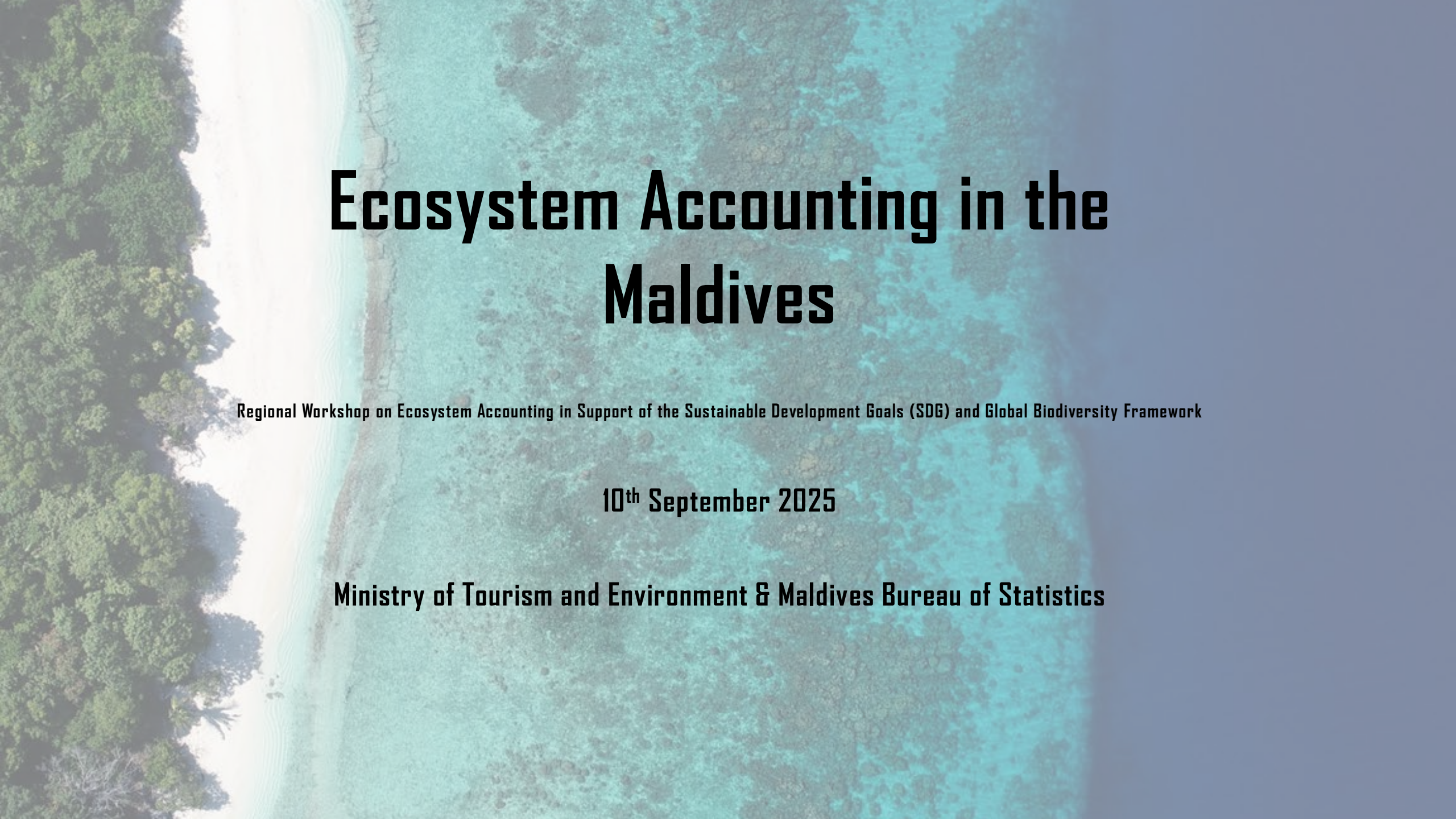


Ecosystem Accounting in the Maldives

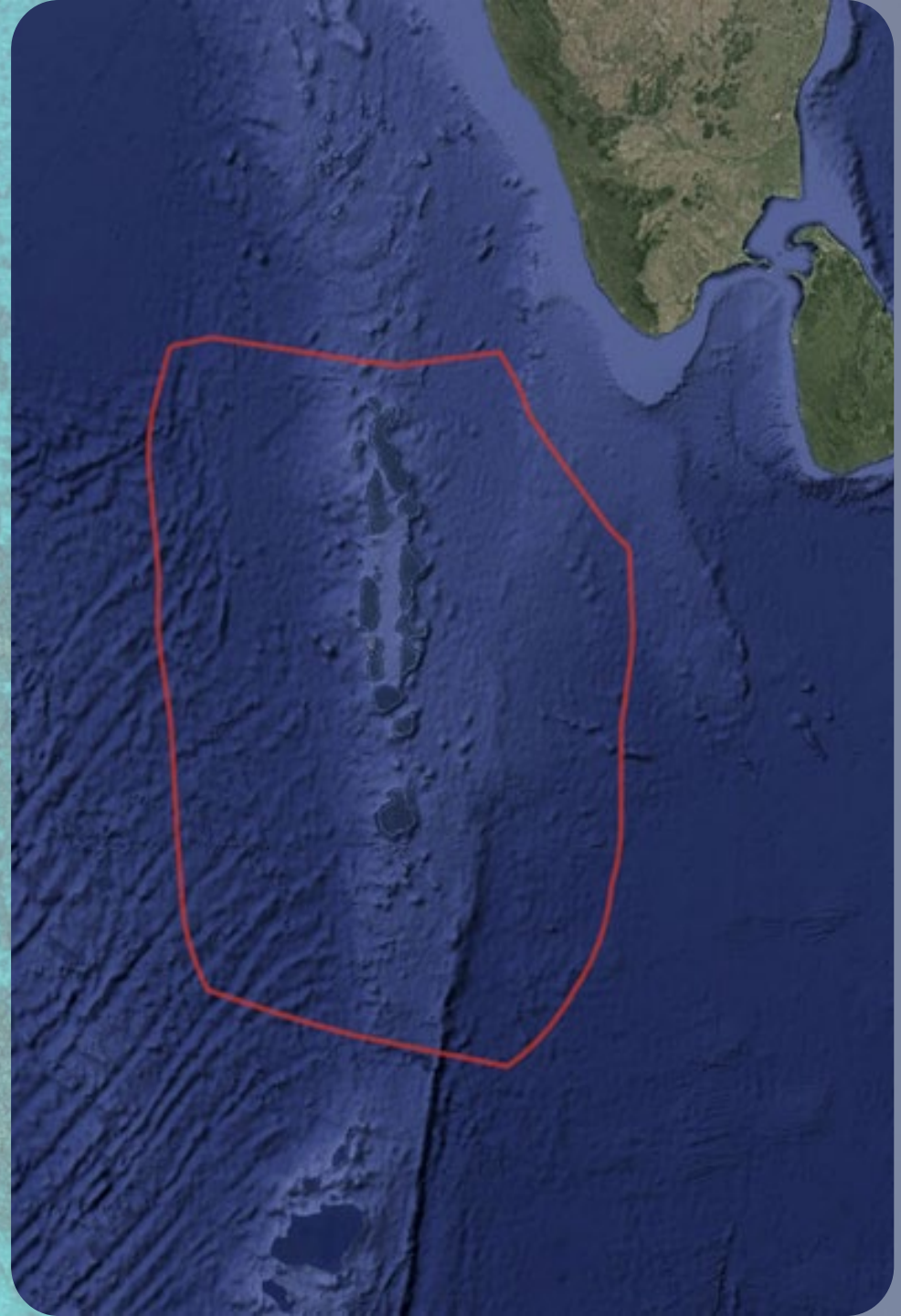
Regional Workshop on Ecosystem Accounting in Support of the Sustainable Development Goals (SDG) and Global Biodiversity Framework

10th September 2025

Ministry of Tourism and Environment & Maldives Bureau of Statistics

Maldives

- 26 natural atolls - 1192 low-lying coral reef islands
- ~99% of the country is Ocean
- Economy: tourism and fisheries sector – half of the GDP and jobs



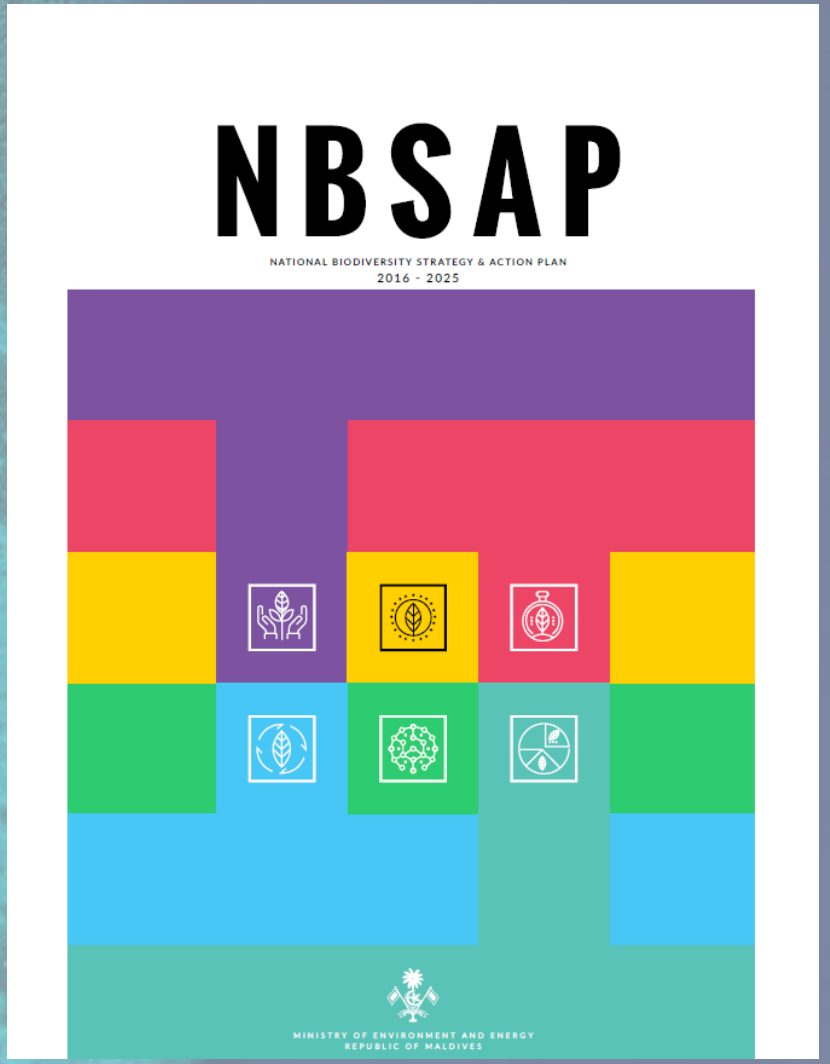
Maldives

- Valuing Biodiversity (2009) found that biodiversity-based sectors contribute:
  - 71% of national employment
  - 49% of public revenue
  - 98% of exports
  - 89% of GDP

Relevant Policies and Priorities

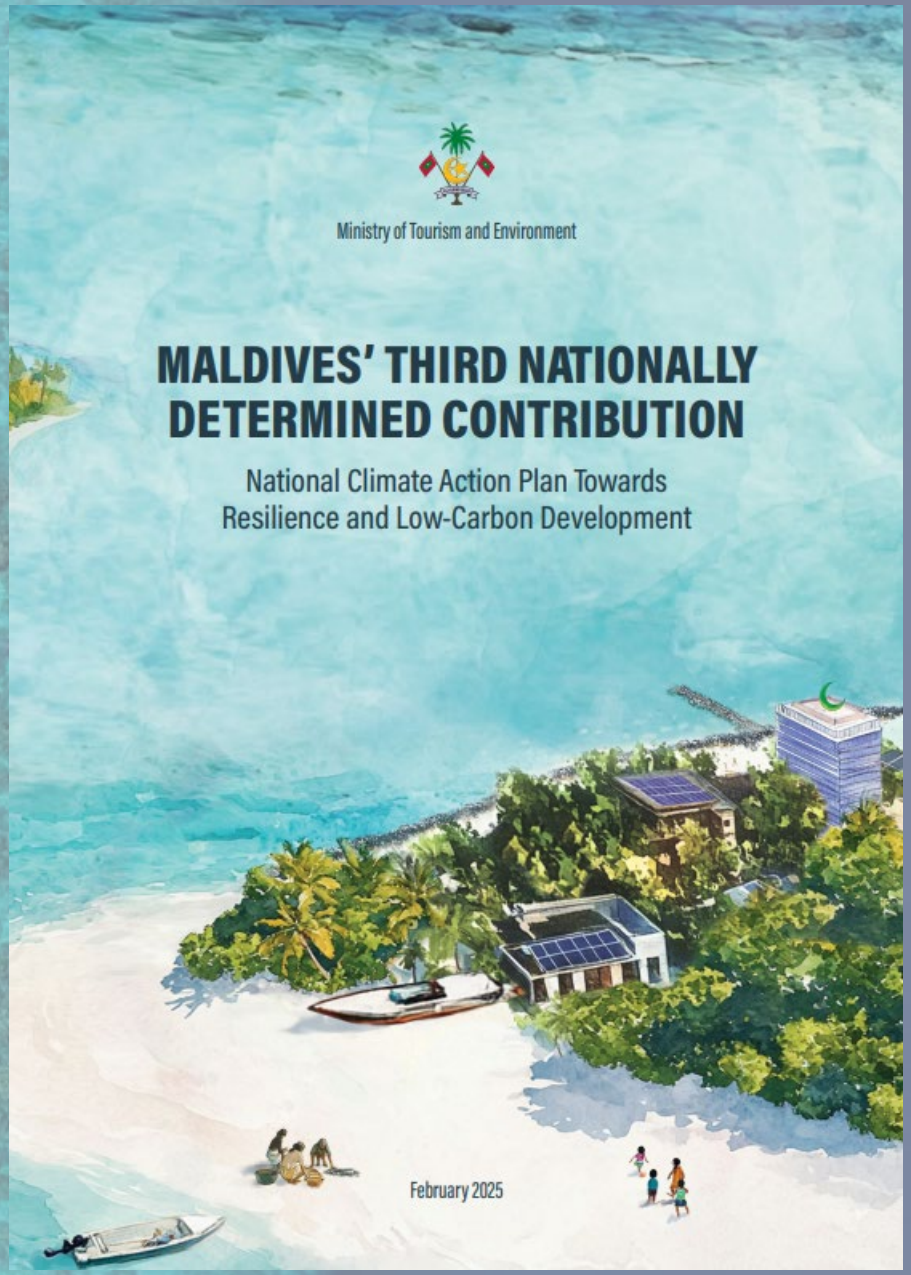
National Biodiversity Strategy and Action Plan

- National Biodiversity Strategy and Action Plan (NBSAP 2016-2025)
  - Currently being updated -> NBSAP 2025-2035
  - New targets to align with the Kunming-Montreal Global Biodiversity Framework
  - Draft national targets include a target on natural capital accounting
  - Identification of key biodiversity areas -> 30 x 30



Maldives' Third Nationally Determined Contribution

- Recognizes nature-based solutions and ecosystem resilience as important actions for climate resilience
- NDC aims to safeguard coral reefs and biodiversity, recognizing the importance of nature-based solutions and ecosystem-based management

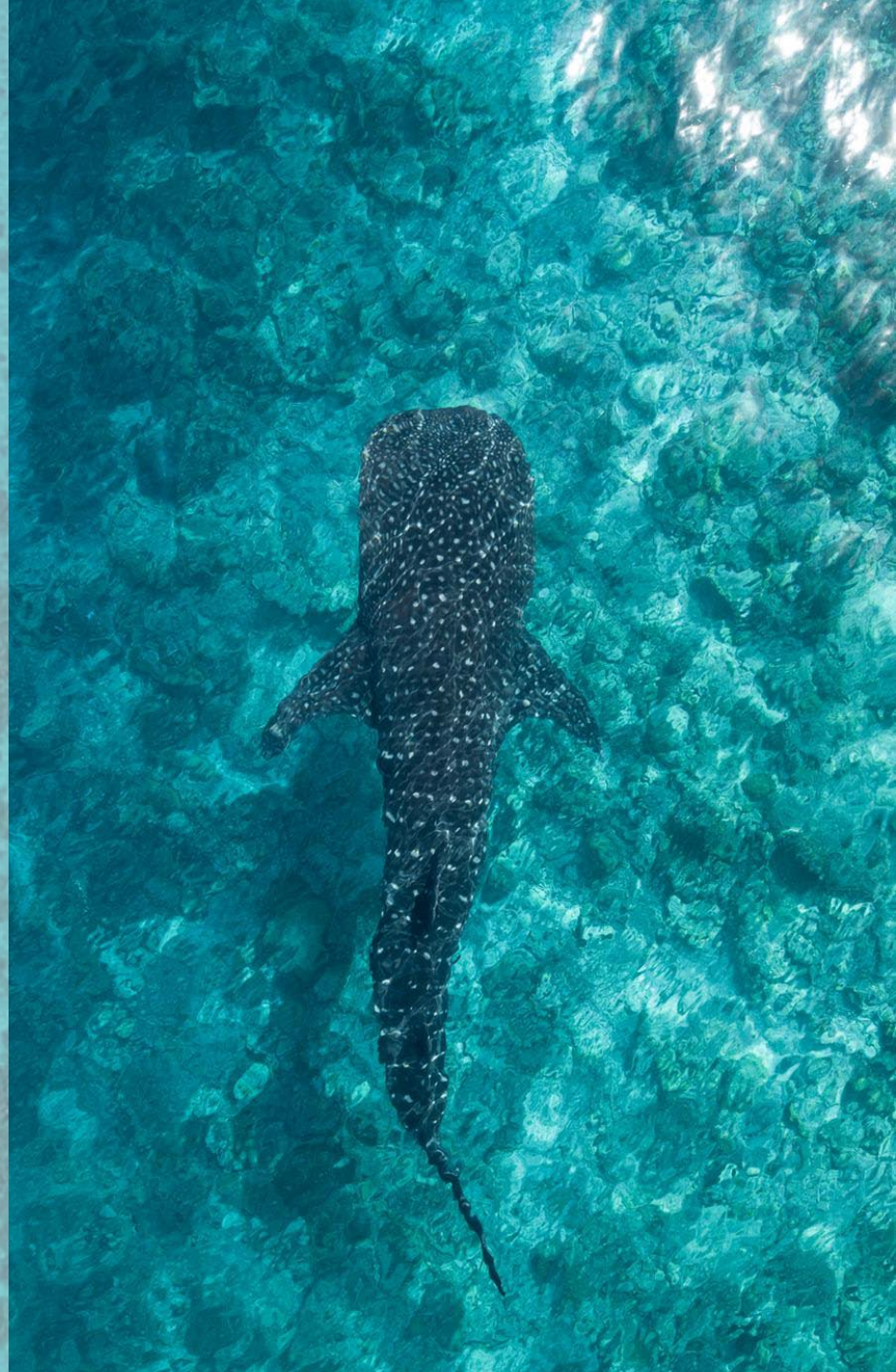


Priority ecosystems

- Coral reefs
- Seagrass beds
- Mangroves

Priority ecosystems

- High dependence of key sectors- tourism and fisheries
  - Tourism- 80% of tourist motivated by sandy white beaches, 60% motivated by underwater beauty, 22% motivated by megafauna
  - Fisheries- food security



Indicators and Data needs

- Extent: coral reef, seagrass, mangrove areas
- Condition: live coral cover, bleached coral cover, live seagrass cover, fish biomass, average mangrove tree height etc
- Services: costal protection, recreational value, fish provisioning, nursery habitat

Natural Capital Account Pilot- Laamu Atoll

Natural Capital Accounts Pilot

- Piloted in Laamu Atoll
- Produced: Extent, Condition, Service (physical and monetary value) accounts
- Data Sources:
  - Remote sensing (Senitel-2, Pleaides)
  - Field surveys: coral belt transects, fish counts, seagrass transect surveys
  - Published data- fisheries data, MBS Tourism Satellite Account

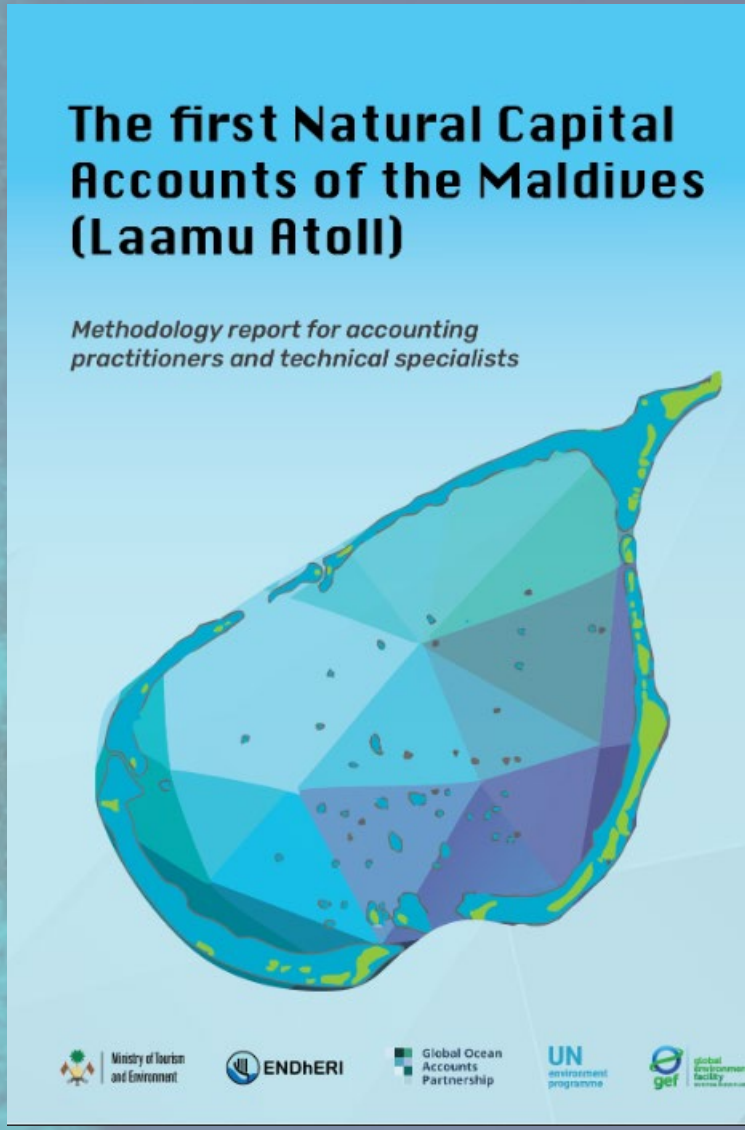


Table 1.1 Ecosystems extent, condition and asset value accounts produced, aligned with SEEA EA guidance.

Ecosystem	Extent		Condition		Asset value
	Resolution	Years	# variables	Years	
Coral reef	S + HR	2017, 2020 (S), 2021 – 2024 (HR)	6	2019, 2021, 2022, 2024	-
Seagrass	S + HR	2017 – 2024 (S, HR)	5	2023, 2024	Yes (carbon only, 2023)
Mangrove	S + HR	2014, 2016, 2017, 2019, 2020, 2022, 2023 (S, HR)	6	2023, 2024	Yes (carbon only, 2023)
Macroalgae	S	2017, 2020 (S)	-	-	-
Other substrate	S	2017, 2020 (S)	-	-	-

S = Standard resolution (10 m), HR = High resolution (< 1.5 m)

Table 1.2 Ecosystems services accounts produced, aligned with international guidance. All services were based on factors from 2023 and 2024. Macroalgae and other substrate were not assessed for ecosystem services.

Ecosystem	Ecosystem services					
	Wild biomass consumption	Coastal protection	Sediment supply	Recreational value	Nursery services	Carbon sequestration
Coral reef	P+M	P+M	P+M	P+M	P	-
Seagrass	-	-	P+M	P	P	P+M
Mangrove	-	-	-	P+M	-	P+M

*P = Physical value, M = monetary value. *DD = Data deficient – further data is required to estimate this service.

➢ Extent Account

Table 4.2 Opening and closing account for coastal ecosystems for 2017 and 2020 in Laamu Atoll, Maldives. Slight differences in total area due to rounding.

Entry	Units	Coral Reef	Seagrass	Mangrove	Macroalgae	Other Substrate	Totals
Opening (2017)	ha	6734.0	4257.4	4.9	42.9	150910.2	161949.4
Additions		0.5	0.5	0.0	0.0	74.5	75.6
Reductions		-42.4	-37.6	0.0	-2.1	4.8	-77.3
Closing (2020)		6692.1	4220.4	4.9	40.8	150989.5	161947.7
Net Change		-41.9	-37.1	0.0	-2.1	79.4	-6.4
Net Change (%)	%	-0.6	-0.9	0.0	-4.9	0.0	0.0

Table 4.3 Change matrix for Laamu Atoll, Maldives. Differences in total area are due to rounding.

From 2017 ↓ / To 2020 →	Coral Reef	Seagrass	Mangrove	Macroalgae	Other Substrate	Total 2017
Coral Reef	6691.6	0	0	0	42.4	6734
Seagrass	0	4219.9	0	0	37.6	4257.4
Mangrove	0	0	4.9	0	0	4.9
Macroalgae	0	0	0	40.8	2.1	42.9
Other Substrate	0.5	0.5	0	0	150909.2	150910.2
Total 2020	6692.1	4220.4	4.9	40.8	150989.5	161947.7

➢ Ecosystem Extent

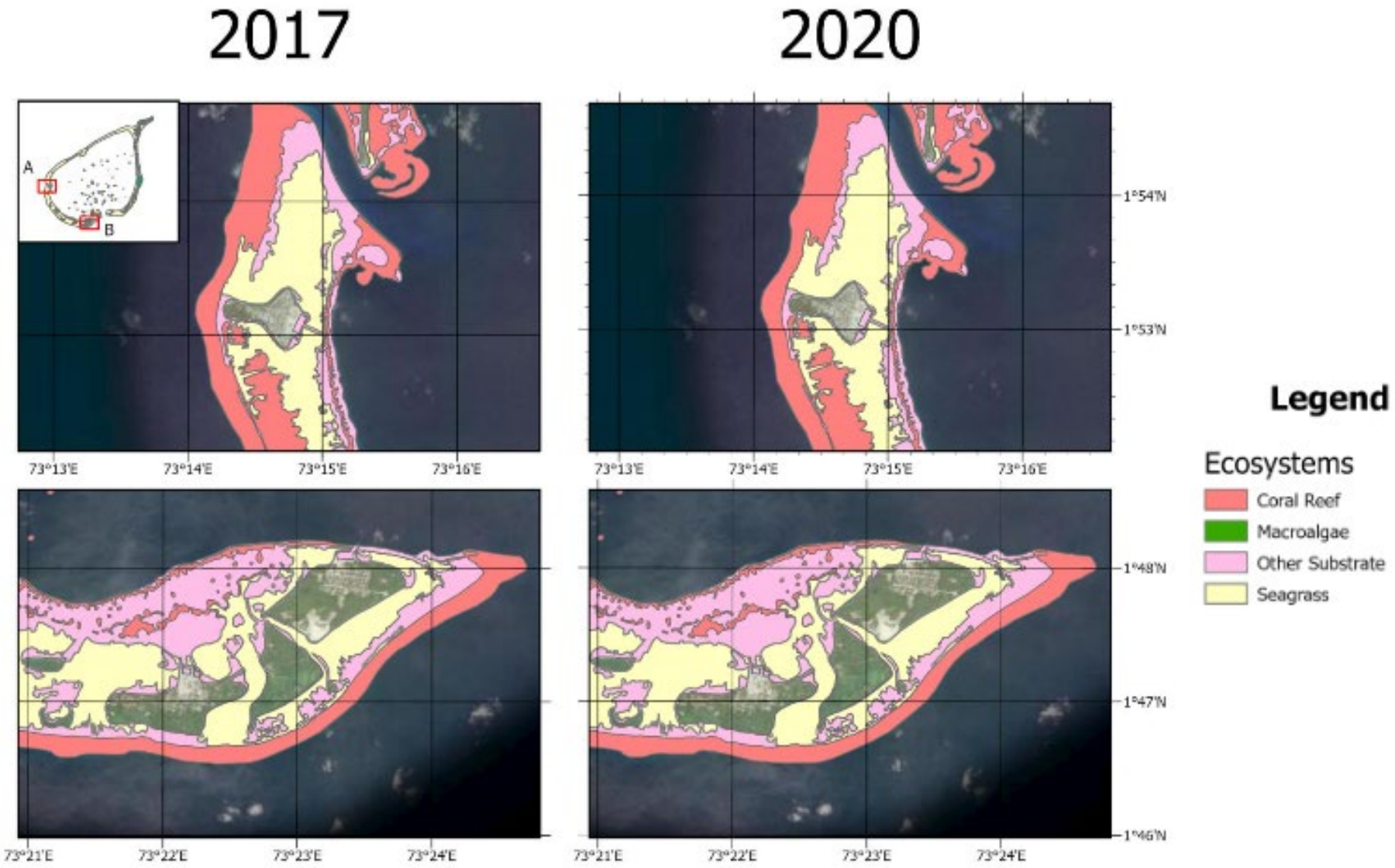
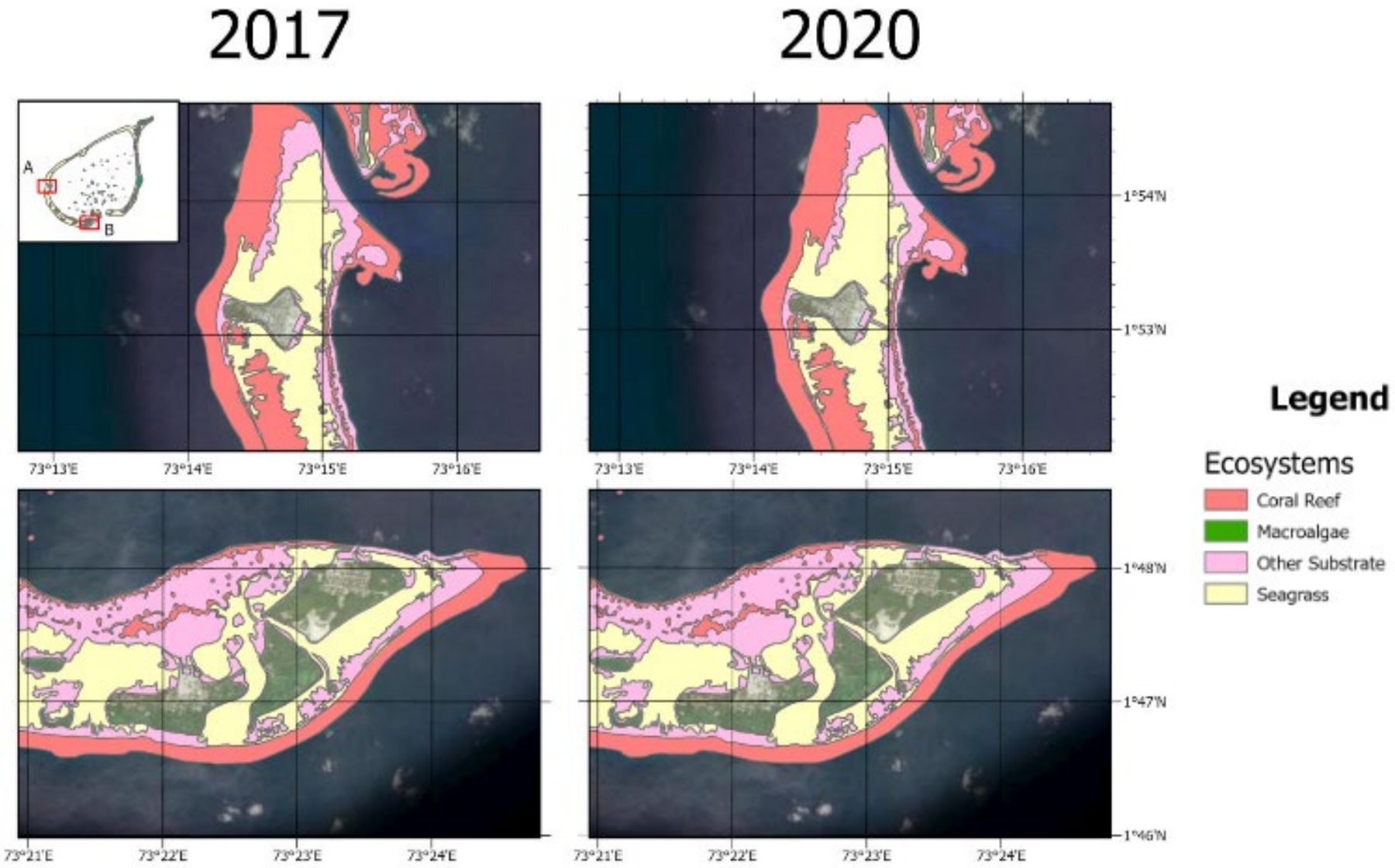


Figure 4.4 Ecosystem extent in (A) Maavah and (B) Kunahandhoo, Medhoo and Hithadhoo, Laamu Atoll, comparing 2017 (opening) and 2020 (closing) for key ecosystems. Mangroves are presented separately.

➢ Ecosystem Extent



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➢ Ecosystem Condition

Table 5.1 Structure, function and biodiversity variables relevant to ecosystem condition accounts.

Characteristics	Mangrove	Seagrass	Coral reef	Rationale
Structural	Average tree height, canopy cover, basal area, and density of adult trees	Average leaf blade length, percentage cover, meadow density	Percentage live cover	Related to ecosystem services such as carbon sequestration, coastal protection and erosion control
Functional	Net primary productivity, nutrient cycling, and water filtration rates		Disease, physical damage, plastic pollution	Related to regulating ecosystem services
Biodiversity	Species composition of mangroves and other associated flora	Species composition of seagrass and other associated flora	Species composition and associated fish families	Provide insights to biodiversity and resilience to disturbances

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➢ Ecosystem Condition Account

Table 5.13 Condition account for mangrove, seagrass and coral reefs of Laamu Atoll. *Difference due to site selection.

Entry	Units	2019	2020	2021	2022	2023	2024
Coral reef							
Live cover	%	17.44	-	22.93	25.90	-	19.67
Bleached	%	0.34	-	0.04	0.83	-	10.97
Diseased	%	0	-	0	0.6	-	0
Fish biomass (commercial families)	Kg / 100 m^2	-	-	1.4	4.72	-	-
Fish biomass (ecological families)	Kg / 100 m^2	-	-	3.55	0.76	-	-
Mangrove							
Average tree height*	m	-	-	-	-	4.5	4.05
Basal area*	cm	-	-	-	-	529	479
Above ground biomass	Mg	-	-	-	-	168.90	168.45
Below ground biomass	Mg	-	-	-	-	185.47	184.66
Seagrass							
Live cover	%	-	-	-	-	53.98	51.29
Epibenthic cover	%	-	-	-	-	10.51	13.42

*Dominant mangrove species - *Rhizophora mucronata*

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➢ Ecosystem Service Account

Table 6.35 Ecosystem service supply table, in physical values.

Ecosystem service	Year (data)	Units	Economic units	Households	Government	Ecosystems			Total supply
						Coral reef	Seagrass	Mangrove	
Final ecosystem services									
Wild fish provisioning (reef fish)	2022	Tonnes landed (Mg)				28.17			28.17
Global climate regulation (Carbon sequestration)	2020	Carbon sequestered (MgC)					3460.1	24.6	3484.7
Coastal protection	2023	Coastline protected (m)				33,142			33,142
Recreational value	2023	Visitor nights / Participants (#)				53,250	1440 (gleaning)	120	
Intermediate ecosystem services									
Nursery and habitat maintenance service*	2020	Tonnes of enhancement (Mg)				203.64	40.78		244.42
Sediment production	2023	Natural sediment nourishment (m^3)				4524.98	88.9		4613.88

➢ Ecosystem Service Account

Table 6.37 Ecosystem service supply table, in monetary values (MVR, millions) over multiple years due to differing data source dates.. NV = Not valued, data insufficient to perform monetary valuation of service.

*Quaywall replacement cost

Ecosystem service	Year (data)	Economic units	Households	Government	Ecosystems			Total supply
					Coral reef	Seagrass	Mangrove	
Wild fish provisioning (reef fish)	2022				NV	-	-	NV
Global climate regulation (Carbon sequestration)	2020				-	10.58	0.08	10.66
Coastal protection*	2023				82.85	-	-	82.85
Recreational value	2025				640.91	NV	0.00	640.91
Nursery and habitat maintenance service	2020				NV	NV	-	NV
Sediment production	2023				0.47	<0.01	-	0.47

Challenges

- Lack of availability of data
- Fragmented and inconsistent data systems
- Limited technical and institutional capacity
- Geographic dispersion of islands raises monitoring costs
- Lack of coordination and centralized database for data

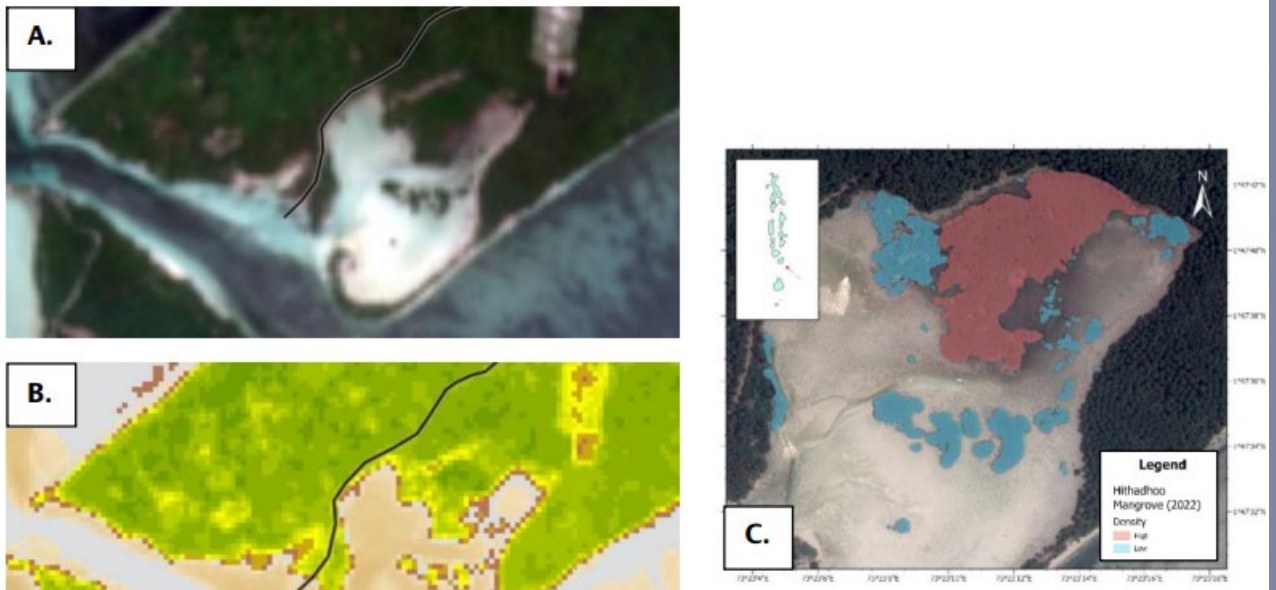

Figure 4.6 Comparison of Sentinel-2 (10 m) natural-colour imagery (A) and vegetation product (B), against (C) Pleaides ultra-high resolution satellite imagery (0.3 m) for mapping Hithadhoo mangroves.

Potential use(s) of Accounts

- Evidence-based planning – MPAs, MSP, identifying key areas
- Climate adaptation- valuing natural buffers vs engineered alternatives
- Innovative financing- supports blue bonds, debt for nature swaps
- Meeting international reporting obligations- 30 x 30, NDC targets, GBF reporting

Next steps

- ❑ National Implementation Roadmap for Ocean Accounts 2025-2030
- ❑ Expand accounts to national level (all atolls & ecosystems)
- ❑ Strengthen institutional coordination & centralized data management
- ❑ Develop sustainable financing strategies linked to accounts
- ❑ Regular reporting to track progress & inform policy

Next steps

- National Implementation Roadmap

  for Ocean Accounts 2025-2030

- Launched in June 2025

Developing the **foundation:**

focusing on **identifying priority indicatiors** for the OA modules (Environmental assets, flows, ocean economy and ocean governance)

Iterative testing at national level for:

- **policy mainstreaming** of OA and decision support tools used
- Dedicated **dashboard**

National system of OA established
– mainstreamed into decision making

– aligned with national priorities and development strategies


Thank you!