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Evaluation of the Living Condition in Fishermen Settlement in the Coastal Area of Marisa City, Gorontalo Province

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ABSTRACT

The population living in the residential area in two villages, including Pohuwato village and Pohuwato Timur village, are mostly fishermen, who live under the poverty line, meaning that the people there have low income. The objective of the present study was to explore the living condition in terms of the physical, social, and economic aspects of the fishermen communities in Pohuwato Village and Pohuwato Timur Village, Marisa City, Gorontalo; it took into account the minimum service standard of a settlement area. The primary data was obtained by conducting field observations, interviews with fishermen, and Focus Group Discussion (FGD) forums; secondary data was obtained from the related literature, including books, research results and documentation as well as various articles. The quantitative analysis was implemented by scoring, in which the indicators and variables of slum will be assessed with the standards of the Ministry of Public of Works and Housing, Directorate General of Human Settlement. Living conditions in the slums spread in the studied villages were in the moderate category. Findings showed that, issues, such as the provision of lavatory, drainage system for wastewater, clean water supply, waste management, and fire protection system, were most visible. Developing a disaster management system for the settlement area is also crucial. Therefore, the fulfillment of basic needs was deemed essential as the solution to the sustainability of the fishermen community.

1. Introduction

The term "urbanization" is defined as the population shift from rural areas to urban areas, aiming at creating a better quality of life. This phenomenon can be found in many parts of the world, both in metropolitan cities and small cities, with a feasible livelihood option that people can find compared to the one in their previous settlement. In [1], the authors argue that urbanization has encouraged and attracted rural communities to move to urban areas. Marisa city, one of the small cities, has experienced a rise in its population numbers due to urbanization. The rapid advancement of industrial cities, in addition to other contributing factors, e.g., ease of access to infrastructures, education, health, and job opportunity, is cited as the cause of urbanization. However, the population growth is not accompanied by the initiative of the city government to provide basic infrastructure, include adequate or appropriate settlements, for the people; thus leading to socio-economic inequality. In [2], the authors claim that the inability to provide the infrastructures contributes to the rise in the number of slums with insufficient necessary infrastructures, and this problem is found in the fishermen's settlement in Marisa city.

The population living in the residential area in two villages, including, Pohuwato Village and Pohuwato Timur Village, are mostly fishermen. In those villages, the houses are adjusted to fit the needs of the fishermen so that the pattern of the settlement results in a linear shape, with wooden moorings and wild plants along the beach. Many people there live under the poverty line, meaning that they have low income. In [3], the authors propose that the settlement in those villages is mostly inappropriate houses with poor environmental conditions due to dense populations. In this research, the term "slum" refers to unsuitable building and/or high-density housing, which is inappropriately arranged, with

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below standard facilities and infrastructures. Another defining characteristic of a slum is that this area does not meet the spatial planning or housing standard. A slum is notoriously known for its settlement that has poor services; it is an overcrowded and unhealthy area with high criminality rates. In general, settlements located in a slum represents an area with poor quality in terms of the environmental aspect, overpopulated, and high-density housing, with below-standard public infrastructures.

Conditions in an abandoned small city could trigger some problems, such as the rise in the number of slums, poor development of the area, visually undesirable city, and a decline in the health of the population due to the absence of the health standard, as well as socio-economic problems. The present work discusses the life of the fishermen community residing in areas nearby a small city of Marisa, including Pohuwato Village and Pohuwato Timur Village; these areas are notable for their urban-rural characteristics and far from the activity center.

Based on the research background, the main question of the study is as follows: "how is the living condition of fishermen's settlement in the coastal area of Marisa City, Gorontalo province according to the minimum standard of services? Therefore, the objective of the present study was to explore the living condition of the fishermen's settlement. It focused on examining the physical, social, and economic aspects of the fishermen communities in Pohuwato Village and Pohuwato Timur Village, Marisa City, Gorontalo; it took into account the minimum service standard of a settlement area.

It is further expected that the study will contribute to: (1) broadening the insight regarding the living condition, facilities, and infrastructures of the fishermen's settlement in the coastal area of Marisa City, Gorontalo; (2) providing references and inputs for the government of Pohuwato regency in terms of the housing and settlement in the area, by which it helps their development program and the management of the coastal area in Marisa City, including the provision of housing facilities and infrastructures that fit the physical, social, and economic condition of the people.

2. Literature Review

2.1. Settlement

A settlement refers to a process of functional establishment underpinned by the pattern of human activities and the influence of the aspect of the physical and non-physical setting (which affects the activities and establishment process). In [4], the author infers that the setting is impactful on the physical environment that is shaped by the location and the community with its socio-cultural aspects. A settlement can be established through particular processes, with or without a plan. The processes are long-term and continuous. On the other hand, in [5], the author opines that the formation of a settlement pattern is the outcome of the distribution of a settlement area based on a particular geographical factor, e.g., a settlement in a coastal area or nearby a river and linear settlement.

According to the Law of the Republic of Indonesia, Number 1 of 2011 Concerning Housing and Areas for Settlement, the term settlement refers to a part of the environment, outside the protecte d areas, including both urban and rural areas serving as a residential area and a place that supports livelihood. The term settlement area, in this context, is defined as the residence of a person or a family, consisting of a house and yards. In [6], the author states that this notion later confirms that housing is among the components of a settlement area. Furthermore, In [7], the author mentions five major elements in a settlement area, namely (1) residential area, (2) workplace, (3) movement area, (4) recreational area, and (5) facilities and infrastructures.

In [9], (as cited in R.W. Diah [8] I.N Nasution, A. Syahreza), the author argues that issues revolving around settlement areas are notoriously complicated due to many underlapping factors that contribute to the concerns. As a living place, the settlement areas take into account several aspects other than physical and technical; those aspects include the socioeconomy and culture of t he residents. The problem concerning the provision of housing mostly occurs in urban areas. It blames the population migration from the rural areas to cities due to cities' appealing aspects and internal urges from the villages. Such a condition results in continuous increases in the urban population by which it is considerably impactful on the provision of land for housing. In [10], the authors point out that the growth rate in cities in many developing countries is accompanied by the growth in the number of population living in a slum. This is signified by the condition of people living with undesirable standards.

In [11], the author defines the condition of a building is seen from its age, density, and arrangement. Building's age is one of the factors causing damage and fires. In [12], the author describes an area becomes a slum due to the density of the building and the poor standard of the area of the construction. On top of that, the types of construction can determine the level of the building's durability. As mentioned in [13], the author states that most constructions in a slum are made of combustible materials, e.g., wood, zinc, fabric, iron, and bamboo.

2.2. Urban Settlement

A settlement develops along with the rise in the population number of an area. The constant condition of the land and the increase in the population number is the leading cause of the increase in the needs for settlement areas. For this reason, finding another land to create more suitable residential is a necessity.

Settlements in urban areas are generally categorized into three groups, namely: (i) well-arranged settlement with quality facilities, infrastructures, and utilities; (ii) unplanned settlement, i.e., areas where the housing is not in compliance with the regulation, and it has no facilities, infrastructures, and utilities that meet the standard, and; (iii) informal settlement, where the construction of the houses are not well-planned. In [14], the author explains that in the last group of the settlement, poorly arranged houses can be found amid well-constructed houses. The inability of spatial planning in urban areas to make ends meet results in improper management of the settlement areas; which also causes rapid growth of slums. In [15], the author states that these situations will, in turn, lead to a distortion in the environment in terms of the physical and social aspects.

A metropolitan city has people with different elements; this condition is the outcome of the high attractiveness value of the city. Some of the people have inhabited the city for a long time, and the others are newcomers who expect to earn a better living. One

inexorable trend of a metropolitan city near a coastal area or ship port is the presence of the fishermen community in the structure of the urban population. According to [16], the author reckons that fishers are among the components of society with the lowest financial well-being compared to other social groups. In the same tune, in [17], the authors state that the consequence of low-quality human resources in the fisheries sector is a declined productivity level, leading to the low earning and impoverishmen t among the fishermen.

2.3. Slum

The term slum refers to a settlement area with undesirable environment qualities caused by the gap between the rapid population growth and slow economic growth. A guideline published by the Directorate General of Human Settlements has established the criteria to identify a slum area. Indicators or criteria of a slum area based on the facilities and infrastructures include the condition of the road drainage system, clean water, wastewater, and waste management.

The slum area is an unplanned settlement area with inadequat e basic services, such as clean water and sanitation, and poor ownership security. Further, this area is infamous for its inapprop riate and dense housing, and unsafe construction of the houses. In [18], it considers that there are many terms associated with the slum area at the national and regional levels, such as informal settlement and squatter. In other words, the slum area represents a squalid and overcrowded area in many cities. The slum area is represented by many defining characteristics, such as inhabited by unemployment, high crime rate, and demoralization rate, inha bited by unemotionally stable residences with low purchasing power and income level, and squalid and unhealthy environment. Most of the population in this area are migrants from villages, and they are prone to serious health issues, such as malnutrition [19], since authors have limited access to the public facilities. In [20]-[22], the authors express the majority of the people here work in informal sectors as labor, and they live in informal houses.

According to [23], the author states that common problems revolving around a slum area include (1) overcrowded housing with poor health and social standard, (2) dense building, which is prone to fires, (3) lack of clean water, (4) insufficient electrical energy supplies, (5) poor drainage system, (6) bad roads, and (7) lack of lavatories. Preventions of slum conditions are possible if the development of the settlement area adheres to the regulations; one of the practices is by establishing a healthy housing standard. A slum area represents a residential area with low quality of housing and poor infrastructures with a constant decline in the environmental aspect. Despite these conditions, the residences of the area have guaranteed land ownership; this regulation encompasses legal protection for the owner of the land, a residence, or the landlord. In [24], the author states that slum refers to an area located in urban areas, in habited by marginalized communities that experience a drop in the quality of life.

2.4. Typology of Fishermen's Settlement Areas

The fishermen's settlement area in Pohuwato and Pohuwato Timur villages is positioned to adjust with the area, facing the coastline, i.e., a linear settlement. This adjustment is based on the fishermen's activities. In general, this typical settlement is categorized into two: (1) settlement area with houses facing towards the beach, and (2) settlement area with houses facing towards the street with access to the beach.

The settlement is regarded as a high-density area, thus leaving the impression that the settlement resembles a slum area with bad sanitation. Most of the houses are made of wood and bamboo, although there are some concrete houses with gable roofs. Furthermore, the materials of the roof of the houses in the area are zinc and thatch. Each house has a mooring. Currently, the two villages have no fishing ports that function as a port or harbor for landing and distributing fish.

Each fisher who owns a boat is accompanied by 25-30 subordinates who are helpful during fishing. They can catch 1.5 to 3 tons of fish per day.

As many as 1.5 to 2 tons of the catch are distributed to the tra ditional market in Marisa and Paguat for fulfilling the food supply of the population in the cities and nearby areas, while 3 tons of the catch is sold to the markets in the city center in Bitung, Gorontalo, Palu, and even to other islands, such as Kalimantan to earn more income for the community in Marisa city. Should the fishermen want to land their catches from their boat to the coastal area, they have no choice but to rent a smaller boat because the port in the area does not meet the standard.

Figure 1: Fish Drying (Source: Authors, 2018)

Figure 2: Fishermen's Activities in Pohuwato Village and Pohuwato Timur Village (Source: Authors, 2018)

Figure 3: Fishermen's Activities in Drying the Fish (Source: Authors, 2018)

Figure 4: Fishermen's Activities in Scaling the Fish (Source: Authors, 2018)

Figure 5: Permanent house of a Fisherman in Pohuwato and Pohuwato Timur (Source: Authors, 2018)

3. Research Methodology

3.1. Research Sites

This study was conducted in the fishermen's settlement in Po huwato and Pohuwato Timur village, Marisa city, Pohuwato regency; the area of the settlement is 392.91 Hectares. (see Figure 6). In these densely packed villages, the majority of the population works as fishermen living in slums. Such a situation leaves the impression of an inelegant city since the fishermen settlement is located at the center of Marisa City.

3.2. Data Collection

The data involved primary and secondary data. The primary data functioned to gather information regarding the overview of the condition in the settlement area of the fishermen community in Pohuwato and Pohuwato Timur village, and information regarding the preferences and perceptions of related stakeholders in terms of the improvement of the quality of these two villages. Methods to obtain the primary data involved field observation, interviewing 148 fishermen (or 25% of the total population selected purposively), and Focus Group Discussion (FGD). Each closed-ended question (with responses using a Likert scale system) is intended to retrieve information regarding the condition of the fishermen settlement. The secondary data were collected from reviewing the literature, books, research report, documents, and articles that correlated with the present study.

3.3. Data Analysis

The data were analyzed quantitatively using a scoring system, where the indicator and the variables of slum area were examined based on the standard of Ministry of Public of Works and Housin g, Directorate General of Human Settlement; this was aimed at determining the living conditions in the fishermen's settlements in the studied villages.

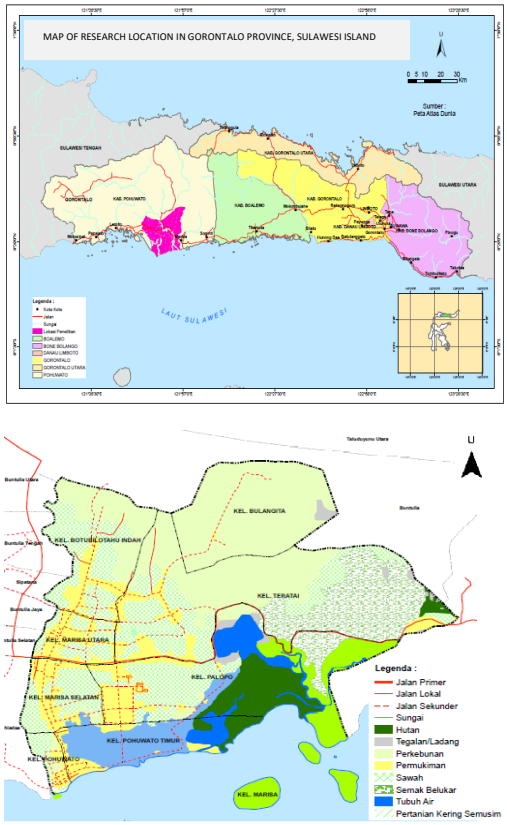

Figure 6: Research Site Map

4. Results and Discussion

4.1. Evaluating the living conditions in the fishermen's settlements

The population living in the residential area in two villages, including, Pohuwato village and Pohuwato Timur village, are mostly fishermen. The total population is 4333. The two villages share land borders with several areas. Palopo and Marisa Selatan villages are located in the north border of Pohuwato and Pohuwato Timur. On the east border and the southern border, the two villages share land borders with Maleo village, Paguat district, and Tomini bay, respectively. Bulili village, Duhiadaa district, is located on the east border of Pohuwato and Pohuwato Timur.

Table 1 shows the living conditions of the settlement area of the fishermen community in Pohuwato and Pohuwato Timur village.

Table 1: Living conditions in fishermen's settlements in Pohuwato and Pohuwato Timur village units

Number	Aspect	Conditions of slums in Pohuwato Village and Pohuwato Timur Village
1.	**Information of Population**	
	Total population	4333
	Number of the head of the household	867
2.	**Conditions of house**	
	Total houses	864 units
	Number of unorganized houses	529 units

	Number of houses that do not meet the standard	335 units
3.	**Environmental Condition**	
	Road width > 1.5 m.	6634 meter.
	Road width < 1.5 m.	1957 meter.
	Width of bad roads	1796 meter.
	Width of the road without canal	5519 meter.
4.	**Condition of Drainage System**	
	Width of the drainage canal	5034 meter
	Width of the bad drainage canal	3045 meter
5.	**Clean Water Services**	
	Number of households who has no access to clean water	651
	Number of households who has no access to clean water	651
6.	**Condition of Waste Water Management**	
	Number of houses without access to public lavatories	304
	Number of houses without standard lavatories	475
7.	**Condition of Waste Management**	Management of domestic waste in Pohuwato Village and Pohuwato Timur Village are yet categorized good since the officers do not take the waste to the garbage dump nearby.
8.	**Condition of Fire Protection System**	The villages have no fire protection systems; some locations are hard-to-reach areas, thus hindering the fire trucks from reaching the areas (the road is < 1.5m).

Source: Survey reports, 2018

According to the findings, the general information depicting the condition of the building in Pohuwato and Pohuwato Timur village based on eight main indicators of a slum area are as follows:

1. As many as 61% of the total houses in the two villages are categorized as informal housing, and the majority of them are not facing directly to the main road with a minimum width of 1.5m.
2. The percentage of houses that do not meet the standard is 38.64%. All of those buildings need to be repaired.
3. The width of some of the roads is less than 1.5m.
4. Other roads (83.19%) with a width of more than 1.5m have no drainage system.
5. As many as 33.89% of the drainage system is in bad condition, hampering the function of the system to flow the water.
6. Although the access to clean water for the community in the research sites has been provided by Indonesian Regional Water Utility Company (hereinafter referred to as PDAM) of Marisa city, 75.34% of the population in the two villages still have a problem regarding the clean water supply. As a result, they rely on public wells.
7. Regarding the wastewater management, the majority of the people in Pohuwato and Pohuwato Timur village have standard private lavatories, while others still use the public lavatories or defecate in the seawater.
8. The disaster management system in Pohuwato and Pohuwato Timur village is yet available. On top of that, some areas are hard to reach by a fire truck as the roads are too narrow (< 1.5m). The two villages also do not have sufficient disaster management systems (such as mangrove forest as shoreline protection) to keep the settlement area from abrasion and rob flood.

Figure 7: Simple fishermens' settlement in Pohuwato Village and Pohuwato Timur Village (Source: Authors, 2018)

Figure 8: Houses with mooring (Source: Authors, 2018)

Figure 9: Condition of roads (Source: Authors, 2018)

Figure 10: Daily activities of the fishermen (Source: Authors, 2018)

Two scoring methods were employed to determine the living conditions in the fishermen's settlement in the studied villages. Table 2 demonstrates the criteria and indicators of the slum area, along with its scoring, prepared by the Directorate General of Human Settlements

Table 2: Criteria score of living conditions in fishermen's settlements in Pohuwato and Pohuwato Timur village units

No.	Aspect	Criterion	Indicator and Parameter	Score
1.	Condition of building	Building irregularity	Building located in an irregular location	3
		Building density	High-density building that does not meet the standard	3
		The discrepancy with building	Building in a location that is not in compliance	5

		technical requirements	with the technical requirements	
2.	Condition of roads	Road coverage	Areas not covered by the roads	1
		Quality of the surface of the roads	Areas with poor-quality roads	5
3.	Condition of clean water supply	Availability of the access to clean water supply	Total population with no access to clean water	1
		Unfulfilled demand for clean water supply	Total population, whose demand for clean water supply, is not met	3
4.	Condition of the drainage system	Inability to manage water flow	Areas with >30cm of puddle, in > 2 hours, and > 2 times a year	3
		Unavailability of the drainage system	Areas with no drainage system	3
		A local drainage system that is not connected to the urban drainage system	A drainage system that is not connected with other systems	5
		Poorly-managed drainage system	Dirty and unpleasant smell	5
		Quality of the construction of the drainage system	Areas with a poorly-constructed drainage system	5
5.	Condition of the wastewater management system	The wastewater management system is not in compliance with the technical standard	Areas with a wastewater management system that is not in compliance with the technical standard	3
		Infrastructures in the wastewater management system are not in compliance with the technical standard	Areas with poor infrastructures in its wastewater management system	3
6.	Condition of waste management	Infrastructures in the waste management systems are not in compliance with the technical standard	Areas with poor infrastructures in its waste management system	5
		The waste management system that does not meet the technical standard	Areas with poor waste management systems	5
		Poorly-managed infrastructures	Areas with poorly-managed infrastructures	5
7.	Condition of the fire protection system	The availability of fire protection system	Areas with no fire protection system	5
		Unavailability of the fire protection system	Areas with no fire protection system infrastructures	5
			Slum criteria score	73
	Category	Moderate		

Source: Analysis Results, 2018

Description: Score 1 = 25% – 50%, Score 3 = 51% – 75%, Score 5 = 76 %– 100%, Low slum level = 19 – 44, Moderate slum level = 45 – 75, Severe slum level = 76 – 95.

The condition of an area with a disproportional number betwe en the total population, the availability of facilities, and infrastructures would evince the quality of a slum area. As a result, the provision of the facilities and infrastructures is considered as something that is likely over compelled.

Facilities and infrastructures found at the fishermen's settlement are discussed below.

- Lavatories

The needs of lavatories are something unavoidable for the fishermen community in Pohuwato and Pohuwato Timur village. According to the data, 31 units of the house (3.57%) are regarded unlivable, although those houses have lavatories. This condition urges a need for a public lavatory for the fishermen community, considering that 96.43% of the houses in the area have no private lavatories. Consequently, the majority of the people have no choice but to defecate in seawater or a river. Table 3 provides information regarding the distribution of public toilets in Pohuwato and Pohuwato Timur village.

Table 3: The Number of Public Lavatories in Marisa City, 2019

No.	Village	Total	Percentage
1	Pohuwato	21	67,74
2	Pohuwato Timur	10	32,26
Sum Total		31	100

Source: Village Profile, 2020

Table 3 shows that Pohuwato village has more public rest rooms totaling 21 units or 67.74% compared to Pohuwato Timur Village. Pohuwato Timur Village has the least lavatories (10 units, 32.36%) for its people. There are 31 public lavatories spread in the residential area and the settlement of the fishermen community at Marisa City. However, people's awareness to manage the cleanliness of the public facility is low. To worsen, the public lavatories in the two villages are far from satisfying the minimum standard. Such a condition demands the involvement of the people to start taking care of the cleanliness of this facility.

- Roads

Roads are crucial for the fishermen's settlement at Marisa city since these infrastructures connect the activities between the city and the village. The roads in the research site are mostly collector roads, residential streets, and pathways. In this context, the collector road and the residential street refers to a road that connects a group of houses with others, while the pathway connects one house with another.

Table 4: Roads in the fishermen's settlement, Marisa City, 2019

No.	Road classification	Height (km)	Width (m)	Existing condition	SPM (Minimum Service Standard)	Description
1	Collector	22.65	10	0.00522	0.0006 m/individual	Meet criteria
2	Residential street	9.56	8	1.59703	40-60/Ha	Does not meet criteria
3	Pathway	7.1	0.8-2	1.18608	50-110/Ha	Does not meet criteria

Source: Field Survey, 2020

Table 4 reveals that only the collector road that satisfies the minimum public service standard compared to other road types in Marisa city. The other two roads, however, urge the local government to improve, such as expanding new road networks and enhancing the quality of the roads to fulfill the standard.

- Wastewater system

According to [25], the author states that an urban drainage system is designed as flood control in a settlement. The drainage system in the residential area and fishermen's settlement in Marisa city is adjusted according to the model of the road. However, some of the current drainage canals cannot be used properly. The drainage systems that are properly functioned serve to manage the rainwater and domestic wastewater thus flow the water into a river and sea. Problems in some canals blame the rubbish heap covering the drainage surface. The rubbish clogs the rainwater, thus resulting in floods. For this reason, the maintenance of the drainage system is crucial in preventing the rise in the water level surface and flood during the rainy season. The types of drainage systems in the residential area and fishermen's settlement in Marisa city consist of arterial, primary, and secondary drainage.

Table 5: The drainage system in Marisa City, 2019

Number	Classification of Drainage System	Height (m)	Width (m)	Description
1	Primary	2108	1	Good
2	Secondary	514	0.9	Poor
3	Tertiary	326	0.7	Poor
Sum Total				

Source: Survey Reports, 2020

According to the interview with the people living in the residential area and the fishermen's settlement area in Marisa city, flood never hit their areas since the drainage canals can collect the rainwater, thus preventing puddles for two hours. On that ground, it could be argued that the drainage system in the residential area and the fishermen's settlement within Marisa city has met the minimum standard. Expansion of canals in the areas without the drainage systems allows the rainwater to flow into the point of final disposal.

- Clean water resources

In general, PDAM has provided affordable access to clean water for people in the residential area and fishermen's community in Marisa city. The following table provides brief information regarding the use of clean water of the people in the research sites.

Table 6: Clean water resources in Marisa City, 2019

No.	Village	Water source			Percentage		
		Dug well	Drilled well	Indonesian Regional Water Utility Company (PDAM)	Dug well	Drilled well	Indonesian Regional Water Utility Company (PDAM)
1	Pohuwato	15	0	0	4,76	0,00	0,00
2	Pohuwato Timur	300	0	10	95,24	0,00	100,00
Sum Total		315	0	10		100,00	0,00

Source: Village Profile, 2020

According to the results of Table 6, the clean water supply of the fishermen community in Marisa City includes 315 dug wells. PDAM contributes to ten units of water resource facilities. Pohuwato Timur Village has the most access to clean water resources (dug wells), totaling to 300 units or 95.24%, while Pohuwato village has limited resources with only 15 units or 4.76%. Resources provided by PDAM in Pohuwato Timur Village comprise ten units (100%). Both Pohuwato Village and Pohuwator Timur village, however, have no injection wells due to funding problems and the fact that the water from such wells contains salt, and thus it is undrinkable. Clean water resources are one of the primary needs for the fishermen community residing in the residential area and settlement area found within Pohuwato Village and Pohuwato Timur Village. From the above discussion, it can be said that 37.84% of the urban population has access to clean water, while the remaining 62.16% is the opposite.

Thereby, the local government is urged to provide facilities of clean water resources for 1000 houses in the fishermen's settlement; it is aimed at ensuring a healthy life of the fishermen community.

- Waste management

The residential area and fishermen's community in Marisa city has been perplexed by the issue of waste. Such a condition blames the lack of waste management and temporary waste dump sites (hereby referred to as TPS) in all residential areas and fishermen's settlement area in the city. As a result, the majority of the people have no choice but to litter and to burn their waste.

A survey conducted in the residential areas and fishermen's settlement in Marisa city reveals that some areas, such as temporary drainage systems, have been turned into a garbage disposal, thus resulting in the spread of diseases.

Provision of facilities, such as TPS, in a specific area that serves 100 units of the house per radius is, thereby, deemed essential. According to Table 7, the waste management system in the research sites is below the minimum standard, urging the stakeholders to design waste management planning.

Table 7: SPM of waste management

No.	Representing Parameter	Existing condition	SPM (Minimum Service Standard)	Description
1	TPS	0	Per 50-100 m	Below standard
2	Public waste container	0	Per 150m	Below standard
3	Domestic trash bin	26%	60-100%	Below standard
4	Frequency of waste collection	2 times	Every day	Below standard
5	Population served	20%	80%	Below standard

Source: Survey Reports, 2019

- Electricity

Electricity is the source of energy and lighting, which is crucial for all human activities in every sector, e.g., industry, commercial, and household. It also functions as the resource of energy for

electric supplies and industrial machines. There are no significant issues regarding the electrical distribution system in the residential area and fishermen's settlement in Marisa city since the system has been distributed within these areas. The only notable concern for the State Electricity Company (PLN) is the management of cable management for better power transmission to all houses.

- Fire Protection System

There were fires in the residential area and fishermen's settlement in Marisa city in 2008, 2016, and 2017, damaging the houses and public facilities, e.g., schools and regent's official residence, within the city. However, the issues had been addressed properly due to the preparedness of fire brigades in Marisa city, with four units of fire trucks.

The capability of the fire trucks to reach the area correlates with the road and the availability of water supply in every house within the residential areas and settlements in Marisa city. However, there are still some issues regarding the availability of hydrant and road conditions (the trucks are unable to reach the site due to narrow roads, such as in Pohuwato and Pohuwato Timur village). Another issue worth-mentioned is the density of building in the areas, in which it could hinder the officers from extinguishing the fire.

5. Conclusion

It can be concluded that the living conditions in the studied settlements are in the moderate category. Several issues, such as the provision of lavatory, drainage system for wastewater, clean water supply, waste management, and fire protection system, are most visible. Formulating coping strategies by the local government is necessary to address the problem in the areas. According to the living conditions in the studied slums, the fulfilment of basic needs is deemed essential for the sustainability of the fishermen community. This approach thus addresses the scarcity of lavatories and clean water supply, limited drainage system for wastewater, and poor management of waste. Developing a disaster management system for the settlement area is also crucial.

Oftentimes people residing in Pohuwato Village and Pohuwato Timur Village tend to build their houses in a vacant land without any legal permission. The houses can be found around the riverbanks, beaches, or nearby the workplace of the people and in the city center. The needs for housing and settlement areas for the fishermen in Marisa City are considered as their primary needs. Meanwhile, the provision of facilities and infrastructure of a settlement area is supposed to fulfill the spatial planning criteria, involving education facilities, health facilities, praying facilities, public services (office) and open spaces, roads, clean water system, drainage system, waste management (such as garbage dump), electrical energy, telephone network, and fire protection systems. For this reason, the government of Marisa City must strictly monitor the issuing of a building permit, since carrying out building work without such a permit is considered illegal and violate the regulation of urban planning.

Conflict of Interest

The authors declare no conflict of interest.

References

[1] B. Marx, T. Stoker, T. Suri, "The economics of slums in the developing world" Journal of Economic Perspectives, **27**(4), 187–210, 2013, https://dspace.mit.edu/openaccessdisseminate/1721.1/88128/J.S. https://doi.org/ 10.1257/jep.27.4.187

[2] M. Ishtiyag, S. Kumar, "Typology of informal settlements and distribution of slums in the NCT, Delhi" Journal of Contemporary India Studies: Space and Society, Hiroshima University, **1**, 37-46, 2011, http://doi.org/10.15027/31427

[3] B. Ferguson, N. Jesus, "A financial framework for reducing slums: lessons from experience in Latin America," Environment and Urbanization, **15**(2), 201-216, 2003, https://doi.org/10.1177/095624780301500210

[4] A. Rapoport, House Form and Culture, the University of Michigan, Prentice-Hall, 1969.

[5] J.T. Jayadinata, Tata Guna Tanah dalam Perencanaan Pedesaan, Perkotaan dan Wilayah [Land Use in Rural, Urban and Regional Planning], ITB, 1999.

[6] Sumartono, B. Deliyantono, "Pengembangan Kawasan Permukiman dan Keberlanjutan Kota [The Development of Settlement Area and Urban Sustainability]," in National Seminar FMIPA on Universitas Terbuka, 2018.

[7] H.S. Yunus, Struktur Tata Ruang [Spatial Structure], Pustaka Pelajar, 2008.

[8] R.W. Diah, "Penataan permukiman di kawasan segiempat Tunjungan Kota Surabaya [Settlement Arrangement in Tunjungan square area, Surabaya City]," Jurnal Tata Kota Dan Daerah, **2**(2), 2010, https://doi.org/10.26905/mintakat.v18i2.1692

[9] I.N. Nasution, A. Syahreza, "Riverside Sustainability-Overcome Problems and Reliable Approaches" in MATEC Web of Conferences 138, 08001, 2017, https://doi.org/10.1051/matecconf/201713808001

[10] F.J. Chowdhury, A.T.M. Nurul Amin, "Environmental assessment in slum improvement programs: some evidence from a study on infrastructure projects in two Dhaka slums," Environmental Impact Assessment Review, **26**(6), 530-552, 2006, https://doi.org/10.1016/j.eiar.2005.11.004

[11] I. Akmal, Membetulkan Dan Merawat Rumah [Home Repair and Maintenance], Gramedia Pustaka Utama, 2012.

[12] Komarudin, Menelusuri Pembangunan Perumahan Dan Permukiman [Tracing the Development of Housing and Settlements], Yayasan Realestatet Indonesia, 1997.

[13] E.E. Sutriani, Faktor-Faktor yang Mempengaruhi Terciptanya Kawasan Permukiman Kumuh di Kawasan Pusat Kota [Factors Affecting the Rise in the Number of Slums at a City Center], Universitas Diponegoro, 2006.

[14] S. Yudohusodo, Rumah Untuk Seluruh Rakyat [Houses for All People], Direktorat Jendral Cipta Karya, 1991.

[15] E. Suharini, "Menemukenali agihan permukiman kumuh di perkotaan melalui interpretasi citra penginderaan jauh [Identifying the characteristics of slum areas through the interpretation of remote sensing imagery]," Jurnal Geografi Universitas Negeri Semarang, **4**(2), 77-85, 2007, https://doi.org/10.15294/jg.v4i2.100

[16] Kusnadi, Konflik Sosial Nelayan: Kemiskinan dan Perebutan Sumber Daya Perikanan [Fishermen Social Conflict: Poverty and Conflicts over Fisheries Resources], in LKIS, 190, 2002.

[17] H.M. Putri, Nurlaili, "Tata kelola pemukiman nelayan di wilayah perkotaan pesisir utara Jakarta [Fisherman settlement governance in the north coastal area of Jakarta]," Buletin Ilmiah "MARINA" Sosial Ekonomi Kelautan dan Perikanan, **4**(1), 7-13, 2018, http://dx.doi.org/10.15578/marina.v4i1.2048

[18] P. Jones, "Formalizing the informal: Understanding the position of informal settlements and slums in sustainable urbanization policies and strategies in Bandung, Indonesia" Sustainability, **9**(8), 14-36, 2017, https://doi.org/10.3390/su9081436

[19] A. Khan, H. Akter, S. Zakia, J.K. Tania, "Displacement and deplorable living conditions of slum dwellers: With special reference to Sylhet City," International Letters of Social and Humanistic Sciences, **46**, 51-64, 2015, https://doi.org/10.18052/www.scipress.com/ILSHS.46.51

[20] U. Nasir, "Assessing urban sustainability of slum settlements in Bangladesh: Evidence from Chittagong city," Journal of Urban Management, **7**(1), 32-42, https://www.sciencedirect.com/science/article/pii/S2226585617301279?via%3Dihub, 2018, https://doi.org/10.1016/j.jum.2018.03.002

[21] W. Malau, "Dampak urbanisasi terhadap permukiman kumuh (slum area) di daerah perkotaan [The impact of urbanization on urban slums]," Jurnal Pendidikan Ilmu-Ilmu Sosial, **5**(2), 2013, https://doi.org/10.24114/jupiis.v5i2.1113

[22] M. Basir, "Hubungan sosial dan akses sosial masyarakat pada lingkungan pemukiman kumuh di Kota Makasar [Social relations and social access of communities in slums in Makassar City]," Jurnal Perkotaan, **4**(1), 2012.

[23] Kadir, "Penanganan kawasan kumuh Kota Bau-Bau [Management of slums in Bau-Bau City]," Metropilar, **8**(2), 251-259, 2010,

[24] Indriani, "Formasi spasial permukiman kumuh kota studi kasus: perubahan pola ruang bermukim pada lahan di Jalan Sersan Sani Palembang [A case study of spatial formation of urban slums: changes in the pattern of living space on land in Jalan Sersan Sani, Palembang]," Jurnal Arsir, **1**(1), 30-37, 2017, https://doi.org/10.32502/arsir.v1i1.855

[25] Sarbidi, "Kriteria desain drainase kawasan permukiman kota berwawasan lingkungan [Criteria of the design of environmental-friendly urban drainage system]," Jurnal Permukiman, **9**(1), 1-16, 2014, doi: 10.31815/jp.2014.9.1-16