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Development Characteristics of a Coastal Slum Area in Indonesia: A Case Study of Fishermen Settlements in Muara Angke, North Jakarta

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Abstract

As a fast developing and urbanizing country, the problem of slums – those unplanned and unorganized settlements - does not only hit big cities, but almost every region in Indonesia. One such example can be found in the coastal areas of Muara Angke, a fishing settlement area located in North Jakarta. This study identifies and analyses the characteristics of slum areas in Muara Angke based on seven physical criteria, namely, buildings, roads, drinking water, drainage, waste, garbage and fire protection. Primary data were obtained from a questionnaire survey of 70 local respondents supplemented by field observations. Secondary data were gathered from published and unpublished documents. Results of the study revealed that improvements of living conditions in the fishing slum village of Muara Angke were at moderate-to-very high levels. While buildings in the Muara Angke slums were of irregular quality, the quality of the fire protection service in the slums was moderately low. By contrast, the scores for building density was high as was the supply of drinking water and the provision of local drainage. In terms of environmental quality in the slums, road conditions, waste water management and solid waste management received very high scores. In conclusion, the development pattern for Muara Angke fishing villages may be said to be well leading towards a rejuvenated resettlement.

Keywords: fishing village; slum area; coastal area

Introduction

Urbanization which is not in accordance with the ability of city services would have an impact on the demographic and spatial conditions of a city. The pressure of urbanization has resulted in the need for provision and development of decent settlements as one of the needs must be met. The inability in the provision and development of decent settlements would trigger the development of slums which tend to increase annually. Therefore the issue of the surge in urbanization rates and the increasing number of urban slums is absolutely a concern.

Sociologically slum settlements are settlements which are not habitable due to the unmet of requirements for occupancy, both technically and non-technically. In general, slums area provide an impression that people living there are those with low behaviors as seen in the middle-class living with low income. That is a common interpretation saying that people who spend their daily live in slum areas are those who live in a low quality environment with minimum human service standards in order to live properly.

Based on the space utilization, slums areas are analogous to the settlements with poor housing conditions and lack of residential infrastructure services. The use of space is often not in accordance with its designation which then turns into a settlement, for example slums in the area designated as green open spaces.

The concentration of majority of population in big cities has led to the emergence of slums which are accompanied by various problems. Some of the things include the increasing potential and frequency of fire and flood disasters, the increasing vulnerability and social conflict, the decreasing level of public health, and the decreasing of services quality for infrastructure and facilities for the settlements.

The problem of slums does not only hit big cities, such as Jakarta, Medan and Surabaya, but almost every region in Indonesia has the same problem, namely the emergence of slums, especially those which are unplanned and located in the coastal areas, such as in Muara Angke, Jakarta. Coastal areas have a unique typology compared to the urbans. Location in the waterfront, Muara Angke has the characteristics of residential areas intended for the fishermen. Most of the buildings do not have IMB and are located in the area with poor elevation which various activities are mixed up, the absence of clean water service systems, and the unfunctioned of some SPAM containers. In addition, the condition of raw water piping in the area is unfunctioned, while direct drainage and sanitation to the sea are not accommodated first. The low quality of community housing would resulted in a decrease in the quality of environment and people's health.

Based on the description above, the purpose of this study is to identify the characteristics of slum areas based on seven physical criterias (buildings, roads, drinking water, drainage, waste, garbage and fire protection) in Muara Angke fishing area.

Literature Review

Criteria of Slums Area

The basic definition of settlements according to Law No. 1/2011 is a part of residential environment consisting of more than one housing unit which has the infrastructure, facilities, public utilities, and has additional of other functional activities in urban and rural areas.

Slums, according to Sukamto (1985), are area with low economic status and buildings which do not meet the health requirements. Based on Minister of Public Works and Public Housing Regulation No. 2/2016 regarding Quality Improvement of Slum and Slum Settlements, slum settlements were the uninhabitable settlements due to the irregularities in buildings, high density of buildings, and the unqualified quality of buildings and facilities and infrastructure.

In this study, the slums of settlements would be approached by the physical criteria and non-physical criteria (legality).

Criteria for slums and slum settlements are the criteria used to determine the slum conditions. Criteria for slums and slum settlements based on Draft by Minister of Public Works and Public Housing Regulation on Quality Improvement of Slum and Slum Settlements, are including the slum criteria in terms of buildings, environmental roads, provision of drinking water, environmental drainage, wasted water management, waste management, and fire protection.

Buildings

a. Building irregularities

Building irregularities are the condition of buildings in the housing and settlements:

- Not fulfilling the provisions of building layout in Detailed Spatial Plan (RDTR/*Rencana Detil Tata Ruang*), which includes the arrangement of forms, quantities, placement, and appearance of buildings in a zone, and or
- Not fulfilling the provisions of building layout and environmental quality management in Building and Environmental Planning (RTBL/*Rencana Tata Bangunan dan Lingkungan*), which includes environmental block arrangements, plot arrangements, building arrangements, floor height and elevation arrangements, arrangement of concepts of environmental identity, arrangement of concepts of environmental orientation, and street appearance settings.

b. High building density which is not in accordance to Spatial Planning Provisions

The high level of building density which is not in accordance to the provisions of spatial plan is the condition of buildings in housing and settlements with:

- Building Basic Coefficient (KDB/*Koefisien Dasar Bangunan*) which exceeds the provisions of RDTR, and/or RTBL, and / or
- Building Floor Coefficients (KLB/*Koefisien Lantai Bangunan*) which exceeds the provisions in the RDTR, and/or RTBL.

c. Incompatibility to building technical requirements

The incompatibility to technical requirements of building is the condition of buildings in housing and settlements which are in the contrary to the requirements:

- Control of environmental impacts,
- Construction of buildings on and/or under the ground, above and / or under water, above and / or under infrastructure/public facilities,
- Safety of building,
- Health of buildings,
- Comfort of buildings, and
- Ease of building.

Environmental Roads

a. The network of environmental road does not serve the entire housing or settlement environment

The environmental road network does not serve the entire residential or residential environment is the condition of some neighborhoods or settlements which do not served by the environmental roads.

b. The poor quality of the road surface

The poor quality of environmental road surface is the damaged condition of part or all of the environmental road surface.

Provision of Drinking Water

a. The unavailabililty of safe access of drinking water

The unavailability of safe access to drinking water is a condition where people cannot access drinking water which are colorless, odorless and tasteless.

b. Non-fulfillment of drinking water needs for each individual according to the Applicable Standards

Non-fulfillment of drinking water needs of each individual is a condition where the need for drinking water in a residential environment does not reach to a minimum of 60 liters/person/day.

Environmental Drainage

a. The unability of environmental drainage to flow rainwater to cause generate puddles

Environmental drainage is unable to drain rainwater runoff so that it causes puddles. It is the condition where the environmental drainage network is unable to drain runoff so that it creates a pool of with more than 30 cm deep for more than 2 hours and it occurs more than twice a year.

b. The unavailability of drainage

The unavailability of drainage is the condition where a tertier waterway and/or local waterway is unavailable.

c. Unconnected to the Urban Drainage System

The unconnected to the urban drainage system is the condition where local waterway is not connected to the upper waterway which cause the unflowed water and puddles.

d. Drainage system is not being maintained so solid and liquid waste are accumulated inside it

The drainage system is not being maintained so solid and liquid waste are accumulated inside it. It is the condition where the maintenance of the drainage system is not well performed, both the routine and periodically maintenance.

e. The poor quality of environmental drainage construction

The poor quality of environmental drainage construction is a condition that shows the drainage system is a soil excavation without coating material or a cover or when the damage has occurred.

Waste Water Management

a. Waste water management system is not in accordance to the applicable technical standards

The waste water management system which is not in accordance to the applicable technical standards is a condition where the management of wastewater in a residential area does not have an adequate system, which consists of latrines or toilets connected to septic tanks, either individually or domestically, communally and centrally.

b. Waste water management infrastructure and facilities do not meet the technical requirements

The waste water management infrastructure and facilities do not meet the technical requirements. It is the conditions that describe the waste water management infrastructure and facilities in housing or settlements with the following conditions:
a. Goose neck toilet inside the toilet is not connected to the septic tank tank; and/or
b. The unavailability of local or centralized waste treatment systems.

Waste Management

a. Solid waste infrastructure and facilities are not in accordance to the technical requirements

Garbage infrastructure and facilities are not in accordance to the technical requirements. It is the conditions in which the infrastructure and facilities for wasting in the residential areas are inadequate as follows:

- Waste bins with a sorting waste on a domestic or household scale,
- Waste collection points (TPS/*Tempat Pengumpulan Sampah*) or TPS 3R (reduce, reuse, recycle) in the environmental scale,
- Waste carts and/or garbage trucks in the environmental scale, and
- Integrated waste treatment plant (TPST/Tempat Pengolahan Sampah Terpadu) in the environmental scale.

b. Waste management system does not meet the technical requirements

The solid waste management system which does not meet the technical requirements is a condition where waste management in a residential area does not meet the following requirements:

- Domestic collection and sorting,
- Collection of the environment,
- Transportation of the environment, and
- Environmental treatment.

c. Waste management facilities and infrastructure are not maintained so the environmental pollution occurs due to the waste. The pollution occurs in the source of clean water, soil and drainage network

Waste management facilities and infrastructure are not maintained so that there is pollution of the surrounding environment by garbage. The sources of clean water, land and drainage networks are polluted and it is the conditions where the maintenance of waste management facilities and infrastructure is not conducted.

Fire Potential

a. Fire Protection Infrastructure

The unavailability of fire protection infrastructure is a condition where these things below are unavailable:

- Water supply for fire protection infrastructure which obtained from the natural or artificial sources,
- Environmental roads which facilitate the entry and exit of fire trucks,
- Communication facilities for notifications of fires, and /or
- Data on environmentally accessible fire protection systems.

b. Fire Protection Facilities

The unavailability of fire protection facilities, such as

- Lightweight Fire Extinguisher (APAR/*Alat Pemadam Api Ringan*),
- Fire trucks,
- Car ladder as needed; and/or
- Other supporting equipment.

Handling of Slums Area

The pattern of handling the increase in the quality of slums consists of the followings.

a) Restoration: Activities to repair, restore houses and infrastructure, facilities, and public utilities to their original forms, carried out for the classification of light slums with legal land status,
b) Rejuvenation: Comprehensive overhaul and structuring activities covering

housing and infrastructure, facilities and public utilities and settlements, carried out for the classification of heavy slums and moderate slums with legal land status,

c) Resettlement: The activity of removing affected communities from slum housing or slum areas that is unlikely to be rebuilt due to the fact it is not in accordance to spatial plans and/or disaster-prone areas, carried out for the classification of heavy slums, medium slums and light slums with illegal land status.

Coastal Areas

The following are definitions from several sources regarding coastal areas. Kay and Alder (1999) stated that "The band of ocean space dry land adjancent (water and submerged land) in terrestrial processes and land uses directly affect oceanic processes and uses, and vice versa". It means that the coastal area is a region which is a sign or boundary of land and territorial waters where the process of activities or activities of the earth and land usage still affect the process and function of the ocean. The definition of coastal area according to the latest international agreement is a transition area between the sea and the land, to the land covers the areas still affected by sea water or tidal sparks, and towards the sea covers the continental shelf (Dahuri, et al., 2001).

From the definitions above, conclusion could be taken that the coastal area is a unique area due to the mixture of land and sea. This affects the physical conditions where generally the area around the sea has a relatively flat contour. The existence of such conditions is very supportive for the coastal area to be a potential area in the development of the entire region. This shows that there is no real boundary for coastal areas. The boundaries of coastal areas are only imaginary lines which are determined by local conditions and situations. In the sloping coastal areas with large rivers, this boundary line could be far from the coastline. On the contrary, in places with steep beaches and directly adjacent to the deep sea, the coastal areas would be narrow. According to Law No. 27/2007 regarding the Boundaries of Coastal Areas, to the land, it covers land administration areas and towards the sea waters, it is as long as 12 nautical miles measured from the coastline towards the open sea and/or towards the islands waters.

Research Method

Research Approaches

This study uses a community based development approach and an evaluative approach. The community based development approach is considered appropriate in this study due to it assesses the criteria and typology of slum areas which requires the involvement of the community as the perpetrators of development. Through this approach, it is expected that the data and mapping of slums on the coast would be presented. The evaluative approach is a continuation of the previous approach. After the data and information are presented, they could be assessed through weighting in the form of criteria and typology of slum areas.

In its implementation, this research was conducted using a mixed method approach. According to Sugiyono (2011), a mixed method (a combination) is research

method which combines a quantitative method with a qualitative method to be used together in a research activity so that more comprehensive, valid, reliable and objective data is obtained.

Research Phases

Data Collecting

Primary data collection is done by observing and distributing questionnaires to 70 respondents. Observation in this study is in the form of direct observation in the study area. The observation was carried out to determine the existing visual phenomena, including the physical condition of buildings, roads, drainage, drinking water, waste, garbages and fire protection.

The secondary data collection was obtained through an institutional survey and literature studies. An institutional survey is carried out by conducting visits to the agencies, such as Bappeda and sub-district and village offices to obtain data. Literature studies include studies relating to literature from books, journals and articles on slums and coastal areas.

Data Analysis

Analysis of research data uses a descriptive analysis and weighting. Descriptive analysis was carried out to identify the characteristics of slums, to do typology of slum areas, to assess criteria for slums, and to pattern the slums. While the weighting analysis in this study was conducted for the assessment of slum criteria which was done to determine the level of community acceptance, and to find out the classification of slums based on the category of heavy slums, moderate slums and light slums.

Results and Discussion

General Description of Muara Angke

Muara Angke (6 ° 6′21 ″ LS, 106 ° 46′29.8 ″ BT) is a fishing boat or port in Jakarta. It was marked by the operation of supporting fishermen's needs, such as fish auction (its structure and facilities) besides the prevalence of a port managed by a martyrdom center. Administratively, Muara Angke is located in Kapuk Muara Village, Penjaringan District, North Jakarta Municipality. The location is adjacent to Muara Karang.

Although it is well-known by many people in Jakarta as a fishing villages, an auction site and fish ports as well as a place to eat grilled fish, Muara Angke holds other potentials. In this area, there is Muara Angke Wildlife Reserve, a 25.02 hectare of mangrove area inhabited by no less than 90 species of birds.

Muara Angke is part of the last remaining mangrove forest in DKI Jakarta Province. Angke-Kapuk forest area which consists of Muara Angke Wildlife Reserve, Protection Forest and Angke Kapuk Nature Park is the last mangrove forest which could be found in Jakarta. This forest area has a total area of around 170.60 ha. (https://id.wikipedia.org/wiki/Muara_Angke).

Source: Google Map, 2018

Picture 1. *Map of DKI Jakarta and Map of Muara Angke Area*

Muara Angke area itself is located in Muara Angke delta which is about 60 hectares, surrounded by Kali Angke and is bordered by Jl. Pluit in the east and Java Sea (Jakarta Bay) in the west. Angke River serves as the main access to the entry and exit point of small fishing boats, while the edges are used by fishermen to prop up their boats.

Physically, Muara Angke area is a reclaimed land which is still unstable. This area has a flat land contour, with a height of 0 to 1 meter above sea level. With a soft coastal geomorphology, it causes a low soil carrying capacity and high seawater intrusion processes. Seabed sediments are dominated by mud (Maritje, et.al., 2004).

Demography Condition of Muara Angke

In general, Muara Angke is divided into three RWs (*Rukun Warga*/Citizens Association), namely RW 1, RW 11 and RW 20. Muara Angke consists of various regions, such as settlements, traditional fishery products processing (PHPT/*Pengolahan Hasil Perikanan Tradisional*), fishing ports (and fish auctions/TPI/*Tempat Pelelangan Ikan*), and fish ponds. PHPT area is approximately 5 hectares and consists of 212 fish processing units (Tiya, 2017). The fishing port area is equipped with a place for fish auctions, containers, salt warehouses and ice factories.

According to Tiya (2017), people living in Muara Angke based on their original regions are divided into two, namely native people (permanent residents) and migrant (seasonal residents). Indigenous people or permanent residents are those who have lived permanently for generations and were born in Jakarta and recorded in RT/RW population. Migrants or seasonal residents are people who do not live permanently and frequently move (fishermen commonly called them as *andon* fishermen).

The migrants came from various coastal areas in the northern part of Java Island, such as Banten, Cirebon, Indramayu, Tegal, Pekalongan, some even came from Southeast Sulawesi. These residents and *andon* fishermen are usually not recorded as residents in local RT/RW due to the fact that in certain seasons, they would return to their original areas.

Population in Muara Angke are dominated by Moslem, then Christians and Buddhists. Livelihoods carried out by local residents are also vary, ranging from fishermen, fish processing, traders, drivers, food stalls/grocery stores, restaurants,

pedicab drivers, janitors, laborers, company employees to government employees (Tiya, 2017).

Traditional fisheries product processing or PHPT is an area of total 6.2 hectare. While the land area for settlements is 4,553 m^2 or 0.4 hectare. Based on BPS (Central Bureau of Statistic) survey in 1990, the population density was 5,772 people/km^2 then in 2000 the population density dropped to 5,540 people/km^2, and in 2010 the population density increased dramatically to 6,749 people/km^2. The increase in population is by an average of 1.9% per year (see Table 1.)

Table 1. Population Density of Muara Angke

Notes	1990	2000	2010
Number of population	262,065	251,568	306,456
Population growth (%)	-	-0.41	1.99
Population density	5,772	5,540	6,749
Sex ratio (L/P) (%)	98.00	101.71	99.73

Source: BPS Survey on Population 1990, 2000, 2010

According to Anisa, et al. (2018), population settlements in Muara Angke were divided into three, namely flats, planned settlements and ordinary housing. In the flats section, residents could only stay there. Most of the residents of this flats are office workers. In addition, fishing and salting activities could not be seen in this flats area. In the planned settlements which are near Traditional Fisheries Product Management Office, the streets near the location are also often used to dry salted fish.

Characteristic Identification of Slums Area in Muara Angke Fishermen Village

The Building Conditions

There are two locations for the settlement in Muara Angke. One is in the complex area and the other one is in the flats. People who work as fishermen usually live in complexes with permanent tenements and semi-permanent huts (Tiya, 2017). The residential area in Muara Angke is divided into several small fishing villages or also called blocks, such as Empang Block, Eceng Block, Kampung Nias and Kampung Baru.

Fisherman housing in Muara Angke is 60 hectare. The housing distance from the pier is around 500 meters. Up to budget year of 2000, there were 1,128 fishing facilities built, which consisted of old houses (540 units), *bermis* type 21/60 (203 units), stage type 21/60 (38 units), apartment buildings type 21 (80 units), F. HKSN 18 / 52.5 (20 units), and flats type 21 (112 units). The average floor area of flats is 21 m^2 per unit, while the floor area of a simple house is 36 m^2 per unit. The living conditions of fishermen who perform their activities in Muara Angke area consist of 64.29 % in permanent houses and 35.71 % in semi-permanent houses. The condition of ceramic floor is 10 %, tile 50% and cement 40% (Maritje, et al., 2004).

The condition of the connecting road between houses could only be passed by 2 people with a width of ± 120 cm. In addition, there are several roads in the settlement which are still in the form of land which are only piled up with debris from buildings with uneven contours. When it rains it, the roads often becomes a pool of water (Anisa, et al., 2018).

The environmental conditions in Muara Angke is unhealthy. The area is relatively dense and dominated by houses made by flammable material which are very close to each other. When entering this area, there was also an unpleasant fishy odor resulted from the salting fish production. The area is lack of cleanliness as many piles of household garbage could be seen everywhere, including solid and liquid waste from salting fish. There ere puddles on the roads as the result of tidal floods and clogged and turbid drains. The household needs for clean water for cooking, bathing, washing and so forth are fulfilled by buying water from mobile water traders (Tiya, 2017).

Source: www.merdeka.com; www.antaranews.com; and Kartika Putri, 2013.

Picture 2. *The Condition during the Floods in Muara Angke*

The other Muara Angke fishing villages are settlements with no legal permits and located in the river and coastal border areas. The settlements are housing with irregular inter-building locations and semi-permanent building quality. The houses are in quite level of density. In addition, the existing buildings did not take river border into consideration, even still the building was built by utilizing an empty river bank. This resulted in the emerge of slums area in several corners of Muara Angke (Kartika Putri, 2013). The last type of settlement requires a layout arrangement of the building to eliminate the slums in Muara Angke.

Housing around the salting location
Source: Anisa et al., 2018

Settlements in river and coastal border areas
Source: Anisa et al., 2018

Conditions for connecting roads between houses
Source: Kumparan.com, 2017

Settlements in the coastal border
Source: Kumparan.com, 2017

Picture 3. *The Fishermen Housing Condition of Muara Angke*

The Infrastructure and Facilities Condition

Poor drainage conditions, starting from the residential areas to the drainage at the salting fish production are not well-integrated to the main waterways. People living there are also lack of caring when they process or dispose the processed fish waste which could pollute the drainage. Drainage in residential areas is also very small, ± 30 cm wide with a depth of ± 30 cm, which is less able to accommodate all community activities, added to the large amount of mud deposits and the amount of waste which makes drainage less functioning properly (Anisa, et al., 2018).

Source: Anisa et al., 2018

Picture 4. *Drainage Condition in Muara Angke*

The waste management in residential settlements is poor. From the garbage pick-up rate from the temporary landfills to final waste disposal is less intense which resulting in the accumulation of garbage causes the unpleasant odors. This disturbed the comfort of the residents in the settlement who passed by the garbage bin. Sometimes the waste was over-builds which narrowing the road so that the road becomes jammed (Anisa, et al., 2018).

According to Anisa, et al. (2018), for the need of clean water in the salting fish processing settlements, they still use water from PAM and well water. Residents are very dependent on PAM water due to the fact that well water in Muara Angke is actually very close to the sea so it is contaminated with salt water that is unsuitable to be used for the daily needs of residents. In the fish processing settlements, there are also several

public toilets as the source of clean water which people usually use to wash and bathe. Although there is a new water treatment plant built by the private sector, it is not considered sufficient for residents due to the coverage is still small. So many people who do not get clean water must buy clean water through small containers.

Source: Anisa et al., 2018

Picture 5. *Clean Water in Muara Angke*

The characteristics of Muara Angke fishing village is identified as slums area through several aspects, namely the condition of the building, basic facilities and infrastructure, and socio-economic conditions. Building conditions are seen from indicators of the level of building irregularities, building density and building quality. The condition of basic facilities and infrastructure could be traced from indicators of environmental road conditions, drinking water supply, environmental drainage, waste water management, solid waste management, and fire protection. While the socio-economic conditions are seen from the level of poverty, education, and income. The distribution of Muara Angke fishing village slum values could be seen in Table 2.

Table 2. Coverage of Slum Values in Muara Angke Fishermen Village

Aspects	Indicators	Values			Result for Muara Angke	Values and Weights for Muara Angke
		Very High	High	Medium		
Building Condition [1)]	The level of building irregularity	>66%	66-33%	<33%	Many permanent flats compared to semi-permanent houses (30%)	Medium (1)
	The level of building density	>66%	66-33%	<33%	Close to each other (50%)	High (3)
	The level of building quality	>66%	66-33%	<33%	Flats and semi-permanent houses (30%)	Medium (1)
Basic infrastructure and facilities condition	Condition of environmental roads [2)]	>66%	66-33%	<33%	Connected roads between houses are narrow, the road in the settlements are made from land (70%)	Very high (5)*
	Condition of drinking water	>66%	66-33%	<33%	Access to safe drinking water is less provided.	High (3)

	availabililty [3)]				The drinking water is highly depending on PAM and buying water in small containers (40%)	
	Condition of environmental drainage [4)]	>66%	66-33%	<33%	The environmental drainage is too small, not connected to the main waterway (60%)	High (3)
	Condition of water waste management [5)]	>66%	66-33%	<33%	Water waste management (IPAL) in Kali Angke waste pond is not functioning. The local or central waste management system are not available (70%)	Very high (5)*
	Conditio of waste management [6)]	>66%	66-33%	<33%	The waste management is not intense and poor, waste are piled up (70%)	Very high (5)*
	Condition of fire protection [7)]	>66%	66-33%	<33%	There was one unit of fire distinguisher. The road condition is lacking so it was difficult for the fire trucks to enter or exit during a fire (30%)	Medium (1)
Socio-economic condition	Poverty leverl [8)]	>66%	66-33%	<33%	Half of the fishermen could not afford to go to the doctor to have medication, putting children to school, did not have a proper fishing equipment (boats) and production tools (50%)	High (3)
	Education level [9)]	>66%	66-33%	<33%	In average, fishermen have low education level (50%)	High (3)
	Income level [10)]	>66%	66-33%	<33%	Half of the fishermen have an income only to fulfillef their daily lives even less than that (so many have debts) (50%)	High (3)

Note:

1) Residents who work as fishermen usually live in complexes with permanent or semi-permanent huts (Tiya, 2017). The conditions of the fishermen's residence in Muara Angke consist of 64.29% permanent houses and 35.71% semi-permanent housing. The condition of the ceramic floor is 10%, 50% tile and cement is 40% (Maritje et al., 2004).
2) The condition of the connecting road between houses which can only be passed by 2 people with a width of ± 120 cm. In addition, there are several roads in the settlement that are still in the form of land which are only piled up with debris from buildings with uneven contours so that when it rains it often becomes a pool of water (Anisa et al., 2018).
3) For the needs of clean water, the salted fish processing settlements use a lot of PAM (Drinking Water Company) and well water. Residents are very dependent on PAM water because the well water in Muara Angke which is actually very close to the sea is contaminated with salt water which is not suitable to be used for the daily needs of residents. In the fish processing settlements there are also several public toilets as a source of clean water that people usually use to wash and bathe. Although there is a new water treatment plant built by the private sector, it is not sufficient for residents because the coverage is still small. So that many people who do not get clean water must buy clean water through small quantities (Anisa et al., 2018).
4) Drainage of residents' settlements is very small (30 cm wide and 30 cm deep), less able to accommodate all community activities, silt and garbage which makes drainage less functioning properly, does not integrate well into the main channel. Processing / disposal of processed fish waste is also allowed by residents to pollute drainage (Anisa et al., 2018).

5) Conditions for wastewater management. The WWTP (Waste Water Management Installation) in the Kali Angke waste pool has not been functioning. Housing waste water is channeled to reservoirs and domestic WWTPs. The unavailability of local or centralized waste treatment systems.
6) Poor waste management in processing settlements up to the level of garbage picking from temporary landfills, to final waste disposal, is classified as less intense, resulting in accumulation of garbage that causes unpleasant odors. This disturbed the comfort of the residents of the settlement who passed the garbage bin. Sometimes rubbish that over-builds makes the road narrower so that the road becomes jammed (Anisa et al., 2018).
7) Fire protection conditions. At Muara Angke there is one fire fighting unit. Environmental road conditions do not facilitate the entry and exit of fire engines.
8) Poverty level. The poverty perception according to fishermen Muara Angke: Not able to see a doctor; Not able to send children to school; Income "mediocre" or even less (lots of debt); Do not have fishing gear (boats) and production equipment; The house does not meet the standards. Half of the fishermen live in homes with an average density of 5 to 7 m2 (Ginanjar, 2008).
9) Based on the level of education, the average fisherman in the Muara Angke area is poorly educated. A total of 7.14% of educated fishermen did not complete elementary school, 50% graduated from elementary school, 28.57% graduated from junior high school and 14.29% graduated from senior high school (Maritje et al., 2004).
10) Income level. Half of the fishermen earn "mediocre" or even less (lots of debt) (Ginanjar, 2008).

Based on Table 2, the level of slum in Muara Angke fishing village is at a moderate to very high level. The irregularity of building and the quality of building, as well as the fire protection received a moderate slumness value. While for the building density, drinking water supply, environmental drainage, poverty levels, education, and income, a high level of slumness are obtained. Whereas the environmental road conditions, waste water management and solid waste management levels are very high.

Table 3. Classification of the Level of Slum based on Perceptions of Respondents (N = 70)

No.	Characteristics of slums	Classification of the Level of Slum					
		Medium		High		Very High	
		Quantity	%	Quantity	%	Quantity	%
1	Building:						
	a. Building irregularities	**39**	**55.7**	22	31.4	9	12.9
	b. Quality of the building	**40**	**57.1**	20	28.6	10	14.3
	c. Building density	12	17.1	**50**	**71.4**	8	11.4
2	Roads	8	11.4	10	14.3	**52**	**74.3**
3	Drinking water	13	18.6	**47**	**67.1**	10	14.3
4	Drainage	9	12.9	**53**	**75.1**	8	11.4
5	Waste	8	11.4	7	10.0	**55**	**78.6**
6	Garbage	7	10.0	9	12.9	**54**	**77.1**
7	Fire Protection	**47**	**76.1**	13	18.6	10	14.3

Based on Table 3, it is stated that according to most respondents, building irregularities (55.7%), building quality (57.1%), and fire protection (76.1%) belong to the medium slum category. Building density (71.4%), drinking water (67.1%), and drainage (75.1%) belong to the high slum category. While the aspects of the road environment (74.3%), waste (78.6%) and garbage (77.1%) belong to the very high slum

category. Respondents' perceptions of the level of slums in their area, the results are almost the same as secondary data from previous studies summarized in Table 2.

Analysis on Handling Pattern of Slums Area in Muara Angke Fishermen Village

In the effort to improve the quality of slum housing and slum settlements, government and/or local governments have established policies, strategies, and patterns of handling which were humane, cultured, equitable and economical.

The handling patterns are based on the results of the assessment of slum conditions and legal aspects of the land. The patterns of handling are planned by taking the typology of slums and slums into account.

Handling patterns includes restoration, rejuvenation, or resettlement. The conduct of rejuvenation, rejuvenation and/or resettlement is carried out by taking into account, among other things, civil rights of the affected people, ecological location conditions, as well as the social, economic and cultural conditions of the affected people. The patterns of handling are carried out by the government and/or local government in accordance with their authority by involving the community.

The handling patterns are arranged with the following conditions.

a. in the event when the location has a heavy slum classification with a legal land status, the pattern of treatment carried out is rejuvenation,
b. in the event when the location has a heavy slum classification with an illegal land, the pattern of handling carried out is resettlement,
c. in the event when the location has a moderate slum classification with a legal land status, the pattern of handling carried out is rejuvenation,
d. in the event when the location has a moderate slum classification with an illegal land status, the pattern of handling taken is resettlement,
e. in the event when the location has a mild slum classification with legal land status, the pattern of handling carried out is restoration,
f. in the case when the location has a classification of mild slum with an illegal land status, the pattern of handling taken is resettlement.

For Muara Angke fishermen villages which have a moderate to very high slum classification with a legal status of land, the treatment pattern is rejuvenation.

While Muara Angke fishermen village which has a moderate to very high slum classification with an illegal land status which occupying the riverbanks and sea, the pattern of handling is resettlement. Illegal buildings in the form of huts and beds on the banks are more widely distributed in Muara Angke Kali Adem area, which by the government is called a grey area and actually it should not be used as a settlement due to it functions as a river flow prone to tidal flooding.

In dealing with slums in Muara Angke fishermen village, boundaries of the border buildings on the banks of the river must be taken into consideration for further regional development. Then the arrangement of building layout and the provision of decent open space for the community should be done to eliminate the slums and to increase the comfort of community in Muara Angke fishermen village. In addition, the type of settlement which has a distinctive form, namely Traditional Fisheries Products Processing (PHPT), could be maintained due to it describes the type of settlement of fishery products.

Conclusion

Based on the research results and the discussion in the previous chapters, it could be concluded that the level of slum in Muara Angke fishermen village is at a moderate to very high level. The irregularity of building and the quality of building, and fire protection received a moderate slowness value. While the building density, drinking water supply, environmental drainage, poverty levels, education, and income received a high level of slums. Whereas environmental road conditions, waste water management and solid waste management levels are very high.

For Muara Angke fishermen villages which have a moderate to very high slum classification with a legal status of land, the treatment pattern is rejuvenation. Whereas Muara Angke fishermen village which has a moderate to very high slum classification with an illegal land status which occupying the riverbanks and the sea, especially in Muara Angke Kali Adem area, the pattern of handling is resettlement.

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