International Journal of STEM Education for Sustainability, Vol.5, No.1, 2025, pp. 72-80
e-ISSN 2798-5091. DOI. 10.52889/ijses.v5i1.490

Analysis of the Impact of Household Waste on the Environment and Drinking Water Sources of Pontang Subdistrict Residents and Its Implications for Biology Learning

Submitted 8 October 2024 Revised 18 November 2024 Accepted 28 November 2024

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Abstract

Population growth harms water resources in terms of both quality and quantity. The negative impact in quantity is the occurrence of environmental pollution, such as water, soil, and air pollution. The negative impact in quality is a decrease in the quality of natural resources, especially pollution of water resources in the surrounding environment, so that a decrease in the quality of clean water available to the community results in an increase in disease rates, damages aquatic ecosystems and affects economic activity in the environment. Waste disposal and management are two factors that affect environmental quality. Household garbage or waste is waste from daily activities, such as used water from bathing, washing, or cooking waste. Waste disposal and management, especially household wastes, are still poorly handled. All of these things have a huge impact on environmental pollution in Pontang Subdistrict, especially on the drinking water source for the residents of Pontang Subdistrict. This research was conducted qualitatively using survey, observation, and interview methods. The results showed that the impact of household waste in Pontang Subdistrict pollutes the environment by reducing the aesthetics of the environment, causing unpleasant odors and becoming seeds of disease material. The impact of household waste on drinking water sources in Pontang Subdistrict causes drinking water sources consumed to have a color that is not clear, smells, and tastes so that there may be microorganisms that cause various sources of digestive diseases. Implications for biology learning utilizing group discussions, field trips or project-based. The application of impact is useful for students and the community in raising awareness about the importance of environmental awareness.

Keywords: Household Waste, Environment, Drinking Water Source

INTRODUCTION

Developing countries often suffer from population problems such as high population growth, intense urbanization, and uneven population distribution (Widiyanto & Kuswanto, 2015). Indonesia is one of the developing countries facing population problems, ranking fourth after China, India, and America (Akhirul *et al*., 2020). The increasing population growth has impacted the balance of natural resources. This is supported by Yunianto (2021), who states that the increase in population density affects the community's quality of life and greatly impacts environmental pollution while the environment meets human needs. This is sustainable because the environment is one of the natural resources used to meet the needs of human life, namely, the need for food, shelter, clean water, and other basic needs.

Rapid population growth has a major impact on environmental pollution, thus reducing the quality of water resources. Water availability is very important because it is needed in various daily activities, such as processing food, washing, bathing, and especially for drinking, so the availability of clean water sources is very important. Environmental pollution, especially water resources in Indonesia, is largely caused by human activities that produce household

waste (Mildawati *et al*., 2022).

Household waste, also known as domestic waste, is waste or garbage from foodstuffs, bathrooms, and laundry (Sitepu, 2024). The fact that Pontang Subdistrict has a river flow that dominates the community environment so that since long ago now, the community in Pontang Subdistrict has carried out many daily activities around the riverbanks, building houses until daily activities such as bathing and washing clothes are carried out in the river flow. This causes the river to be very vulnerable to water pollution due to the results of household activities. This is supported by Yati (2021), who states that household, industrial, and agricultural wastes are one of the main factors that cause environmental pollution, especially water resources.

Another factor that affects water pollution due to household waste is the problem in the collection and management of household waste, which is still not handled properly; on the other hand, the capacity of waste used by the community and local government is not optimal (Tisnawan *et al*., 2020). Utari (2017) states environmental management has not been appropriately implemented. Various facts show that the causes of various environmental disturbances that occur on planet Earth originate from the dependence between humans and their environment, namely, human attitudes and behaviors that pay less attention to environmental conditions.

Several studies have raised the issue of the impact of domestic waste on the environment, such as those conducted by Utami *et al*. (2023) with the results of research that the impact of domestic waste that is not appropriately managed causes environmental pollution, namely, the decline in water and soil quality. This has threatened the sustainability of the environment, human health, and the sustainability of agriculture. Another study by Widjaja & Gunawan (2022) shows that domestic waste greatly affects water quality, and the impact of waste flowing into the sea causes eutrophication, harming living marine biota.

Domestic waste generated by the community considerably impacts water pollution, especially regarding drinking water sources consumed by the community in Pontang Sub-district. Household waste that is not managed properly will affect the environment and the surrounding community's health (Tisnawan *et al*., 2020). This research issue was raised regarding the impact of household waste.

METHOD

This research was conducted in January-April 2024 in Pontang District. The methods used in this research are descriptive research, surveys, and interviews. Field observations were conducted as primary data, and literature studies, books, and journals were used as secondary

data. Observations made in the field are:

1. Observing the environment starting from the air, water, and soil around Pontang Subdistrict
2. Observing Pontang Subdistrict water sources
3. Observing the waste found around the neighborhood of Pontang Subdistrict residents

RESULTS AND DISCUSSION

Based on the results of research that has been carried out through field observations based on aspects:

The Environment Polluted by Domestic Waste

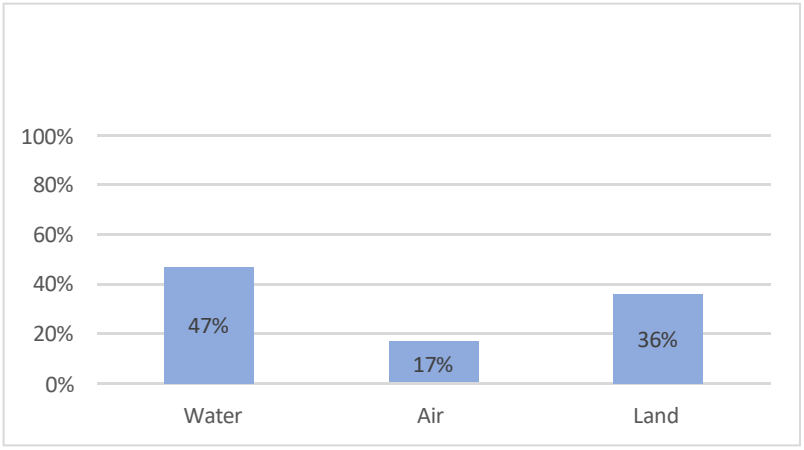

Figure 1. Graphic of Environment Polluted by Domestic Waste

Figure 1 shows that the environmental aspects are polluted by domestic waste, with the largest percentage being water pollution. This proves that all daily activities carried out by the community in the river flow of Pontang Subdistrict are very influential and result in environmental pollution. Many factors cause water pollution, including intentional or unintentional elements, but the main factor regulating water pollution is human activity. This is supported by research conducted by Yati (2021), which states that the main cause of water pollution is irresponsible human activity and a lack of concern for the cleanliness of the river environment when carrying out daily activities such as throwing garbage, chemical waste, industrial factory waste, and other things into the river.

Aspects of environmental pollution to air and soil produce 17% and 36%. This is still caused by human activities that do not manage household waste properly and government efforts that are less than optimal in solving waste problems, especially household waste. The main factor that causes pollution in the soil is the discovery of waste dumping, so it become the main cause of environmental pollution. Hoarding of household waste causes a decrease in aesthetics and reduces soil quality so that it can no longer be utilized as a potential land for farming. Landfilling also causes air pollution because it creates unpleasant odors that reduce air quality. Pollution of soil also causes changes in the metabolism of microorganisms that

live in the soil.

Pollution of Water Sources in Pontang Subdistrict

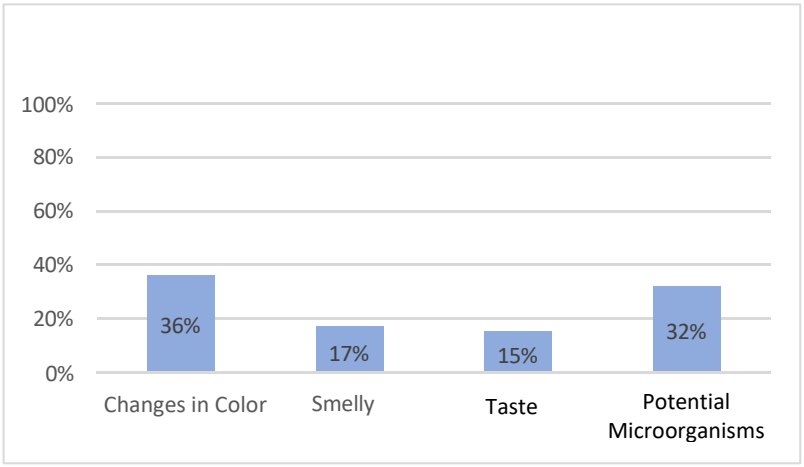

Figure 2. Graph of Water Source Pollution

Figure 2 shows that the aspect of water source pollution with the largest percentage is the aspect of discolored water pollution at 36%. Organic and inorganic material factors cause discoloration in water. Organic materials, for example, result from household waste, cooking ingredients or waste derived from living things. Inorganic materials such as chemical fertilizers, cans, and so on. This is supported by Arifa & Ratnawati (2023), who states that one of the factors that cause discoloration due to environmental pollution is the presence of organic and inorganic waste products and the presence of tannin and humic acid, which are naturally present in river water, thus causing discoloration of river water. Firmansyah et al. (2021) state that water pollution can occur biologically, chemically, or physically. If pollution due to these three factors exceeds the appropriate quality standards, it will negatively impact aquatic life and especially the needs of daily life.

The parameter aspects of discoloration, odor, and taste are physical aspects that determine whether or not the quality of a water source is considered good. The water source in the Pontang Subdistrict river stream looks very cloudy and smelly. This is caused by the accumulation of household waste discharged into the river flow and other factors such as industrial waste disposal, which eventually flows into the river flow in Pontang District.

The potential of microorganisms as a parameter testing of biological aspects that may be contained in the water sources of river flows in Pontang Subdistrict will be very dangerous for humans and the environment. If microorganisms grow and become bacteria or viruses, they will cause disease and death. One of the microorganisms that may be present in the water flow in Pontang Subdistrict is *Escherichia coli (E. coli*) or coliform bacteria. According to Dwijayanti *et al*. (2022), *E. coli* is used as an indicator to assess whether the water source

available for household activities is good or not.

The Discovery of Household Waste in Pontang Subdistrict

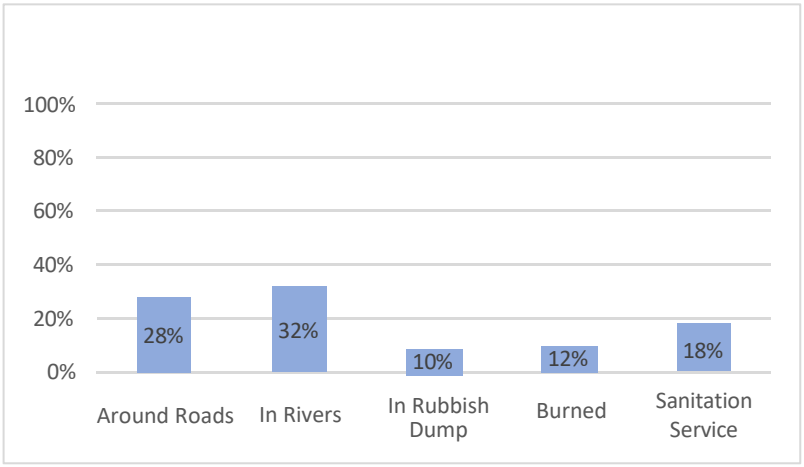

Figure 3. Graphic of Discovery of Household Waste in Pontang Subdistrict

Figure 4. Household Waste in the Surrounding Environment

In Figure 3, it can be seen that the aspect of finding household or domestic waste with the largest percentage is the aspect of finding it in the river flow of Pontang Subdistrict at 32%. The percentage of these results shows a high enough number so that it can be seen that the knowledge factor about environmental education in Pontang Subdistrict is low, so the factor of public awareness of the importance of keeping the river flow clean around the environment becomes an important and influential factor. Other factors include a lack of understanding of properly managing waste or the lack of existing TPS (temporary disposal sites).

The discovery of domestic wastes on the road or in the river flow of Pontang Subdistrict has a large percentage; for example, it can be seen in Figure 4. This can be used as a benchmark to show that public awareness of the dangers of environmental pollution is minimal. Waste management carried out by the community by burning also has a fairly large percentage. Waste management by burning is a less effective way because it can cause air pollution.

The aspect of the cleaning service has an important role in managing domestic wastes, but the density of the population results in increased food needs, so the waste produced will

continue to increase; therefore, public awareness and concern are important so that waste management carried out by the cleaning service becomes effective.

The density of community settlements in Pontang Subdistrict makes household waste the dominant factor causing environmental pollution. The types of waste that appear are organic and inorganic waste. Organic waste is included in the type of waste that contains the element carbon (C), which comes from living things such as animal feces and humans (feces). Such waste contains pathogenic microbes urine containing nitrogen and phosphorus (Mildawati *et al*., 2022).

Inorganic waste does not contain the element carbon (C), such as metal, aluminum, household appliances, or organic fertilizers. Inorganic waste is a type of waste that is difficult to decompose or decompose naturally with the help of decomposing microorganisms (Mildawati *et al*., 2022).

Water Source of Pontang Subdistrict

Figures 1, 2, and 3 reinforce that the level of water pollution shows that the category of water pollution in Pontang Subdistrict is quite high. Even though the community in Pontang Subdistrict utilizes water sources in the river flow to meet their daily needs. The river flow water source is the main water source chosen by the majority of the Pontang Subdistrict community. Water sources in the form of river flow water have a very important role for the people of Pontang Subdistrict, almost all community activities in Pontang Subdistrict depend on water in the river flow such as the primary need to wash clothes or bathe. The availability of clean water sources is still a major problem in Pontang Subdistrict, so that the use of river flow water is the main alternative carried out by the people of Pontang Subdistrict.

The lack of clean water availability affects the source of drinking water that is good for health. Judging from the observation of the high utilization of river water by the community of Pontang Subdistrict, it does not rule out the possibility that the source of drinking water consumed by the community still does not have good quality for consumption because of the negative impact obtained from the observation results due to the lack of proper management of existing household waste.

Implication in Biology Learning

Biology learning, especially on environmental pollution material, can have various implications, not only for students on learning materials but for society and the surrounding environment. Environmental pollution material not only explains the various types of environmental pollution or its negative impacts, but the material and knowledge on environmental pollution material can encourage and motivate students to be more concerned

and environmental awareness and play an active role in environmental conservation efforts.

The application of the implications of biology learning on environmental pollution material can be done in various ways, namely:

1. Project-based learning. This method can be done by doing small projects, such as making observations of water quality around the environment or making a poster or leaflet.
2. Effective use of learning media. This method is widely practiced during learning by using various interesting media, such as illustrative videos, pictures, or PowerPoint, to facilitate understanding in students.
3. Group discussion. This method is also widely practiced during learning because this method can help students to exchange opinions and discuss various ideas related to environmental pollution issues.
4. Field trip. This method is a real way to show directly about the problem of environmental pollution. Field trips are conducted by visiting polluted rivers or garbage dumps. This method can provide different experiences to students and motivate students to participate more in environmental conservation efforts.

CONCLUSION

Based on the results of the research that has been carried out, it is concluded that the environment that is affected by household waste pollution is water pollution with the facts obtained, namely discoloration of water sources and the discovery of a lot of household waste in the river flow of Pontang District. The lack of awareness and concern for the dangers of environmental pollution is a dominating factor in environmental pollution, especially water resources in Pontang Subdistrict. From the results obtained and the factors that influence it, pollution of water resources in Pontang Subdistrict has decreased the quality of drinking water sources consumed. The first change that can be made is to increase the awareness of the surrounding community about the importance of disposing of garbage in its place as a form of concern for the environment. Other steps that can be taken include working together to clean the river once a week and not building a landfill site near the river. These steps are taken as a form of concern for the environment and public health in Pontang Subdistrict. The implications of biology learning on environmental pollution material can be applied in various ways in education, such as Project-based Learning, effective use of learning media, group discussion, and field trips.

SUGGESTIONS

It is necessary to conduct further research on environmental pollution in Pontang Subdistrict, especially on the chemical, physical, and biological parameters contained in the

Pontang Subdistrict river flow water resources. Further research can also be done in the industrial field because the river flow in Pontang Subdistrict is close to industrial factories. Deeper research into agriculture and other fields.

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