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RESEARCH STUDY

Analysis Of Water Mimosa (*Neptunia Plena* (L.) Benth.) Density as Water Pollution Level Bioindicators in Jalan Karya Baru, Palembang, South Sumatra

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Abstract

One of commonly found flora in swamps is water mimosa (*Neptunia plena* (L.) Benth.). Swamp is low land ecological system filled with standing water. This study aims to measure approximate water pollution level based on water mimosa (*Neptunia plena* (L.) Benth.) density using biometering to be used as public information to maintain and manage swamp water quality. This study showed dissolved oxygen content was 23.6, 24.64, and 25.05 at Station I, II, and III respectively. The pH at Station I, II, and III was 6.48, 6.50, and 6.47 respectively. The clarity was 0.18 m, 0.47 m, and 1.12 m at Station I, II, and III respectively, averaging at 0.59 m. Highest depth was observed at Station II (2.2 m), while lowest depth was observed at Station I (1.5 m).

Keywords: density, water mimosa, quality

Introduction

Water mimosa (*Neptunia plena* (L.) Benth.) is a member of Fabaceae family originating from tropical America. This plant grows in clusters and reaching up to 1 meter in height. Water mimosa has large water content. This plant can be easily identified by its leaves, shaped like conjoined oval fins in regular intervals. Water mimosa flower is yellow, sprouting between leaves with smooth hairs on its surface (Karyati & Adhi, 2018). *Neptunia plena* (L.) Benth. is floating aquatic plant abundant in calm and slow-moving water, similar to lakes, swamps, or canals and grows in altitude up to 300 meters above sea level. Water mimosa has thick tap root and prefers abundant sunlight in high humidity environment. Shades, brackish water, and high soil salinity affects water mimosa growth (Csurhes on Paisooksantivatana, 1993).

Water is the highest priority for life. Majority of earth surface is covered by water, mainly due to large area of seas and oceans (Jatmiko, 2007). In Jalan Karya Baru, Bukit Baru, Palembang, several gutters and small rivers can be found. Gutters play significant role in urban drainage. Rainwater absorbed by soils may collect and form springs, and several water sources may form river, swamps, or lakes. Those fresh water bodies are called as surface water. Surface water is defined as every kind of fresh water above ground, as can be found on rivers, wells, lakes, and swamps (Bapelkes, 2018). Swamps are not commonly used as freshwater sources; swamps are usually not able to comply with Peraturan Pemerintah No. 82 Tahun 2001 (Indonesian Government Regulation No. 82, year 2001) (Auzar, 2016).

Water quality is degraded due to solid, chemical, foodstuff, organic, or inorganic contamination. Physical and biological factors can affect public health. Human beings require environmental support to sustain human life. Thus, humans are required to maintain and increase overall health, without unduly destroying natural integrity supporting physical and biological environment. Swamp water quality can be determined by observing water plants diversity, and this study is focused on water mimosa (*Neptunia plena* (L.) Benth) because its significant growth compared in other swamp ecosystem on the study site. According to Halim (in Kurniadie *et al*., 2016), water plants may increase water loss from evapotranspiration, creates sedimentation and blockage, and decreased fish population.

Neptunia plena (L.) Benth (UNITE, 2022), is as follows:

Kingdom	: Plantae
Phylum	: Tracheophyta
Class	: Magnoliopsida
Order	: Fabales
Family	: Fabaceae
Genus	: *Neptunia* Lour.
Species	: *Neptunia plena* (L.) Benth.

Methods

This study was conducted in swamps at Jalan Karya Baru, Bukit Baru, Palembang in December 2022. This study was conducted using biometering technique, a method to measure biological water quality approximated from water mimosa growth sampled using stratified random sampling technique at three observation points.

First observation was conducted at Karya Baru, at the point of water entrance near the nearest settlement, with no observed water mimosa. Second observation was conducted in the mid-length of Karya Baru, while third observation was conducted in Karya Baru, after borders with bridge and the settlement is nearby. Secchi plate was used to measure water depth, while DO and pH meter were used to measure dissolved water oxygen. Water samples taken from three locations were used.

Results And Discussion

General Condition of Study Site

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- Geographical points

Geographically, Palembang is located at 2°59′27.99S and 104°45′24.24E. Bukit Baru District is spread across 6000 Ha, with majority of them are functioned as settlements bordering Gandus District (south), Banyuasin Regency (west), Alang-alang Lebar District (north), and Demang Lebar Daun and Siring Agung District (east) (Ariansyah *et al.*, 2018).

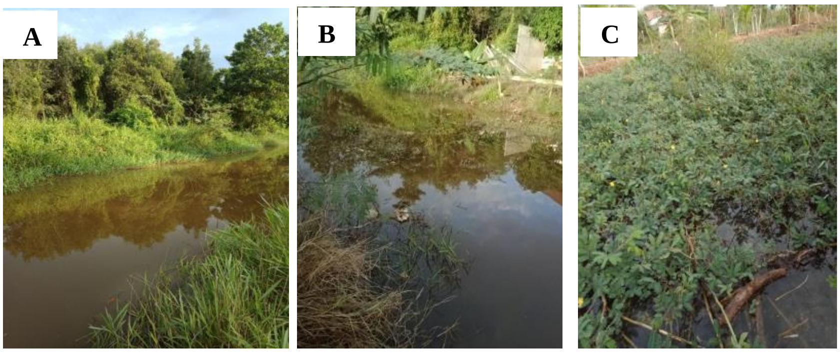

Figure 1 Observation points. A. Station I (water entry); B. Station II (mid-length); C. Station III (bridge as border).

Water quality on Bukit Baru was measured by randomly sampling water on three points. The organism measured was water mimosa, while physical and chemical properties measured was temperature, DO, pH, smell, turbidity, and depth as shown on table below.

Tabel 1 Physical and Chemical Water Quality at Karya Baru, Bukit Baru, Palembang.

Parameter	**Station**		
	I	II	III
Suhu (°C)	28°C	28°C	28°C
DO (*Dissolved Oxygen*)	23.6	24.64	25.05
pH meter	6.48	6.50	6.47
Clarity (m)	0.18	0.47	1.12
Depth (m)	1.5	2.2	1.83

Table 2 Chemical and Biological Characteristics at Karya Baru, Bukit Baru, Palembang.

Location	**Color**	**Smell**	**Solid waste**
Station I	Clear dark brown	(-)	(-)
Station II	Highly murky light brown	(-)	(+)
Station III	Slightly murky light brown	(+)	(+)

Based on water quality tests conducted, Station I had lower dissolved oxygen compared to Station II and III (23.6 vs 24.64 vs 25.05 respectively). Higher turbidity reduces dissolved oxygen content, in conjunction with increased organic matter and higher water temperature (Reid, 1961).

The pH value differs at all stations. The observed pH at Station I was 6.48, while pH at Station II was 6.50 and 6.47 at Station III. Increase of pH is dependent on water temperature at its particular location; pH increases in lower water temperature and decreases in higher temperatures. (Abidin, 2019). Increase of water temperature may lower dissolved oxygen, increases

chemical reaction speed, and affecting water organism survivability (Abidin, 2019). Optimal water at Station I, II, and III was observed (28°C), thus swamps Karya Baru has good water temperature in tropical climate.

Clarity at Station I, II, and III was 0.18 m, 0.47 m, and 1.12 m respectively, averaging at 0.59 m. at Station I, the clarity is lower due to higher amount of organic and anorganic waste, increasing turbidity. This result is in accordance with APHA–AWWA statement in Mandasari (2019), stating that clarity may be affected by turbidity, suspension density, water microorganisms, detritus, water organism density, weather, time of measurement, and visual accuracy.

Depth is the measurement of water surface to bottom of water body. Highest depth was observed at Station II (2.2 m) and lowest at Station I (1.5 m). Field study conducted on Karya Baru found sedimentation at water bodies, in accordance to Shaleh *et al*. (2020), stating that prolonged suspended particles accumulation may create sedimentation. Normally, water is without smell, taste, or color (Abidin, 2019). Changes in dissolved waste may create changes in color, taste, and smell. Organic and inorganic substances decomposition may change the color, taste, and smell.

Conclusions

From this study, dissolved oxygen content was found to be at 23.6 (at Station I), 24.64 (at Station II), and 25.05 (at Station III). The pH value differed at all stations: 6.48 (at Station I), 6.50 (at Station II), and 6.47 (at Station III). Clarity at Station I was 0.18 m, meanwhile the clarity at Station II and III was 0.47 m and 1.12 m respectively (averaging at 0.59 m). highest depth was observed at Station II (2.2 m), while Station I has lowest depth at time of observation (1.5 m).

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