

# ZONES OF TERRESTRIAL COASTAL ISSUES AND DEVELOPMENT COMMUNICATION STRATEGI IN PADANG PARIAMAN REGENCY

\*Hamdi Nur , Yunia Wardi, and Susi Evanita

Postgraduate Program - Padang State University, Indonesia  
Email: hamdinur66@gmail.com

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**ABSTRACT:** This research aims to explore distinctive zones of terrestrial coastal issues in Padang Pariaman Regency and identify communication strategies to address each zone. This research employs a literature research method by collecting secondary data and interpreting, integrating, and analyzing information. This research identifies five zones for coastal management, namely a) sandy beach zone used for shrimp pond operations, b) sandy beach for recreation activity, c) coastal abrasion-prone zones, d) mangrove conservation zone, and e) sea turtle conservation zone. The government needs to empower and transform the community regarding knowledge, attitude, and practice through the development communication strategy. The important aspect of knowledge is information about coastal setback regulation and ecosystem processes with various impacts. Communication strategy for changing the attitude of people focused on avoiding causing harm to mangrove and turtle habitats and changing the habit of littering on the beach. Communities also have to be involved further in conserving mangroves and turtles.

*Keywords: Coastal Zone, Communication Strategy, Knowledge, Attitude, Practice*

## 1. INTRODUCTION

The coastal zone is the interface between the land and the sea and an area in which human activities are interlinked with both the land and the marine environments (1). Notable characteristics of the coastal zone include a) a heterogeneous mixture of terrestrial and marine environments, habitats, and ecosystems, as well as providing goods and services to the coastal communities, b) frequent competition and conflict among various stakeholders over the common property of land and sea uses, c) has significant potential for fisheries and tourism resources, and e) usually has a high concentration of human settlements and urbanization (2).

The complex relationship between the environment and humans in coastal areas requires management efforts to balance human needs with the conservation of biodiversity and ecosystem services, which will ensure long-term coastal sustainability and resilience. Development information needs to be communicated to various stakeholders, and involve local communities (3).

Development communication can be viewed as a planned and systematic application of communication resources, channels, approaches, and strategies to support the goals of socio-economic, political, and cultural development (4).

More specifically environmental communication is defined as the planned and strategic use of communication processes and media products to support effective policy-making, public participation, and project implementation geared toward environmental sustainability (3). The objective of such communication is to increase knowledge, influence attitudes, and change practices in the environment (5).

Development communication refers to the use of communication strategies and tools to facilitate social and economic development and environment conservation to stakeholders by giving important information regarding coastal resources and regulations as well as encouraging environmental concerns and sustainable practices (6). Conservation efforts in coastal areas can be fostered by raising awareness and understanding of the significance of coastal ecosystems, and the imperative need for their protection, and empowering stakeholders to make informed decisions and take proactive measures for coastal conservation. These efforts involve a range of activities such as advocacy, public awareness campaigns, community mobilization, and capacity building to improve sustainable development (7).

Two main stages in development communication are, first, determining strategic issues in the environment that need to be

communicated and, second constructing a framework on how information about certain characteristics of an issue is presented to influence attitudes or behaviors (8).

Effective communication strategies to address issues to various stakeholders in coastal areas are needed. These strategies have a role in disseminating pertinent information regarding the significance of coastal ecosystems, the imminent threats, and the imperative of conservation measures. Effective communication fosters collaboration and partnerships and mobilizes collective action. Especially by empowering local communities with knowledge, skills, and resources, these strategies facilitate participation in decision-making processes, implementation of sustainable practices, and adaptation to environmental changes.

Understanding the characteristics of the coast is fundamental in the management of coastal areas (9). Discrete coastal zones based on physical characteristics are necessary to address development issues for identifying strategy of development communication. Stakeholders can better understand the unique characteristics, resources, and vulnerabilities of areas by defining and delineating specific zones within coastal regions. This delineation enables targeted interventions and tailored management strategies. It facilitates regulatory compliance, risk assessment, and resource management to ensure that development activities align with environmental conservation goals.

Coastal zoning entails the delineation and establishment of a regulatory framework governing discrete coastal zones based on physical, ecological, social, economic, and cultural characteristics. Its objective is the sustainable utilization of coastal territories while meticulously considering the exigencies of local communities, imperatives of environmental preservation, and economic development. A clearly defined coastal zone will facilitate effective planning and management strategies.

The coastal regions along Padang Pariaman Regency in West Sumatera, Indonesia, possess biodiversity and economic opportunities. Nonetheless, this region is also susceptible to natural hazards such as the threat of tsunamis and abrasion. In addition to rapid urbanization, aquaculture, and tourism development, these issues pose significant challenges to the sustainable development of coastal areas

The development plans and district spatial planning of Padang Pariaman do not adequately identify the specific characteristics of coastal zones. These plans merely determine the restriction on construction within 100 meters of the coast measured from the highest tide point up to

inland and delineate mangrove zones not allowed to converse. Such spatial plans only stipulate the coastline as a green open space. The provisions of the spatial plan are insufficient as a reference for managing coastal areas facing the issues. Thus, it is necessary to identify distinctive zones based on coastal characteristics and land use issues. Based on this identification, local governments can communicate development in a more focused and effective manner.

## 2. METHODS

The research questions in this study are: 1) What categories of zones are in the terrestrial coastal area of Padang Pariaman according to environmental issues? 2) What is the focus of development communication in each zone? 3) What are the appropriate media for communicating development?

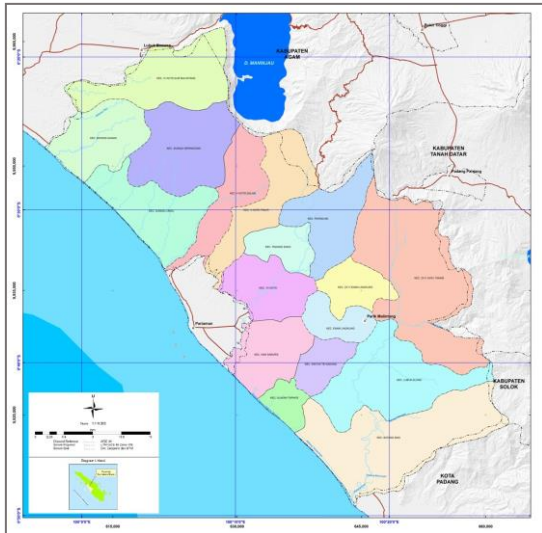
To address these questions, this research employs a literature research method by collecting secondary data and interpreting, integrating, and analyzing the collected information. In this type of research, information is collected from various sources and is open to interpretation, integration, and speculation as long as the logic and arguments are plausible and based on evidence. Information is collected from various sources comprises district environmental reports, development statistics, spatial planning documents, and mass media publications.

## 3. RESULTS AND DISCUSSION

Padang Pariaman is a regency in West Sumatra, Indonesia consisting of seventeen districts. In the eastern region, there are Bukit Barisan mountain ranges and two large volcanoes namely Gunung Tandikat and Gunung Singalang. Between mountains and coastline lies volcanic highlands, plain, and a narrow coastal plain. It has a coastline of 42 kilometers facing the Indian Ocean with a coastal region encompassing six districts, namely Batang Anai, Ulakan Tapakis, Nan Sabaris, V Koto Kampung Dalam, Sungai Limau, and Batang Gasan. Eleven rivers flow into the Indian Ocean with Batang Anai as the largest river. There are two small islands, Pieh and Bando Island, in its open waters.

The coast of Padang Pariaman Regency is flat with a slope of less than 20%, where at a distance of 0-5000 meters, the sea depth is only 20 meters. Combined with large ocean waves, the coast of Padang Pariaman is prone to accretion and abrasion. River estuary sedimentation spreads along the coast (10,11). In addition, construction

along the coast contributes to the increase in these accretion and abrasion processes.



**Fig.1** Padang Pariaman Regency Region

The terrestrial coastal zone at Padang Pariaman Regency can be classified into two distinct categories: sandy beach and wetland areas. Sandy Beach areas consist of expansive stretches of coastline characterized by dynamic processes influenced by wave action, tidal patterns, and sediment transport dynamics. In some places, there are the sites of settlement and recreational activities. Its wetland areas have a diversity of ecosystems, including mangroves and estuaries providing habitats for diverse flora and fauna, and offering resources for fisheries and ecotourism activities.

Besides sandy beaches, coastal areas, and small islands, this regency is rich in estuarine natural resources. The coastal estuarine consists of coastal plain estuaries and lagoons. The benefit of estuaries by coastal communities mainly from its mangrove crabs, shellfish, and shrimp. The species commonly found in the coastal areas of Padang Pariaman Regency is land crabs/mangrove shrimp (*Sesarma* sp) in the Batang Gasan Lagoon and Tiram Beach. Sea turtles are commonly found on Gasan Beach (12).

Some significant environmental problems encountered in Padang Pariaman coastal zone are: a) the poor quality of seawater along the coast of Tiram Beach in Ulakan Tapakis District, Tiram Beach, and Arta Beach, as the places of recreation activities, b) Almost all estuary areas in Padang Pariaman Regency is no longer have intact mangrove forests, where the remnants of mangrove forests can still be seen along the muddy coastline, c) In Ulakan Tapakis District, mangrove forest destruction is not only come from land conversion into residential areas, ponds, and tourist areas but also by garbage disposal in site.

Development issues faced by the coastal areas of Padang Pariaman are described as follows.

### 3.1 Environmental impact of Shrimp ponds operation along the coastal area

Pariaman Regency has the largest number of shrimp ponds in West Sumatra Province. Shrimp farms have been developing rapidly since 2018 in the coastal region. There are approximately 93 pond units along the coast of Padang Pariaman Regency, with the largest number located in Batang Anai District. The development of ponds is now beginning to move northward to Sungai Limau and Batang Gasan District. All of these ponds are small in size, less than 5 hectares.

Controlling the development of aquaculture ponds is important in terms of biotic and location aspects. The construction of shrimp farms along the coastal area needs to be controlled so as not to cause negative impacts on the coastal environment caused by its waste threatens marine life. The uncontrolled investment of shrimp ponds will have a repercussive effect on pond production as pollutants reaching saturation levels reduce the quality of water used. In turn, the law of diminishing returns will apply to shrimp production (13).

Referring to the uncontrolled development of shrimp ponds along the northern coast of Java Island has had a significant impact on mangrove ecosystems and consequently leads to the degradation of the coastal ecosystem as a whole. The impact resulting from the disturbance of the mangrove ecosystem includes coastal and riverine erosion, sedimentation, water pollution, the reduction of ecological functions, and directly affects the income of fishermen by decreasing the number of fish catches by fishermen; as well as seawater intrusion (14).

The majority of farms are operating without obtaining a location permit, where almost three-fourths are illegal. Approximately, half of those illegally operate less than 100 meters from the coastal setback (15). The uncontrolled development of shrimp ponds suggests inadequate enforcement of spatial planning regulations. It should be noted that this is not just an exception in a region but has become a widespread phenomenon in Indonesia.

The location of shrimp ponds is not only found on sandy beaches but also in estuaries at the mouths of rivers. The operation of shrimp ponds in this location is typically protested by the community due to the effects of water pollution and the depletion of aquatic resources upon which they depend.



**Fig.2** Location of the shrimp pond operates less than 100 meters from the coastal setback (taken from Google Earth)



**Fig.3** Location of shrimp pond operate in wet land (taken from <https://covesia.com/news/116816/ancam-ekosistem-mangrove-masyarakat-padang-pariaman-tolak-pembukaan-tambak-udang>)

### **3.2 The development of tourist facilities and housing too close to the coastline**

The development of tourist facilities such as hotels and restaurants often occurs too close to the coastline. This is commonly observed in tourist areas and fishing villages. With this close proximity, public access along the beach is disrupted. Many buildings are found near the coast obstructing public access to the beach. In certain points of locations, traditional fishermen's houses were threatened by abrasion, and some had even been damaged.

### **3.3 Difficulty encountered in applying spatial planning regulation regarding setback requirement**

Referring to the regulation of Spatial Planning of Padang Pariaman Regency 2020-2040 and the provision of the state regulation, the coastal setback has been set at a minimum of 100 meters from the highest tide point towards the land. It is defined as "land along the beach, which width is

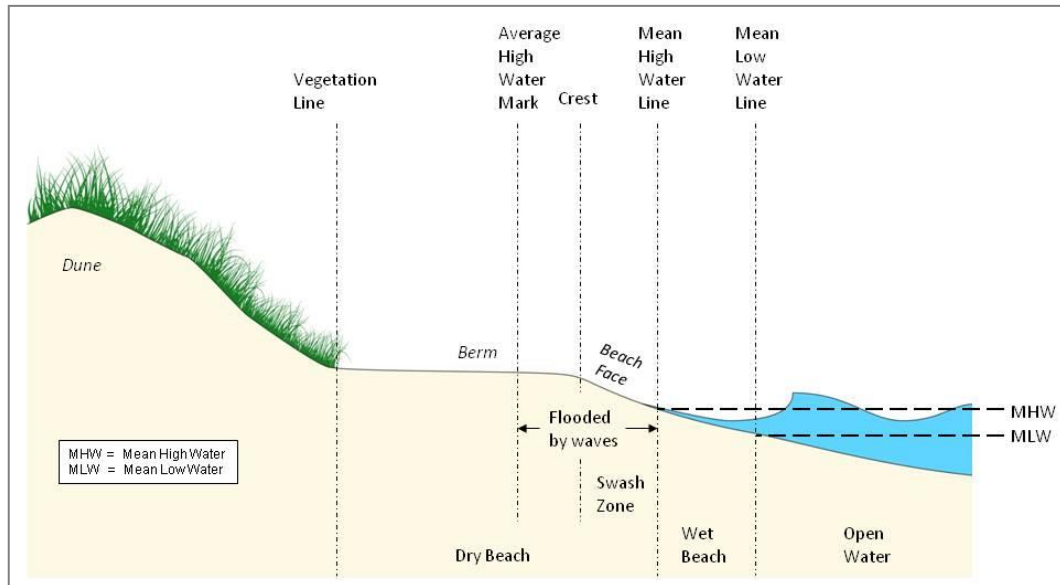
proportional to the shape and physical condition of the beach, at least 100 meters from the highest tide point towards the land" (16).

However, to measure a 100-meter distance from the highest tide point precisely as a reference for the determined setback is technically difficult because on the site it is uncertain where the highest tide point lies. Thus, practical benchmarks still need to be established in drawing coastal lines. The problem becomes more complicated given the dynamics of abrasion and accretion along the coast of Padang Pariaman. It causes the established highest tide point to shift significantly over time, rendering it ineffective in the long run.

Determining the highest tide point can be accomplished by an analytical approach (17). In this approach, the wet beach is defined as the area between the lowest low tide and the highest high tide (18). In this definition, the tide point is interpreted as the Mean High Water Line (MHWL). Its weakness is that this method necessitates considerable time and in-depth study. Furthermore, measuring the highest tide point with this method is not quite effective, particularly on the type of beaches characterized by high wave and significant abrasion-accretion dynamics

Alternatively, a practical approach can be employed, referring to the physical characteristics of the beach to determine the highest tide point. The determination is based on the Average High Water Mark (AHWM), which represents the furthest landward point reached by waves (as illustrated in Figure 4). This point is characterized by the physical features of the beach behind the highest sand dune (crest) (19). Through this method, the coastal setback requirement will extend further landward. This method makes sense to be applied in the Padang Pariaman coastal area, considering necessitating a sufficiently wide buffer zone caused by its highly dynamic abrasion and accretion processes.

This measurement approach is easy to apply and can be disseminated to the community enabling them to participate in the development monitoring process. The dissemination of this information should be conducted using visual media that is easily understood by people such as posters illustrating coastal morphology elements and the starting points for measuring the coastline setback. Coastal morphology to determine the highest tide point as seen in figure 4.



**Fig.4** Coastal Morphology, high water line, and high water mark (19)

### 3.4 Categories of coastal terrestrial zones based on the main development issues

The coastal management issues include: a) maintaining the functional integrity of the coastal systems; b) reducing resource-use conflicts; c) maintaining environmental health; and d) facilitating multi-sectoral development (2). Referring to these categories of issues and coastal problems previously described, several categories of coastal terrestrial zones in Padang Pariaman can be mapped out.

The categories of zones consist of 1) sandy beach zones that serve as shrimp aquaculture locations. The main issue of this cultivated zone is seawater pollution, and proximity to the coastline leaving insufficient distance for a buffer zone between the beach and the shrimp ponds; 2) sandy beach zone serving as tourist locations with buildings close to the beach that obstruct public access to the beach; 3) coastal abrasion-prone zones threatening residential buildings; 4) estuarine wetland zone near community settlements serving as shrimp pond locations. The main issues are water pollution and habitat destruction; 4) mangrove conservation zones, the main issues are preventing mangrove forest conversion and conserving fauna habitats; and 5) beach zones for sea turtle conservation with the main issue of human disturbance along nesting sites.

### 3.5 Communication strategy in addressing development issues

A common framework for the development communication strategies in implementing

environmental programs involving the aspects of knowledge (K), attitude (A), and practice (P) (5,20,21).

The aspect of knowledge (K) provides communities with accurate and relevant information regarding coastal development issues and educates them about the causes, impacts, and potential solutions associated with these issues. The aspect of attitude (A) focuses on influencing perceptions, beliefs, and attitudes that support positive change and sustainable practices. The aspect of practice (P) involves translating knowledge and positive attitudes within communities into actions and behaviors by promoting and facilitating the adoption of sustainable practices and behaviors.

Communication strategies in each zone are as follows. a) In the sandy beach zone for shrimp pond operations, the priority of community communication is related to providing knowledge about the coastal boundary (K) and involving the community in reporting violations of pond locations on the beach (P).

a) In the sandy beach zone for shrimp pond operations, the priority of community communication is related to providing knowledge about the coast setback (K) and involving the community in reporting violations of ponds location in the beach (P).

b) In zones with sandy beaches for recreation activity, the priority of community communication is related to providing knowledge about the coastal boundary (K), changing attitudes to avoid obstructing public access to the beach (A), and involving the community in reporting building violations of coast setback (P).

c) In coastal abrasion-prone zones threatening residential buildings, community communication is related to providing knowledge about erosion threats (K) and changing attitudes to build houses away from the beach (A).

d) In the mangrove conservation zone, community communication is related to providing knowledge about environmental damage (K), changing attitudes to avoid causing harm to and littering in mangrove forests (A) and involving the community in mangrove conservation (P).

e) In the sea turtle conservation zone, community communication is related to providing knowledge about the value of turtle species (K), changing attitudes towards activities to not disturb turtle habitat (A), and involving the community in turtle conservation activities (P).

Media have a crucial role in addressing communication strategies. For knowledge dissemination (K), workshops, printed materials like posters, and digital platforms can be employed to provide communities with accurate information about the issues and potential solutions. Changing attitudes (A) utilizing mediums such as storytelling through radio, television, social media campaigns, and community dialogue sessions. Promoting behavior change and sustainable practices (P) requires practical demonstrations, mobile applications, and community-led initiatives to adopt and maintain behaviors that contribute to sustainable development.

It is important to set targets for community engagement through students by incorporating the issue of environmental conservation and environmental health around them into school lessons, and the local government facilitates introducing conservation exercises in the field to students. This awareness among students will have a significant impact on their families and the future.

A strategy of development communication applied in the West Sumatra community is to leverage the social capital of Nagari as the lowest unit of Minangkabau rural communities. On the coast of Padang Pariaman, communication efforts can be tailored to encompass the aspirations and necessities of the Nagari community. This approach entails disseminating information regarding development issues in a manner that is both relevant and easily comprehensible to the people of the rural communities. Communication initiatives can be directed towards fostering awareness regarding the significance of preservation and sustainable use of resources within the respective rural communities. Collaborative endeavors among regional authorities, non-governmental organizations, and local stakeholders are important in effectively implementing this strategy.

**Table 1** Coastal Zone, Communication Strategy and Essential Media

No	Zone	Communication Strategy Priority for Community			Essential Media
		Knowledge	Attitude	Practice	
1	Sandy Beach zone for shrimp pond operations	Providing coastline information	-	Involving in reporting violations	The poster of coastline morphology illustrates the location of high water lines and setback requirement
2	Sandy Beach for recreation activity		changing attitudes to avoid obstructing public access.		
3	Coastal abrasion-prone zones	knowledge about abrasion threats	changing attitudes to building houses and facilities away from the beach	-	social media campaigns; billboard
4	Mangrove conservation zone	providing knowledge about environmental damage	avoid causing harm and littering	involving the community in conservation	Billboard; school campaigns; Facilitating community-led initiatives
5	Sea turtle conservation zone	providing knowledge about the value of turtle species	changing attitudes towards activities to do not disturb turtle habitat	involving the community in conservation	Billboard; school campaigns; Facilitating community-led initiatives

Source: Results of data analysis, 2024

#### 4. CONCLUSION

This study explores distinctive zones of environmental issues in the terrestrial coastal areas of Padang Pariaman Regency and identifies communication strategies to address these issues based on a literature review. The research indicates five zones that require attention for management by the government involving community participation.

The government needs to empower and transform the community regarding knowledge, attitude, and practice. An important aspect of knowledge is in information about the highest tide point, which serves as a reference for determining the coastal setback, as well as knowledge of coastal ecological processes and their various impacts. Communication strategy is addressed for changing the attitude of people in avoiding causing harm to mangrove and turtle habitats and changing the habit of littering on the beach. Communities need further to be involved in conserving mangroves and turtles. Various media like posters, billboards, and social media campaigns, can be used as tools of environmental information whereas school campaigns, and facilitating community-led initiatives can be designed to involve community

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