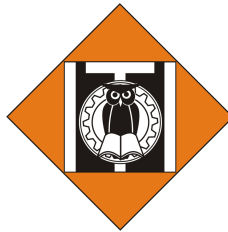


LAPORAN PENELITIAN



**ENVIRONMENTAL HEALTH STUDY OF MARINE COASTAL
WATERS OF GILI MATRA MARINE TOURISM PARK, LOMBOK,
NUSA TENGGARA BARAT, INDONESIA**

Prof. Dr. Ir. Suhendar I. Sachoemar, MSi

NIDK. 8991020021

Surat Tugas No.: 022/ST-PLT/PRPM-ITI/I/2024

**PROGRAM STUDI TEKNOLOGI INDUSTRI PERTANIAN
INSTITUT TEKNOLOGI INDONESIA
FEBRUARI 2024**

HALAMAN PENGESAHAN

Judul Penelitian : *Environmental Health Study of Marine Coastal Waters of Gili Matra Marine Tourism Park, Lombok, Nusa Tenggara Barat, Indonesia*

Jenis Penelitian : Penelitian Dasar
Bidang Fokus Penelitian : Agricultural and Environmental Sciences
Tujuan Sosial Ekonomi : Sosialisasi pentingnya kesehatan lingkungan perairan dan laut untuk mendukung pembangunan dan pengembangan pariwisata berkelanjutan

TKT (Tingkat Kesiapterapan Teknologi) : 3

Peneliti

- a. Nama Lengkap : Prof. Dr. Ir. Suhendar I. Sachoemar, MSi
- b. NIDK : 8991020021
- c. Jabatan Fungsional : Tenaga Pengajar
- d. Program Studi : Teknologi Industri Pertanian (TIP)
- e. Nomor HP : 082122014795
- f. Alamat Surel (*e-mail*) : suhendarsachoemar@yahoo.com

Anggota Mahasiswa

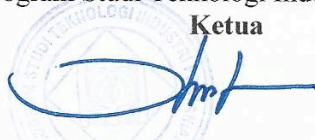
- a. Nama Mahasiswa : Muhammad Adam Rafli
- b. NIM : 1322000006
- c. Jurusan : Teknologi Industri Pertanian (TIP)

Institusi Sumber Dana : Ehime University, Japan
Biaya Penelitian : Rp. 14.520.745,- (136.000 yen)
Mitra Penelitian : Pusat Riset Lingkungan dan Teknologi Bersih BRIN

Tangerang Selatan, 26 Februari 2024

Mengetahui,
Program Studi Teknologi Industri Pertanian

Ketua



(Ir. Shinta Leonita, STP., MSi)
NIDN : 0322089006

Ketua Tim



(Prof. Dr. Ir. Suhendar I. Sachoemar, MSi)
NIDK : 8991020021

Menyetujui,

Kepala

Pusat Riset dan Pengabdian Masyarakat (PRPM)
Institut Teknologi Indonesia



(Prof. Dr. Ir. Ratnayati, M.Eng.Sc., IPM)
NIDN : 0301036303

RESEARCH REPORT
LaMer, Ehime University, Japan

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

Prof. Dr. Ir. Suhendar I Sachoemar, MSi

Department of Agro-Industrial Technology, Institut Teknologi Indonesia (ITI),
Tangerang Selatan

1. Background and Research Objective

Gili Matra Marine Tourism Park, hereinafter referred to as MTP Gili Matra, has an area of 2,954 ha, consisting of 665 ha of land and the rest is marine waters. Gili Matra Marine Tourism Park (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. MTP Gili Matra is a tourist destination for tourists from various countries. The economic life of coastal communities in MTP Gili Matra 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 MTP Gili Matra Marine 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 MTP Gili Matra, West Nusa Tenggara which consists of the coastal and marine areas of Meno, Ayer and Trawangan Islands. MTP Gili Matra is located at 8°20' - 8°23' South Latitude and 116°00' - 116°08' East Longitude (Fig.1). MTP Gili Matra 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 MTP Gili Matra area has an area of 2,954 hectares which is divided into three islands, namely Gili Air. (± 175 ha with an island circumference of ± 5 km), Gili Meno (± 150 ha with an island circumference of ± 4 km) and Gili Trawangan (± 340 ha with an island circumference of ± 7.5 km). The rest of the area is marine waters. MTP Gili Matra 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).

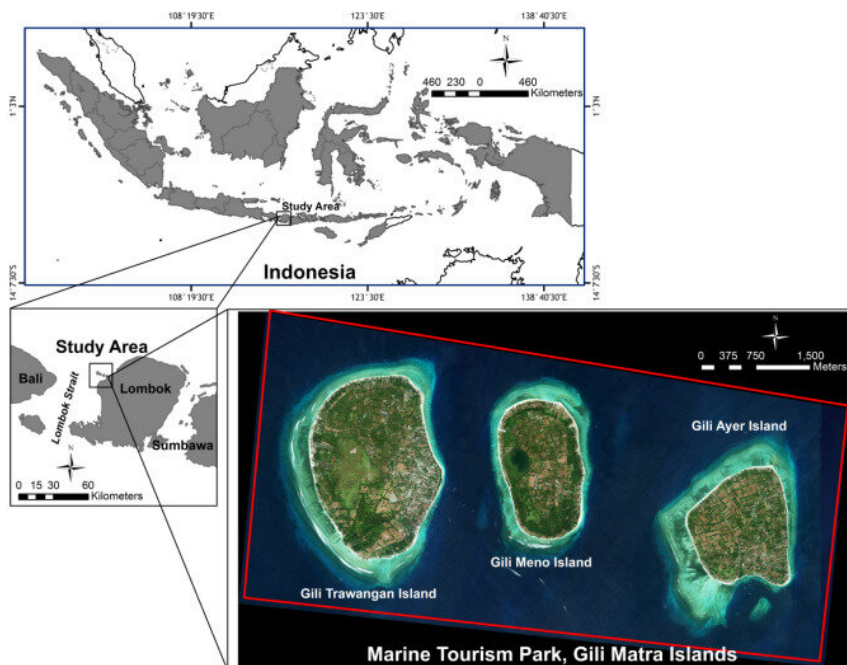


Fig 1. Study area of Gilli Matra Marine Tourism Park of Lombok, Nusa Tenggara Barat, Indonesia.

The MTP Gili Matra ecosystem consists of seagrass beds, mangrove forests and coral reef. The mangrove forest ecosystem is centered on Gili Meno with the api-api type. Meanwhile, the seagrass meadow ecosystem is spread with 8 types of seagrass. Management of the MTP Gili Matra 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 the MTP Gili Matra in 2022 (Fig. 2). The data was obtained from field surveys and analysis in the laboratory from 4 seasons (southeast monsoon of December, northwest monsoon of August, 2 transition seasons of southeast of May and northwest monsoon of 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.

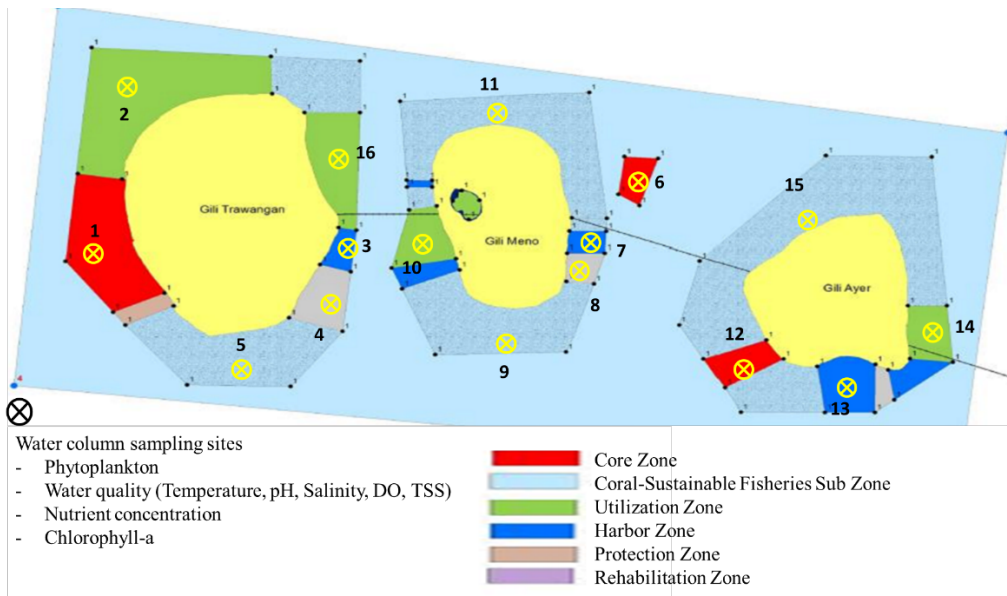


Fig 2. Sampling stations of biophysical and chemical of MTP Gilli Matra of Lombok, Nusa Tenggara Barat, Indonesia.

3. Result and Discussion

3.1. Biophysical and Chemical Condition

Seasonal variation of Sea Surface Temperature (SST) and Salinity at MTP Gilli Matra are shown on Figure 2. SST was within range of 28.46 to 29.93 °C and Salinity was within range 32.00 to 33.88 ppt (psu).

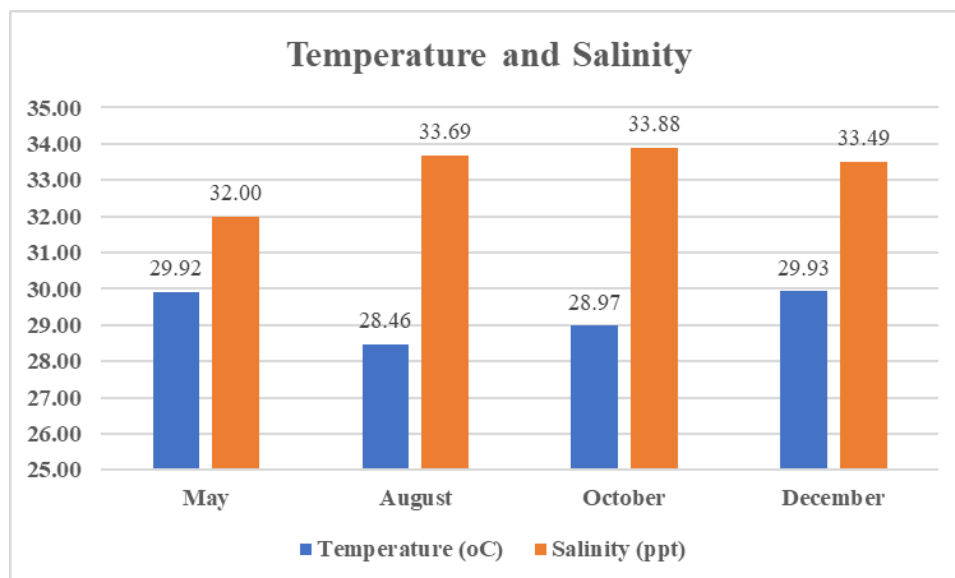


Fig. 3. Seasonal variation of SST and Salinity of Gilli Matra Marine Tourism Park of Lombok, Nusa Tenggara Barat, Indonesia.

Seasonal variation of Turbidity, TSS, Chlorophyll-a, DO, Transparency, Phosphate, Nitrite, Nitrate, Ammonia and Phytoplankton were seen on Tabel 1. During the rainy season in December, TSS, Chlorophyll-a were high, but DO dan phytoplankton were lower compare to the other months.

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

	May	August	October	December
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. DIN and DSi were high during the transition period of dry to wet season in October and DIN/DIP in December (wet season) was the highest compare to the other months and , indicated that phosphate to be a limiting factor because the N/P ratio >12 .

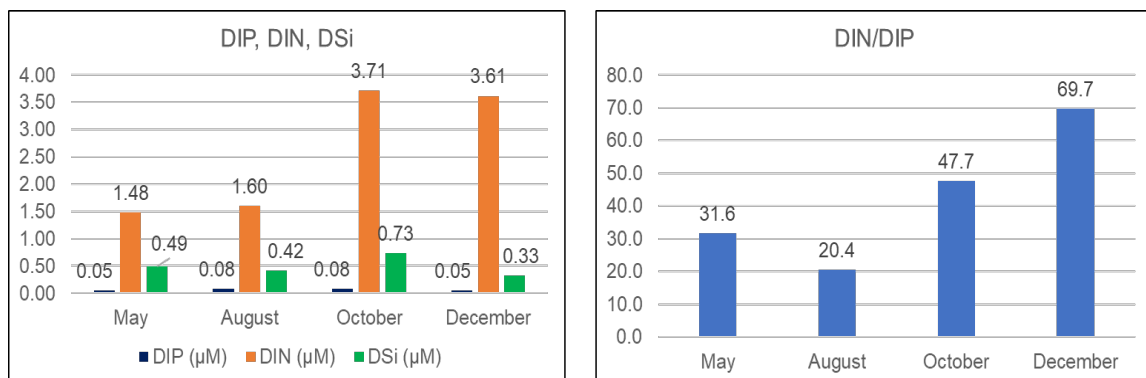


Fig. 4. Seasonal variation of DIP, DIN, DSi and DIN/DIP of Gilli Matra Marine Tourism Park of Lombok, Nusa Tenggara Barat, Indonesia.

4. Future Challenges

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