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The Study of Plant Utilization in Aquatic Waste Management

Kajian Penggunaan Tumbuhan Dalam Manajemen Limbah Perairan

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ABSTRACT

Household, industrial, office and various other human activities produce waste. Based on the type, waste consists of liquid, solid, gas and B3. Each waste management needs to be carried out sustainable so that it will not damage the environment and human health. This paper aims to find out the effectiveness of plants in aquatic waste management. The method used in this research is literature study in the form of research articles that have been published in related fields. The data found will be analyzed descriptively qualitatively and determine the type of plant that is effective in aquatic waste management and the way plants in degrade hazardous substances that are in the waste. The results of the literature study show that some plants have a special mechanism in reducing hazardous substances contained in waste both actively and passively.

1. INTRODUCTION

Humans produce waste in various forms. Based on its form, the waste produced can be in the form of solid, liquid, gas to hazardous waste (B3) (Nugroho, 2013). This waste is a byproduct of various daily activities carried out by humans. This waste is generated from household activities, office industries and various other activities (Supriyatno, 2000). The waste generated from human activities needs management efforts so that it will not damage the environment and interfere with human health.

The case of love canal and minamata bay in the 1960-1970s is an example of how waste can be harmful to humans (Prasetiawan, 2012). Efforts to treat waste in a sustainable manner are needed so that human activities are not disturbed, but the environment and health can be maintained.

The Indonesian government has long paid attention to the importance of this waste management through a number of regulations. One of them is through Law No. 32 of 2009 on environmental

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protection and management. This needs to be regulated in law so that Indonesia's development can continue to be followed by a sustainable waste management strategy (Supriyatno, 2000).

Various attempts have been made to carry out waste treatment. The methods commonly used in waste treatment efforts are carried out physically, chemically and biologically (Thuraidah et al., 2016). One of the important aspects to pay attention to in waste treatment is low cost and natural. One of them is the use of plants. Moreover, Indonesia is a country with high natural wealth and potential for plants that are capable of processing waste (Moenir, 2010). This article attempts to describe the effectiveness of using plants in aquatic waste management.

2. RESEARCH METHOD

This research uses literature study by collecting published research articles related to the use of plants in aquatic waste treatment. The data analysis that has been collected was carried out in a descriptive qualitative manner by comparing various research results in this field.

3. RESULT AND DISCUSSION

Waste Hazards

Based on its form, waste is divided into solid, gas, liquid and B3. Solid waste is generally managed through recycling or reuse mechanisms. Liquid waste is managed by a Wastewater Treatment Plant (IPAL). Waste in the form of gas is managed through tree planting and energy savings. Hazardous waste is a type of waste that requires special handling (Nugroho, 2013). In fact, because of the danger of B3 waste, the Government of Indonesia prohibits the import of B3 waste for any reason.

The characteristics of B3 waste are flammable, explosive, reactive, poisonous and cause infection and are corrosive. Hazardous waste management is carried out by means of MDC, namely minimization, conversion and disposal (Prasetyawan, 2012). Apart from being dangerous, the prohibition on importing B3 waste is also related to the lack of B3 waste treatment facilities in Indonesia. The impact of not managing these various types of waste is pollution that will occur on land, air and especially water (Nugroho, 2013).

Effectiveness of Use of Plants as Waste Processors

Several studies have shown that there are several types of plants that can be used in waste management efforts. Research conducted by Thuraidah et al., (2016) shows that the *Limnocharis flava* plant can reduce the level of Biological Oxygen Demand (BOD) in rubber waste by 29.05%. The high BOD content is an indicator of pollution that occurs in water areas. A decrease in BOD means that pollution can be managed.

Similar research conducted by Filliazati (2010) showed that the combination of kiambang and bioball plants can reduce the BOD concentration by 68.98%. Purwanti et al., (2014) through their research on

oil palm waste, showed that the *Typha latifolia* plant was able to reduce the BOD content in palm oil waste.

Table 1. Plant and It's Potential in Aquatic Waste Management

Name of Species	Findings	References
<i>Limnocharis flava</i>	Reduce BOD from rubber waste	Thuraidah et al., (2016)
<i>Salvinia sp.</i>	Reduce BOD from Aquatic Waste	Filliazati (2010)
<i>Typha latifolia</i>	Reduce BOD from palm oil waste	Purwati et al., (2014)
<i>Hydrilla verticillata</i>	Absorb heavy metals	Moenir (2010) & Hasbi et al., (2020)
<i>Limnocharis flava</i>	Absorb heavy metals	Moenir (2010) & Hasbi et al., (2020)
<i>Echinodorus sp.</i>	Absorb heavy metals	Moenir (2010) & Hasbi et al., (2020)

Besides being able to reduce BOD levels in the waters. Plants are also used in waste management in the form of heavy metals. This is shown by the research of Moenir (2010) and Hasbi et al., (2020). *Hydrilla verticillata*, *Limnocharis flava* and *Echinodorus palifolius* plants are able to absorb various types of heavy metals with varying abilities (Hasbi et al., 2020).

Although there are several plants that have potential in waste management, in fact not all plants can be used in waste management. Research by Wirawan et al., (2014) shows that the treatment of apu wood plants on household liquid waste actually increases the levels of BOD. This shows the need for further studies on the potential of various types of plants in waste management.

The use of plants in waste management, apart from being influenced by plant species, is also influenced by the density and length of treatment days (Purwanti et al., 2014; Moenir, 2010). In addition, the metabolic mechanisms that occur in plants also vary according to their type.

There are at least 2 types of passive waste processing methods carried out by plants, namely ion exchange between cell walls and pollutants and complex formation between pollutants and functional groups (Moenir, 2010). Meanwhile, active waste processing is carried out through absorption of pollutants through the roots, translocation of the roots to other parts and accumulation in certain parts (Purwanti et al., 2014; Moenir, 2010). This sometimes causes structural changes as a result of the large pollutant load (Wirawan et al., 2014).

4. CONCLUSION

Waste must be managed in a sustainable manner so that it is no longer harmful to the environment and health. Some plants have potential in waste management efforts. This waste treatment mechanism can be carried out actively by absorbing pollutants through the roots and accumulating them in certain parts. Meanwhile, passively is carried out by exchanging ions between pollutants and cell walls and by forming complexes between pollutants and functional groups.

5. REFERENCES

- Filliazati, M., Apriani, I., Zahara, T. A. 2010. Pengolahan Limbah Cair Domestik Dengan Biofilter Aerob Menggunakan Media Bioball Dan Tanaman Kiambang. *Jurnal Teknologi Lingkungan Lahan Basah* Vol. 1 No 1.
- Hasbi, M., Budijono., Hendrizal, A. 2020. Heavy Metal Uptake Capacity By Floating Plant Island In Sail River Pekanbaru. *IOP Conf. Series: Earth And Environmental Science* 430.
- Moenir, M. 2010. Kajian Fitoremediasi Sebagai Alternatif Pemulihan Tanah Tercemar Logam Berat. *Jurnal Riset Teknologi Pencegahan Dan Pencemaran Industri* Vol 1 No 2 Hal 115-123.
- Nugroho, S. S. 2013. Pengelolaan Limbah Bahan Berbahaya Dan Beracun Perspektif Undang-undang Nomor 32 Tahun 2009 Tentang Perlindungan Dan Pengelolaan Lingkungan Hidup. *Jurnal Sosial* Volume 14 No 2 Hal 60-70.
- Prasetiawan, T. 2012. Kebijakan Pelarangan Impor Limbah Bahan Berbahaya Beracun (B3) Dan Permasalahannya. *Widyariset*, Vol. 15 No.1
- Purwanti, Elystia, S., Sasmita, A. 2014. Pengolahan Limbah Cair Pabrik Kelapa Sawit Dengan Metode Fitoremediasi Menggunakan *Typha Latifolia*. *JOM Fteknik* Volume 1 No.2
- Supriyatno, B. 2000. Pengelolaan Air Limbah Yang Berwawasan Lingkungan Suatu Strategi Dan Langkah Penanganannya. *Jurnal Teknologi Lingkungan*, Vol.1, No. 1
- Thuraidah, A., Puspita, E. I., Oktiyani, N. 2016. Pengaruh Genjer (*Limnocharis Flava*) Terhadap Penurunan Biological Oxygen Demand (Bod) Limbah Industri Karet. *Medical Laboratory Technology Journal* :Volume 2 No 1 Hal 6-10.
- Wirawan, W. A., Wirosedarmo, R., Susanawati, L. D. 2014. Pengolahan Limbah Cair Domestik Menggunakantanaman Kayu Apu (*Pistia Stratiotes L.*) Dengan Teknik Tanam Hidroponik Sistem DFT (Deep flow technique) . *Jurnal Sumberdaya Alam Dan Lingkungan* Vol 1 No 2.