

## RESEARCH REPORT

# **Environmental Health Study of Marine Coastal Waters of The Gili Matra Marine Tourism Park, Lombok, Nusa Tenggara Barat, Indonesia**

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### **1. Background and Research Objective**

Gili Matra Marine Tourism Park, hereinafter referred to as Gili Matra MTP, has an area of 2,954 ha, consisting of 665 ha of land and the rest is marine waters. Gili Matra MTP, is located in the coastal waters of North Lombok, West Nusa Tenggara Province and consists of three islands, namely Gili Meno, Gili Air and Gili Trawangan. Gili Matra MTP is a tourist destination for tourists from various countries. The economic life of coastal communities in Gili Matra MTP is highly dependent on tourism activities with the main attractions being snorkeling and diving at several coral reef and turbid coral spots. The aim of the research is to understand the environmental health status of the marine coastal ecosystem of Gili Matra MTP by identification and observation of biophysical and chemical oceanography in order to maintain the sustainability of marine ecotourism-based economic life. This objective is in accordance with the implementation of the SDGs point 14 program concerning conserve and sustainably use of the oceans, seas and marine resources for sustainable development.

## 2. Method

### 2.1. Study Area

The research was conducted in the marine and coastal environment of the Gili Matra MTP, West Nusa Tenggara which consists of the coastal and marine areas of Meno, Ayer and Trawangan Islands. Gili Matra MTP is located at 8°20' - 8°23' South Latitude and 116°00' - 116°08' East Longitude (Fig.1). Gili Matra MTP borders the Java Sea in the north and west, while in the south it borders the Lombok Strait and in the east it borders Tanjung Sire. The Gili Matra MTP area has an area of 2,954 hectares which is divided into three islands, namely Gili Air. ( $\pm 175$  ha with an island circumference of  $\pm 5$  km), Gili Meno ( $\pm 150$  ha with an island circumference of  $\pm 4$  km) and Gili Trawangan ( $\pm 340$  ha with an island circumference of  $\pm 7.5$  km). The rest of the area is marine waters. Gili Matra MTP was originally a protected area since 1993. Its status was changed to a marine tourism park in March 2009. In September 2009, its name was changed to Marine Tourism Park based on Decree of the Minister of Maritime Affairs and Fisheries No. KEP.67/MEN/2009 (BKKPNK, 2021).

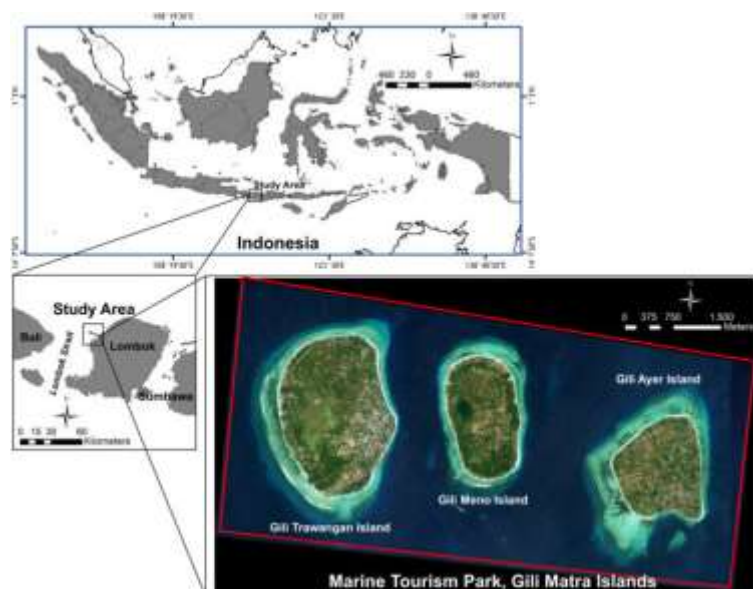


Fig 1. Study area of Gili Matra Marine Tourism Park of Lombok, Nusa Tenggara Barat, Indonesia.

The Gili Matra MTP ecosystem consists of seagrass beds, mangrove forests and coral reef. The mangrove forest ecosystem is centered on Gili Meno with the *Avicennia*, *sp* type. Meanwhile, the seagrass meadow ecosystem is spread with 8 types of seagrass. Management of the Gili Matra MTP is divided into 7 zones with 2 sustainable fisheries zones. Each zone is the core zone, utilization zone, port zone, rehabilitation zone and protection zone. Meanwhile, sustainable fisheries zones are divided into traditional sustainable fisheries zones and modern sustainable fisheries zones (BKKPNK, 2018).

### **2.1. Data Collection and Analyzed**

The biophysical and chemical data (Temperature, Salinity, Turbidity, Transparency, TSS, DO, pH, Phosphate, Nitrite, Nitrate, Ammonia, Silicate, Chlorophyll-a and plankton of the aquatic environment has been collected from 16 stations at Gili Matra MTP in 2022 (Fig. 2). The data was obtained from field surveys and analysis in the laboratory from 4 seasons i.e. wet season (southeast monsoon) in December, Dry season (northwest monsoon) in August, and 2 transition seasons (Wet to Dry season in May and Dry to Wet season in October). The physical data of Temperature, Salinity, Turbidity, DO pH was measured by Horiba U-10 and Transparency by Seichi Disk and phytoplankton by extracting of 50 liters of water sample using Plankton net with diameter 20 cm. TSS and Chlorophyll-a was analyzed after filtering of water sample using Millipore GFF 47 mm Membrane Filter 0.45 micron pore size. TSS was obtained from weighing results after the TSS filtrate was opened at a temperature of 100 °C and Chlorophyll-a was obtained by extracting the Chlorophyll-a filtrate with 90% acetone and analyzed using a Trilogy Laboratory Fluorometer, Turner Designs model 7200-046 (Cochlan and Hendorn, 2012). Meanwhile nutrients (Phosphate, Nitrite, Nitrate, Ammonia and Silicate) were analyzed in the laboratory using a Shimadzu UV-1800 Spectrophotometer and Autoanalyzer. These data was then processed and analyzed to determine the environmental health level of the seawater based on the level of environmental health indicators.

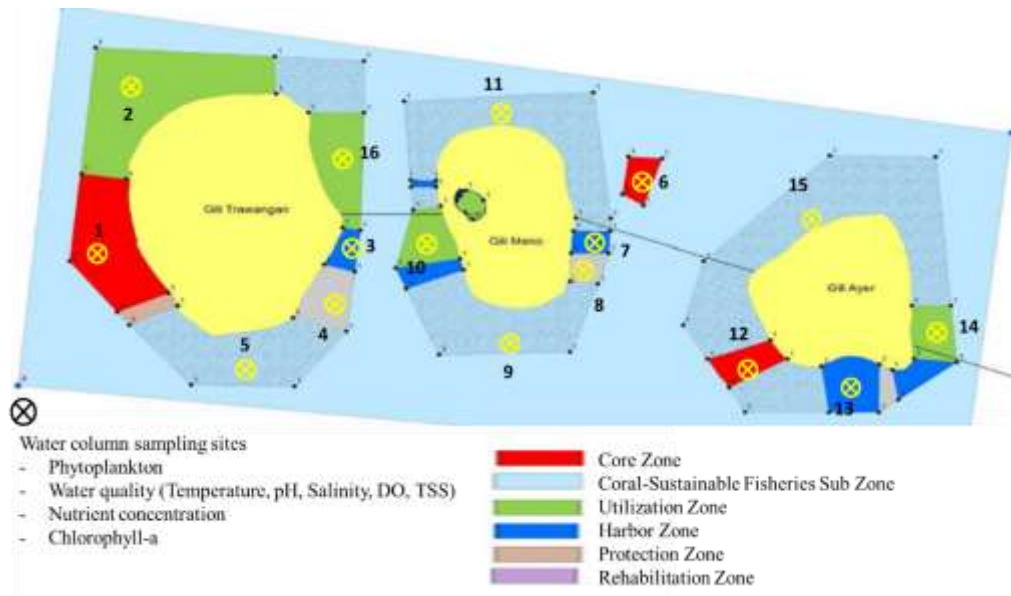


Fig 2. Sampling stations of biophysical and chemical of Gilli Matra Marine Tourism Park of Lombok, Nusa Tenggara Barat, Indonesia.

### 3. Result and Discussion

#### 3.1. Biophysical and Chemical Condition

Seasonal variation of Sea Surface Temperature (SST) and Salinity at Gilli Matra MTP are shown on Figure 3. SST was within range of 28.46 to 29.93 °C and Salinity was within range 32.00 to 33.88 PSU.

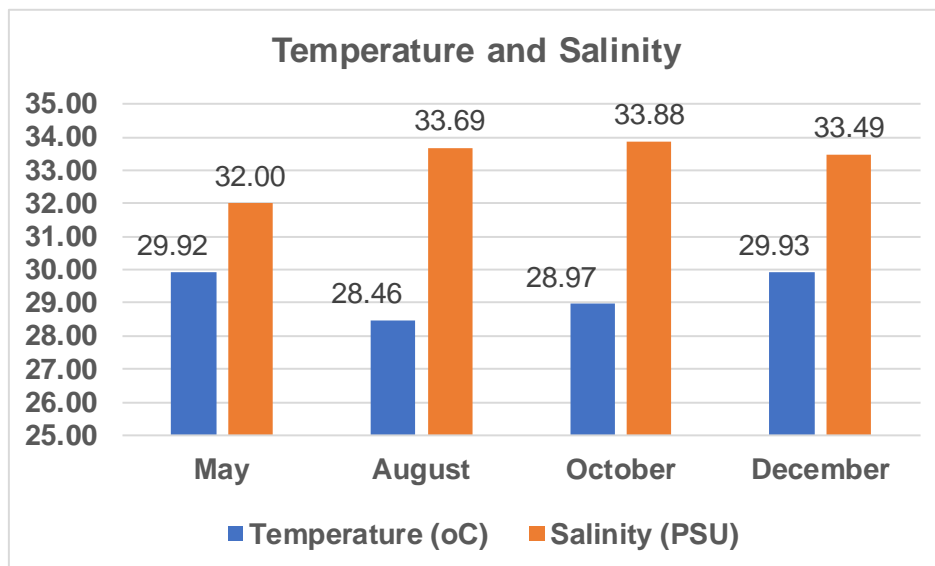


Fig. 3. Seasonal variation of SST and Salinity of Gilli Matra Marine Tourism Park of Lombok, Nusa Tenggara Barat, Indonesia.

Seasonal variation of Turbidity, TSS, Chlorophyll-a, DO, Transparency, Phosphate, Nitrite, Nitrate, Ammonia and Phytoplankton were seen on Tabel 1.

Tabel 1. Seasonal variation of Turbidity, TSS, Chlorophyll-a, DO, Transparency, Phosphate, Nitrite, Nitrate, Ammonia and Phytoplankton of Gilli Matra MTP of Lombok, Nusa Tenggara Barat, Indonesia

Parameters	Months-Seasons			
	May Trans Wet-Dry	August Dry Season	October Trans Dry-Wet	December Wet Season
Turbidity (NTU)	0.08	0.00	0.00	0.00
TSS (mg/l)	2.80	2.53	3.07	15.73
Chlorophyll-a ( $\mu\text{g/l}$ )	0.30	0.36	0.36	0.74
DO (mg/l)	5.44	5.20	5.14	4.74
Transparency (%)	96.250	100	100	100
Phosphate (mg/l)	0.047	0.079	0.078	0.052
Nitrite (mg/l)	0.008	0.007	0.008	0.004
Nitrate (mg/l)	1.450	1.556	3.650	3.600
Ammonia (mg/l)	0.023	0.041	0.055	0.010
Phytoplankton (ind/l)	190.938	135.583	106.125	72.938

Seasonal variation of DIP, DIN, DSi and DIN/DIP are shown in Fig 4.

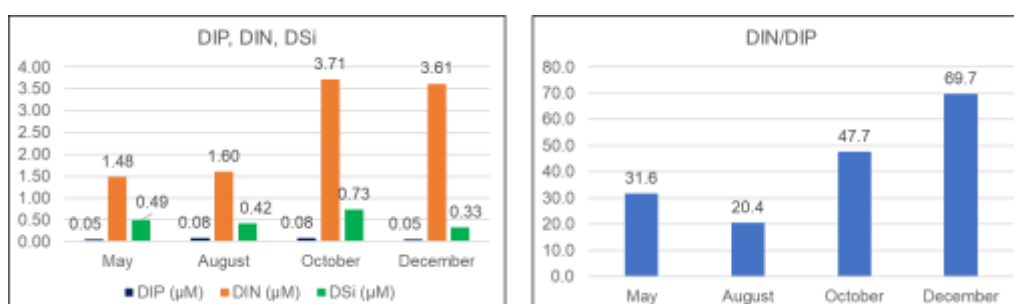


Fig. 4. Seasonal variation of DIP, DIN, DSi and DIN/DIP of Gilli Matra Marine Tourism Park of Lombok, Nusa Tenggara Barat, Indonesia.

#### 4. Future Challenges

- Publication of scientific papers based on research data conducted at the Gili Matra Marine Tourism Park, Lombok.
- Continuing research on marine environmental health and eutrophication using oceanographic satellite data and field data from the Gili Matra Marine Tourism Park, Lombok.
- Developing a disaster mitigation model for coastal and marine ecosystems damage of the Gili Matra Marine Tourism Park, Lombok based on the health of the marine environment and biophysical-chemical conditions.