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# Characteristics and Management of the Gray Water Sanitation Fishermen Settlements in Pantai Bahari Village

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## Abstract

Rural coastal communities have very simple housing conditions. Another view that is often encountered is the poor condition of the environment and pollution with a very minimal infrastructure system. Sanitation facilities and infrastructure in a fishermen's settlement environment are not or less available, if there are then the conditions are inadequate or not feasible. One of the sanitation networks that exist in settlements and has a worrying condition is household waste water sanitation. Without proper management, liquid waste can cause various infectious diseases. but in some poor communities in developing countries, especially in rural areas, people try to dispose of liquid waste as cheaply as possible, in the absence of a sanitation system some people depend on natural processes. Inadequate liquid waste disposal systems are rarely considered a problem by the community. The aim to be achieved is to find out the characteristics of the household waste sanitation system in the form of gray water that exists in fisherman settlements and the appropriate form of handling in accordance with community conditions and environmental conditions. The method used is qualitative observational which is naturalistic.

Keyword: Characteristics, Sanitation, Gray Water, Fisherman Settlements, Pantai Bahari Village

## 1. Background

The current level of welfare of fishermen is still below other sectors including the agricultural sector. According to data from the Central Statistics Agency (BPS) in 2017, the poor population in Indonesia reached 26.58 million and 61.36 % of them were people living in coastal and rural areas. Rural coastal communities have very simple settlement conditions, another scene that we often encounter is that environmental conditions are slum and polluted with very minimal infrastructure systems (Dahuri, 1996). Sanitation facilities and infrastructure in a fisherman settlement are not or less available. If there is, then the conditions are insufficient or inadequate, even though poor sanitation can cause a variety of adverse impacts on public health, the environment, and economic activities that are closely related to people's welfare. One of the sanitation networks that exist in settlements and has a worrying condition is household wastewater sanitation. Definition of wastewater is water that has been used by humans in various activities, the wastewater can come from household activities, as well as from other places. other meanings are unused used water produced from various human activities in utilizing clean water (Supriyatno 2000). Liquid waste that comes from the bathroom, kitchen containing leftovers, and also from the washing place. This liquid waste generally pools before the water flows. So the place around it will be smelly, dirty, germs nest, and also slums. Without proper management, they cause infectious diseases. More than half of the population of less developed countries do not have access to sanitation and more than 80% of the wastewater produced is discharged directly into surface water bodies. According to Nduthu, in some poor communities in developing countries, inadequate liquid waste disposal systems are rarely considered a problem by the community. In rural areas, people try to get rid of liquid waste as cheaply as possible. In the absence of a sanitation system, some communities depend on natural processes, such communities are located along the coast, in swampland, on the banks of rivers and most often built on water (Nduthu, 2012).

## 2. Purpose

The aim to be achieved is to find out the characteristics of the household waste sanitation system in the form of gray water that exists in fisherman settlements and the appropriate form of handling in accordance with community conditions and environmental conditions.

## 3. Method

The type of research used is qualitative observational which is naturalistic (observation is an activity that involves all sensory forces such as hearing, sight, feeling, touch, and taste based on the facts of empirical events), is a collection of impressions about the surrounding world based on all power capabilities catch human senses. Qualitative observation is naturalistically applied in the context of a natural event, following the natural flow of observing life (Morris 973, in Hasyim Hasanah, 2016). This is done to determine the characteristics of various forms of domestic liquid waste disposal in a natural fishing environment. The research location was carried out in the Bahari Coast fisherman settlement, Bangkala-Jeneponto, South Sulawesi.

The population in this study is all wastewater originating from household activities. The sampling technique used was purposive sampling technique, and the sample in this study was household wastewater (liquid waste from the bathroom, kitchen containing leftovers, and also from the washing place). Observation of events in naturalistic or in situ situations. The observation place is divided into 3 places, in high-rise housing units in the form of stage and non-stage, residential neighborhood roads and beaches. The analysis technique in this study was carried out in several stages, according to Miles & Huberman (2014) that analysis techniques data in qualitative research includes: collecting data, reducing data, presenting data (Presentation of data is analyzed in the form of short descriptions, tables, charts, networks, graphics) and drawing of conclusions.



Figure 1. Bahari Beach village location

## 4. Existing Condition

The form of the sewage system in the coastal settlement of Bangkala-Jeneponto is divided into 3, namely dirty water disposal in residential units, sewage disposal in the drainage street, sewage disposal on the beach.

Dirty water disposal in residential units is divided into stage s and non-stage houses. At the stage house, then at the bottom of the service area, some people fence off with stones, but there are those who do not carry out treatments and just leave it in the hope that the water can seep directly into the sand (especially in houses set up within the tide). Whereas in houses that are established in a non-stage house style, they will contain water reservoir holes near the service area. Disposal system showed in Figure 2.



Figure 2. Disposal system at the stage house unit

There are several forms of household wastewater disposal systems on stilt house. Let it naturally seep into the sand without doing any effort (1,2). Water from the service area falls freely under the house. This occurs in housing units established in the coastal area (within 15 m of coastal water). There is also a flow from the service area to the backyard through a pipe (3,4), and the dirtiest is seen to make shallow holes under the service area and only give a stone fence or makeshift board, so that if the wastewater has exceeded the capacity limit of the hole it will flow to the neighbor's page (5).



Figure 3. Disposal system in non-stage housing units

The community makes a channel from the service area to the drainage holes located behind the house. Average hole depth of 30 m and 1/2 m in diameter, and some residents guarded the hole with stones in order not to overflow to the neighboring yard. If the water in the hole is full, the occupants will draw onto the road. The average drainage of the water reservoir is done twice in a week. But in the rainy season, the drainage is not done because the water is allowed to overflow into the yard and hopes rain or flood will sweep away the dirty water. In principle, it is accommodated, allowed to seep, and if it is abundant, it is then thrown into the yard or to the beach.



Figure 4. IPAL (Waste Water Disposal Installation)

There is an IPAL made with government assistance planned to serve 16 houses. At present, it is not connected to the central government, there is an IPU perunit home. Dirty water from the upper floor service area is flowed with a paralon pipe leading to a closed disposal in the backyard of the house



Picture. 5. The drainage system on environmental roads

The environmental drainage network on the side of the road is limited, only in some places has drainage channels and is cut off continuously. As a result, the water from the houses flowing through the network is clogged and if it is full, it spills into the street.



Figure 6. Drainage conditions from settlements to beaches

Some people whose houses are bordered by the coast, dispose of domestic liquid waste into the sea through simple channels that cross the coast. Wastewater will quickly dry out and be absorbed by the sand, but the existence of the flow damages the beauty of the beach. Unlike the case with the sewer which is also directed to the beach, but its position is rather far from the highest tide limit, the wastewater will be flooded and difficult to absorb.

From the results of the data collection, it was found that all communities expressed their desire to participate if there was a drainage improvement program, their participation was in the form of energy assistance and ideas / thoughts. The community gave a reason not to throw into the road drainage system and to let the water runny into the ground because there was no channel connection from the road to their house, they also did not know about the carrying capacity of the soil for water absorption.

## 5. Discussion

The sewerage network in settlements still uses conventional systems, water is left to flow without proper planning. The community hopes that the wastewater can seep into the sand/soil. The community does not think that if the carrying capacity of the soil is saturated, wastewater will be flooded everywhere because it is difficult to absorb, and the puddle leaves a bad smell and view. The concept of a conventional system is to dispose of wastewater as quickly as possible to the sea or river without previously seeping into the ground, while the concept of eco-drainage manage excess water naturally by absorbing it into the soil or flowing to the sea/river without exceeding the capacity of rivers or marine ecosystems (Pambudi, 2015). The poor system of domestic wastewater sanitation network in the Bahari Beach fisherman settlement is caused by several things, (a) irregular settlement patterns so that to make a regular sewerage network system leading to housing drainage is rather difficult because it has to go through the houses are located haphazardly, (b) residential drainage network system is very lacking and disconnected, so that even though there is a network system from home units to the street, it cannot function properly and eventually the water will continue to overflow to the road, (c) the community opinion that wastewater will quickly seep into the soil, (d) the lack of public awareness to repair or establish a drainage system, because they have an opinion that this is the government's duty, (e) Absence of knowledge about the carrying capacity of the environment towards the absorption of water into the soil. So what needs to be done is:

- Minimize waste. This program seeks to reduce waste water produced from households and save costs for waste water management. In addition, minimizing waste water does not only reduce waste water that must be collected, processed and disposed of but also reduces the use of raw

materials, energy, and water. In managing centralized sanitation, alternative low-cost sewer systems such as shallow sewers, small bores, and interceptors need to be considered (Supriyatno, 2000).

- Provision of communal waste disposal systems (off-site sanitation) is a household sewage disposal system (shower, washing, kitchen, and liquid waste) that is channeled out from the location of each house to the sewer and then distributed centrally to development wastewater treatment before being discharged into water bodies (Fajarwati, 2008). The benefits of a communal scale housing sanitation system, for example, do not need to build their own septic tanks, do not need to allocate land for septic tanks, the environment is cleaner because all waste water from toilets, showers, and washing is completely disposed of in a closed place. piping system. Communal systems must be community-based because they are one of the 5 basic factors for the sustainability of sanitation scale settlements (Lutz Kleeberg. 2016). Dirty water from households contains toxic substances such as soap, oil, which requires special care before being thrown into nature. With the disposal of household waste water without going through management or because the building for processing household waste is not good, water quality will decrease, this condition will be very detrimental to users of raw water. The level of acidity or pH in water greatly affects the quality of water, the lower the pH value the higher the acidity, pH 7 shows a neutral value and above the value of 7 water is alkaline (<https://docplayer.info/33392024-Pengelolaan-limbah-cair-rumah-tangga-sri-subekti-f...>).

At present the government has provided assistance to a number of houses in the northern part of the settlement, but is still private because the connection to the internal communal has not been made, but the government has planned and determined its location. The community strongly supports these efforts and they will be ready to participate in the form of energy and thought assistance if needed. Law No. 6 of 2014 mandates that village development planning must be carried out in a participatory manner and involve all communities, including vulnerable groups (minority, disabled, women, and poor). It is intended that the development carried out by the village is truly beneficial for all residents (Susetawan, 2018).

- The intermittent sand filtering system is a very biologically active unit. Filtering technology using sand media is cost effective and is an alternative to providing an economical way for fast wastewater treatment (Bhutiani and Ahamad, 2018). This is very suitable for use in sandy coastal areas.

For the results of TDS (Total Dissolved Solid or total mineral content in water, to meet water quality standards according to the standards set by the government) the maximum is found on the beach sand at a volume of 3000 ml (255 ppm). Sand as a filter medium with a very small grain size, which serves to filter out small-sized impurity particles. Subuhul et al., (201 2) which stated that Indrayanti beach sand produced the highest absorption efficiency compared to other sands. this explains that sand is a very good medium for filtering wastewater (Aliaman, 2017)

- Eco drainage system. One eco drainage system is a "bioretention" (rain garden), system that can be built into a part of green open space and is designed based on the type of land, the condition of the location, and the spatial plan of the development area. The use of bioretention as a green open space in the real estate area can increase the aesthetic value of the region developed (Cofman, 2000; Winogradoff, 2001; in Darsono 2007). Bioretention integrates the function of reducing pollution and storing surface flow due to garbage filtering and sedimentation. Bioretention is a water quality treatment through settling, adsorption, vegetation uptake, biochemical decomposition, with concentration on aesthetic Landscape and water supply (aesthetic landscape, water supply), one example of which is bioretention built on wetlands. The constructed wetlands are an effective and relatively low maintenance method to provide treatment and disposal of wastewater at the site. These units consist of various layers coated with synthetic liners, filled with filter materials, usually nonlimestone or similar materials, and planted with ordinary wetland plants. Waste from the septic tank flows through the entire filter where plant roots and living microorganisms are involved/stuck on the surface of the roots and gravel which

will remove pathogens and nutrients from wastewater. Any effluent that is not removed by plants is usually disposed of using subsurface absorption but can be disposed of using surface applications. Following figure is bioretention images with construction of wetlands.

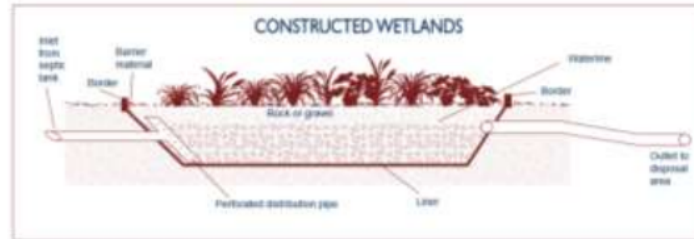


Figure 7. Bioretention with construction of wetlands  
<http://www.deq.state.ok.us/factsheets/local/booklet.pdf>

## 6. Conclusion

Characteristics of disposal are influenced by the house shape and location. But in general, wastewater is allowed to seep or flow to the road, yard, or beach. This omission is caused by people's experience that water will certainly seep into the sand/soil, they lack knowledge of the carrying capacity of the environment. In addition, the assumption that the provision of drainage channels is government affairs, but if anyone wants to create a drainage channel on its own, it will be constrained because the channel has to twist and use other people's land because the house does not regularly pattern. Drainage channels on the side of the street are also very limited in length, broken, and shallow so that it is difficult to accommodate dirty water.

Management of domestic waste sanitation in rural coastal settlements must consider several things namely, minimizing the waste volume, using sand media that is widely available in settlements, disposal should use a communal system due to consideration of settlement patterns and limited land, community involvement in procurement and control to foster a sense of belonging, using eco drainage with a bioretention system that has health, beauty, and ecological values.

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