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# Ocean Accounts of Gili Meno, Ayer, Trawangan (Gili Matra) of Indonesia

*Presented on Regional Training Workshop on the SEEA Ecosystem Accounting for Asia and the Pacific  
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7<sup>th</sup> June 2023

# PROGRESS OF SEEA IMPLEMENTATION IN INDONESIA



BPS regularly publishes *Indonesia System of Integrated Environmental-Economic Accounting (SISNERLING)* since 1993, comprising asset accounts for land, timber, mineral and energy resources.



In addition to SISNERLING, BPS also publishes physical energy flow accounts and GHG emission accounts.

## Sisnerling Publication



## Flow Accounts Publication



## Inter-Agency Coordination Mechanism



Government Regulation No. 46/2017 about Environmental Economic Instrument

BPS Regulation No. 3/2023 about Compilation Guideline on Environmental-Economic Accounts in Indonesia

## Topics of In-depth Study SEEA

2016-2017



EPEA/EGSS

2018



SEEA for Agriculture,  
Forestry, and Fishery

2019-2020



Sustainable  
Tourism

2021-2022



Ocean  
Accounts

2023



Biodiversity  
Accounts



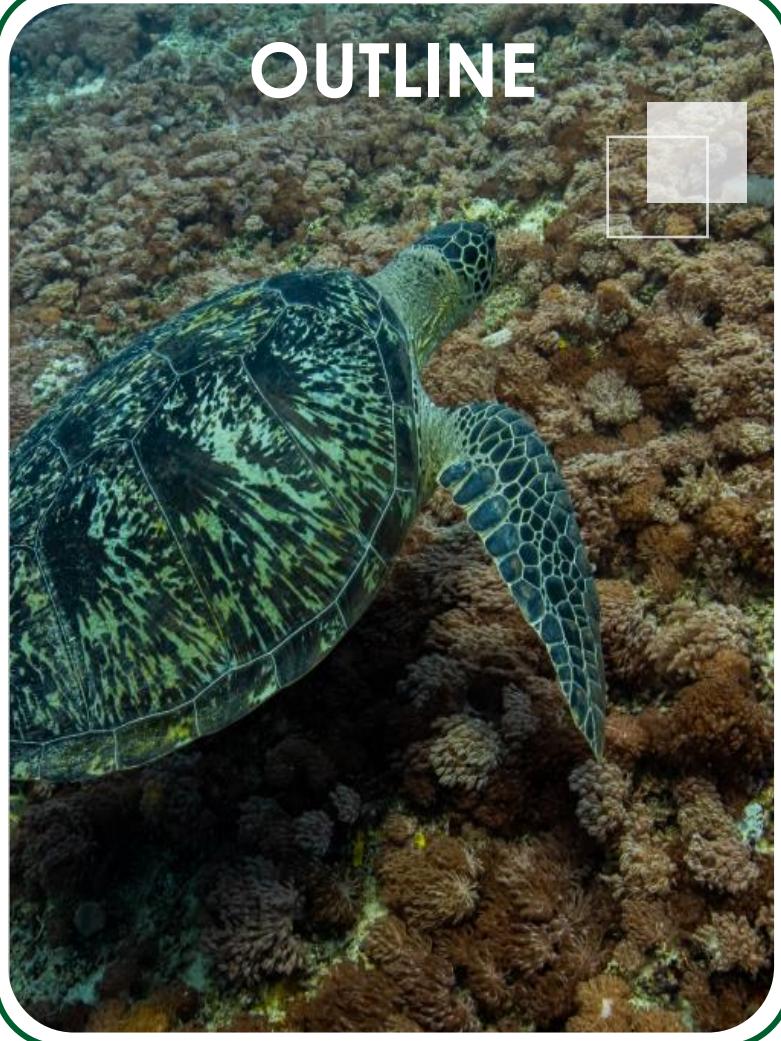
Climate  
Change

2024



Green  
Economy

# OUTLINE



1

## INTRODUCTION

2

## DATA SOURCES AND METHODOLOGY

3

## RESULTS

4

## CHALLENGES

# 01 INTRODUCTION



# CURRENT DEMAND

## Global

### **SDG dan CBD**

(life below water dan mainstreaming biodiversity within development plan)

### **HLP-SOE**

(Account the value of ocean)

## National

### **Law 32/2014**

Blue Economy

### **Govt. Reg. 46/2017**

Environmental Account

### **Midterm Devt. Plan 2020-2024**

Development of environmental account

## Program

### **Blue Economy**

Tracking the policy impacts to sector, environment, and social welfare

### **MSP Implementation**

Monitoring and evaluation of marine spatial plan effectiveness



# OCEAN ACCOUNTS PILOTS TO SUPPORT MANAGEMENT FRAMEWORKS

## Marine Spatial Planning

- Java Northern Coast/  
West Nusa Tenggara  
Province



## Marine Protected Area

- Gili Matra
- Raja Ampat
- West Waigeo
- Banda
- Padaido
- Anambas
- Pieh
- Aru
- And other MPAs

## Fisheries Management

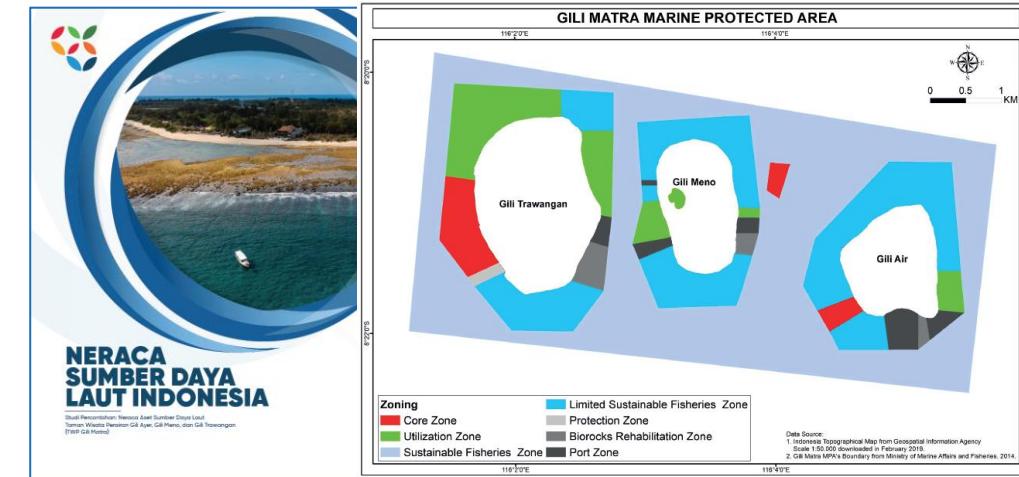
- Saleh Bay (particularly for snapper and grouper fishery)
- Fisheries Management Area of 718

### Priority Accounts

- Account 1 – Ecosystem extent, condition, and monetary value
- Account 2 – Flows to the economy
- Account 3 – Flows to the environment

# Introduction [1]

- Ocean Accounts plays an important role in ocean management as indicators of the balance between economic growth and marine resources sustainability.
- The implementation of Ocean Accounts in **Marine Protected Areas (MPA)** as pilot site, **Gili Matra** has been selected as a pilot site for 2021 Ocean Accounts implementation in Indonesia.
- Gili Matra is one of the National Marine Protected Areas located in North Lombok Regency, West Nusa Tenggara Province. This area is composed of 3 islands, namely Gili Ayer Island, Gili Meno, and Gili Trawangan.



# Introduction [2]



Four accounts have been prioritized to be developed:

- Ecosystem extent account
- Ecosystem condition account
- Flow to the environment
- Ocean governance

Implementing agencies involved for 2021 Ocean Accounts in Indonesia:



BPS-Statistics Indonesia



Ministry of Marine Affairs and Fisheries (MMAF)



BIG-Geospatial Agency



Ministry of Finance (MoF)



Ministry of National Development Planning/  
National Development Planning Agency



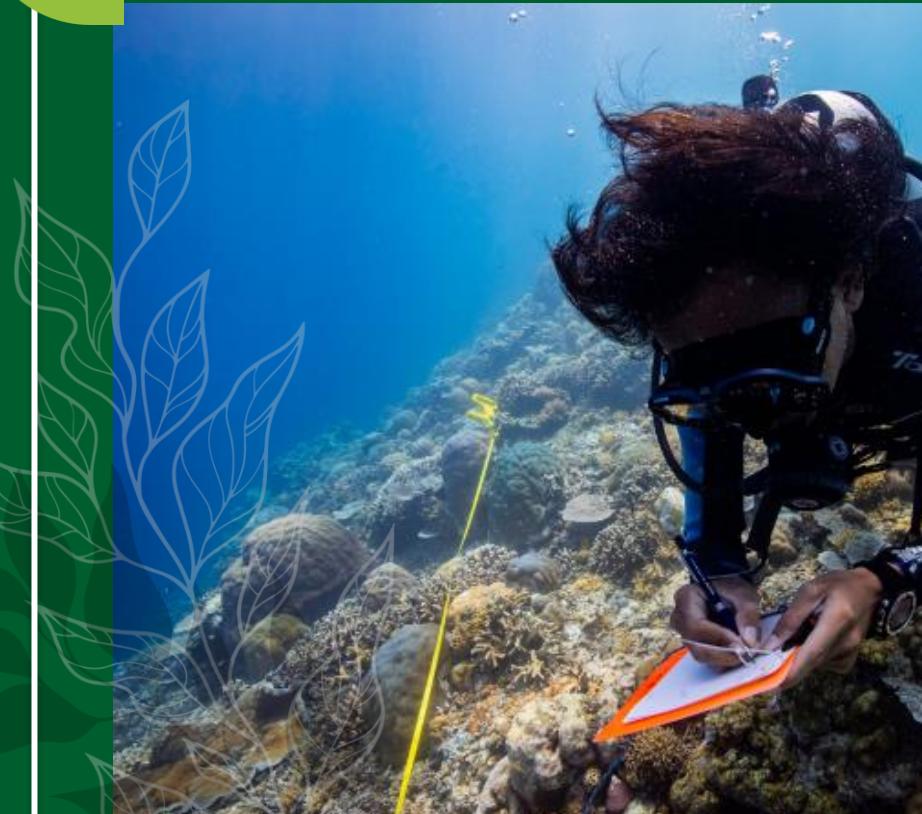
Rekam Nusantara Foundation



Global Ocean  
Accounts Partnership

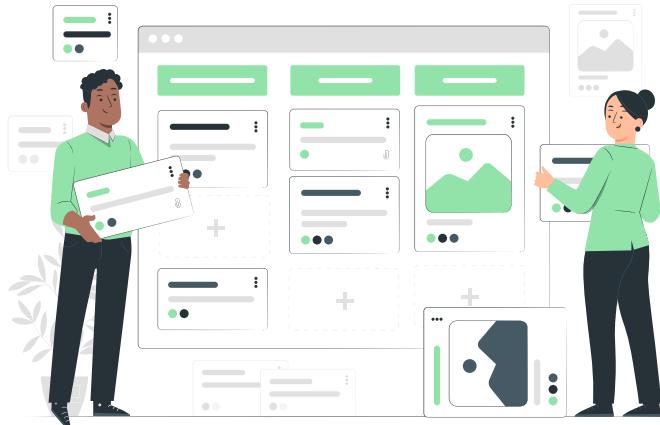
# 02

## DATA SOURCES AND METHODOLOGY



# Data Source and Methodology [1]

- Observation period : 2015 to 2021 which was collected through primary and secondary data collection.



## Primary Data

- Field survey, samplings and analysis of image data

## Secondary Data

- Geospatial Information Agency (BIG), scientific articles, and technical reports

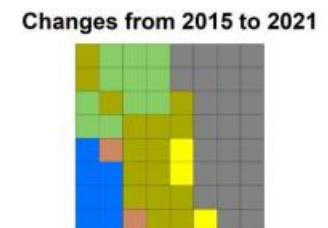
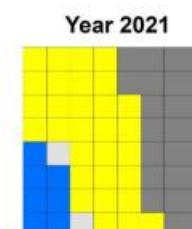
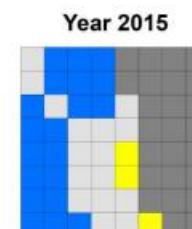
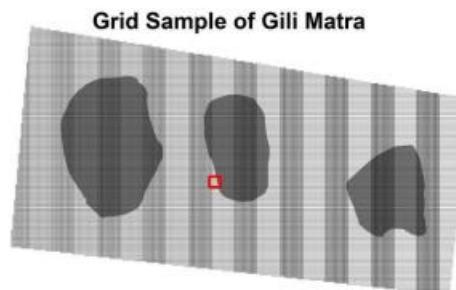


# Data Sources and Methodology [2]

## Ecosystem extent

The ecosystem extent was carried out by calculating the difference between ecosystem areas in 2015 and 2021. 2015 as opening stock, and 2021 as closing stock, field survey data in 2021 is used as validation for closing accounts. The considerations for selecting opening or closing accounts are basically based on data availability.

1. The Gili Matra MPA area is divided into MBSU grids with a size of 25 meter x 25 meter to produce 48,211 grids.
2. Data from the validation survey for 2021 are combined and adjusted to the grid ID from BIG.
3. Overlaying the grid data with coastal ecosystem data for 2015 and 2021.
4. Calculating the difference in values between 2015 and 2021.



# Data Sources and Methodology [3]

## *Ecosystem condition*



## *Coral Reef Condition*

Coral Reef condition was observed using the underwater photo transect method by taking quadratic transect images (Muttaqin et al. 2020).

## *Seagrass Condition*

Seagrass observations were carried out using the Seagrass Watch method (McKenzie et al. 2003 in Yulianto et al. 2012)

## *Mangrove Condition*

Mangrove was observed using the plot sampling method.

## *Biophysics Condition*

Information on biophysics conditions were obtained using three approaches:

- (1) analysis of satellite imagery,
- (2) field observations, and
- (3) laboratory analysis.

# Data Source and Methodology [4]

## *Ecosystem extent and condition*

Agenda	Parameter Observed	Methods
<b>Ecosystem extent and condition</b>		
Survey of coral reef extent and condition	Coral reef extent (validation)	Rapid survey, Coral Point Count with Excel extensions (CPCE)
	Diversity	Underwater photo transects
	Coral reef condition	Recruitment
	Reef fishes	Underwater visual census, timed swim, habitat complexity
Survey of seagrass extent and condition	Seagrass extent (validation)	Rapid survey
	Diversity	Quadratic transect
	Seagrass condition	Diversity analysis
Survey of mangrove extent and condition	Mangrove extent (validation)	Rapid survey
	Diversity	Quadratic transect
	Seagrass condition	Diversity analysis
<b>Water quality</b>		
Analysis and survey of biophysics condition	Sea surface temperature	Landsat 8 satellite analysis
	Chlorophyll-a	Landsat 8 satellite analysis
	Total suspended solids (TSS)	Landsat 8 satellite analysis
	Acidity (pH)	Water Quality Multiparameter
	Dissolved oxygen (DO)	Water Quality Multiparameter
	Biological oxygen demand (BOD)	DO Meter

# Data Sources and Methodology [5]

## *Economic Valuation of Ecosystem*

**Environmental services provided in Gili Matra MPA:**

- (i) **Coral reef ecosystem : provision, regulation, and culture.** Economic value estimation was obtained using the benefit transfer method from Bohol Philippines (Samonte-Tan et al, 2007) and the United States of America's Mariana Islands (Beukering et al, 2006).
- (ii) **Seagrass ecosystems : support and regulation.** Economic value estimation uses the benefit transfer method from Mexico.
- (iii) **Mangrove ecosystem : provision, regulation, culture and support.** Economic value estimation uses the benefit transfer method from Gazi Bay Kenya (Hoberg, 2011) and Bintuni Bay Indonesia (Ruitenbeek, 1992).



# Data Sources and Methodology [6]

## Flow to the environment

RAHASIA

SINASI 2021



REPUBLIK INDONESIA  
BANDAN PUSAT STATISTIK  
SURVEI NERACA TERINTEGRASI  
TAHUN 2021

Kode Sampel (Pilih Salah Satu):  
 1. SKNP 2. SKSJ 3. Indepth Study SEEA   
(diisi oleh petugas)

Selamat pagi/siang/sore Bapak/Ibu,

Kami dari Badan Pusat Statistik (BPS) sedang mengumpulkan data/informasi perkembangan usaha di Indonesia. Kegiatan ini kami laksanakan secara rutin tiap tahun untuk mengetahui struktur pendapatan dan pengeluaran usaha/perusahaan, margin perdagangan dan pengangkutan (*Trade and Transport Margin /TTM*), serta gambaran mengenai aktivitas kelautan di Indonesia, khususnya kuantitas input produksi yang diperoleh langsung dari alam di wilayah laut dan pesisir, serta limbah yang dihasilkan oleh kegiatan di sekitar wilayah laut dan pesisir.

Kegiatan pendataan kami laksanakan melalui metode wawancara langsung oleh petugas SINASI 2021 dengan menggunakan kuesioner yang dicetak atau tidak dicetak (*paper* atau *paperless*) dan mengisikan jawaban responden melalui *Computer Assisted Personal Interviewing* (CAPI) serta metode pengisian mandiri oleh responden SINASI 2021 melalui *Computer Assisted Web Interviewing* (CAWI). Mohon kesedian Bapak/Ibu untuk memberikan jawaban untuk pertanyaan yang telah diberikan. Seluruh data yang Bapak/Ibu berikan kepada kami akan **dirahasiakan** dan digunakan secara agregat untuk mengukur kinerja ekonomi yang ditunjukkan antara lain dalam statistik pertumbuhan ekonomi. Terima kasih atas kesedian dan partisipasi Bapak/Ibu. Kontribusi Bapak/Ibu dalam memberikan data/informasi sangat berarti dalam meningkatkan kualitas statistik di Indonesia.

### BLOK VIII. PEMBUANGAN LIMBAH TAHUN 2020 (DIISI JIKA KODE SAMPEL = 3 )

Yth. Bapak/Ibu Responden,  
Isian blok ini digunakan untuk mendapatkan informasi mengenai limbah yang dihasilkan oleh lapangan usaha terkait sektor kelautan.

1. Air limbah yang dibuang oleh perusahaan/usaha selama tahun 2020 : ..... m3

2. Pembuangan air limbah selama tahun 2020:

No.	Tempat Pembuangan	Percentase (%)
(1)	(2)	(3)
a.	Laut / sungai / saluran air yang bermuara ke laut	
b.	Danau / waduk / bendungan / tanah	
c.	Saluran air limbah yang dikelola oleh perusahaan pengelola limbah	
d.	Bak penampungan / <i>septic tank</i>	
e.	Lainnya (tuliskan .....)	
f.	J U M L A H	1 0 0

3. Total sampah (limbah padat) yang dihasilkan perusahaan/usaha selama tahun 2020 : ..... kg

4. Persentase jenis sampah (limbah padat) perusahaan/usaha selama tahun 2020:

No.	Jenis Sampah / Limbah Padat	Kuantitas (kg)	Percentase Pembuangan Sampah/Limbah Padat (%)				
			Didaur ulang / dimanfaatkan kembali oleh pihak lain	Tempat pembuangan akhir	Sungai/ Laut/ Pesisir	Lainnya	Total
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
a.	Limbah kimia dan layanan kesehatan						100
b.	Limbah radioaktif						100
c.	Limbah metal/logam						100
d.	Limbah nonlogam yang dapat didaur ulang						100
e.	Peralatan dan kendaraan						100
f.	Limbah hewan dan tumbuhan						100
g.	Campuran limbah perumahan dan komersial						100
h.	Limbah mineral dan tanah						100
i.	Limbah pembakaran						100
j.	Lainnya (tuliskan .....)						100
k.	J U M L A H						

# 03 RESULTS



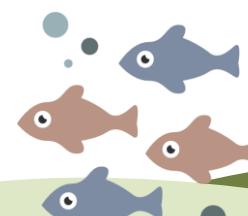
# Ecosystem Extent Accounts, MPA Gili Matra

Ecosystem type	Ecosystem extent (hectare)		
	Opening Stock 2015	Addition/ Reduction	Closing Stock 2021
Coral reefs	183,34	-18,16	165,08
Sea grass	56,50	+8,43	64,93
Mangrove	13,53	-7,38	6,15

Source: BIG (2020), validated 2021

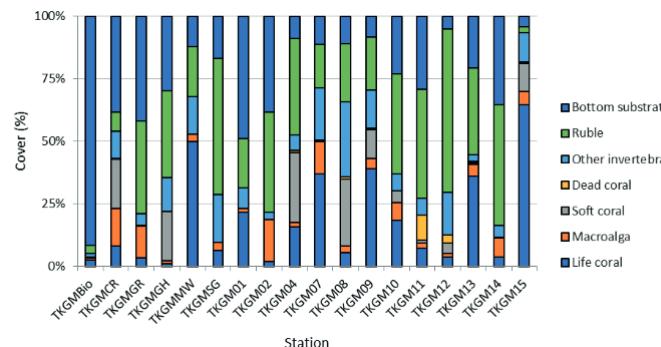
► In the period of 2015-2021, the area of coral reefs and mangrove ecosystem assets has decreased by 18.16 hectares and 7.38 hectares, respectively.

► Meanwhile, in the same period, the seagrass ecosystem experienced an increase in area of 8.43 hectares.

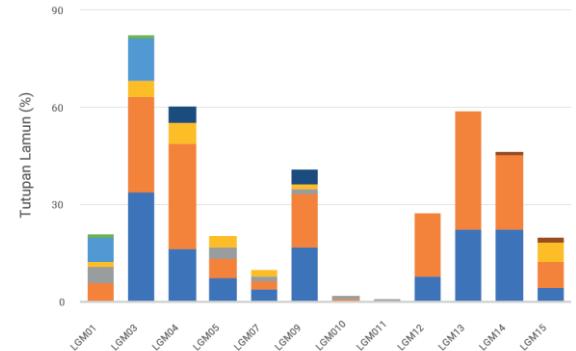


# Ecosystem Condition Account, MPA Gili Matra (1)

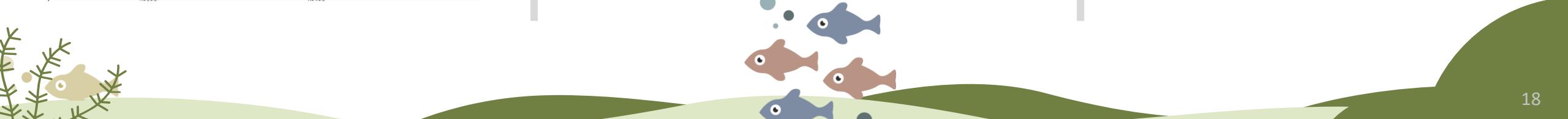
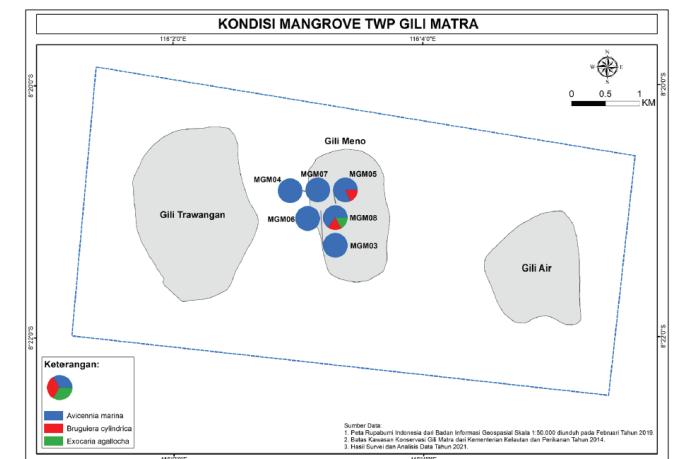
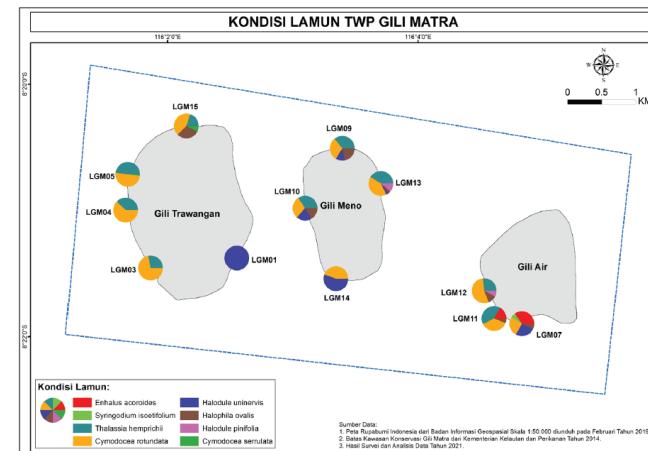
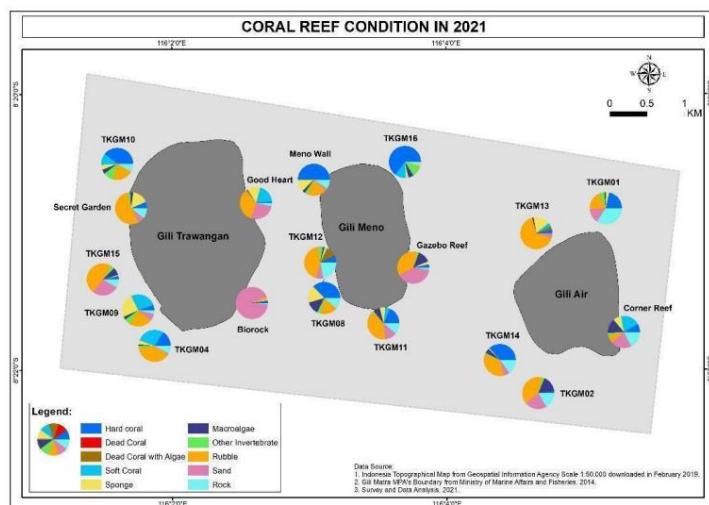
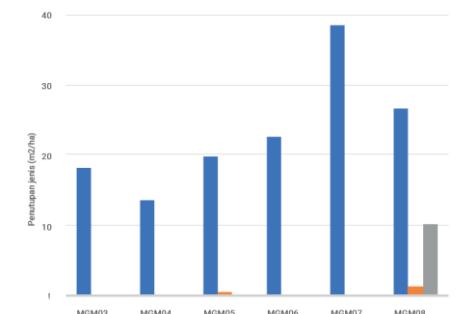
## Coral reefs



## Sea grass



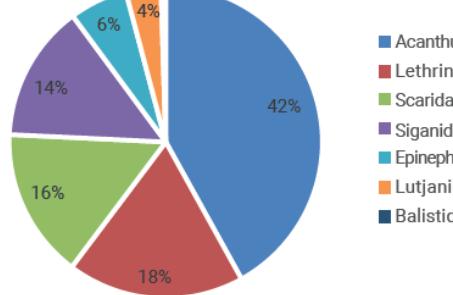
## Mangrove



# Ecosystem Condition Account, MPA Gili Matra (2)

## Fish Resources

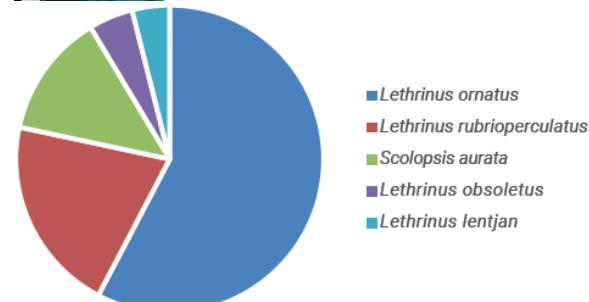
### Fish by Familiae



Acanthuridae species

- Acanthuridae
- Lethrinidae
- Scaridae
- Siganidae
- Epinephelidae
- Lutjanidae
- Balistidae

### Lethrinidae species



Scaridae species

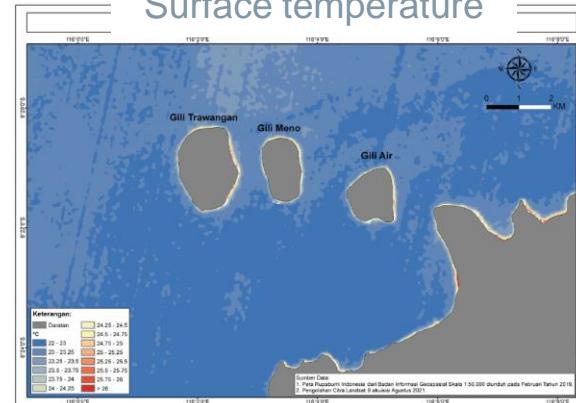
- Lethrinus ornatus
- Lethrinus rubrioperculatus
- Scarus tricolor
- Lethrinus obovatus
- Lethrinus lentjan



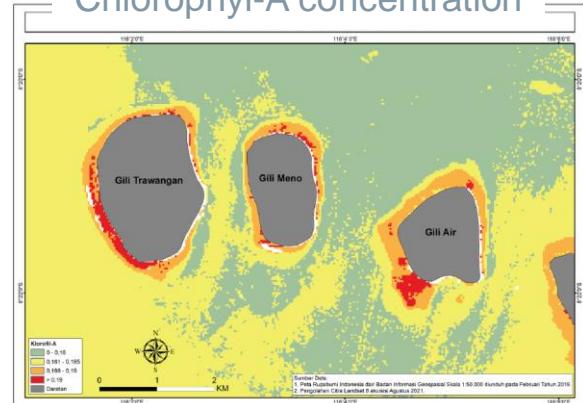
- Scarus sp.
- Scarus ghobban
- Scarus tricolor
- Chlorurus capis
- Chlorurus sp.

## Aquatic Biophysical Conditions

### Surface temperature



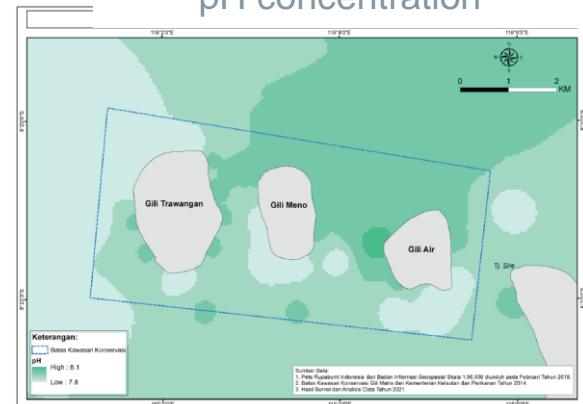
### Chlorophyl-A concentration



### total suspended solids

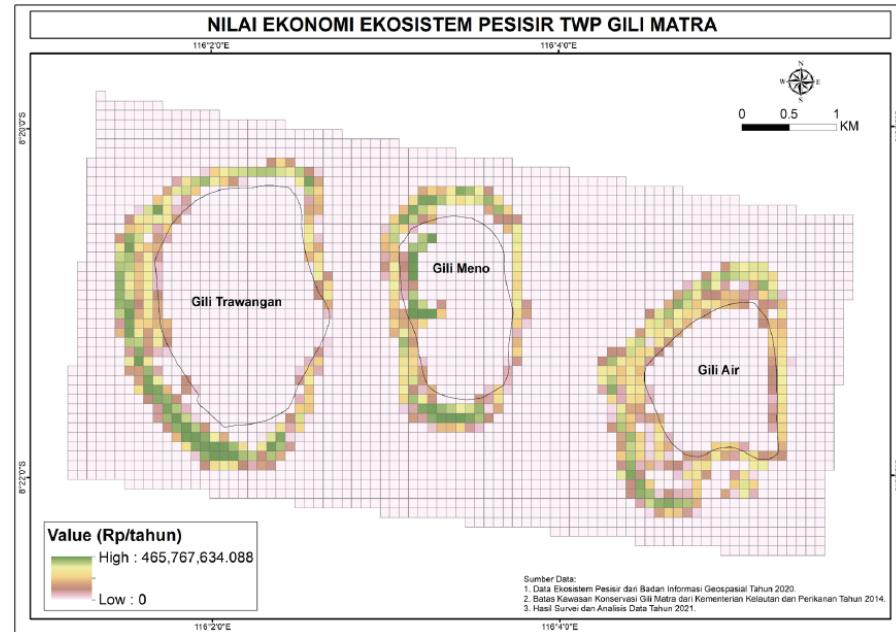


### pH concentration



# Ecosystem Economic Value, MPA Gili Matra

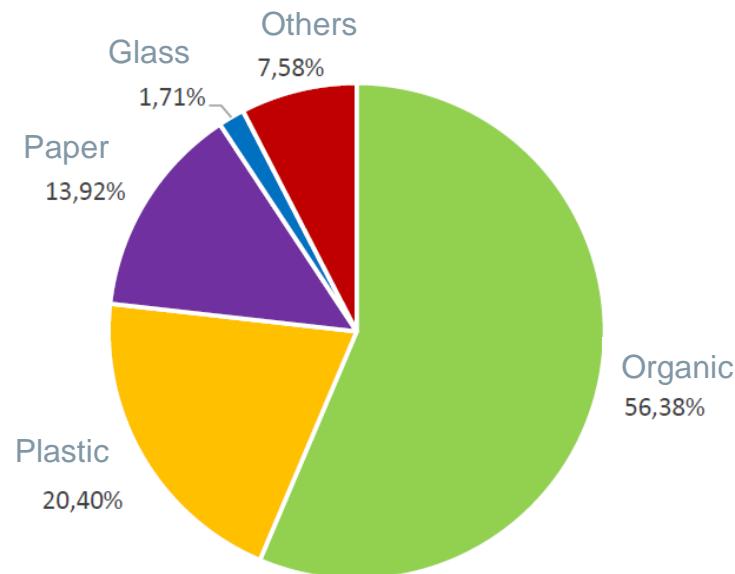
(Million IDR Rupiah), 2021



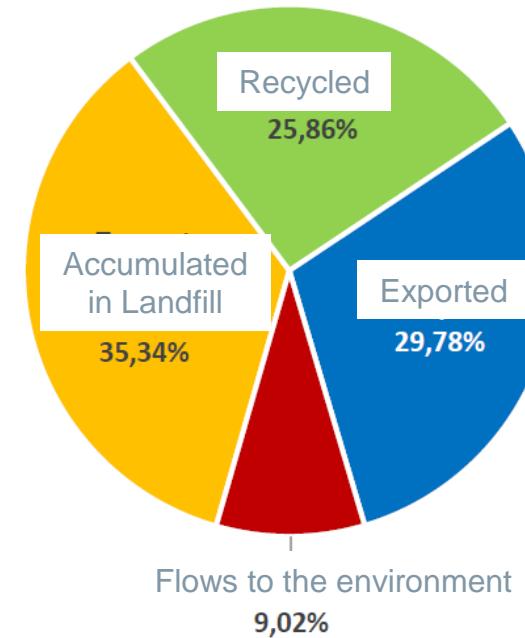
- 
- *Ecosystem economic values for the three important ecosystems in MPA Gili Matra (coral reefs, sea grasses and mangroves) were also analyzed spatially to identify areas with high resource value.*
  - *Areas of high resource value are scattered along the southwest coast of Gili Trawangan; the south coast, northwest and mangrove area of Gili Meno; and the southwest coast of Gili Ayer*

# Flows to Environment Account, MPA Gili Matra

## Solid waste by types



## Treatment of solid waste



- In 2021, the amount of solid waste generated at MPA Gili Matra was 4.45 thousand tonnes, 56,38% consisted of organic waste.
- Most of the solid waste generated at MPA Gili Matra was treated by the sewerage, waste management and remediation activities to be recycled back into products which are then reused in the economy (25,86%), while the rest is accumulated in the landfill (35,34%).



# Governance Account, MPA Gili Matra

Regulation regarding capture fishing in the MPA is applied based on fishing gear as follows:

Handlines can be used in all zones except the core zone; Spearguns and longlines are allowed in the sustainable fisheries zone; Net fishing is allowed in the sustainable fisheries zone outside the sustainable coral fisheries sub-zone; Fish aggregating devices (FADs) may only be used in the sustainable fisheries zone outside the sustainable coral fisheries sub-zone; Destructive fishing in any forms is prohibited in all zones.

Arrangements for marine tourism activities include:

- Diving is allowed except in core zone and port zone
- Snorkeling and swimming are allowed in the sustainable coral fisheries zone, utilization zone, protection zone, and rehabilitation zone
- Surfing and canoeing are allowed in the sustainable fishing zone and utilization zone
- The use of anchors in tourism activities is not allowed in all zones except in port zone

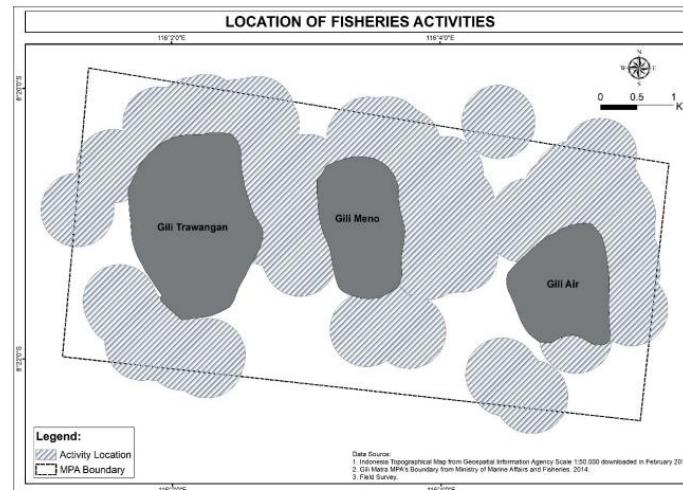


Figure 31. Fishing grounds in Gili Matra MPA

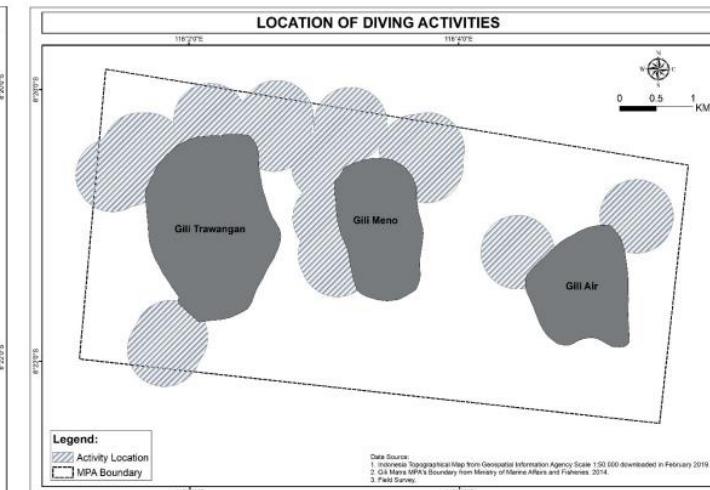


Figure 34. Diving area in MPA Gili Matra

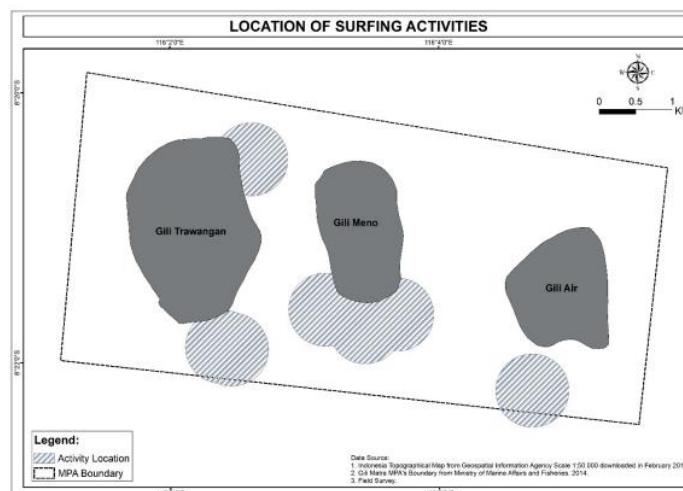


Figure 35. Surfing area in Gili Matra MPA

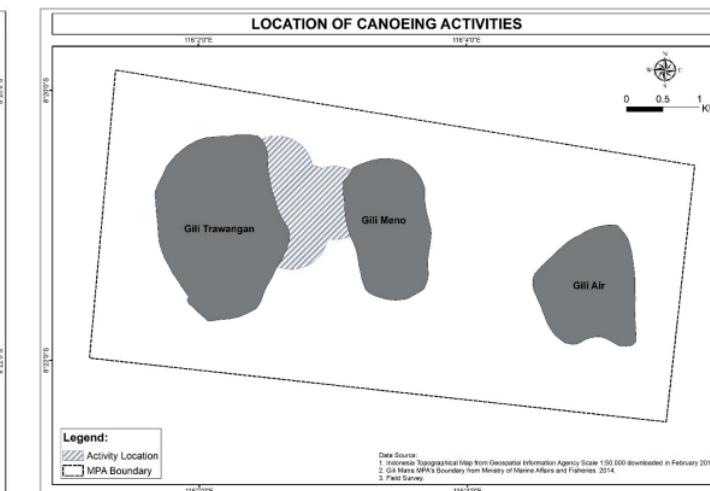


Figure 36. Canoeing area in MPA Gili Matra

# 04 CHALLENGES





# Challenges



## ► Scale up

Implementing ocean account for the total Indonesia marine area

## ► Data availability

Strong collaboration in data interoperability among stakeholders.

## ► Ocean Ecosystem valuation

Standard valuation methods not yet implemented by relevant stakeholder

## ► Policy use

Ocean Accounting for policies formulation

## ► International support

International assistance and country-to-country knowledge share





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# Thank You

[www.bps.go.id](http://www.bps.go.id)

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