

Maldives Coastal Characterization

Spatial and Temporal Characterization of Coastal Development and Infrastructure in the Maldives

Geodatabase Summary

23rd October 2022

Prepared for

Waitt Institute



Prepared by

Small Island Geographic Society



Document Name	Geodatabase Summary Report
Project Title	Spatial and Temporal Characterization of Coastal Development and Infrastructure in the Maldives
Client	Waitt Institute
Project Number	SIGS/2022/P-004
Document Number	2022-P004-REP-05
Document Date	23 rd October 2022

Review and Approval Record of the Present Document:

Action	Name	Designation	Date
Prepared by	Hamza Moosa	GIS Analyst	20 th October 2022
Checked by	Faruhath Jameel	GIS Expert	23 rd October 2022
Reviewed by	Ahmed Jameel	Project Leader	23 rd October 2022

Revision:

Version	Date	Description
1.0	23 rd October 2022	Initial Release

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2 List of Abbreviations

SIGS	Small Island Geographic Society
GIS	Geographic Information system
NGO	Non-government organizations
MECCT	Ministry of Environment, Climate Change and Technology
EIA	Environmental Impact Assessment
EPA	Environmental Protection Agency
MOFA	Ministry of Fisheries and Agriculture
MNPPI	Ministry of National Planning, Housing and Public Infrastructure
MOT	Ministry of Tourism
MED	Ministry of Economic Development
MCAA	Ministry of Civil Aviation Authority
MMS	Maldives Meteorology Service
MMRI	Maldives Marine Research Institute
MLSA	Maldives Land and Survey Authority
MPA	Maldives Ports Authority
GEBCO	General Bathymetric Chart of the Oceans
BODC	British Oceanographic Data Centre
NOAA	National Oceanographic and Atmospheric Administration
NBS	National Bureau of Statistics
IPRC	International Pacific Research Centre

3 Introduction

This project's aim is to study and characterize the spatial and temporal coastal development projects to create a spatial database of coastal infrastructures. The overall approach of this project was to establish a geospatial database using existing data in various government and other agencies. Therefore, the project does not include collection of spatial raw data from the field.

This report consists of a technical summary of the layers compiled in the final geodatabase. The final geodatabase is a collection of 4 shapefile folders (EIA_shapes, EIAlist_points, basemap_shapes, and MLSA). The features in the folders EIA_shapes, EIAlist_points and basemap_shapes have been digitized in WGS 1984 (EPSG) 4326 using ArcGIS Pro. Whereas, the features in "MLSA" were published by the Maldives Land and Survey Authority (MLSA).

The team acknowledges the support and assistance provided by Ms. Robin Ramdeen - Program Director, Mr. Andy Estep, Science Director and Mr. Matt Paufve – Science Manager from Waitt Institute in guiding the team to achieve the overall objective of the project. Hon. Aiminath Sauna, Minister of Environment, Climate Change and Technology was instrumental in gaining access to the spatial database at the Climate Change Department of the Ministry of Environment, Climate Change and Technology developed as part of the Climate Risk Screening for Mainstreaming Climate Change Adaptation into Development Activities and Policies in the Maldives by Asian Development Bank's (ADB) regional capacity development technical assistance (TA) Action on Climate Change in South Asia.

The team also acknowledges the support and assistance provided by Mr. Moosa Zameer Hassan - Program Coordinator, Ms Maeesha Mohamed - Administrative Coordinator from Noo Raajje programme to implement the project activity in the Maldives as on track.

This report is prepared by Small Island Geographic Society (SIGS).

4 Geodatabase (shapefiles)

4.1.1 EIA_shapes

These layers are the features digitized from information extracted from EIAs. Apart from data on coastal infrastructure, they also include data from graphs/tables/photos from surveys carried out and presented in the selected EIAs. For example, available benthic data, water quality data and photos from marine surveys have been added to the features. Moreover, the attribute “category” refers to the existence or implementation of the infrastructure. For example, “Proposed” stands for infrastructure that have been built as proposed by the EIA report, whereas, “Existing” stands for infrastructure that are/were already present at the time of the EIA study.

Layer	Feature type	Sub classification	Attributes	Data type
Marine survey points (m_survey) Number of features: 3107	Point	Standard attributes	OBJECTID	Default
			SHAPE	Default
			Type (EIA type)	Text
			Year (year of publication)	Text
			Project (project name)	Text
			Consultant	Text
			Proponent	Text
			Atoll (name of the atoll the EIA was carried out)	Text
			Island_Reef (name of the island/reef the EIA was carried out)	Text
			Method (survey methodology)	Text
		Benthic classification (%)	LC (live coral)	Double
			HC (hard coral)	Double
			SC (soft coral)	Double
			ALG (algae)	Double
			SG (seagrass)	Double
			OT (other)	Double
			DC (dead coral)	Double
			RC (rock)	Double
			RB (rubble)	Double

		Water quality	SD (sand)	Double
			SI (silt)	Double
			Temperature (°C)	Float
			Salinity (ppm or mg/l)	Float
			pH	Float
			DO (dissolved oxygen) (mg/l)	Float
			Turbidity (NTU)	Float
			SS (suspended sediments) (mg/l)	Float
			Photos (photos taken in relation to the survey)	Attachments
Reclamation areas (reclam_area) Number of features: 131	Polygon		OBJECTID	Default
			SHAPE	Default
			Shape_Length	Default
			Shape_Area	Default
			Type	Text
			Year	Text
			Project	Text
			Consultant	Text
			Proponent	Text
			Atoll	Text
			Island_Reef	Text
			Volume (m ³)	Double
			Category	Text
Revetments (revetment) Number of features: 309	Line		OBJECTID	Default
			SHAPE	Default
			Shape_Length	Default
			Type	Text
			Year	Text
			Project	Text
			Consultant	Text
			Proponent	Text

			Atoll	Text
			Island_Reef	Text
			Material	Text
			Category	Text
Borrow areas (borrow_area) Number of features: 137	Polygon		OBJECTID	Default
			SHAPE	Default
			Shape_Length	Default
			Shape_Area	Default
			Type	Text
			Year	Text
			Project	Text
			Consultant	Text
			Proponent	Text
			Atoll	Text
			Island_Reef	Text
			Volume (m ³)	Double
		Category	Text	
Dredging areas (dredge_area) Number of features: 204	Polygon		OBJECTID	Default
			SHAPE	Default
			Shape_Length	Default
			Shape_Area	Default
			Type	Text
			Year	Text
			Project	Text
			Consultant	Text
			Proponent	Text
			Atoll	Text
			Island_Reef	Text
			Volume (m ³)	Double
		Category	Text	

Impact areas (impact_area) Number of features: 379	Polygon		OBJECTID	Default
			SHAPE	Default
			Shape_Length	Default
			Shape_Area	Default
			Type	Text
			Year	Text
			Project	Text
			Consultant	Text
			Proponent	Text
			Atoll	Text
			Island_Reef	Text
			System	Text
Outfall pipes (outfallpipe) Number of features: 42	Line	EIA general information	OBJECTID	Default
			SHAPE	Default
			Shape_Length	Default
			Type	Text
			Year	Text
			Project	Text
			Consultant	Text
			Proponent	Text
			Atoll	Text
			Island_Reef	Text
			Outfall	Text
			Category	Text
Wave data locations (wave) Number of features: 14	Point	Wave data	OBJECTID	Default
			SHAPE	Default
			Type	Text
			Year	Text
			Project	Text
			Consultant	Text

			Proponent	Text
			Atoll	Text
			Island_Reef	Text
			Direction (°)	Double
			Hs (Significant Wave Height) (m)	Double
			Ts (Mean Period of Hs) (s)	Double
			Mean_Depth (Mean Depth of Water) (m)	Double
Current data locations (current)	Point	Current data	Objectid	Default
Number of features: 966			Shape	Default
			Type	Text
			Year	Text
			Project	Text
			Consultant	Text
			Proponent	Text
			Atoll	Text
			Island_Reef	Text
			Direction (degrees)	Double
			Speed (m/s)	Double
Channels (channel)	Polygon		OBJECTID	Default
Number of features: 151			SHAPE	Default
			Shape_Length	Default
			Shape_Area	Default
			Type	Text
			Year	Text
			Project	Text
			Consultant	Text
			Proponent	Text
			Atoll	Text
			Island_Reef	Text

			Category	Text
Harbor basins (harbor) Number of features: 148	Polygon		OBJECTID	Default
			SHAPE	Default
			Shape_Length	Default
			Shape_Area	Default
			Type	Text
			Year	Text
			Project	Text
			Consultant	Text
			Proponent	Text
			Atoll	Text
			Island_Reef	Text
			Category	Text
Quay walls (quay_wall) Number of features: 232	Line		OBJECTID	Default
			SHAPE	Default
			Shape_Length	Default
			Type	Text
			Year	Text
			Project	Text
			Consultant	Text
			Proponent	Text
			Atoll	Text
			Island_Reef	Text
			Category	Text
			Seagrass removal areas (seagrass_rem) Number of features: 33	Polygon
SHAPE	Default			
Shape_Length	Default			
Shape_Area	Default			
Type	Text			
Year	Text			

			Project	Text
			Consultant	Text
			Proponent	Text
			Atoll	Text
			Island_Reef	Text
			Species	Text
Fill areas (fill_area)	Polygon		OBJECTID	Default
Number of features: 94			SHAPE	Default
			Shape_Length	Default
			Shape_Area	Default
			Type	Text
			Year	Text
			Project	Text
			Consultant	Text
			Proponent	Text
			Atoll	Text
			Island_Reef	Text
			Volume (m³)	Double
			Category	Text
Jetties (jetty)	Line		OBJECTID	Default
Number of features: 277			SHAPE	Default
			Shape_Length	Default
			Type	Text
			Year	Text
			Project	Text
			Consultant	Text
			Proponent	Text
			Atoll	Text
			Island_Reef	Text
			Purpose	Text

			Category	Text
Breakwaters (breakw) Number of features: 774	Line		OBJECTID	Default
			SHAPE	Default
			Shape_Length	Default
			Type	Text
			Year	Text
			Project	Text
			Consultant	Text
			Proponent	Text
			Atoll	Text
			Island_Reef	Text
			Material	Text
			Category	Text
Overwater facilities (ow_facility) Number of features: 2861	Point		OBJECTID	Default
			SHAPE	Default
			Type	Text
			Year	Text
			Project	Text
			Consultant	Text
			Proponent	Text
			Atoll	Text
			Island_Reef	Text
			Facility	Text
			Category	Text
			Groynes (groyne) Number of features: 258	Line
SHAPE	Default			
Shape_Length	Default			
Type	Text			
Year	Text			
Project	Text			

			Consultant	Text
			Proponent	Text
			Atoll	Text
			Island_Reef	Text
			Material	Text
			Jetty (jetty)	Text
Beach nourishments (beach_nour) Number of features: 111	Polygon		OBJECTID	Default
			SHAPE	Default
			Shape_Length	Default
			Shape_Area	Default
			Type	Text
			Year	Text
			Project	Text
			Consultant	Text
			Proponent	Text
			Atoll	Text
			Island_Reef	Text
Coral propagation (coral_prop) Number of features: 32	Point		OBJECTID	Default
			SHAPE	Default
			Type	Text
			Year	Text
			Project	Text
			Consultant	Text
			Proponent	Text
			Atoll	Text
			Island_Reef	Text
			Category	Text
			Species	Text

4.1.2 Basemap_shapes

These layers consist of visible coastal infrastructure that have been digitized directly from the ESRI living atlas basemap. Listed below are the features that have been digitized. The attribute “FCODE” stands for a unique identification number assigned to each island/reef by MLSA.

Layer	Feature type	Attributes	Data type
Overwater facilities (ow_facility) Number of features: 8263	Point	OBJECTID	Default
		SHAPE	Default
		Atoll	Text
		Island_Reef	Text
		FCODE	Text
Revetmenst (revetment) Number of features: 709	Line	OBJECTID	Default
		SHAPE	Default
		Shape_Length	Default
		Atoll	Text
		FCODE	Text
Quay walls (quay_wall) Number of features:313	Line	OBJECTID	Default
		SHAPE	Default
		Shape_Length	Default
		Atoll	Text
		FCODE	Text
Jetties (jetty) Number of features:1057	Line	OBJECTID	Default
		SHAPE	Default
		Shape_Length	Default
		Atoll	Text
		FCODE	Text
Groynes (groyne)	Line	OBJECTID	Default
		SHAPE	Default

Number of features:1056		Shape_Length	Default
		Atoll	Text
		Island_Reef	Text
		FCODE	Text
Breakwaters (breakw) Number of features:1938	Line	OBJECTID	Default
		SHAPE	Default
		Shape_Length	Default
		Atoll	Text
		Island_Reef	Text
		FCODE	Text
Harbor basins (harbor) Number of features:395	Polygon	OBJECTID	Default
		SHAPE	Default
		Shape_Length	Default
		Shape_Area	Default
		Atoll	Text
		Island_Reef	Text
		FCODE	Text
Channels (channel) Number of features:493	Polygon	OBJECTID	Default
		SHAPE	Default
		Shape_Length	Default
		Shape_Area	Default
		Atoll	Text
		Island_Reef	Text
		FCODE	Text

4.1.3 EIAlist_points

This layer consists of point data which represent EIAs. This was digitized using the island polygons from Onemap and a list shared by the EPA which includes EIAs from 2011-2021.

Layer	Feature type	Attributes	Data type
EIA points Number of features: 634	Point	FID	Default
		SHAPE	Default
		Atoll	Text
		islandName	Text
		capital	Text
		islandNa_1	Text
		Category	Text
		longitude	Text
		latitude	Text
		Area_ha	Double
		ORIG_FID	Long
		Year	Double
		EIA_title (project name)	Text
		Type (EIA type)	Text
		Proponent	Text
Consultant	Text		

4.1.4 MLSA (Onemap)

These are the layers published by MLSA. The attribute “FCODE” stands for a unique identification number assigned to each island/reef by MLSA.

Layer	Feature type	Attributes	Data type
Islands	Polygon	FID	Object ID
		Shape	Geometry
		FCODE	Text
		atoll	Text
		islandName	Text
		capital	Text
		islandNa_1	Text
		Category (Inhabited or Uninhabited)	Text
		longitude	Text
		latitude	Text
		Area_ha	Double
Reef	Polygon	FID	Object ID
		Shape	Geometry
		name	Text
		Atoll	Text
		FCODE	Text
		Areaha	Double
		longitude	Text
		latitude	Text
Lagoon	Polygon	FID	Object ID
		Shape	Geometry
		Atoll	Text
		FCODE	Text
		Areaha	Double
		longitude	Text

		latitude	Text
Protected_Areas_of_Maldives (EPA_V2)	Polygon	FID	Object ID
		Shape	Geometry
		name	Text
		Declared_D (date of declaration)	Text
		Directive	Text
Ihthisaas (administrative boundary)	Polygon	FID	Object ID
		Shape	Geometry
		IslandName	Text
		IslandNaDH	Text
		Shape_Leng	Double
		Shape_Area	Double