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Research Paper

Land Consolidation Policy in Addressing Slums and Tidal Flooding: A Case Study of Kampung Bugisan

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Abstract

Tidal flooding has significantly impacted the settlements in Kampung Bugisan, requiring a collaborative approach for resolution. This study aims to describe the challenges and key elements of land consolidation that have alleviated slum conditions and contributed to sustainable development. A qualitative descriptive method used primary data from interviews and direct observations, which was combined with secondary data from reports, spatial documents, and publications. These data were validated through triangulation. The findings reveal challenges in implementing land consolidation in Kampung Bugisan, including its prolonged duration, low community awareness, and land administration issues. Although a top-down approach in site selection, land consolidation was successful due to the environmental pressures and the community's inability to overcome the problems. Participatory and inclusive elements must involve local leaders to strengthen the community's trust. The successful implementation depends on collaboration, community participation, and comprehensive development, therefore contributing to SDGs 6, 9, 11, 16, and 17 for sustainability.

Keywords: Land Consolidation; Slum; Tidal Flooding; Active Community Participation; Bugisan.

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1. Introduction

The problem of tidal flooding often occurs in areas with sloping beaches with land surface elevation that is not significantly higher than the highest level of sea tide (Musarofa et al., 2024). This phenomenon commonly occurs in the northern coastal areas of Java Island, Indonesia, such as in Semarang City, Jepara Regency, Demak Regency, Pekalongan Regency, and Pekalongan City, which until now has not been able to be handled and resolved optimally. The primary causes of tidal flooding are land subsidence and sea level rise (Nashrrullah et al., 2013; Laksmi et al., 2020; Miftakhudin, 2021; Riyatmoko et al., 2022; Gradiyanto et al., 2024), and subsidence in Pekalongan is relatively significant and consistent compared to other cities (Sidiq et al., 2023). Furthermore, land subsidence has been identified as the primary factor influencing the extent of tidal flood inundation compared to sea level rise (Miftakhudin, 2021; Andari et al., 2023). Excessive groundwater use exacerbates the impacts of flooding and seawater intrusion (Fitrinitia & Matsuyuki, 2022). This is driven by increased land use change due to population growth, urbanization, and settlement development (Nashrrullah et al., 2013; Suharini et al., 2016). North Pekalongan Subdistrict is one of the subdistricts that is directly adjacent to the Java Sea, has numerous streams, and has experienced a decline in groundwater levels (Iskandar et al., 2020; Andari et al., 2023). River overflows due to high tides and heavy rainfall frequently result in flooding along floodplains, one of which is in Kampung Bugisan, Panjang Wetan Village, North Pekalongan Subdistrict. Kampung Bugisan, located in the floodplain of the Loji River meander, experiences daily flooding for 5 - 7 hours. The intensity of flooding in Kampung Bugisan has increased over the past five years, which has negatively impacted the social and economic activities of the community.

Tidal flooding in Bugisan Village damaged infrastructure, including buildings, roads, and sanitation, as well as the pollution of river water (Harini et al., 2017; Maharlika et al., 2020; Syafitri & Rochani, 2021; Riyatmoko et al., 2022). Damage to residential areas results in a decrease in income and financial assets for individuals employed in the industrial, trade, and service sectors, necessitating damage repair (Ni'mah et al., 2015). Areas inundated by tidal floods become slums (Yulianto et al., 2019; Syafitri & Rochani, 2021), decrease land and building prices (Yulianto et al., 2019), and spread skin disease (Syafitri & Rochani, 2021). It is also increasing poverty and unemployment (Yulianto et al., 2019). Moreover, it has an impact on community psychology (Nurdiantoro & Arsandrie, 2020).

It is important to address the problem of flooding and tidal surges in Kampung Bugisan, as stated in the Pekalongan City Regional Mid-Term Development Plan document for the year 2021-2026. The Pekalongan City Government has a mission to actualize urban facilities and infrastructure in accordance with the principles of sustainable urban development through water resource management, drainage system management, and the construction of large-scale flood and tidal control embankments. The Pekalongan City Government has implemented a non-structural adaptation strategy to enhance community preparedness through counseling and socialization at the Neighborhood Association (RT) and Community Association (RW) levels, the formation of community organizations, and an integrated early warning system (Andrea et al., 2020). Some obstacles to the implementation of non-comprehensive policies have been identified, including the lack of clarity regarding the boundary of the tidal flood area, lack of public concern, limited water pump facilities and infrastructure, and limited budget (Ramadhani et al., 2015). Meanwhile, the resident has attempted to raise the floor level of their house by approximately 50-100 cm every five years (Laksmi et al., 2020). Adlina et al. (2019) identified three categories of community adaptation: avoidance, protection, and accommodation. A study by Utami et al. (2021) found no significant differences in community adaptations across different classes of tidal flood vulnerability in Pekalongan. These adaptations included surviving, raising floor and roof levels, elevating roads, moving valuables to higher places, and changing livelihoods.

The unsolved problems of tidal flooding and slums require a more adaptive and integrative approach. The government must be supported by the willingness of the local community (Octavia et al., 2019); in addition to the provision of infrastructure and facilities, and quality improvements for slum alleviation often require changes in land parcels, which can be found in land consolidation. Land consolidation (LC) and land readjustment (LR) are instruments in land management. The difference is in the focus area, where LC is implemented in rural areas while LR is implemented in urban areas, including peri-urban (Louwsma et al., 2017). However, in Indonesia, only LC is known, according to the Ministerial Regulation of Agrarian and Spatial Planning/National Land Agency Number 12 of 2019, which is

distinguished according to the designation of the area, namely Agricultural Land Consolidation and Non-Agricultural Land Consolidation. The land consolidation program offers an alternative solution to the challenges currently facing Kampung Bugisan in a comprehensive approach. There is various research about the success of land readjustment applications in urban areas for the provision of infrastructure and settlement (Mittal, 2014; Delgado & Scheers, 2021; Mugisha et al., 2024). Another study by Yuliastuti et al. (2022) aims to identify prospects for resolving land tenure issues as part of slum improvement efforts based on community preferences. Land consolidation is a land policy established to support regional structuring, reorganize land tenure and use, and develop infrastructure or public facilities, which in turn can improve environmental quality and the preservation of natural resources (Octavia et al., 2019; Wiryasa & Dwijendra, 2021; Suacana et al., 2024; Mansour, 2024).

Land consolidation policies can contribute to the achievement of the Sustainable Development Goals (SDGs). Louwsma et al. (2017) argued that a participatory approach, inclusiveness, and the role of land administration in land consolidation (LC) and land readjustment (LR) can support balanced land use decisions for sustainability. In line with this, LC and LR policies aimed to optimize urban morphology also contribute to integrated and sustainable spatial planning (Wiryasa & Dwijendra, 2021). Furthermore, the relationship between LR policies and the SDGs is explained in the research by Mansour (2024), which stated the three principles of LR, namely a comprehensive approach, participation, and inclusiveness that can support the SDGs, particularly Goals 3 (Good Health and Well-being), 4 (Quality Education), 6 (Clean Water and Sanitation), 9 (Industry, Innovation, and Infrastructure), 11 (Sustainable Cities and Communities), 13 (Climate Action), 15 (Life on Land), and 16 (Peace, Justice, and Strong Institutions). The relationship between LC or LR and land administration, particularly the success of LC/LR, can promote effective land administration and provide information on land use and people who live in slums, therefore contributing to SDG 11 (Chehrehbargh et al., 2024). Social equity and equality are implemented through active community participation in various activities of LC. A better-organized environment and reliable land information as a result of land consolidation can create opportunities for community economic development.

In 2017, a memorandum of understanding (MoU) was signed among the Central Government (Ministry of Public Works and Housing) and the Regional Government (Governor, Regent of Pekalongan Regency, and Mayor of Pekalongan) as a form of awareness that the resolution of tidal floods cannot be resolved alone (Ula & Tijan, 2020). Since 2022, Kampung Bugisan, Pekalongan City, has been selected as one of three pilot locations for the National Slum Upgrading Program, or “Kota Tanpa Kumuh (KOTAKU)” in Bahasa, led by the Ministry of Public Works and Housing in collaboration with the Ministry of Agrarian Affairs and Spatial Planning/National Land Agency, for the implementation of LC. The other two locations are in DKI Jakarta and Pontianak City, West Kalimantan. This is stated in the AIDE MEMOIRE INDONESIA: National Slum Upgrading Program (NSUP)/Kota Tanpa Kumuh (KOTAKU) Virtual Implementation Support Mission: August 12 - September 30, 2021 (unpublished). The Kampung Bugisan site was selected for this study due to its successful slum upgrading through comprehensive LC, including active community participation, resolution of land administration issues, and collaborative funding for development through the new Integrated Special Allocation Fund (DAK-Integrasi). The other two locations were unsuccessful in their implementation. Yustiningrum and Adianto (2022) argued that the failure of Vertical Land Consolidation (VLC) in Cipinang Besar Selatan, DKI Jakarta, was because of the site selection based on a top-down approach to site selection and not considering a bottom-up perspective and the preferences of local communities, resulting in less than 60% agreement. Meanwhile, the failure of LC in Bansir Laut, Pontianak City, was caused by conflicting perceptions of river boundary lines in slum areas and unclear land tenure along the river boundary (Pontianak City Communication and Informatics Office, 2024). KOTAKU aims to improve the quality, address, and prevent the emergence of slums through a network approach and activities within the village (Zubaidah et al., 2023). There are several challenges in implementing LC policies. In addressing housing issues in Indonesia, the concept of land readjustment (LR) is not widely popular, primarily due to its lengthy process, complicated bureaucracy, and a tendency to focus on agriculture in its implementation (Wiryasa & Dwijendra, 2021). Additionally, a study by Ilyanawati, R. Y. A., & Sihotang, S. (2017) found that there is a lack of knowledge or understanding of land consolidation among low-income communities in urban areas. Another issue is the lack of coordination and commitment from local authorities, resulting in insufficient infrastructure development (Supriatna, 2018).

Based on the above background, this study does not replicate the research conducted by Mansour in 2024, which used three approaches to establish a theoretical foundation for land realignment policy in Egypt. Instead, this study adopts a deductive approach to describe the challenges of LC. Furthermore, this research identifies the key elements of LC that have successfully alleviated slums and resolved daily tidal flooding in Kampung Bugisan, thereby contributing to sustainable development.

2. Methods

This study uses a qualitative research methodology with an exploratory descriptive approach to analyzing efforts in addressing the issues of slum settlements and tidal flooding in Kampung Bugisan through land consolidation (LC). As an exploratory, it also examines the challenges and dynamics associated with each stage of LC, as well as identifies the key elements of LC that contribute to sustainable development.

This research utilized data from primary and secondary sources. Primary data were collected through fieldwork, interviews, and direct observations. Observations by the on-site visits to Kampung Bugisan to gain insights into the phenomena. Unstructured interviews, guided by key thematic outlines with officials from the Pekalongan City Land Office, village authorities, and residents of Kampung Bugisan. Secondary data were employed to support the primary data. These secondary sources included books, journals, conference proceedings, legal regulations, activity reports, and spatial data related to LC. Specifically, spatial and juridical data related to land parcels were obtained from the Pekalongan City Land Office, encompassing the information on land use, existing conditions, and post-LC land parcel conditions.

In this research, data validity was tested using triangulation and combined with various data sources and theories to ensure reliability, allowing researchers to gain a comprehensive understanding of the implementation of LC in Kampung Bugisan. Triangulation involves testing the credibility of data by cross-checking information from numerous sources, methods, and times to reduce bias (Fiantika et al., 2022). It also minimizes the possibility of misinterpretation.

The data in this study were analyzed to conclude by using the analysis technique that was explained by Miles et al. (2014). According to Miles et al. (2014), qualitative data analysis is conducted in three stages: data condensation, data presentation, and conclusion drawing. In this study, data condensation involves sorting and simplifying data from field notes, interview results, and documents that have been collected. The presentation of data in this research includes brief descriptions, tables, and maps to provide an overview of the physical and juridical conditions of the Kampung Bugisan area. The data is presented in a chart illustrating the stages of land consolidation implementation. The presented data is then reviewed by examining research notes to identify relationships and similarities, which are then used to draw research conclusions.

2.1 Research Location

Figure 1. Location of the Study Area
Source: Pekalongan City Land Office, visualized by the author in 2024

The research location is in the Neighbourhood Association (RT) numbers 2, 3, 4, and 5 of Kampung Bugisan, Panjang Wetan Village, North Pekalongan District, Pekalongan City, and Central Java Province. North Pekalongan District is located at 109°-110° East Longitude and 6°-7° S. The area of the research location is 2.32 hectares, and Kampung Bugisan is in the floodplain of the Loji River, which forms part of the Kupang watershed system. The rationale for selecting this location was based on the argument that overcoming regularly flooded lands and slums required land use management activities through LC.

3. Results and Discussions

3.1 Condition of Inadequate Housing and Facilities in Kampung Bugisan

The North Pekalongan Sub-district of Pekalongan City is at high risk of tidal and rain floods (Mustika et al., 2020; Perdinan et al., 2023). Pekalongan City generally consists of lowlands with an elevation of 1 to 6 m above sea level (Maharlika et al., 2020) and a slope of 0–8% (Bappeda, 2021). The impact of the topography, which is generally low and flat, causes difficulties in regulating waterways due to the low slope (Bappeda, 2021; Sidiq et al., 2023). According to the interviews with the community, tidal flooding events have occurred every day over the past five years, with a frequency of two or more occurrences per day where the water level ranges from 10 to 40 cm. Tidal floods, which consistently inundated Kampung Bugisan, resulted in physical damage, deterioration of the environment, and proliferation of slums. The residents' houses become uninhabitable. According to the Letter of Location Determination of the Mayor of Pekalongan City number 430/1131 year 2020, the level of slum in Kampung Bugisan is considered low, as it is located in the riverside area. However, most of the houses have been damaged. According to the decree, the slum area in RT 02 is 1.32 hectares; RT 03 is 0.45 hectares; RT 4 is 1.49 hectares; and RT 5 is 1.77 hectares. The level of slums in Kampung Bugisan is indicated by poor waste and garbage management, road conditions, and environmental drainage that do not meet technical standards (Pekalongan City Public Housing and Residential Areas Service, 2023). Furthermore, there are 42 units of uninhabitable houses and 202 units of habitable houses. People in North Pekalongan prefer to use groundwater (Kartika & Helmi, 2019), particularly given the inadequacy of the clean water services provided by the Regional Drinking Water Company, especially during the dry season (Putri et al., 2023). The slums in Kampung Bugisan fulfill several criteria as defined by UN-Habitat (2018); these include lack of water resources, sanitation facilities, housing durability, and security of tenure. Meanwhile, in Kampung Bugisan, slum households were found as uninhabitable houses and facilities and infrastructure

that do not meet the technical requirements as defined in the Regulation of the Minister of Public Works and Public Housing Number 14 of 2018, so that they require repair, restoration, and rejuvenation. Based on these conditions, the arrangement of slums in Kampung Bugisan is needed because of the community's inability to provide adequate housing, given that the majority of residents are employed in the informal economy sector.

Figure 2. (a). A House Inundated by Tidal Flooding, (b). Tidal Flooding on a Neighborhood Road
Source: field observation by the author in 2023

3.2 Land Tenure, Land Use, and Utilization Characteristics in Kampung Bugisan

Identification and inventory surveys of subjects and objects of LC are based on the delineation contained in the Letter of Location Determination for the Land Consolidation (LC) area issued by the Mayor, covering an area of 23,200 m². As presented in Table 1 and described in Figure 3, the total number of identified land parcels is 260, most of which are self-owned, either already registered as Right to Ownership (Hak Milik) (certificated) or not yet registered (Letter-C). Letter-C documents are also used as proof of ownership. The number of land parcels that have been registered in Hak Milik is 169, while 24 land parcels remain unregistered. Additionally, 7 land parcels are classified as unknown because the proof of ownership was lost. Furthermore, 60 parcels of state land are occupied and used by the community for residential purposes or by local authorities for infrastructure purposes. These parcels of land are uncertified and unregistered. The evidence of land ownership for LC participants includes inheritance, sale, and purchase transactions that occurred around the 1990s and 2000s.

Table 1. Land Status Based on Physical and Juridical Identification

Land Status	Number of Land Parcels
Registered (Land ownership certificate)	169
Unregistered (Letter-C)	24
Unknown (Lost/damaged land ownership documents)	7
State Land	60
Total	**260**

Source: Pekalongan City Land Office, 2023

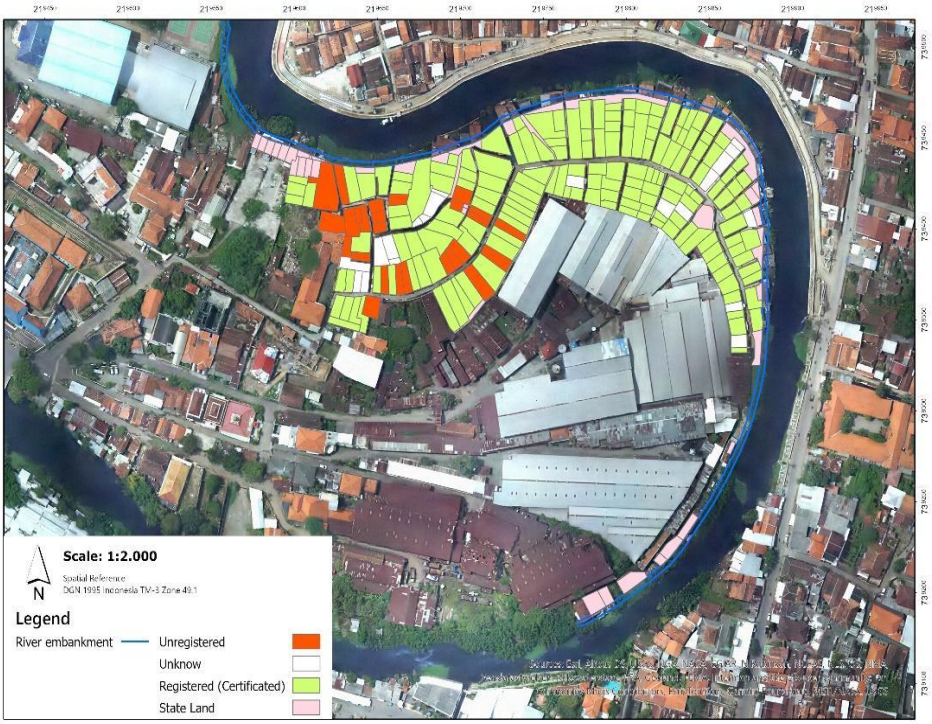

Figure 3. Map of Land Status before Land Consolidation
Source: Pekalongan City Land Office, visualized by the author in 2024

Slum areas are frequently associated with land ownership issues, largely due to the high costs and time constraints associated with land administration (Octavia et al., 2019). If the cost is deemed affordable, they will pursue the legalization of their land (Handzic, 2010). Furthermore, public land is predominantly occupied by informal settlements (Rigon, 2022). This is also found in the location, where state land on riverbanks is utilized as residences by residents in as many as 19 parcels. Some state land found outside the riverbanks has been occupied by communities or controlled by local governments, especially for roads. State land, or land directly controlled by the state, in this case by the provisions of Government Regulation Number 18 of 2021, is land that is not attached to any land rights, not waqf land, not ulayat land, and/or is not an asset of state-owned goods or regional property. Various problems related to land ownership and control in Kampung Bugisan encourage the need for control through LC.

In the selected location of LC projects, the majority of the land is used for residential purposes, as well as for a place of worship (mosque) and land that is left in an unoccupied state. The use of this vacant land occurs on land parcels abandoned by residents. Residents who belong to the upper-middle economic class or have relatives in other places will move. Meanwhile, the economic powerlessness of the community means that many people still occupy their houses, even though the area is flooded every day. The dynamics of LC participants, such as the absence of individuals and flooded neighborhoods, have greatly hindered the survey in obtaining data on LC subjects and objects. However, through active community participation, these dynamics can be facilitated in the implementation of LC.

There are other problems at the location related to the disorderly land administration by people in Kampung Bugisan. These include the transfer of inheritance rights that have not been carried out (some heirs are not in place), 30 parcels of land that are pledged to the bank, 7 parcels of land that have lost proof of ownership due to flooding or being carried by others, and 24 parcels of land not participated to LC. Land parcels had legal document issues that inhibited them from participating in the LC. However, the problems can be resolved after approaching the community and conducting LC activities. There was a change in the data on the number of land parcels based on the type of land rights, as shown in Table 2 and clarified in Figure 4.

Table 2. Types of Land Rights after Land Consolidation

Land Right Status	Number of Land Parcels	Area (m2)
Right of Ownership (Hak Milik)	177	13,720
Right to Use (Hak Pakai)	40	5,751
Right to Build (Hak Guna Bangunan)	20	633
Total	**237**	**20,104**

Source: Pekalongan City Land Office, 2023

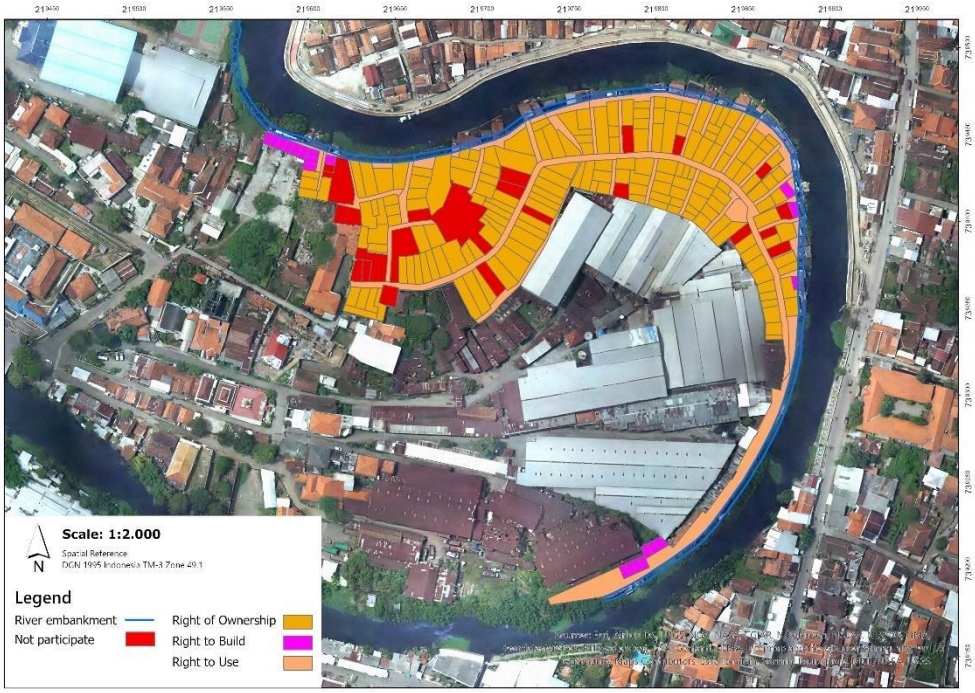

Figure 4. Map of Land Rights after Land Consolidation
Source: Pekalongan City Land Office, visualized by the author in 2024

3.3 Land Consolidation Strategies in Kampung Bugisan

The implementation of land consolidation (LC) in Indonesia consists of four main stages: planning, implementation, development, and supervision. The two main stages of LC are planning and implementation. The flow of activities in the two main stages can be seen in Figure 5. The planning stage of LC emphasizes the analysis of location suitability and collaboration, the analysis of a community's socio-economics, and land and community preparation. The activities in this planning stage include the formation of a planning and coordination team, spatial and sector policy studies, analysis of social mapping and area potential, creation of preliminary design and agreement, and determination of LC locations. In the implementation stage of LC, it focuses on the arrangement of land parcels following the cadastral design plan and land administration affairs intending to produce land rights certificates to ensure the security of tenure. The implementation stage includes several activities; these are the formation of an implementation team, the collection of physical and juridical data, the valuation of LC objects, the preparation of designs and action plans, the implementation of LC designs, and the issuance of land rights certificates. In the study conducted by Yuliastuti and Haryanto (2020), the success of LC in overcoming slums is greatly determined by location factors (spatial planning, stakeholder support, environment, land administration) and community factors (especially community willingness).

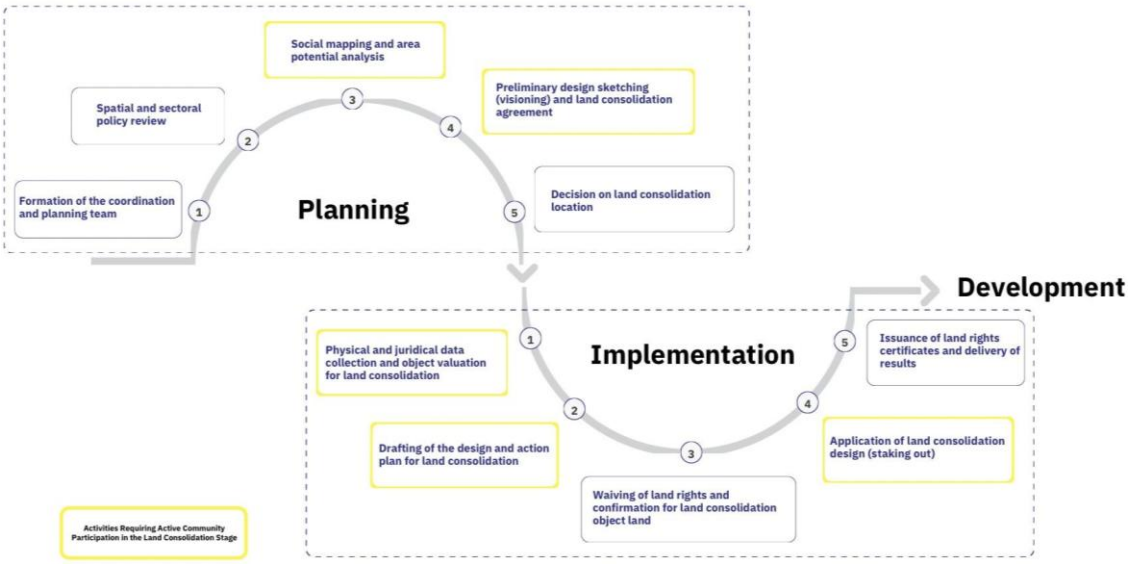

Figure 5. Activities in Two Main Stages of Land Consolidation Requiring Active Community Participation (ACP)
Source: Pekalongan City Land Office, author analysis in 2024

The success of land consolidation is strongly supported by the budget and active involvement of all relevant stakeholders (Purnomo & Wahyono, 2019). The role of government at all levels is crucial. The Regional Land Office of Central Java Province, the Pekalongan City Land Office, and the Office of Public Housing and Residential Areas of Pekalongan City are responsible for the planning of LC. The implementation stage of LC is executed by the Pekalongan City Land Office, while the development of LC is carried out by the Office of Public Housing and Residential Areas of Pekalongan City and the Central Java Provincial Government. Furthermore, infrastructure and utilities are developed in collaboration with funding from the central, regional government, and private sector. Figure 6 illustrates the collaboration in funding LC for slum upgrading. Kampung Bugisan is the pilot project for the KOTAKU/National Slum Upgrading initiative, which is implemented in collaboration with the LC policy and funding supported by The World Bank as well as the State Budget and Regional Budget. Partnerships and funding support from various sources for the implementation of this program are a manifestation of SDG 17. The development of LC in Kampung Bugisan is divided into three main aspects: housing (new construction, quality improvement, and rehabilitation-reconstruction), relocation aspects, and infrastructure and utility aspects. The housing, infrastructure, and utilities aspects are financed by the State Budget, which is facilitated through the Special Allocation Fund (in Bahasa called DAK Integrasi) program of the Ministry of National Development Planning/National Development Planning Agency. These funds are transferred to the local government. However, they were previously handled through the Regional Budget of Pekalongan City, while the relocation aspect was covered by the Regional Budget of Central Java Province and a local government-owned enterprise.

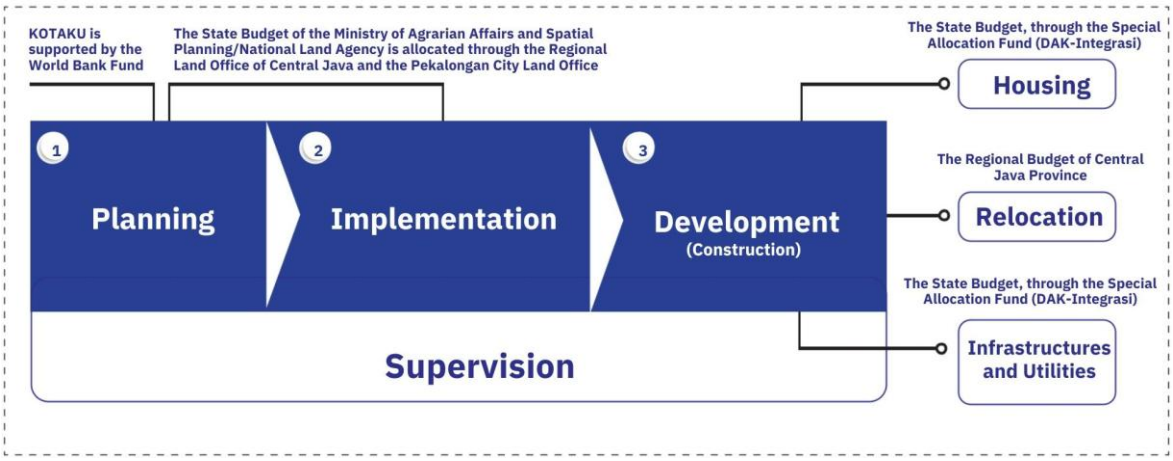

Figure 6. Major Stages of Land Consolidation in Kampung Bugisan
Source: Pekalongan City Land Office, author analysis in 2024

Kampung Bugisan is a small area located on the Loji River meander, but the growth of the settlement has been relatively long. The residents of Kampung Bugisan belong to the low-middle economic class and engage in various occupations as small traders, fishermen, factory laborers, and other informal sectors. Due to their economic circumstances, the community has limited ability to adapt to disasters. However, various activities in the land consolidation stage require that the active role of land consolidation participants be considered (Ayuni et al., 2017). The active participation of LC participants includes involvement in data collection, deliberation in the preparation of LC design, expressing opinions and expectations, and providing agreements. Figure 5 illustrates the involvement of active community participation in each land consolidation activity. Land consolidation is a program that can address the problems; therefore, formulating an agreement is a challenge that requires more attention (Ayuni et al., 2017). The residents of Kampung Bugisan have expressed expectations regarding their participation in LC; these include solutions for tidal flooding, the improvement of the environment, and an increase in land prices in line with the construction of utilities and environmental improvements. In social mapping, some residents disagree with LC. This rejection occurred on plots of land that had relatively livable and well-maintained houses. Nevertheless, this did not result in the cancellation of LC, as stipulated in the Regulation of the Minister of Agrarian Affairs and Spatial Planning/Head of the National Land Agency of the Republic of Indonesia Number 12 of 2019, which requires a minimum of 60%. Based on the Minutes of Land Consolidation Agreement, 160 households (82.9%) agreed to land consolidation activities on 160 parcels of land with an area of ±15,577 m². This Minutes of Agreement is one of the results in the LC planning process. However, there were changes in the implementation of the LC. Some residents were unable to participate in LC because they had issues with their land certificates, while others refused because they had good-quality buildings, did not want to donate land for public facilities, and wanted assistance in the form of money. Conversely, some people changed their decision to participate in land consolidation after being assured of program funding and witnessing successful slum alleviation in the area adjacent to Kampung Bugisan. The implementation of active community participation fosters good social relations and empowers local communities (Suacana et al., 2024). This element directly strengthens the contribution to SDG 16, which aims to promote decision-making processes that are responsive, inclusive, participatory, and representative at all levels.

The success of LC is strongly dependent on the readiness, willingness, and capabilities of landowners as an LC participant in Kampung Bugisan. Consequently, socialization and deliberation related to the LC program are important. The effectiveness of the socialization and deliberation conducted by the team determines the success of land consolidation (Arnowo, 2022). Socialization was conducted by officers from the Pekalongan City Land Office and Pekalongan City Government. However, findings in the field reveal that efforts to convince the community can involve religious or community leaders through intensive deliberation or by tailoring the approach to their needs. This finding is consistent with, and reinforces, the research conducted by Yuliastuti and Haryanto (2020), which states that the willingness of

land consolidation participants is one of the key success factors. Deliberation with LC participants is realized in the creation of an LC design, which must be agreed upon by all LC participants. This policy demonstrates inclusiveness, as community input and expectations are considered, given that the participants will be reoccupying the property. This is consistent with research by Mittal (2014), which states that a participatory process in which landowners and planning teams work together is fairer and prevents the possibility of losing land. LC participants anticipate that the location of their residence will remain unchanged in the sketch design (visioning). This ensures the exclusion of the object from taxation (in Bahasa, referred to as Bea Perolehan Hak Atas Tanah dan Bangunan or BPHTB). In accordance with Article 30 of the Regulation of the Minister of Agrarian and Spatial Planning/Head of the National Land Agency Number 12 of 2019, land rights that do not involve a change in ownership are exempt from BPHTB. The element of inclusiveness in land consolidation activities is a manifestation of SDG 16 and aligns with the research conducted by Mansour in the year 2024. Furthermore, physical and juridical data collectors were able to correctly identify land parcels that would be affected by the construction of public and social facilities. Other agreements that were made included the widening of roads by 2.5 to 3 meters, the provision of allowances to temporarily relocate during the construction of LC results borne by the local government, the improvement of drainage, sanitation, and trash bins in each house, the elevation of land as high as 2 meters, the availability of public space/parks and lighting, and the construction of an inspection road (near the embankment). The improvements in sanitation and water supply in Kampung Bugisan strongly support SDG 6, which aims to ensure universal access to safe, affordable drinking water and equitable sanitation and hygiene. Meanwhile, the construction of the community's houses and house repairs, as well as the development of neighborhood roads. These contribute to the implementation of SDG 11, which has targets to provide universal access to safe, affordable housing and basic services, upgrade slum areas, and promote sustainable and participatory urban planning.

Land consolidation is a land policy to reorganize land tenure and land use in order to improve the quality of the living environment. In the design agreement, there are efforts to handle residences for new construction and quality improvement. Residences near the river will be built facing the river. Meanwhile, residences near neighborhood roads will face the road. Construction of a municipal wastewater treatment plant network located within the neighborhood road. In accordance with Pekalongan City Regional Regulation Number 13 of 2022, the distance of river boundary lines on embanked rivers is at least 3 (three) meters on the outside along the river channel. Utilization of this area will be built as an inspection road and green open space. The construction of retention ponds is carried out as part of the improvement of the irrigation system and increases the storage capacity. Green open spaces play a major role in reducing carbon emissions in cities, as well as providing a place for social interaction and tourism activities (Wiryasa & Dwijendra, 2021). Kampung Bugisan has been designated as an area for heritage tourism in the final draft of Pekalongan City's RPJMD 2021-2026. In addition, the strategy for managing floods and tidal floods in the village involves the widening of the river and the construction of a river barrier embankment (sheet piles). The construction of the embankment serves to separate the dry settlement zone and the inundated ponds. Residents who live on the riverbanks and are affected by the program are given “kerohiman” funds by the local government. The owners of 20 affected land parcels were relocated to Krapyak Village, a village adjacent to Kampung Bugisan. LC is a policy that can overcome slums and tidal flooding in Kampung Bugisan through restructuring of land tenure and land use in the implementation of LC, which a description of land use conditions can be obtained as illustrated in Figure 7.

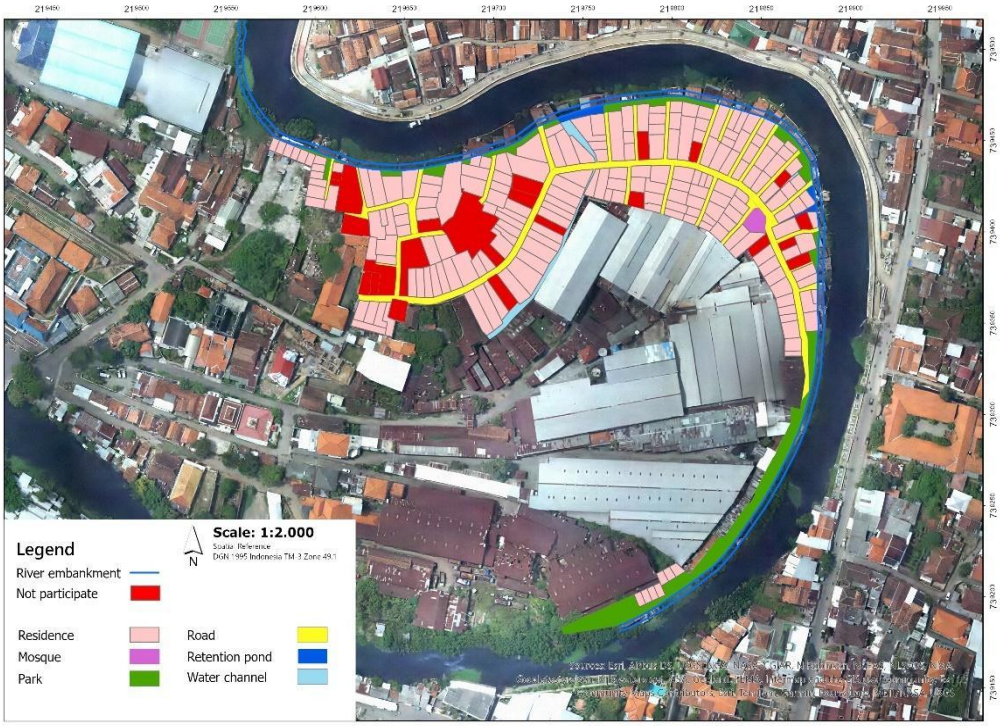

Figure 7. Map of Land Use Plan after Land Consolidation
Source: Pekalongan City Land Office, visualized by the author in 2024

The decline in land function due to tidal inundation and land subsidence has led to changes in land value (Naufalita et al., 2019; Yulianto et al., 2019; Hati et al., 2020). This trend is also projected in research by Suroso and Firman (2018). In 2022, before LC was implemented, based on the Pekalongan City land value zone map, the Kampung Bugisan location had a land value zone of IDR 160,000 to 556,000/m². The value of land in Kampung Bugisan has increased following the development of LC outcomes. According to the 2025 land value zone map accessed from bhumi.atrbpn.go.id (Ministry of Agrarian Affairs and Spatial Planning/National Land Agency, n.d.), the value now ranges from IDR 100,000 to 1,000,000/m². The value of land parcels can be used as a basis for levying the tax on land and building rights (BPHTB) (Suryanto et al., 2019), thereby promoting better taxation. However, local governments have been unable to increase it to match market value because people tend to resist paying higher taxes (Fachrudin, 2020). In this LC in Kampung Bugisan, the local government has implemented a policy to exempt all participants from the BPHTB.

Land consolidation in Kampung Bugisan was an initiative of the central government with the support of the World Bank and the local government. As is the case with most World Bank slum alleviation projects, it is linked to land registration (Handzic, 2010). LC can be defined as a program arrangement and mass registration of land parcels in a determined area with the purpose of ensuring tenure security and environmental improvement. In the case of Kampung Bugisan, where land rights were secured to those who controlled and occupied state land for more than 20 years, they were granted Building Rights Title (Hak Guna Bangunan). However, the potential for administrative and social problems is high in slums and flooded/inundated land, such as the low understanding of the community regarding land consolidation, disagreement by the leasehold community, inability to prove land ownership, and disorder of the community regarding land administration, among others in the transfer of rights. Conversely, the process of implementing LC is protracted due to the necessity of traversing multiple stages. To ensure the smooth functioning of the LC program, a policy is in place that prohibits the transfer and alteration of land use for parcels according to the Letter of Location Determination. This land-freezing application is important for the development activities that utilize land. The findings of relatively low public understanding of land consolidation and the prolonged process of LC are consistent with research conducted by Wiryasa and Dwijendra (2021). These challenges can be addressed through the appropriate approach, therefore ensuring the success of LC. Successful LC can provide land rights security for the community and improve

land administration. Tenure security plays an important role in avoiding conflict (Rigon, 2022). However, the land consolidation program must also be followed by mitigation activities to maintain the environmental and socio-economic balance of society in the North Pekalongan District. Through resource allocation, it can create resilience in areas prone to tidal flooding (Mukhtar & Zuhdi, 2023). This requires more community participation to increase the sense of ownership to support the government's mitigation projects (Buchori et al., 2022).

Conclusion

Implementing land consolidation (LC) in Kampung Bugisan faced the challenges commonly occurring in Indonesia, such as a lack of public awareness of this policy, the lengthy process, and land administration issues. However, the approach and key elements of LC ensured its success in alleviating slums and overcoming tidal flooding. A top-down approach was used for the site selection due to serious environmental pressures, particularly daily tidal flooding, and the community's limited ability to address it independently. Therefore, the community's resistance was relatively low, as residents prioritized the solution to the flood problem over land rights; this is because most of their land was already registered. LC in Kampung Bugisan resolved lost and damaged land certificates to improve land administration. As a participatory element, it is essential to involve religious and community leaders to ensure that residents do not feel disadvantaged due to the donation of a portion of their land in LC. Meanwhile, as an element of inclusiveness, all landowners have an equal role in LC activities, and collaborative funding supported the project from planning to development or construction as a comprehensive approach.

The success of implementing LC in Kampung Bugisan contributes to achieving sustainable development aligned with the SDGs number 6 (clean water and sanitation), 9 (building resilient infrastructure and promoting inclusivity), 11 (human settlements inclusive, safe, resilient, and sustainable), 16 (peace, justice, and strong institutions), and 17 (partnerships for the goals). Future research could compare land values after LC and the value of land donated to public facilities. Moreover, LC policies in Indonesia should integrate strategies to strengthen economic, cultural, and social resilience in facing natural disasters, as well as community welfare based on the purpose of LC. The findings of this study can be a reference in applying LC in similar areas and communities.

Limitations

The researcher acknowledges several limitations that may influence the outcomes of this study, including constraints related to time, personnel, and the researcher's expertise. The researcher acknowledges several limitations that may influence the outcomes of this study, including constraints related to time, personnel, and the researcher's expertise. The conclusions of this study are based not only on secondary data but also on a comprehensive analysis of field observations to elaborate on the major stage of land consolidation and identify its challenges. It is recommended that future studies employ numerous methods and more in-depth research to further explore this subject.

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References

Adlina, Z. I., Sardjono, A. B., & Sari, S. R. (2019). ADAPTASI PERMUKIMAN TERDAMPAK BENCANA ROB (Studi Kasus: Kelurahan Bandengan, Kecamatan Pekalongan Utara, Kota Pekalongan). *Jurnal Arsitektur ARCADE*, *3*(1), 21–26. https://doi.org/10.31848/arcade.v3i1.201

Andari, L., Sugianto, D. N., Wirasatriya, A., & Ginanjar, S. (2023). Identification of Sea Level Rise and Land Subsidence Based on Sentinel 1 Data in the Coastal City of Pekalongan, Central Java, Indonesia. *Jurnal Kelautan Tropis*, *26*(2), 329–339. https://doi.org/10.14710/jkt.v26i2.18324

Andrea, R. M., Sudharto, P. H., & Kismartini, K. (2020). Strategi Adaptasi Non-struktural dalam Menghadapi Banjir Pasang: Studi Kasus Kota Pekalongan. In *Seminar Nasional Lahan Suboptimal Ke-8 Tahun 2020*, 1, 103–108.

Arnowo, H. (2022). KONSOLIDASI TANAH UNTUK OPTIMALISASI TANAH PERTANIAN BERSKALA KECIL (STUDI KASUS DI KOTA SALATIGA). *Jurnal Tunas Agraria*, *5*(1), 1–16. https://doi.org/10.31292/jta.v5i1.165

Ayuni, S. I., Lovenda, E. F., & Hanifati, L. N. (2017). Community-based Peri-Urban Land Cosolidation 3 by People for People in Kampung Bubakan, Kandangan Village, Bawen Subdistrict. In STPN Press Team (Ed.), *Land Consolidation as an Instrument to Support Sustainable Spatial Planning* (pp. 3–13). STPN Press.

Bappeda. (2021). *Rancangan Akhir Rencana Jangka Menengah Daerah Kota Pekalongan Tahun 2021-2026*.

Buchori, I., Zaki, A., Pangi, P., Sejati, A. W., Pramitasari, A., & Liu, Y. (2022). Adaptation strategies and community participation in government-led mitigation projects: A comparison between urban and suburban communities in Pekalongan, Indonesia. *International Journal of Disaster Risk Reduction*, *81*. https://doi.org/10.1016/j.ijdrr.2022.103271

Chehrehbargh, F. J., Rajabifard, A., Atazadeh, B., & Steudler, D. (2024). Current challenges and strategic directions for land administration system modernisation in Indonesia. Journal of Spatial Science, 1–33. https://doi.org/10.1080/14498596.2024.2360531

Delgado, A., & Scheers, J. (2021). Participatory process for land readjustment as a strategy to gain the right to territory: The case of San José–Samborondón–Guayaquil. *Land Use Policy*, *100*. https://doi.org/10.1016/j.landusepol.2020.105121

Fachrudin, K. A. (2020). Analysis of the improvements in the land value zone and revenue from rural and urban property taxes in North Sumatera and Aceh Provinces, Indonesia. *IOP Conference Series: Earth and Environmental Science*, *452*(1). https://doi.org/10.1088/1755-1315/452/1/012034

Fiantika, F. R., Wasil, M., Jumiyati, S., Honesti, L., Wahyuni, S., Mouw, E., Jonata, Mashudi, I., Hasanah, N., Maharani, A., Ambarwati, K., Noflidaputri, R., Nuryami, Waris, L. (2022) Metodologi Penelitian Kualitatif. First Edision, Padang, Sumatera Barat: PT. Global Eksekutif Teknologi.

Fitrinitia, I. S., & Matsuyuki, M. (2022). Role of social protection in coping strategies for floods in poor households: A case study on the impact of Program Keluarga Harapan on labor households in Indonesia. *International Journal of Disaster Risk Reduction*, *80*, 103239. https://doi.org/10.1016/J.IJDRR.2022.103239

Gradiyanto, F., Parmantoro, P. N., & Suharyanto. (2024). Impact of climate change on Kupang River flow and hydrological extremes in Greater Pekalongan, Indonesia. *Water Science and Engineering*. https://doi.org/10.1016/j.wse.2024.03.005

Handzic, K. (2010). Is legalized land tenure necessary in slum upgrading? Learning from Rio's land tenure policies in the Favela Bairro Program. *Habitat International*, *34*(1), 11–17. https://doi.org/10.1016/j.habitatint.2009.04.001

Harini, R., Susilo, B., Sarastika, T., Supriyati, S., Satriagasa, M. C., & Ariani, R. D. (2017). The survival strategy of households affected by tidal floods: the cases of two villages in the Pekalongan coastal area. Forum Geografi, 31(1), 163–175. https://doi.org/10.23917/forgeo.v31i1.4259

Hati, A. C., Putranto, T. T., Hadiyanto, & Budihardjo, M. A. (2020). Escalate groundwater potential for acquiring sustainability and resilience in Pekalongan City, Indonesia-a review. *E3S Web of Conferences*, *202*. https://doi.org/10.1051/e3sconf/202020206007

Ilyanawati, R. Y. A., & Sihotang, S. (2017). CONSOLIDATION OF URBAN LAND FOR THE CONSTRUCTION OF HOUSING FOR LOW INCOME COMMUNITIES (LIC) IN THE CITIES OF BOGOR AND DEPOK. JURNAL ILMIAH LIVING LAW, 9(2). https://doi.org/10.30997/jill.v9i2.1037

Iskandar, S. A., Helmi, M., Widada, S., Muslim, & Baskoro, R. (2020). Analisis Geospasial Area Genangan Banjir Rob dan Dampaknya pada Penggunaan Lahan Tahun 2020 - 2025 di Kota Pekalongan Provinsi Jawa Tengah. *Indonesian Journal of Oceanography*, *2*(3), 271–282. https://doi.org/10.14710/ijoce.v2i3.8668

Kartika, F. D. S., & Helmi, M. (2019). Meta-analysis of community's adaptation pattern with tidal flood in Pekalongan City, Central Java, Indonesia. *E3S Web of Conference*. https://doi.org/10.1051/e3sconf/201

Laksmi, G. S., Rudiarto, I., & Luqman, Y. (2020). Community preparedness toward flood during Covid-19 pandemic at Pekalongan City and Regency. *E3S Web of Conferences*, *202*, 1–6. https://doi.org/10.1051/e3sconf/202020206008

Louwsma, M., Leemmen, C., Hartvigsen, M., Hiiroren. Juhana, Du Plessis, J., Chen, M., & Laarakker, P. (2017). *Land Consolidation and Land Readjustment for Sustainable Development-the Issues to be Addressed* (FIG Working Week 2017).

Maharlika, A. R., Hadi, S. P., Kismartini, & Lenty Hoya, A. (2020). Tidal flooding and coastal adaptation responses in Pekalongan City. *E3S Web of Conferences*, *202*. https://doi.org/10.1051/e3sconf/202020206027

Mansour, A. H. N. (2024). Comparative study of land readjustment policy implementation methodologies in developing countries. HBRC Journal, 20(1), 867–887. https://doi.org/10.1080/16874048.2024.2393468

Miftakhudin, S. (2021). STRATEGI PENANGANAN BANJIR ROB KOTA PEKALONGAN. *JURNAL LITBANG KOTA PEKALONGAN*, *19*(1), 29–38. http://dx.doi.org/10.54911/litbang.v20i.142

Miles, M. B., Huberman, A. M. and Saldana, J. (2014) Qualitative Data Analysis: a Methods Sourcebook. Third Edit. Los Angeles, London, New Delhi, Singapore, Washington DC: SAGE Publications, Inc.

Ministry of Agrarian Affairs and Spatial Planning/National Land Agency. (n.d.). *Peta Bhumi ATR/BPN*. https://bhumi.atrbpn.go.id/peta

Mittal, J. (2014). Self-financing land and urban development via land readjustment and value capture. *Habitat International*, *44*, 314–323. https://doi.org/10.1016/j.habitatint.2014.07.006

Mugisha, J., Uwayezu, E., Babere, N. J., & Kombe, W. J. (2024). Enabling planned urban settlements through land readjustment - A case study from Kigali, Rwanda. *Habitat International*, *145*. https://doi.org/10.1016/j.habitatint.2024.103025

Mukhtar, D. S., & Zuhdi, A. (2023). Mapping Socio-Economic Vulnerability to Rob Flood Hazards in Coastal Cities, North Pekalongan District, Pekalongan City. *PENA TEKNIK: Jurnal Ilmiah Ilmu-Ilmu Teknik*, *8*(1), 117. https://doi.org/10.51557/pt_jiit.v8i1.1828

Musarofa, Siswanti, Y. D., & A-Rosyid, L. M. (2024). Analisis Pengaruh Banjir Rob Terhadap Kualitas Air Tanah Di Kawasan Pesisir Selatan Puger Kabupaten Jember. *Journal of Mechanical Engineering*, *1*(1), 52–59. https://doi.org/10.47134/jme.v1i1.2190

Mustika, R. A., Susilowati, I., & Muhammad, F. (2020). Flood risk spatial index analysis in the coastal Pekalongan, Central Java, Indonesia. *E3S Web of Conferences*, *202*. https://doi.org/10.1051/e3sconf/202020206028

Nashrrullah, S., Monika Pasaribu, J., Hazarika, M. K., & Samarakoon, L. (2013). STUDY ON FLOOD INUNDATION IN PEKALONGAN, CENTRAL JAVA. In *International Journal of Remote Sensing and Earth Sciences* (Vol. 10, Issue 2). http://dx.doi.org/10.30536/j.ijreses.2013.v10.a1845

Naufalita, A., Subiyanto, S., & Hani'ah. (2019). Analisis Pengaruh Perubahan Penggunaan Lahan Terhadap Perubahan Zona Nilai Tanah Pada Daerah Genangan Banjir Rob Di Kecamatan Pekalongan Utara Tahun 2014-2018. *Jurnal Geodesi Undip*, *8*(1), 38–47. https://doi.org/10.14710/jgundip.2019.22450

Ni'mah, N. M., Sadharto, D., & Mardiatno, D. (2015). Kerangka Aset Rumah Tangga Miskin dalam Peristiwa Banjir Pasang Surut di Kecamatan Pekalongan Utara Kota Pekalongan. *Majalah Geografi Indonesia*, *29*(2), 172–176. https://doi.org/https://doi.org/10.22146/mgi.13119

Nurdiantoro, D., & Arsandrie, Y. (2020). Dampak Banjir Rob Terhadap Permukiman Di Kecamatan Wonokerto Kabupaten Pekalongan. *Prosiding SIAR: Seminar Ilmiah Arsitektur*, *8686*, 286–295.

Octavia, A., Barus, L. S., Zubair, A., & Fitriyadi, A. (2019). Land ownership status and handling slums: Case study Kamal Muara, DKI Jakarta. *International Journal of GEOMATE*, *16*(56), 197–202. https://doi.org/10.21660/2019.56.30186

Pekalongan City Public Housing and Residential Areas Service. (2023). Executive Summary Peminatan dan Tematik PPKT TA. 2024 Kampung Bugisan, Kelurahan Panjang Wetan, Kota Pekalongan [PowerPoint Slides].

Perdinan, Ryco, F. A., Syafararisa, D. P., Suvany, A., Sabilla, C. J., Revia, M., & Ikrom, M. (2023). Tidal Flood Hazard Assessment in Pekalongan City, Central Java. *IOP Conference Series: Earth and Environmental Science*, *1266*(1). https://doi.org/10.1088/1755-1315/1266/1/012058

Pontianak City Communication and Informatics Office.(2024), Fokus Entaskan Kawasan Kumuh Tepian Sungai, FGD Bahas GSS. Retrieved from https://jepin.pontianak.go.id/berita/ptk/2603.

Purnomo, E., & Wahyono, H. (2019, January 9). Measuring Institutional Collaboration on Coping Flood and Rob in Panjang Baru Village Pekalongan City. *The 1st International Conference on Environment and Sustainability Issues, ICESI 2019*. https://doi.org/10.4108/eai.18-7-2019.2290118

Putri, E. A. D., Perdinan, Basit, R. A., Janna, S. C., Pratiwi, S. D., & Mustofa, I. (2023). Zonation of critical water distribution based on meteorological water balance in Coastal Areas of Pekalongan City. *IOP Conference Series: Earth and Environmental Science*, *1266*(1). https://doi.org/10.1088/1755-1315/1266/1/012060

Ramadhani, R. F., Setiyono, B., & Manar, D. G. (2015). Implementasi Program Penanganan Banjir Rob Di Wilayah Pesisir Kota Pekalongan. *Journal of Politic and Government Studies*, *5*(4), 261–270. Retrieved from https://ejournal3.undip.ac.id/index.php/jpgs/article/view/9259

Rigon, A. (2022). Diversity, justice and slum upgrading: An intersectional approach to urban development. *Habitat International*, *130*. https://doi.org/10.1016/j.habitatint.2022.102691

Riyatmoko, A., Sanjoto, T. B., & Juhadi. (2022). Impact of the rob flood disaster in north pekalongan. *IOP Conference Series: Earth and Environmental Science*, *1089*(1). https://doi.org/10.1088/1755-1315/1089/1/012016

Sidiq, T. P., Adiwijaya, R. F., Nugroho, E. O., Gumilar, I., & Abidin, H. Z. (2023). Long term subsidence rate in Pekalongan city observed by SAR Interferometry. *IOP Conference Series: Earth and Environmental Science*, *1276*(1). https://doi.org/10.1088/1755-1315/1276/1/012014

Suacana, I. W. G., Sudana, I. W., Wiratmaja, I. N., & Rukmawati, D. (2024). Urban land consolidation policy in the context of creating a good environment according to spatial planning in Indonesia. Journal of World Science, 3(2), 238–245. https://doi.org/10.58344/jws.v3i2.559

Suharini, E., Hanafi, F., Akhsin, W., & Sidiq, B. N. (2016). *Study of Population Growth and Land Use Change Impact of Intrusion at Pekalongan City*. In *1st International Conference on Geography and Education (ICGE 2016)* (pp. 232-238). Atlantis Press. https://doi.org/10.2991/icge-16.2017.46

Supriatna, A. (2018). The Application of Land Consolidation in Indonesia. In Souza, F. F. D., Ochi, T., & Hosono, A. (Eds.), Land readjustment: solving urban problems through innovative approach (pp. 140-146). Japan International Cooperation Agency Research Institute.

Suroso, D. S. A., & Firman, T. (2018). The role of spatial planning in reducing exposure towards impacts of global sea level rise case study: Northern coast of Java, Indonesia. *Ocean and Coastal Management*, *153*, 84–97. https://doi.org/10.1016/j.ocecoaman.2017.12.007

Suryanto, Hermanto, B., & Rasmini, M. (2019). ANALISIS POTENSI BEA PEROLEHAN HAK ATAS TANAH DAN BANGUNAN SEBAGAI SALAH SATU PAJAK DAERAH. *AdBispreneur*, *3*(3), 273–281. https://doi.org/10.24198/adbispreneur.v3i3.19205

Syafitri, A. W., & Rochani, A. (2021). Analisis Penyebab Banjir Rob di Kawasan Pesisir Studi Kasus: Jakarta Utara, Semarang Timur, Kabupaten Brebes, Pekalongan. *Jurnal Kajian Ruang*, *1*(1), 16–28. http://dx.doi.org/10.30659/jkr.v1i1.19975

Ula, M. N., & Tijan, T. (2020). Implementasi Kebijakan Penanggulangan Rob di Kabupaten Pekalongan. *Unnes Political Science Journal*, *4*(1), 21–26. https://doi.org/10.15294/upsj.v4i1.43630

UN-Habitat. (2018). *SDG Indicator 11.1.1 Training Module: Adequate Housing and Slum Upgrading. United Nations Human Settlement Programme (UN-Habitat)*.

Utami, C. W., Giyarsih, S. R., Marfai, M. A., & Fariz, T. R. (2021). Kerawanan Banjir Rob dan Peran Gender Dalam Adaptasi di Kecamatan Pekalongan Utara. *Jurnal Planologi*, *18*(1), 94–113. https://doi.org/10.30659/jpsa.v18i1.13588

Wiryasa, N. M. A., & Dwijendra, N. K. A. (2021). Socio-physical transformation towards sustainable urban morphology through land readjustment in Indonesia. *Civil Engineering and Architecture*, *9*(3), 874–882. https://doi.org/10.13189/CEA.2021.090329

Yulianto, F., Suwarsono, Maulana, T., & Khomarudin, M. R. (2019). Analysis of the dynamics of coastal landform change based on the integration of remote sensing and gis techniques: Implications for tidal flooding impact in pekalongan, central Java, Indonesia. *Quaestiones Geographicae*, *38*(3), 17–29. https://doi.org/10.2478/quageo-2019-0025

Yuliastuti, N., & Haryanto, R. (2020). The Implementation of Land Consolidation Policy for Housing Development. *E3S Web of Conferences*, *202*. https://doi.org/10.1051/e3sconf/202020206035

Yuliastuti, N., Sugiri, A., & Haryanto, R. (2022). Toward Land Consolidation for Slum Upgrading: Community Preferences on Land Tenure in the Fishers' Settlement of Tegalsari, Indonesia. *The International Journal of Interdisciplinary Social and Community Studies*, *17*(2), 229–242. https://doi.org/10.18848/2324-7576/CGP/v17i02/229-242

Yustiningrum, N., & Adianto, J. (2024). Study of Various Obstacles to Vertical Land Consolidation for Kampung Improvement Program (Case Study: Pilot Project of Vertical Land Consolidation in Cipinang Besar Selatan, East Jakarta, 2022). Smart City, 4(1). https://doi.org/10.56940/sc.v4.i1.11

Zubaidah, S., Rusli, B., Djaja Saefullah, A., & Widianingsih, I. (2023). An overview of slum upgrading programs in developing countries: Case study in Indonesia. *Cogent Arts and Humanities*, *10*(2). https://doi.org/10.1080/23311983.2023.2264021