



# Sustainable social adaptation strategies for communities affected by coastal erosion: a case study from the coastal area of Karawang Regency, Indonesia

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**Abstract.** This study is motivated by the successful management of coastal erosion-affected communities in Tambaksari Village, Tirtajaya Subdistrict, Karawang Regency, Indonesia, utilizing a do-nothing approach. Whereas the coastal rehabilitation management approach in the coastal areas of Karawang Regency so far emphasizes a protective approach, which often has low effectiveness. This study develops a sustainable social adaptation strategy for the coastal erosion-affected communities in the village. This study applied a qualitative approach using descriptive analysis methods. The results of this study propose several strategies to address the problem, namely the land ownership reconciliation strategy, the budget preparation strategy, the strategy for strengthening cooperation between stakeholders, and the social media-based publicity strategy.

**Key Words:** coastal rehabilitation efforts, public policy, qualitative approach, sustainability.

**Introduction.** The coastal area of Karawang Regency is one of the northern coastal areas of West Java that is affected by alarming coastal erosion. The impact of coastal erosion has destroyed residential areas, aquaculture lands, rice fields, and infrastructure (Fauzie 2016, 2017; Nopiana et al 2020a, 2021, 2024). Based on the Long-Term Development Plan (RPJPD) of Karawang Regency 2005-2025, the occasion has been deemed a disaster. The coastline affected by coastal erosion covers 35.63 km of the total coastline of Karawang Regency, with the area of damage reaching 227.54 ha. It is estimated that due to coastal erosion, the coastline has retreated inland by approximately 50-300 meters (The Government of Karawang Regency 2010; Nopiana et al 2020b).

Coastal rehabilitation efforts are one way to improve coastal functions in coastal areas. Based on literature reviews, coastal rehabilitation management has been widely implemented in various locations using various approaches, namely protective, adaptive, and do-nothing approaches. The protective approach is executed by directly restraining natural processes, either through the construction of coastal structures (hard structures), planting coastal vegetation, including mangroves (soft structures), or a combination of both. An adaptive approach is enforced by adapting coastal management to natural changes, for example, by building settlements above sea level. Besides, a do-nothing approach is implemented by not opposing the natural dynamics or yielding to them, and adapting the designation to the natural changing conditions (Diposaptono 2001; Schmitt & Albers 2014; Williams et al 2018).

Efforts to mitigate the impacts of coastal erosion in the coastal areas of Karawang Regency generally emphasize protective approaches through the construction of hard structures, soft structures, and a combination of both (Nopiana et al 2020c).

Consequently, the effectiveness of addressing the impacts of coastal erosion in certain coastal areas is low (Nopiana et al 2023). It is based on the physical characteristics of the coast, which are not all suitable for a protective approach. A different approach to addressing the impacts of coastal erosion, such as a do-nothing approach, is needed to prevent affected coastal communities from being continuously threatened and experiencing the impact of coastal erosion in the long term. Based on this, the study aims to develop various strategies of sustainable social adaptation for communities affected by coastal erosion in the coastal areas of Karawang Regency, particularly in Tambaksari Village, Tirtajaya Subdistrict. This village was selected because it is the only village in the coastal area of Karawang Regency known to have implemented a do-nothing approach to coastal erosion management. This study is expected to serve as a role model for other regions in enforcing a do-nothing approach to coastal erosion management.

## Material and Method

**Time and location of the study.** The study was conducted over seven months, from May 2025 to November 2025. The study location was Tambaksari Village, Tirtajaya Subdistrict, Karawang Regency, West Java Province, Indonesia (Figure 1). Tirtajaya Subdistrict covers an area of around 92.25 km<sup>2</sup>, or 5.51% of the total area of Karawang Regency. It is located northwest of the capital of Karawang Regency, bordered by the Java Sea to the north, Batujaya Subdistrict to the west, Jayakarta Subdistrict to the south, and Cibuaya Subdistrict to the east (The Central Statistics Agency of Karawang Regency 2025).



Figure 1. The study site in coastal area of Karawang Regency, Indonesia.

In addition to land, Tirtajaya Subdistrict encompasses rice fields and brackish aquaculture land. The total rice field area in the subdistrict in 2021 was 6,165 ha (The Government of Karawang Regency 2022). In 2024, the potential land for brackish aquaculture activities was 4,483.90 ha, while the cultivated area was 2,845.30 ha (The Central Statistics Agency of Karawang Regency 2025), which encompasses two villages: Tambaksari and Tambaksumur (The Central Statistics Agency of Karawang Regency 2022). In 2024, 802 households were working in brackish aquaculture areas in this subdistrict (The Central Statistics Agency of Karawang Regency 2025).

Tambaksari Village is the largest village in Tirtajaya Sub-district, with an area covering 24.75 km<sup>2</sup>, or 26.83% of the total area of Tirtajaya Sub-district. This village is located at 6.01465° South Latitude and 107.23892° East Longitude. Topographically, Tambaksari Village is a coastal village with a plain overlay pattern. The village's elevation is 2 meters above sea level. The distance from Tambaksari Village to the capital of Tirtajaya Subdistrict is 4.20 km, while to the capital of Karawang Regency is 41.70 km (The Central Statistics Agency of Karawang Regency 2021).

According to The Central Statistics Agency of Karawang Regency (2025), the population of Tambaksari Village is 9,113, or 11.81% of the total population of Tirtajaya Subdistrict. The population density of Tambaksari Village is 191.89 people per square kilometer.

**Analysis and data collection.** This study employed a qualitative approach, utilizing descriptive analysis methods. Data collection was conducted through two sources: primary and secondary data. Primary data were obtained through in-depth interviews with expert informants and relevant sources believed to possess a thorough understanding of the issues facing the Tambaksari Village community affected by coastal erosion, particularly in terms of the chronological time frame. The informant selection technique was based on non-probability sampling with a type of purposive sampling. In-depth interviews with expert informants included Tambaksari Village Government officials, community leaders, and the leader of Sarakan Hutment, as well as representatives from Pertamina EP Tambun Field Ltd. Meanwhile, secondary data were obtained from scientific literature and publications from official institutions, including the local government and the Central Statistics Agency.

## Results and Discussion

**Chronology of relocation of residential areas affected by coastal erosion.** Coastal erosion is occurring in several coastal areas of Karawang Regency, including Tambaksari Village, Tirtajaya Subdistrict (Figure 2). In this village, coastal erosion had affected one of the hutments, Old Sarakan Hutment, located approximately 7 km from the Government Office of Tambaksari Village. The primary livelihood of most residents in the hutment has been fishing for generations, making it difficult for them to live far from the coastal boundaries and the marine environment.

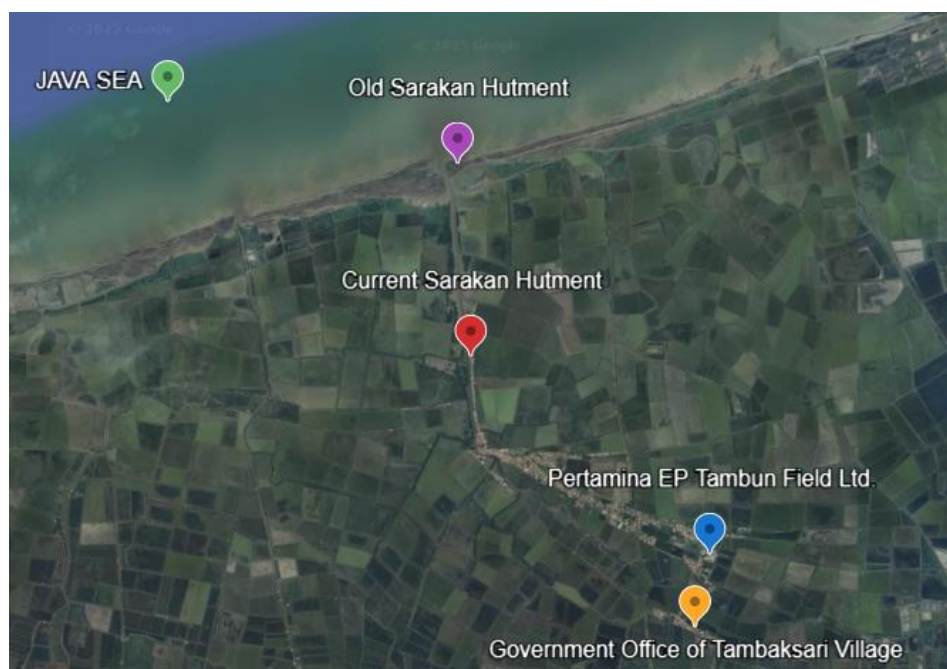


Figure 2. The Tambaksari Village area and the location where coastal erosion occurs.

Chronologically, the residents of Old Sarakan Hutment have been experiencing coastal erosion gradually for a long time, but it reached its peak in 2005. The coastal erosion that struck the village was accompanied by tidal flooding, which inundated and damaged the residential area of Old Sarakan Hutment. At that time, the hutment was home to 70-80 families. Subsequently, the Tambaksari Village Government implemented a policy to relocate the hutment to a new location in the upland, which occupies the exploration land of Pertamina EP Tambun Field Ltd. in the village. The policy was welcomed by the residents of Sarakan Hutment, as indicated by their voluntary willingness to relocate to the new settlement area. The location was chosen because it is located near a river (Sarakan River) that flows into the Java Sea. It makes them very accessible to the sea from their current settlement (the current Sarakan Hutment), given that the majority of the villagers are fishermen.

**Mapping problems from settlement relocation activities.** The relocation of the Sarakan Hutment community, which has been affected by coastal erosion, to its current location can be done with permission from Pertamina EP Tambun Field Ltd., as the landowner. Unfortunately, the agreement regarding the land allocation was only verbal, with no written evidence, particularly between the Tambaksari Village Government and Pertamina EP Tambun Field Ltd. The essence of the agreement between the two parties, among other things, stated that if Pertamina EP Tambun Field Ltd. were to utilize the land currently occupied by the villagers, they would have to be prepared to move from it. Therefore, the Sarakan Hutment community was advised not to build their homes, either semi-permanent or permanent. However, after occupying the land for approximately 20 years, the community is now constructing semi-permanent and permanent homes. This is because the villagers' standard of living has significantly improved, particularly since they now have sufficient funds or income to build semi-permanent or even permanent homes.

Until this research was conducted in 2025, Pertamina EP Tambun Field Ltd. had no plans to use the relocation land for exploration activities. However, there is a potential land conflict between the Sarakan Hutment community and PT. Pertamina EP Tambun Field. If the oil and gas exploration company were to use the land, the community would be forced to demolish their permanent settlements, which they have built at great expense, draining their household budgets. This would result in significant losses due to the loss of their homes and the need to relocate to new settlements. The researchers doubt the financial capacity of most of them to purchase new homes. The researchers reasoned that if the residents of the hutment did have a substantial budget, they would have moved to new settlements long ago, considering that the land they currently occupy is not theirs. They would eventually be evicted from the land.

This presents Pertamina EP Tambun Field Ltd. with a dilemma. On the one hand, because of their concern, the company initially granted permission for one of its land areas to be used as a relocation site for the Sarakan Hutment settlement. However, they appear unwilling to approach the Sarakan Hutment community if the company were to utilize the land for future exploration activities. Furthermore, access for their heavy equipment to reach the land is no longer feasible due to the dense settlements along the narrow road.

To date, the Tambaksari Village Government has no plans to relocate the Sarakan Hutment community from the site owned by Pertamina EP Tambun Field Ltd. This is because the village government lacks replacement land and has not yet found suitable land for the Sarakan Hutment community. Given that the majority of the hutment's residents are fishermen, their settlement must be close to or have easy access to the sea. The most feasible option is to find a new location around the Sarakan River. However, obtaining a new settlement site, especially a freehold status, is not easy. This is because the majority of the land in Tambaksari Village is aquaculture land used for aquaculture, and some of the land is owned by Perhutani Ltd. However, there is unused land suitable for a new settlement for the Sarakan Hutment community. The ownership of the land is unclear, which could potentially trigger land conflicts, particularly with legitimate landowners. Furthermore, if the relocation site is still the aquaculture land, it

will require additional costs to fill the area. This makes the planned relocation of the Sarakan Hutment settlement extremely costly.

***Proposed solutions for the relocation of Sarakan Hutment residential areas.***

Efforts to relocate the Sarakan Hutment residential area to a new location remain unclear. It requires assistance and follow-up from relevant stakeholders, including the university.

Based on the problem mapping, this study proposes the following solutions for the relocation of the Sarakan Hutment residential area as a form of sustainable social adaptation efforts for communities affected by coastal erosion in Tambaksari Village, Tirtajaya Subdistrict, Karawang Regency:

*Land ownership reconciliation strategy.* Tracing the owner of the new relocation land. If the owner cannot be found, the Tambaksari Village Government must prepare suitable replacement land, either within Tambaksari Village itself or in another village. This is to anticipate the possibility of sudden claims from the land owner.

As an alternative to legally acquiring the new relocation land, it is necessary to investigate, based on agrarian law, whether the land can be claimed as government or state land. If the owner cannot be found, it leaves the land's ownership status unclear.

*Budget preparation strategy.* As the primary stakeholder, the Tambaksari Village Government must preparing a budget for:

- purchasing replacement land; and
- developing a residential area for the Sarakan Village community on the new relocation site.

Due to the substantial budget requirement, the Tambaksari Village Government can submit a proposal for housing development to the Karawang Regency Government, specifically the Public Housing and Settlement Areas Office.

The Tambaksari Village Government can also submit a development proposal sourced from the Corporate Social Responsibility (CSR) program of Pertamina EP Tambun Field Ltd. or its holding company.

*Strategy for strengthening inter-stakeholder cooperation.* There are several options, as follows:

- inviting members of the Karawang Regency Regional People's Representative Council (DPRD) (particularly as the Tirtajaya Subdistrict electoral representative area) to oversee and approve the proposed budget for housing relocation development due to the impact of coastal erosion in Tambaksari Village;
- inviting members of the West Java Provincial DPRD (especially those of the Karawang Regency electoral district), so that they submit a proposal for the relocation of the settlement to the West Java Provincial Government, to earn attention and support from Mr. Dedi Mulyadi (as the Governor of West Java Province who is currently known as a charismatic leader who sides with the underprivileged);
- universities can assist in preparing a site plan for the settlement area on the new relocation site;
- submit a request for dredging of the Sarakan River to the Citarum River Basin Agency (BBWS), Ministry of Public Works, to ensure smooth boat movement from the new settlement relocation area to the sea, to support the livelihoods of the majority of the Sarakan Village residents who work as fishermen.

*Social media-based coastal erosion impact management publicity strategy.* To gain the attention of stakeholders and the wider public, effective dissemination of information about the problems and needs to address the impacts of coastal erosion in Tambaksari Village is needed through social media. For example, by inviting well-known content creators to cover this issue.

**Conclusions.** The social adaptation embarked upon by the Tambaksari Village community affected by coastal erosion must be addressed in an integrated and holistic manner. It is because one social issue is often closely related to other social problems. Ensuring the sustainability of the lives of those affected by coastal erosion in this village requires multi-stakeholder intervention, including not only the government but also the private sector, universities, and the community itself.

Some of the proposed strategies to address this issue include land ownership reconciliation, budget preparation, strengthening cooperation between stakeholders, and social media-based publicity strategies for addressing the impacts of coastal erosion. This study recommends further study to complement existing research on coastal erosion management, particularly in Tambaksari Village. For example, the study is based on economic valuation that considers the community's benefits and disadvantages of remaining in coastal areas affected by erosion (through an adaptive approach) versus the current do-nothing approach.

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**Conflict of interest.** The authors declare that there is no conflict of interest.

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