community Participation**

The implementation and supervision of community participation in settlement planning and tourism development based on regional potential must take into account social, environmental, and service needs, not only for tourists but also for the local community. Water Tourism Area planning must involve the community in the planning and decision-making stages, as well as in tourism development and management. The local community should also benefit socio-economically from tourism development. The community's openness to broad-based participation by governmental and nongovernmental sectors in infrastructure development, but with full consideration of community participation. Policy formulation, decision making, funding, implementation, and monitoring are essential activities in the planning and execution of projects.(Ezirim and Okpoechi, 2020; Venkatachalam *et al.*, 2022)

c. **Sustainable Tourism**

The arrangement and development of tourist areas must refer to environmentally friendly concepts that do not deplete or damage natural and social resources, but are maintained for sustainable use. According to the 1995 Charter on Sustainable Tourism, sustainable tourism development is development that is ecologically supported in the long term, while also being economically viable and ethically and socially fair. Therefore, in planning Water Tourism Areas, attention must be paid to the carrying capacity of the ecosystem in accommodating the biotic components (living things) contained therein, including taking into account environmental factors and other factors that play a role in nature, which is highly variable and always depends on the level of utilization by humans. The development of Water Tourism Areas must also consider economic feasibility to provide maximum economic benefits for the community, local government, and private parties. In addition, the development of Water Tourism Areas must be in accordance with the social carrying capacity of the community so that the tourism development carried out does not disrupt the social life of the community around the area.

4. Discussion

4.1. The Concept of Settlement Arrangement Towards a Tourist Village

The formulation of the concept of village and surrounding settlement planning towards a tourist village is a series of overall settlement planning plans, including the planning of settlements that are currently classified as slums into non-slum settlements that will support the development of coastal/water tourism in the Mola-Kapota area. The development concept to be developed in developing the coastal/water tourism area is a concept of water/marine tourism development linked to the potential that exists in the Mola-Kapota planning area. The Coastal/Water Tourism Area aims to

a. Preserving natural and cultural heritage;

b. Developing traditional activities (fisheries);

c. Providing leisure and outdoor tourism activities that involve the local community and benefit the local economy.

The Basis for Formulating the Concept of Settlement Arrangement

The basic considerations in formulating the physical layout concept for the Mola and Kapota Raya residential areas include:

a. Settlements are areas located between Protected Areas (mangrove forests), ferry and conventional ports, and trade and services, so mapping must take into account existing land ownership boundaries and land use functions as well as environmental carrying capacity.

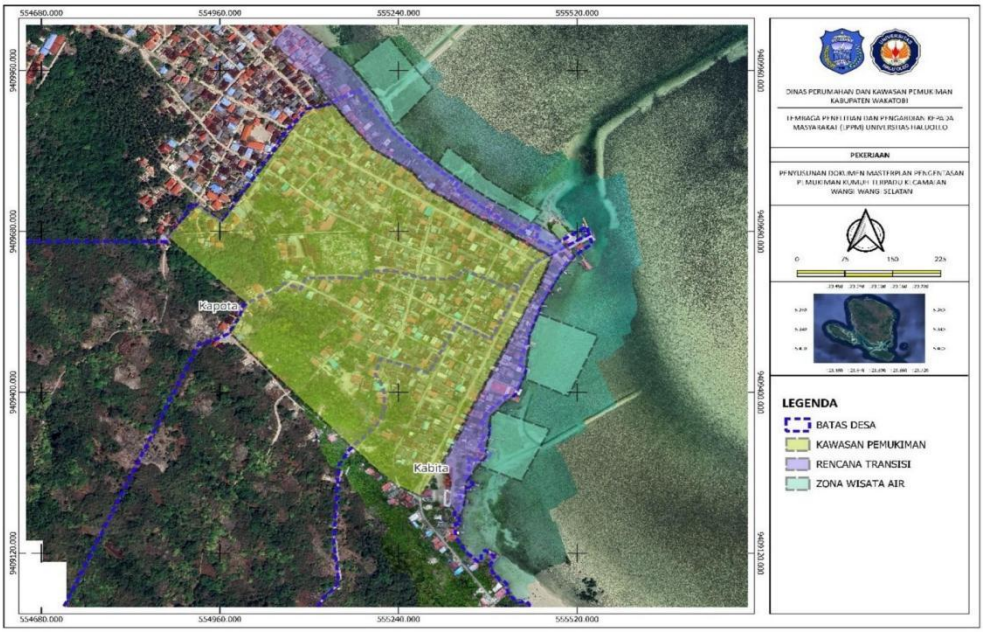
b. The strategic location of the settlement as a showcase for Wanci City as the capital of Wakatobi Regency

c. Natural resources in the form of coral reef landscapes and water, as well as fishery potential, where most of the community works as fishermen.

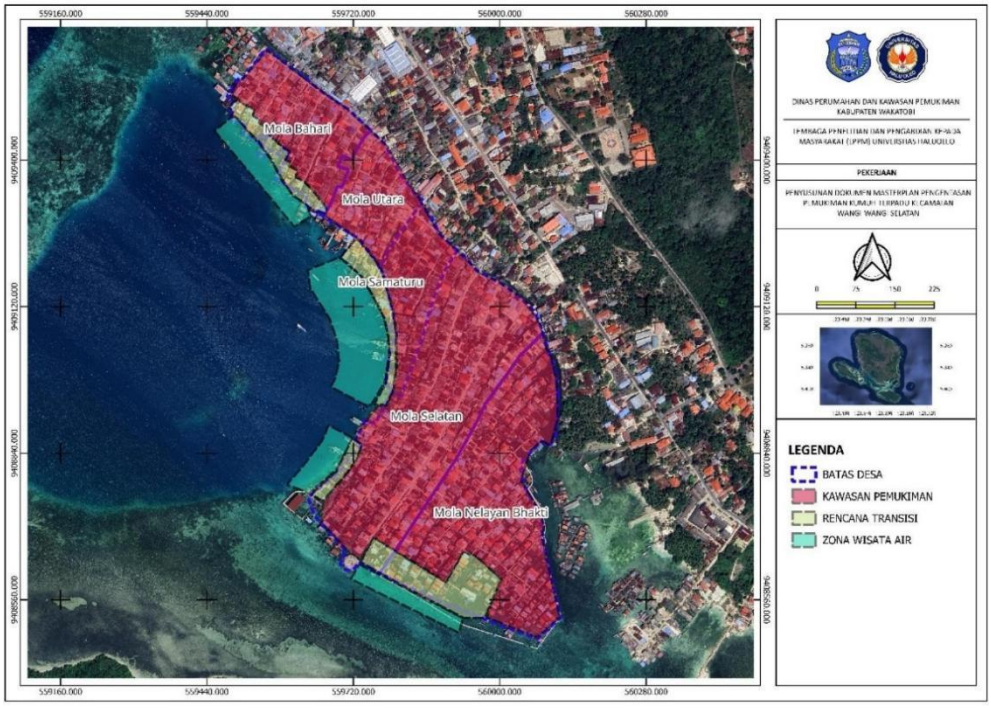
d. The potential of cultural tourism (community traditions/customs, architectural forms, etc.) that can be optimized as tourist attractions.

The Concept of Zoning for Residential Area Mapping

The zoning concept for the Mola-Kapota Raya Settlement Area cannot be separated from the Bajo Settlement Area as a whole (the Mola Raya Village area), as it is a series of integrated settlement areas. Based on the characteristics of the Bajo settlement area, the zone is generally divided into a residential zone on land, a transition zone, and a zone above the sea as a water tourism zone.



a. Kapota Area



b. Mola Area

Figure 3.pota and Mola Are Zoning Mapping of Kaas

The concept of the Mola-Kapota residential area in Figure 3 arrangement is as follows:

a. Existing land use.

b. Not to change the footprint and buildings and to minimize the displacement of existing buildings and structures.

c. Activities within the integrated planning area should not interfere with each other.

d. Grouping of spatial zones based on a hierarchy of public, semi-public, and private spaces.

e. Placement of rest areas in public spaces equipped with courtyards and benches to provide comfort for visitors.

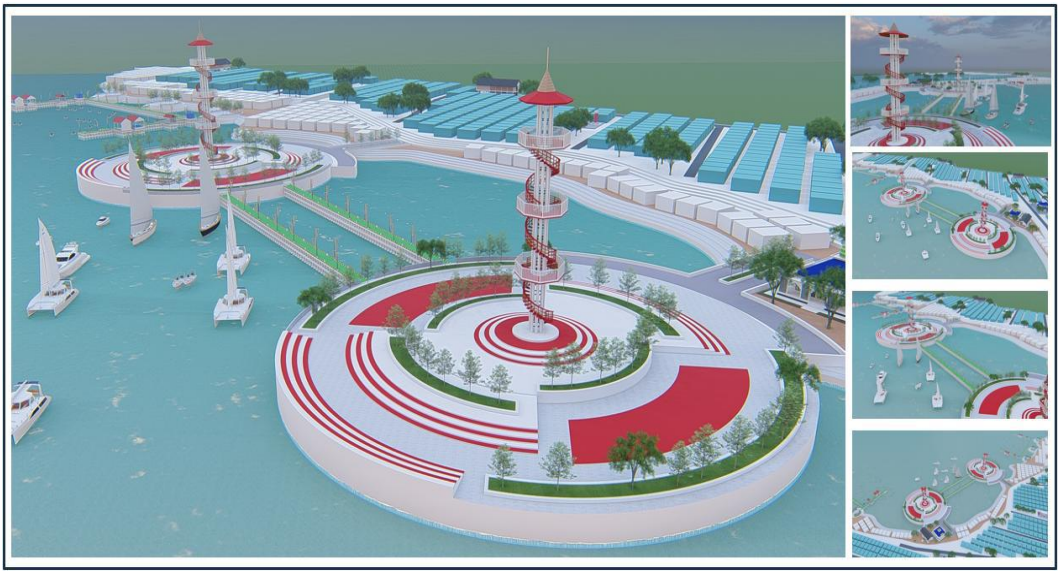
f. Not interfering with residents' activities and synergizing with each other.

The zoning concept for the Mola-Kapota residential area is divided into 3 (three) zones, namely:

1. Coastal Recreation/Tourism Zone

These zones directly face the Port Pier area, which serves as a showcase for the city as the capital of Wakatobi Regency (Figure 4). There is a tendency for residential development to move towards the sea by building houses above the tidal waters. This will result in the increasing use of tidal zones for residential areas.

a. Kapota Area



b. Mola Area

Figure 4. Tourism Zones of Kapota and Mola Areas

The impact of uncontrolled residential development towards the sea will increase in slum areas. Therefore, residential development towards the sea needs to be controlled by reorganizing residential areas, changing the original concept of residential areas facing away from the sea to a concept that utilizes the sea area as the orientation of residential areas to support the concept of the Wanci Waterfront City and realize Wakatobi Regency as a prosperous "Environmentally Friendly Island" through the development of environmentally-friendly regional economic activities based on agriculture, marine, and tourism. This recreational zone is a public space where various activities can be enjoyed over an extended period in one location, including savoring culinary offerings and shopping for various Wakatobi-specific souvenirs. Overall, this placement utilizes the built environment that will be constructed, ensuring it is non-invasive and does not damage the natural integrity of other zones.

2. Zona Transition

This zone is a transition zone between the recreational/water tourism zone and the semi-private residential zone (Figure 5). It is intended to accommodate facilities that support tourism activities, such as the development of tourist accommodation in the form of rest areas or homestays managed and accommodated by the community, as well as commercial activities to support tourist leisure activities.

a. Kapota Area

b. Mola Area

Figure 5. Transition Zone of Kapota and Mola Areas

3. Settlement Zone

This zone is residential, namely a fishing community residential zone, which is mostly used as land for semi-permanent and permanent residential buildings (Figure 6). In addition, there are public facilities such as the village office, a mosque, and commercial and service facilities in the form of kiosks. This zone is an area characterized by active and semi-active community activities and serves as a center for community activities, particularly for the Bajo fishing community. The existence of the Mola Kapota residential zone also contributes to the cultural identity of Wakatobi, as the community still maintains strong maritime traditions, including language, customs, and local knowledge about the sea.

a. Kapota Area

b. Mola Area

Figure 6. Kapota and Mola Area Settlement Zones

Spatially, this area continues to develop in line with the increasing demand for housing, public facilities, and marine tourism support. However, this development takes into account the sustainability of the coastal environment so that it is in harmony with the surrounding marine ecosystem. In the residential area, a boat mooring dock is planned in the residential area to provide direct access from the sea when returning from fishing. The choice of settlement location is also a critical decision that will have a significant impact on the protection and well-being of displaced people, as well as broader local development. While a well-positioned settlement can have multiple protection benefits and contribute to local development, a settlement in the wrong geographical location can pose a threat to the protection and assistance of displaced persons and have negative consequences on the local development and the peaceful coexistence of communities (UNHCR, 2025)

The management of social and physical infrastructures involves ongoing processes to ensure these systems effectively serve the community. Participatory planning approaches (PPAs) with high community involvement tend to foster decentralized, locally driven management structures that are responsive and adaptive to community needs. In bottom-up or hybrid models, local committees or organizations often manage infrastructure, leading to sustainable and context-specific outcomes, as seen in (Terdoo, 2024), where strong community involvement led to effective management post-upgrading. In contrast, top-down approaches centralize management, often resulting in inefficiencies and disengaged communities.

Through a holistic and participatory planning approach, this study identified key strengths, weaknesses, opportunities, and threats affecting slum settlements in Kapota and Mola villages. Community members, local leaders, and planning stakeholders were actively engaged in diagnosing settlement conditions and prioritizing strategic interventions. Based on the empirical synthesis, two complementary development concepts were formulated: (1) a settlement transformation strategy toward

community-based tourism villages, and (2) a spatial zoning scheme consisting of coastal recreation/tourism zones, transition buffer zones, and core residential settlement zones. The tourism-oriented settlement concept leverages local cultural assets, marine-based livelihoods, and coastal landscapes to generate alternative income opportunities while reducing environmental degradation pressures. Meanwhile, the zoning-based settlement mapping framework introduces spatial differentiation to manage land-use conflicts, regulate coastal exposure, and protect sensitive marine ecosystems. The transition zone functions as a buffer to minimize ecological disturbance and to ensure controlled development between tourism activities and residential areas. By integrating socio-economic revitalization with spatial environmental control, the proposed framework supports ecological preservation while improving settlement livability (Syukri and Mawardi, 2014; Ono and Adrien, 2024). The zoning model helps reduce unmanaged coastal encroachment, strengthens risk-informed planning, and promotes sustainable marine resource utilization. Consequently, environmental sustainability and marine ecosystem integrity are maintained alongside improvements in socio-economic resilience.

5. Conclusion

This study aimed to develop a sustainable settlement planning model for coastal communities through the integration of participatory approaches, spatial analysis, and SWOT–TOWS framework. The findings indicate that the existing settlement conditions in Kapota Village and the Mola Raya area are characterized by high density, irregular spatial patterns, limited infrastructure, and environmental challenges, particularly in coastal zones. The results of the participatory process and spatial analysis reveal that community knowledge plays a crucial role in identifying both settlement problems and local development potentials, including opportunities for tourism-based activities. Through thematic analysis and SWOT classification, key strengths, weaknesses, opportunities, and threats were identified and systematically translated into strategic interventions using the TOWS matrix. These strategies were further operationalized into a spatial planning model consisting of three main zones: coastal tourism, transition, and settlement zones. This zoning approach not only improves spatial organization and infrastructure accessibility but also supports local economic development while maintaining environmental considerations. In relation to the research objective, the study successfully demonstrates that integrating participatory methods with structured analytical tools can produce a context-sensitive and implementable settlement planning model. The research question is addressed by showing how community input, when combined with spatial and strategic analysis, can directly inform zoning and upgrading strategies in coastal settlements. The study contributes to the literature by offering an integrated framework that links participation, spatial analysis, and livelihood-based planning, particularly in underrepresented coastal and marine-based settlement contexts. Practically, the model provides guidance for policymakers and planners in developing sustainable, inclusive, and resilient settlement strategies. However, this study is limited by the absence of detailed quantitative modelling and cost analysis. Future research is recommended to incorporate quantitative spatial analysis, financial feasibility assessments, and long-term monitoring frameworks to further strengthen the applicability of the model.

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