MULTIHAZARD RISK ATLAS OF MALDIVES

Biodiversity—Volume IV

MARCH 2020

ADB

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ISBN 978-92-9262-051-6 (print); 978-92-9262-052-3 (electronic); 978-92-9262-053-0 (ebook)
Publication Stock No. TCS200089
DOI: http://dx.doi.org/10.22617/TCS200089

Notes:
In this publication, "$" refers to United States dollars.
The maps presented in this atlas reflect airports based on 2017 data from the Civil Aviation Authority of Maldives.

On the cover: An aerial view shows 1 of 26 natural atolls that make up Maldives, which also includes nearly 1,200 small coral islands and some of the world's most beautiful beaches. Recognized as the seventh-largest in the world, the coral reefs and associated ecosystems of Maldives are key foundations for food security and means of livelihood. Yet, they are considered as among the most vulnerable to climate change (photo by Roberta Gerpacio).

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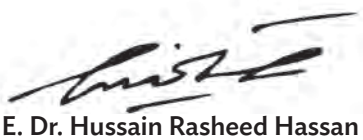
Foreword

Maldives is among the countries most vulnerable to the impacts of climate change as it is a small island nation with extremely low elevations. Maldives is also very vulnerable to impacts of rising air and sea surface temperatures and changes in rainfall patterns. Climate change impacts will therefore impose significant negative consequences on the Maldivian economy and society. Some of the priority vulnerabilities to climate change are land loss and beach erosion, infrastructure damage, degradation of coral reefs, and adverse impacts on water resources, food security, human health, and the overall economy.

Sustainable coastal resources management is of particular importance to Maldives, such that all regulations involving various development activities have coastal components. Despite the government's continued efforts in improving and sustaining coastal resources management, critical issues remain, such as the need for systematized coastal monitoring, clear definition of coastal boundaries and coastal development, enhanced regulatory and monitoring capacities for coastal resources protection, and sustainable long-term strategies on land reclamation and marine area protection. At a time when climate is rapidly changing and extreme weather events are frequently occurring, the critical roles that marine and coastal environments play in mitigating and adapting to climate change need to be sufficiently documented and properly recognized. It is therefore essential for Maldives to develop and establish a comprehensive digital database of marine and coastal ecosystem features and services that can be regularly monitored.

The *Multihazard Risk Atlas of Maldives* was developed through the project "Establishing a National Geospatial Database for Mainstreaming Climate Change Adaptation into Development Activities and Policies in Maldives" under the Asian Development Bank's regional knowledge and support (capacity development) technical assistance Action on Climate Change in South Asia (2013–2018). This five-volume atlas aims to promote the sustainable development of coastal and marine ecosystems and their various components, by enhancing the awareness of stakeholders on and enjoining them to address climate and disaster risks (including hazards, exposures, and vulnerabilities) to which ecosystems are exposed. The atlas presents spatial information and maps necessary for assessing future development investments in terms of their risks to climate and geophysical hazards.

The target audience of the *Multihazard Risk Atlas of Maldives* are the concerned stakeholders with current or planned development activities in the country, including public and private sectors, nongovernment organizations, research and academic community, development partner agencies, other financial institutions, and the general public. The atlas will also be a useful reference for other developing countries with similar geographical and environmental conditions, particularly small island developing states. It is envisioned that the atlas will significantly contribute to rendering important sector development investments more resilient to hazard-specific risk scenarios in the short, medium, and long terms.



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Acknowledgments

Government Ministries, Departments, and Agencies in Maldives
- Civil Aviation Authority
- Land and Survey Authority
- Marine Research Institute
- Meteorological Service
- Ministry of Economic Development
- Ministry of Education
- Ministry of Environment
- Ministry of Fisheries, Marine Resources and Agriculture
- Ministry of Health
- Ministry of National Planning and Infrastructure
- Ministry of Tourism
- National Bureau of Statistics
- National Disaster Management Center

International Institutions
- Manila Observatory
- Marine Spatial Ecology Lab, University of Queensland, Australia
- SANDER + PARTNER
- United Nations Development Programme

International Institutions in Maldives
- International Union for Conservation of Nature, Maldives
- United Nations Development Programme, Maldives

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Abbreviations

BODC	–	British Oceanographic Data Centre
CAA	–	Maldives Civil Aviation Authority
EPA	–	Maldives Environmental Protection Agency
GEBCO	–	General Bathymetric Chart of the Oceans
IHO	–	International Hydrographic Organization
IOC	–	Intergovernmental Oceanographic Commission
ME	–	Ministry of Environment
MED	–	Ministry of Economic Development
MFMRA	–	Ministry of Fisheries, Marine Resources and Agriculture
MLSA	–	Maldives Land and Survey Authority
MNPI	–	Ministry of National Planning and Infrastructure
MRC	–	Marine Research Centre
UNDP	–	United Nations Development Programme
UTM	–	Universal Transverse Mercator
WGS	–	World Geodetic System

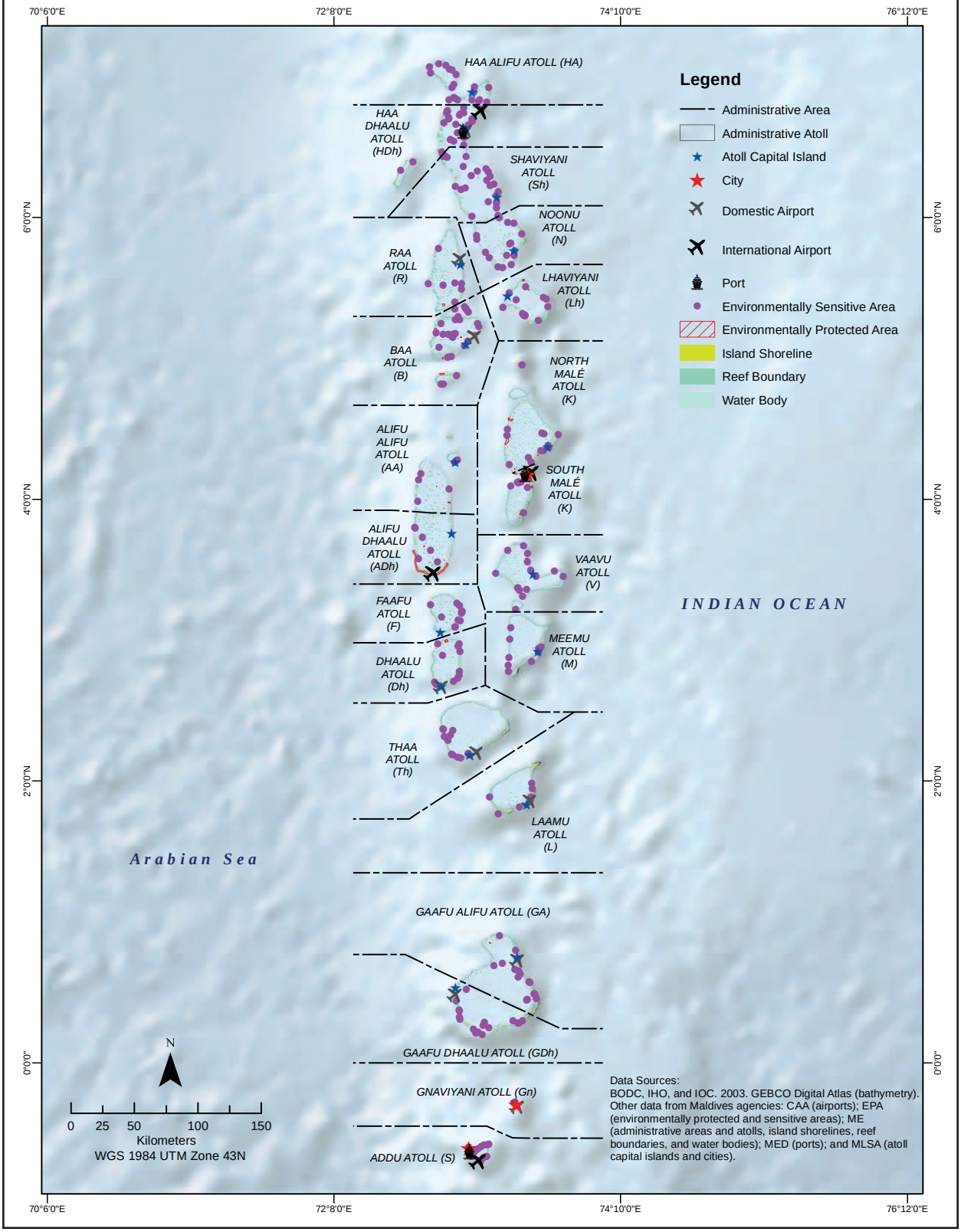
Environmentally Sensitive Areas

Maldives is naturally blessed with an environment that supports a variety of terrestrial and aquatic life. As of 2017, it has a total of 284 environmentally sensitive areas. A quarter of these sites are for bird assembly, nesting, and habitat. Migratory birds find temporary refuge in the islands of Shaviyani Atoll. The mangrove ecosystem, which exists mostly in islands with the least human settlements, serves as breeding grounds for sharks and rays and as a nesting site for turtles. In addition to providing protection to the coast and coastal communities, mangroves also protect the white-breasted waterhen (*kabili*) and tortoise and serve as shelters for aquatic organisms.

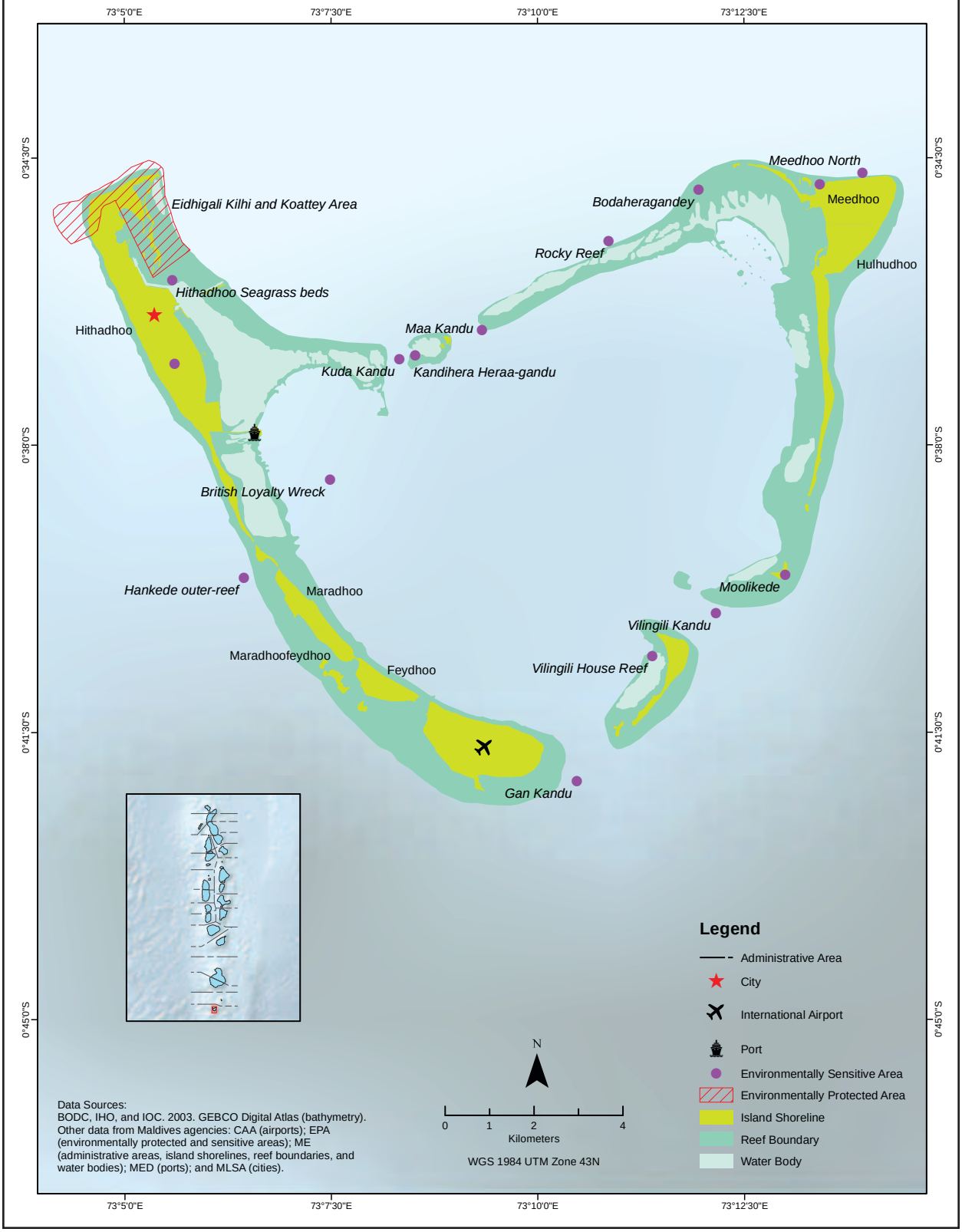
Having evolved from corals, Maldives also has black, soft, hard, and table corals that shelter a variety of marine life. Divers visit Maldives to experience these beautiful coral formations and marine ecosystems teeming with life such as the yellowback fusilier, humpback snapper, whitetip shark, whale shark, grey shark, nurse shark, leopard shark, guitar shark, hammerhead shark, needlefish, eagle ray, manta ray, turtle, tortoise, sea cucumber, lionfish, moray eel, tuna, barracuda, sailfish, red snapper, grouper, and many others. Maldives also has local medicinal plants that the country aims to protect.

Rich biodiversity in Maldives. (Clockwise from top right) The *kabili*, also known as the white-breasted waterhen, is the national bird, while the grey heron is a common sight in some coasts (photos by Wang Chaonan and Anastasia Kolchedantseva). Under the sea, blacktip reef sharks and hawksbill sea turtles abound (photos by Ibrahim Rifath and Andrew Corman).

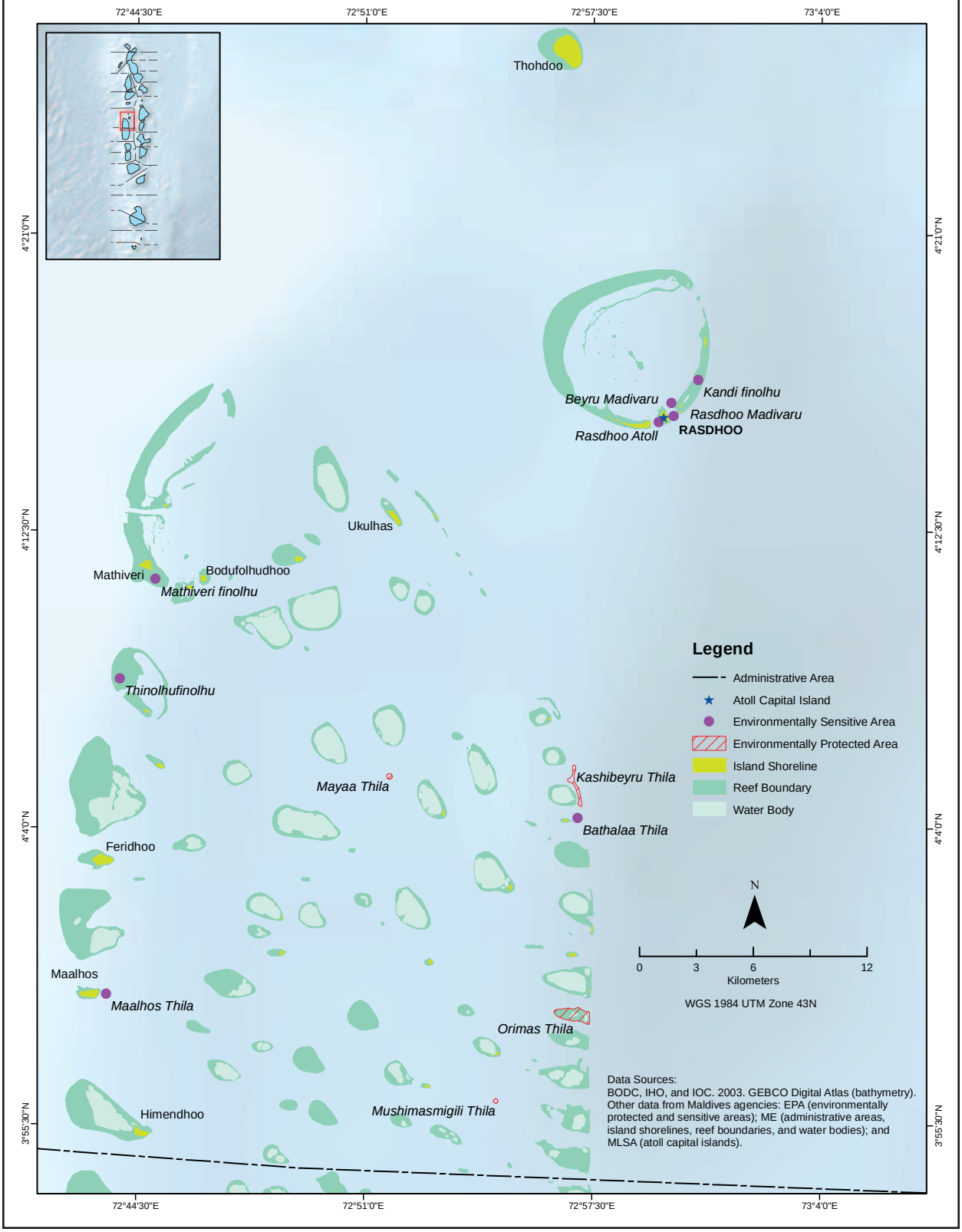
Map IV.1: Maldives, Environmentally Protected and Sensitive Areas



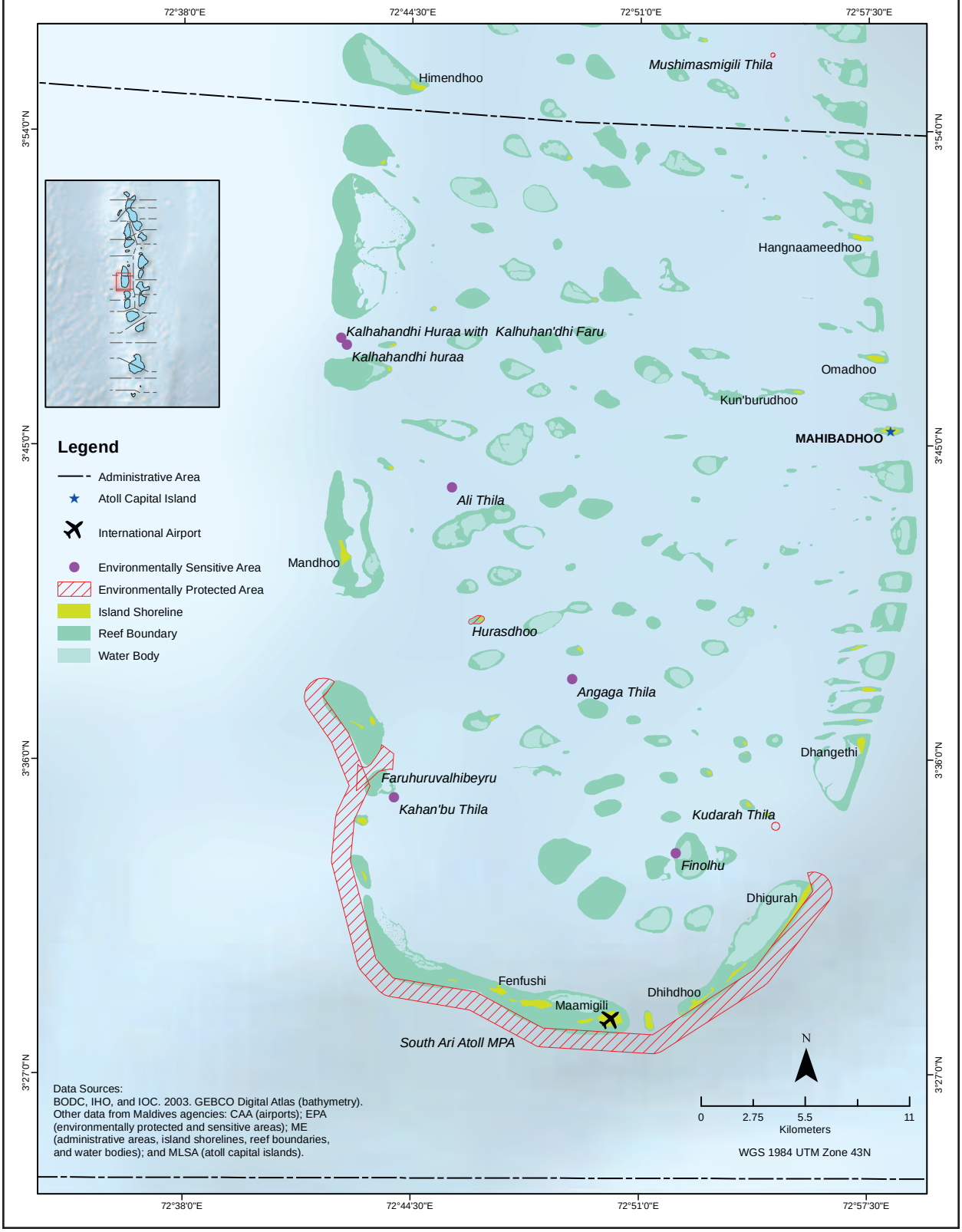
Map IV.2: Addu City, Environmentally Protected and Sensitive Areas



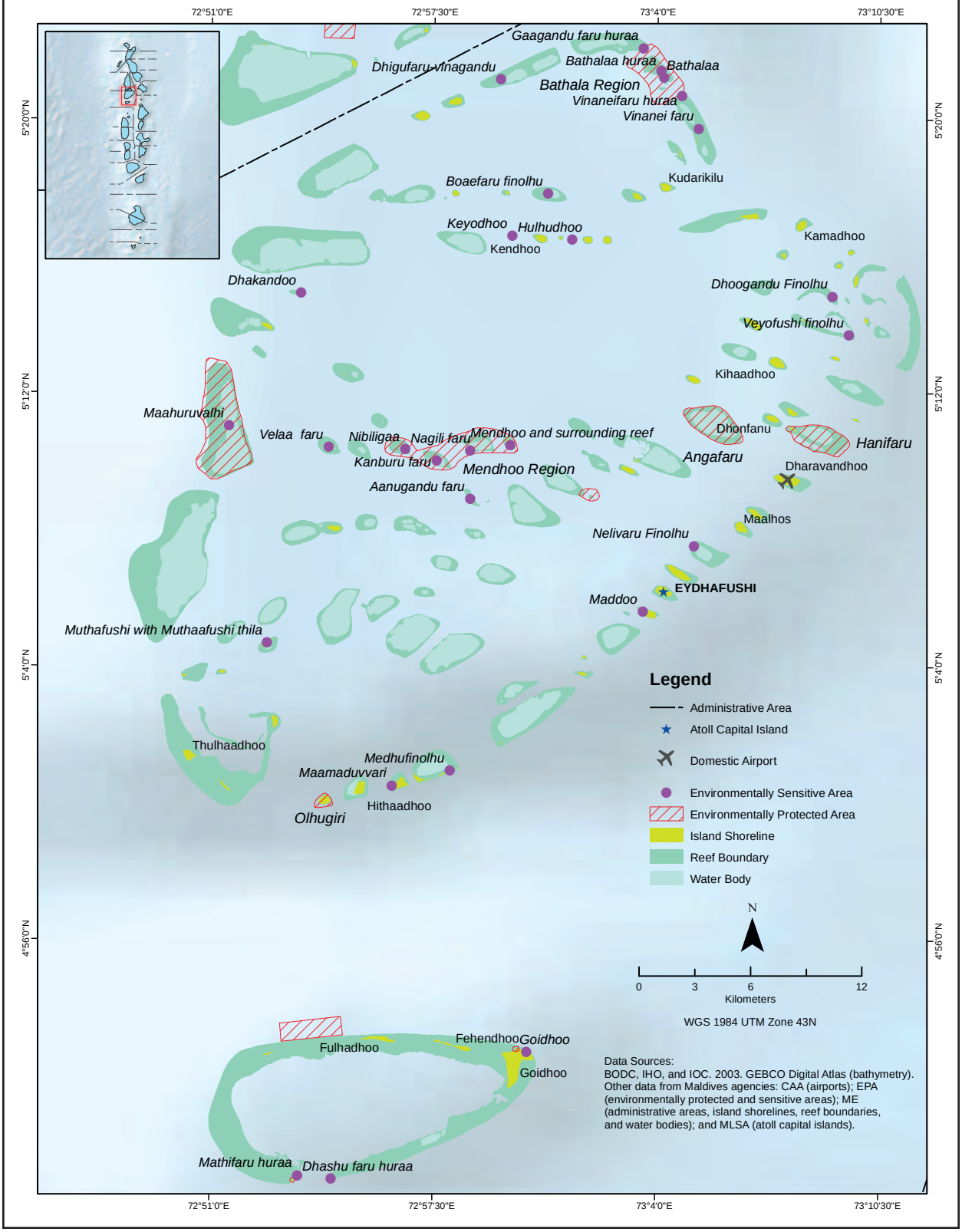
Map IV.3: Alifu Alifu Atoll, Environmentally Protected and Sensitive Areas



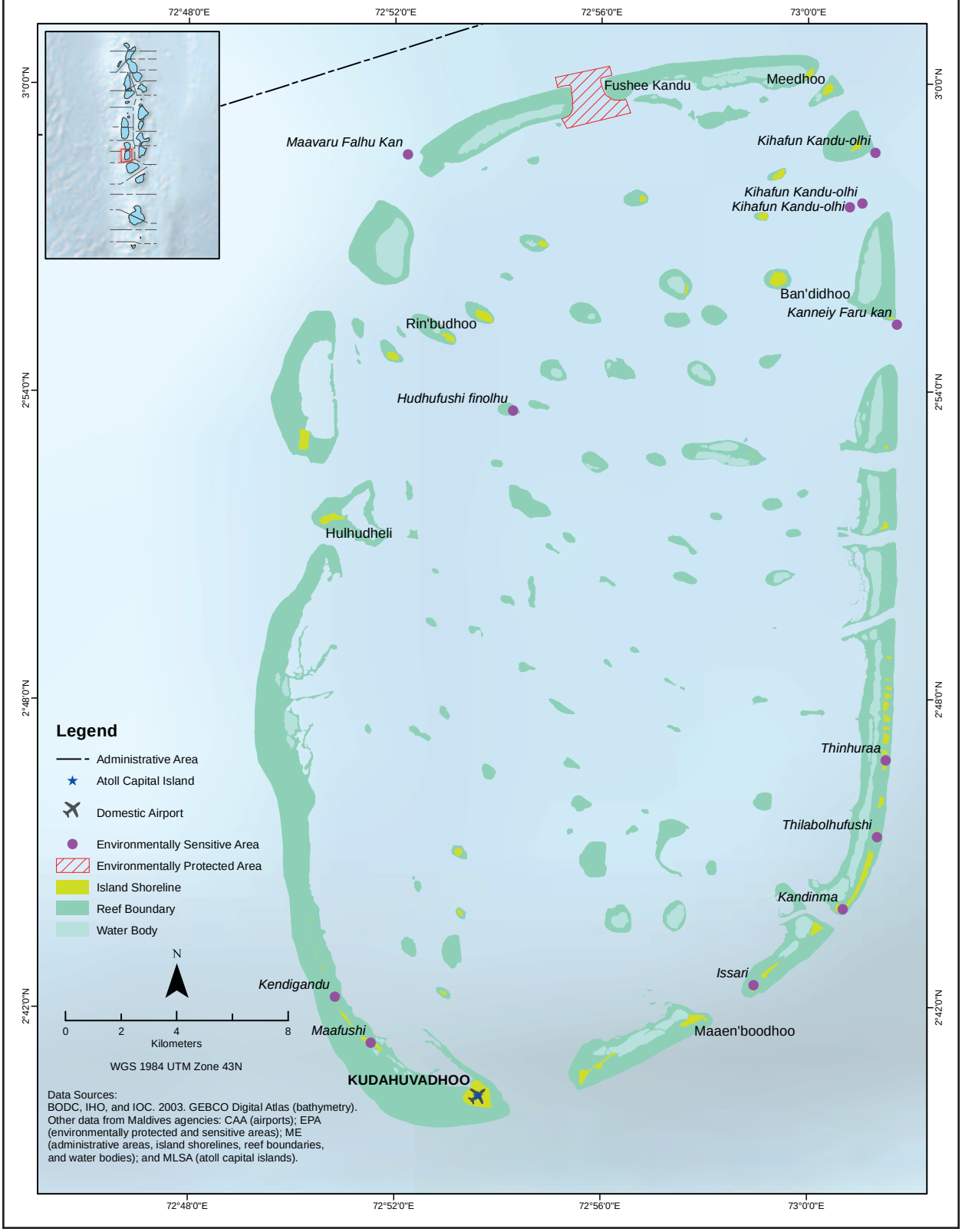
Map IV.4: Alifu Dhaalu Atoll, Environmentally Protected and Sensitive Areas



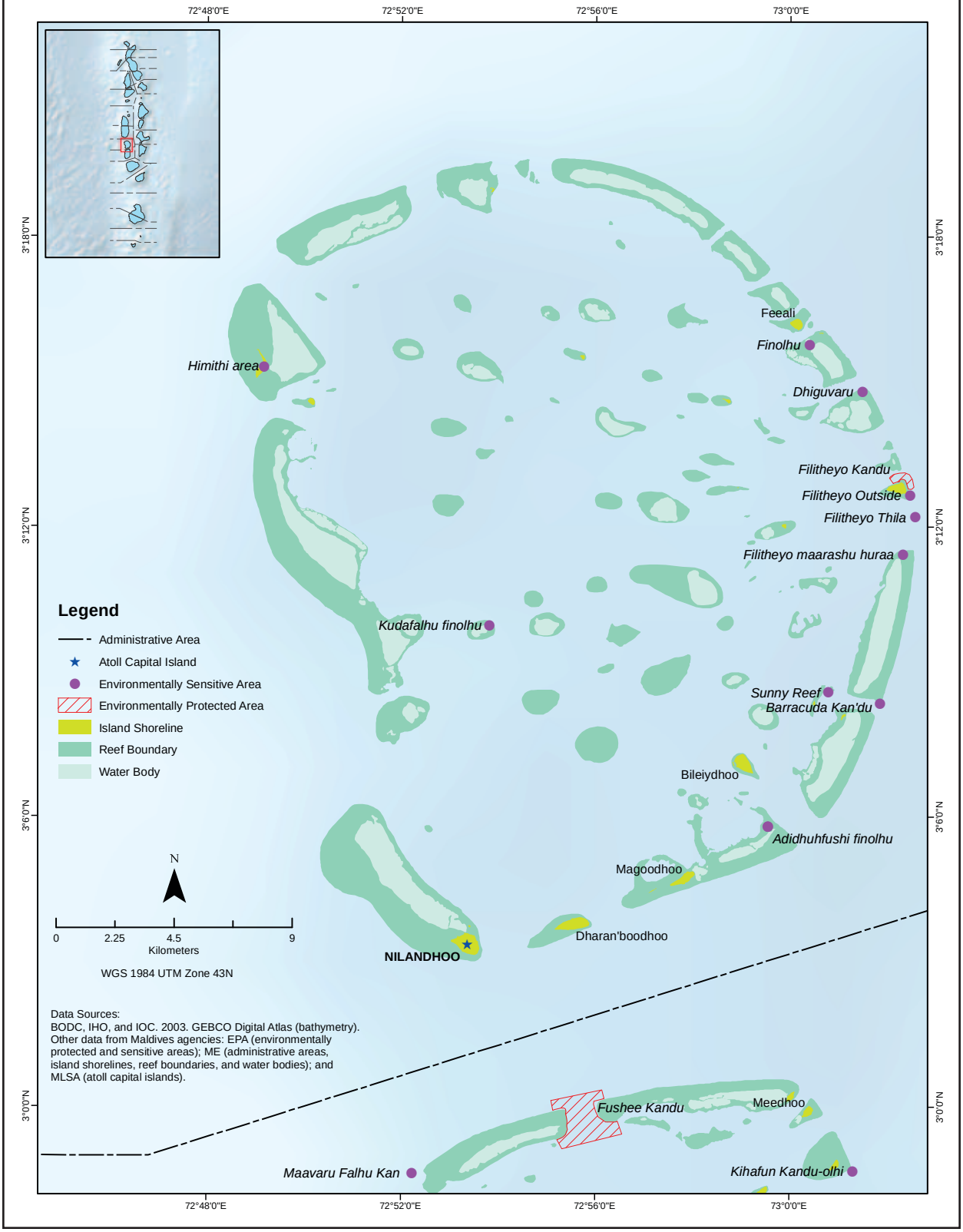
Map IV.5: Baa Atoll, Environmentally Protected and Sensitive Areas



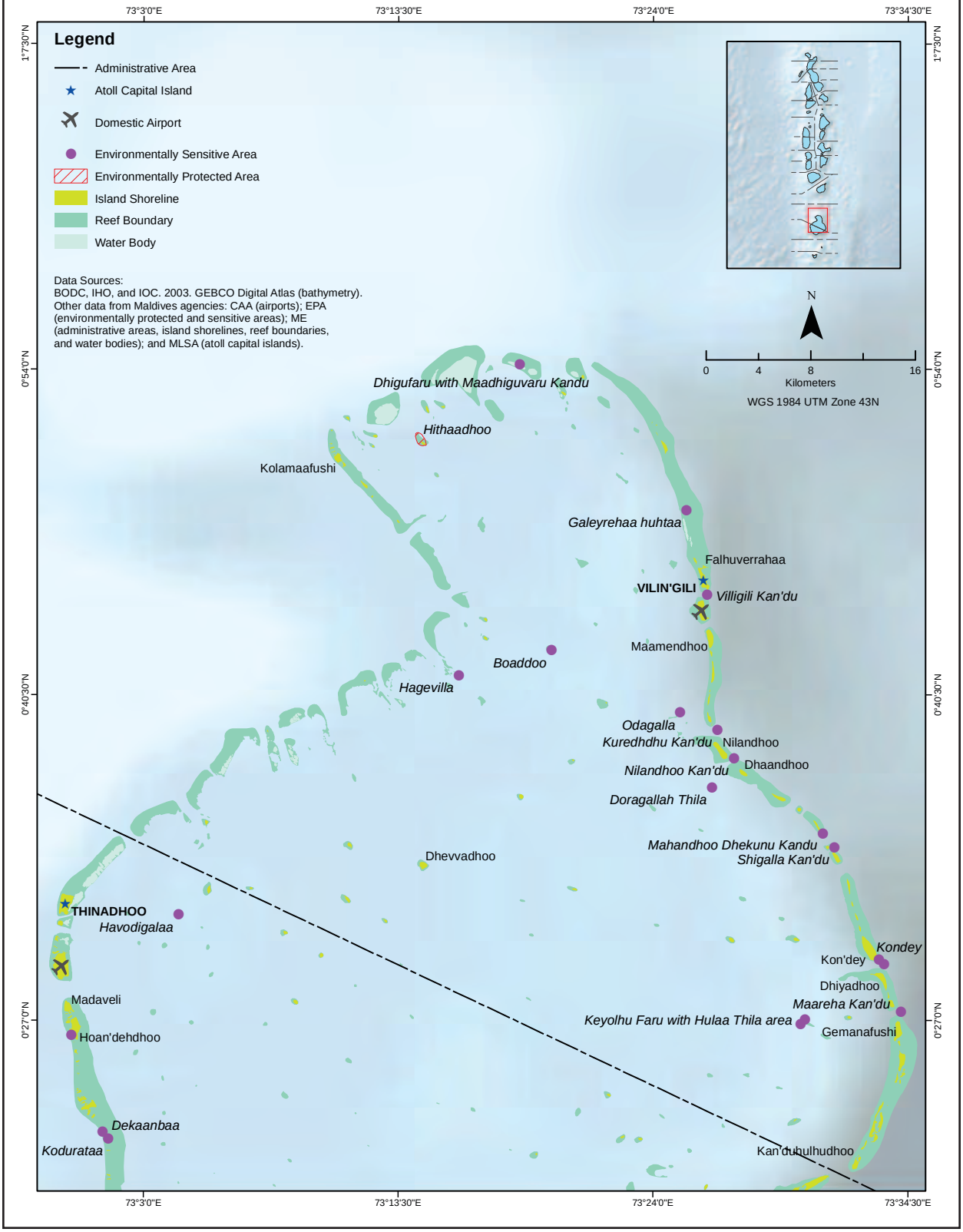
Map IV.6: Dhaalu Atoll, Environmentally Protected and Sensitive Areas



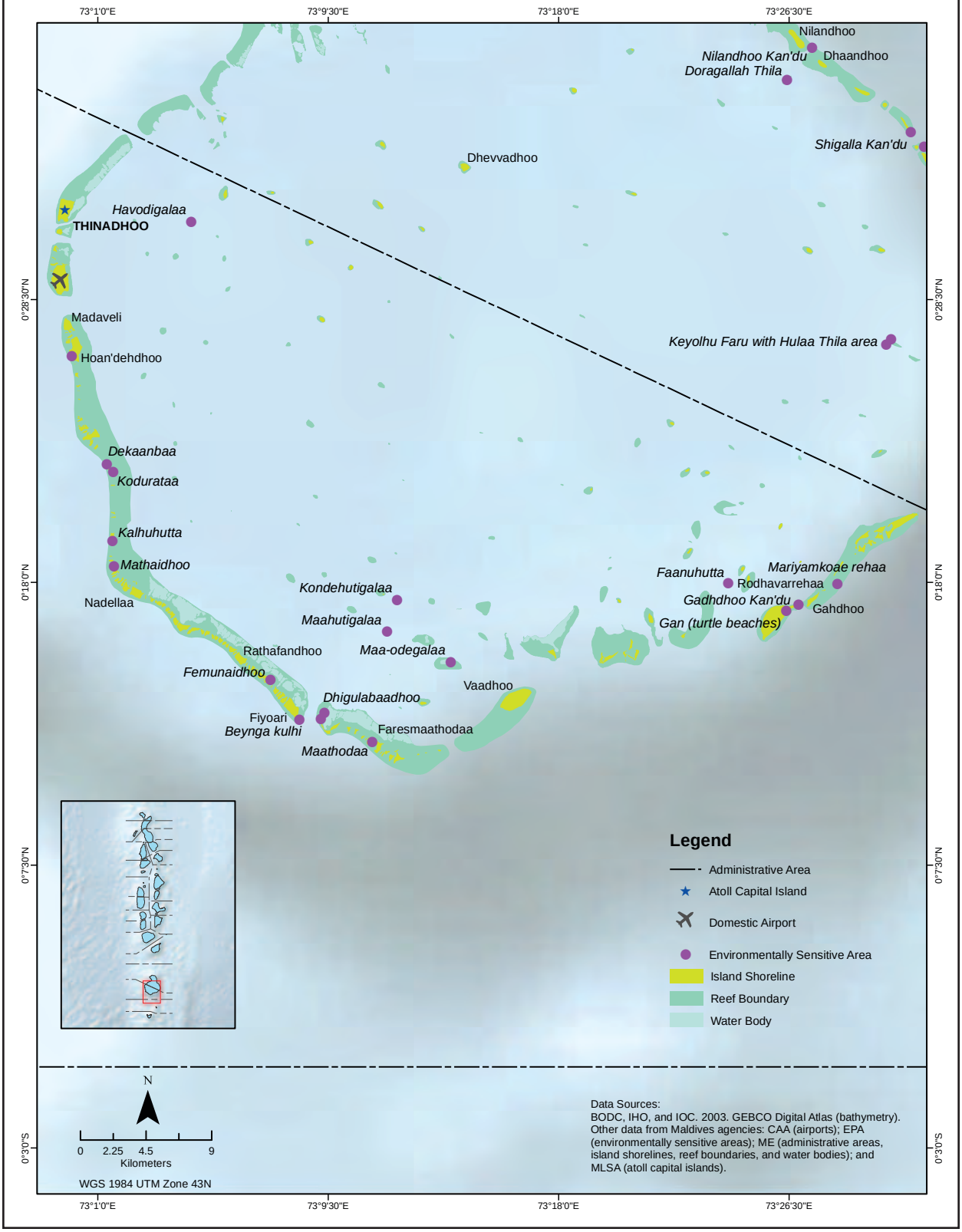
Map IV.7: Faafu Atoll, Environmentally Protected and Sensitive Areas



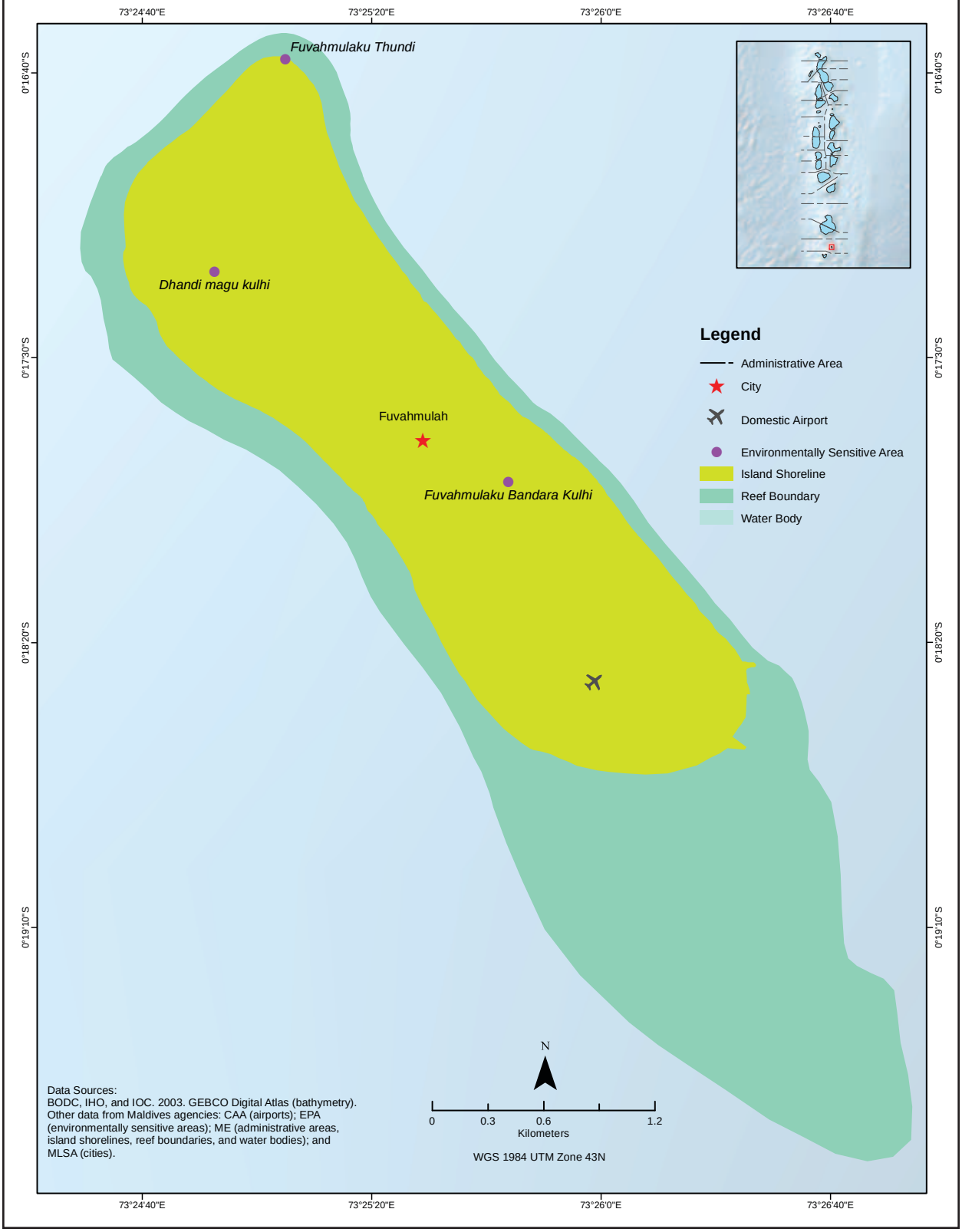
Map IV.8: Gaafu Alifu Atoll, Environmentally Protected and Sensitive Areas



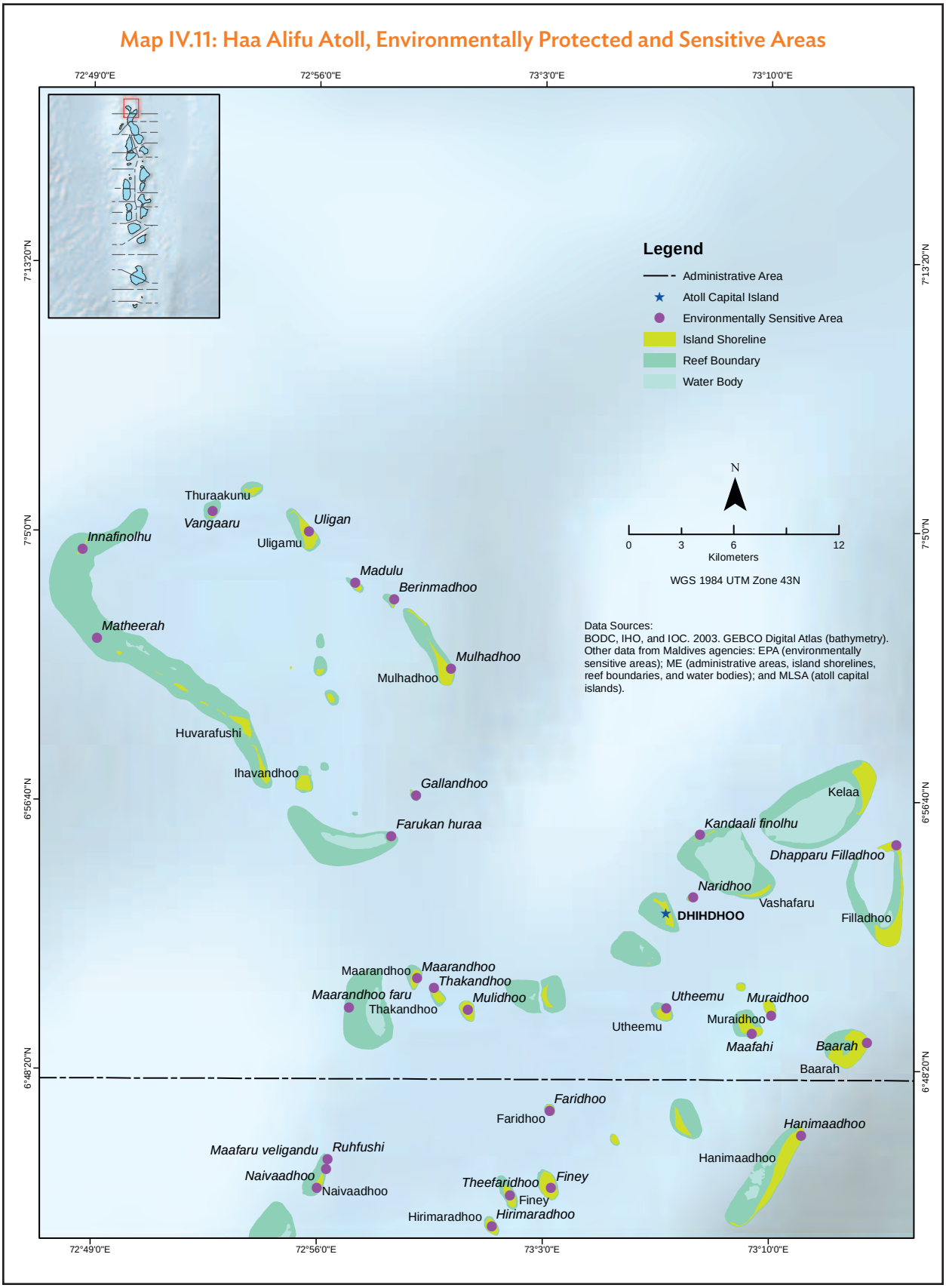
Map IV.9: Gaafu Dhaalu Atoll, Environmentally Protected and Sensitive Areas



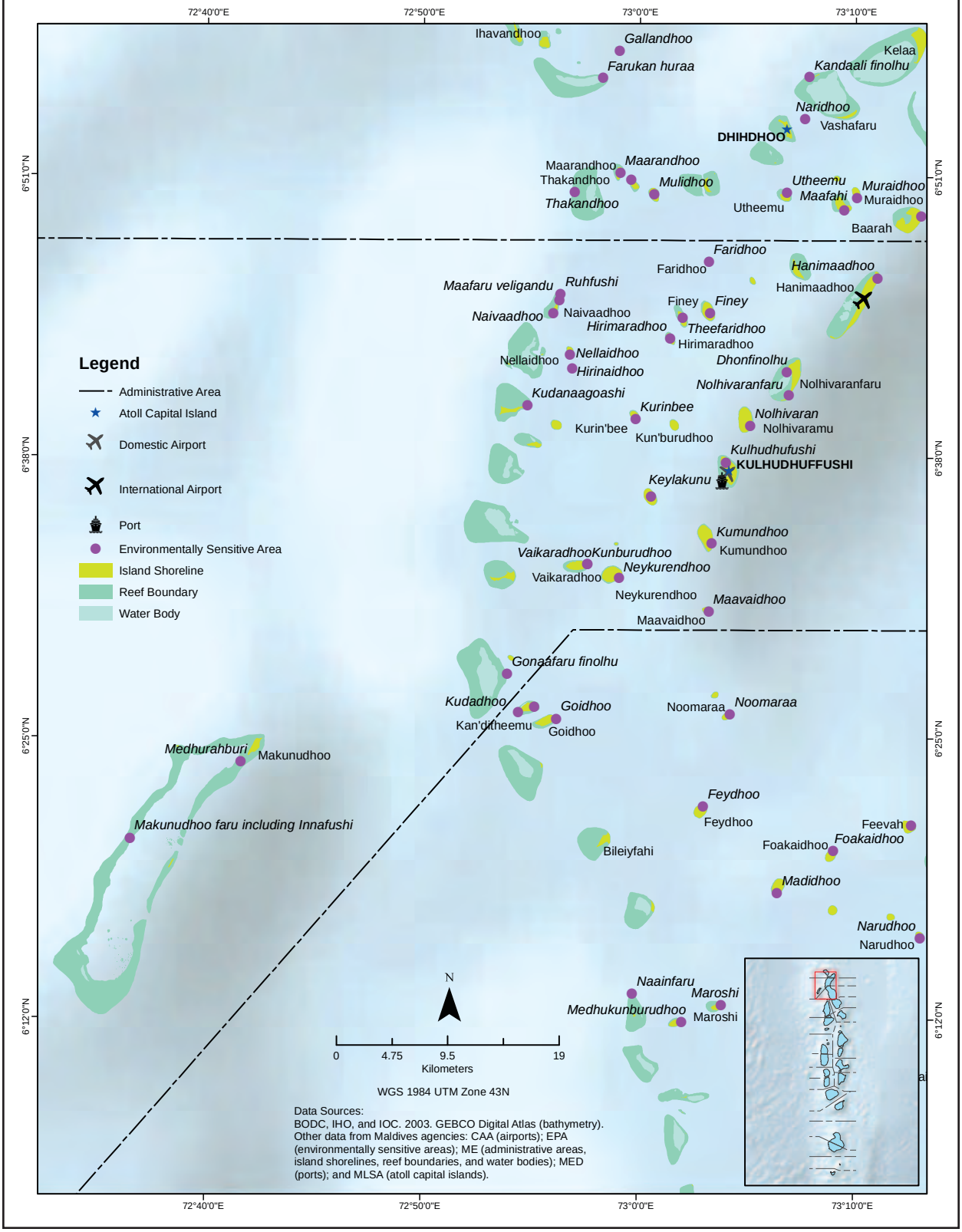
Map IV.10: Gnaviyani Atoll, Environmentally Protected and Sensitive Areas



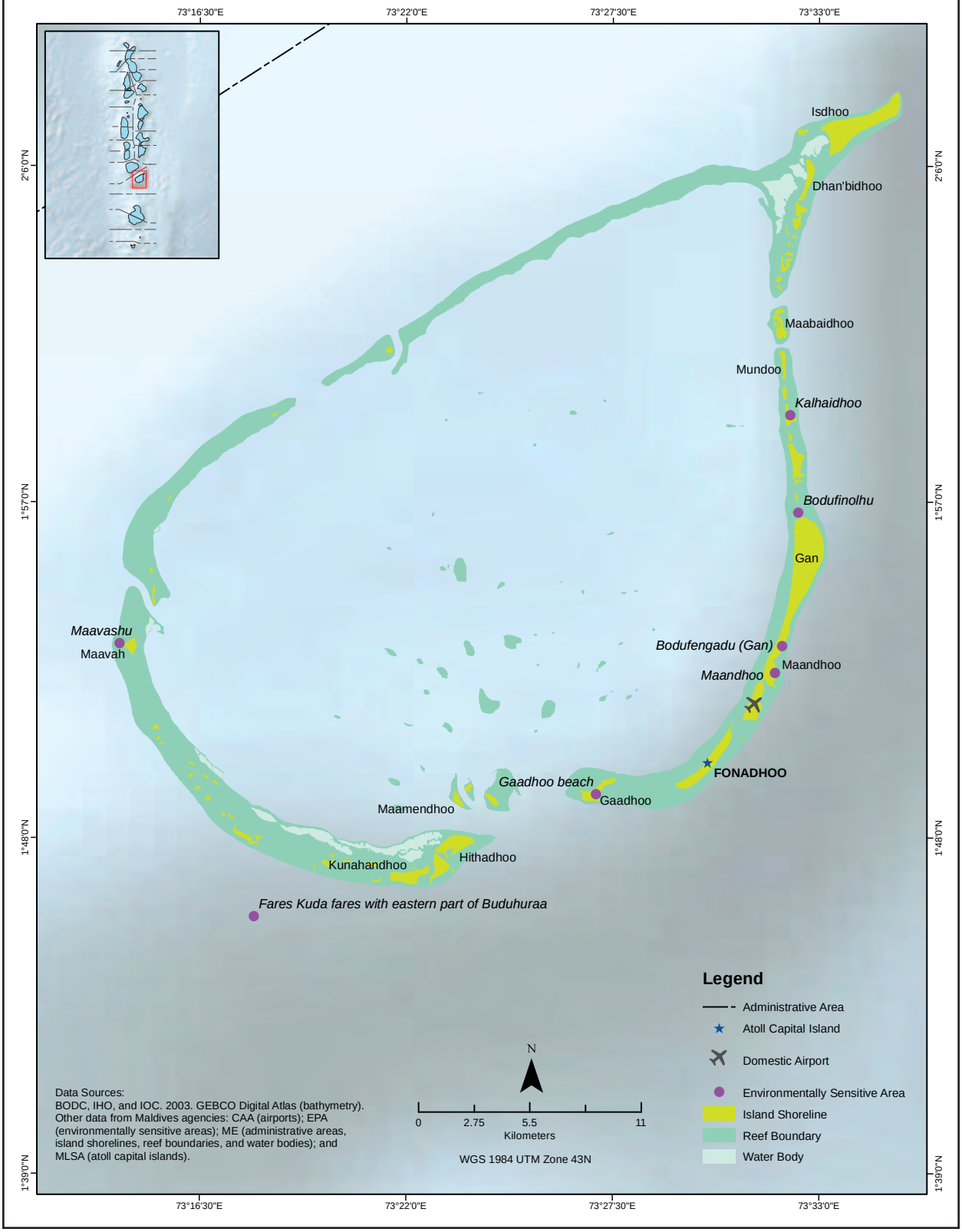
Map IV.11: Haa Alifu Atoll, Environmentally Protected and Sensitive Areas



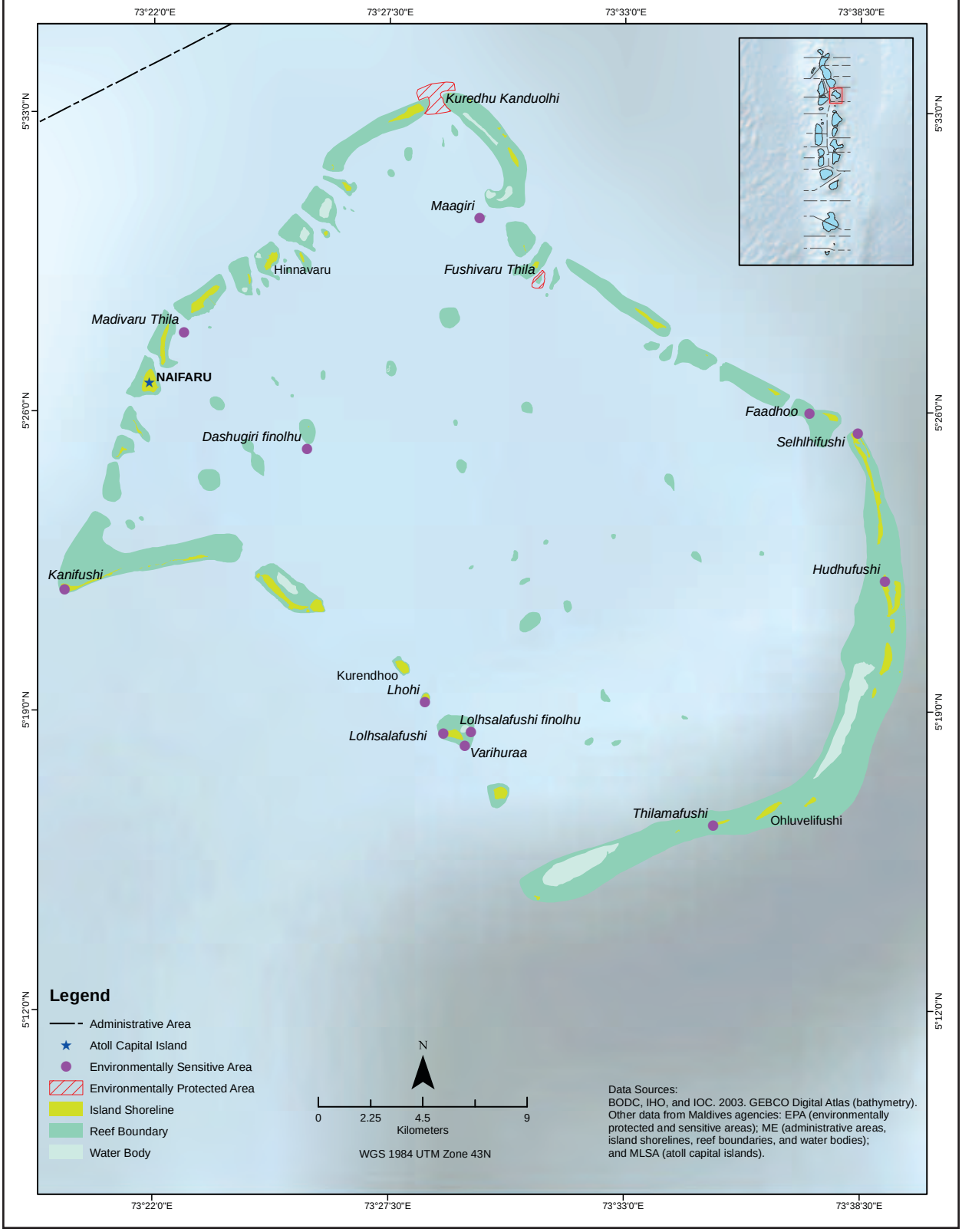
Map IV.12: Haa Dhaalu Atoll, Environmentally Protected and Sensitive Areas



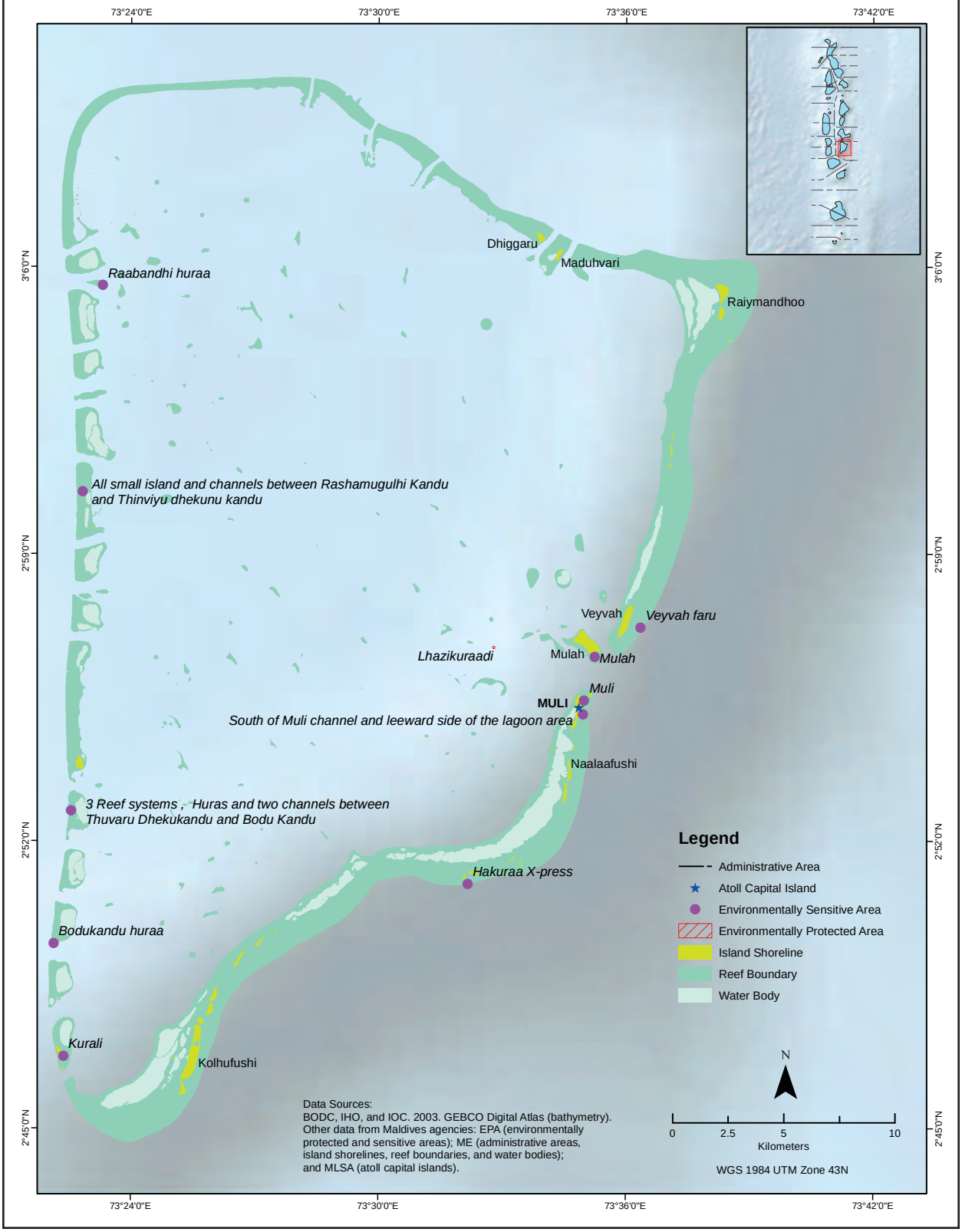
Map IV.13: Laamu Atoll, Environmentally Protected and Sensitive Areas



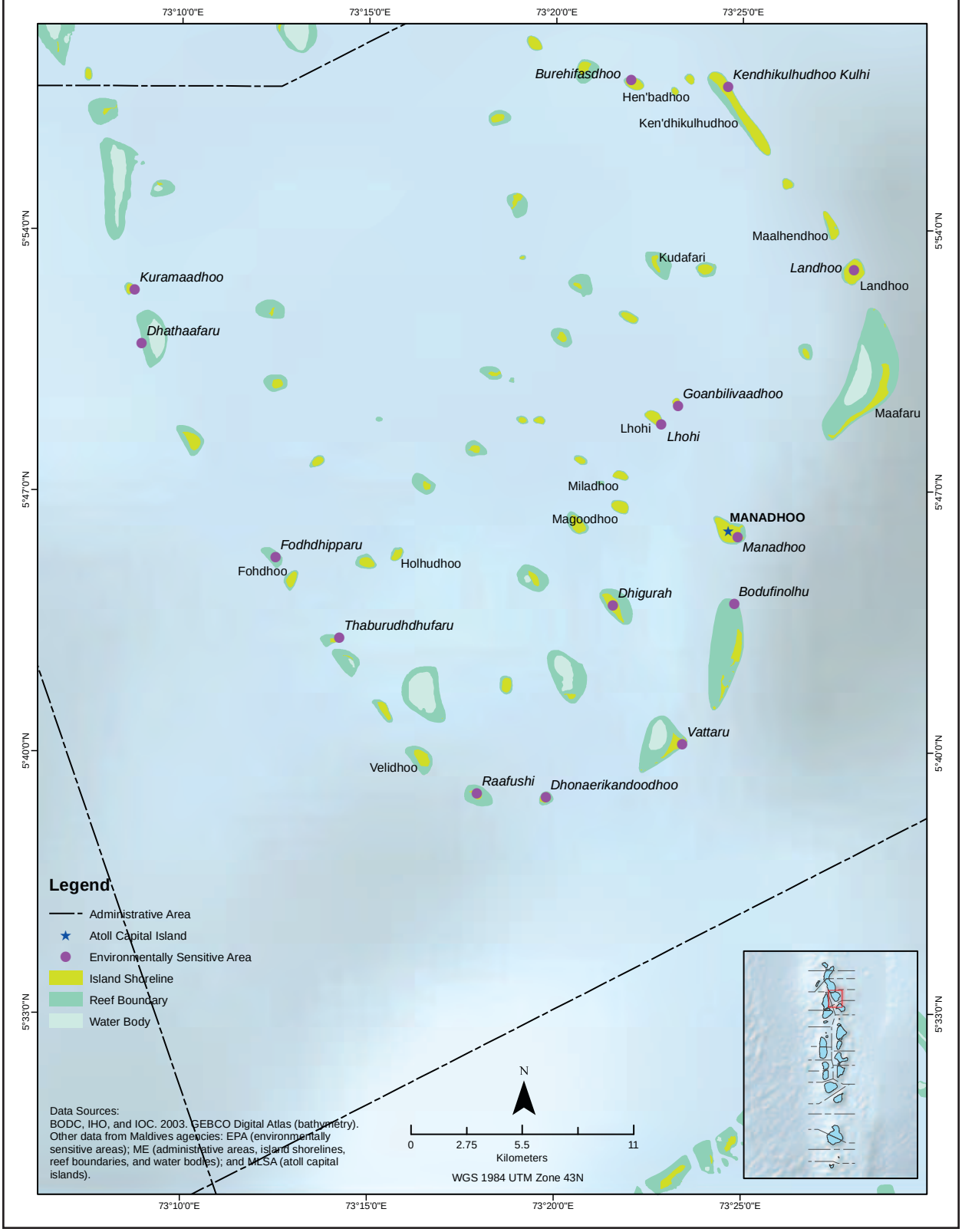
Map IV.14: Lhaviyani Atoll, Environmentally Protected and Sensitive Areas



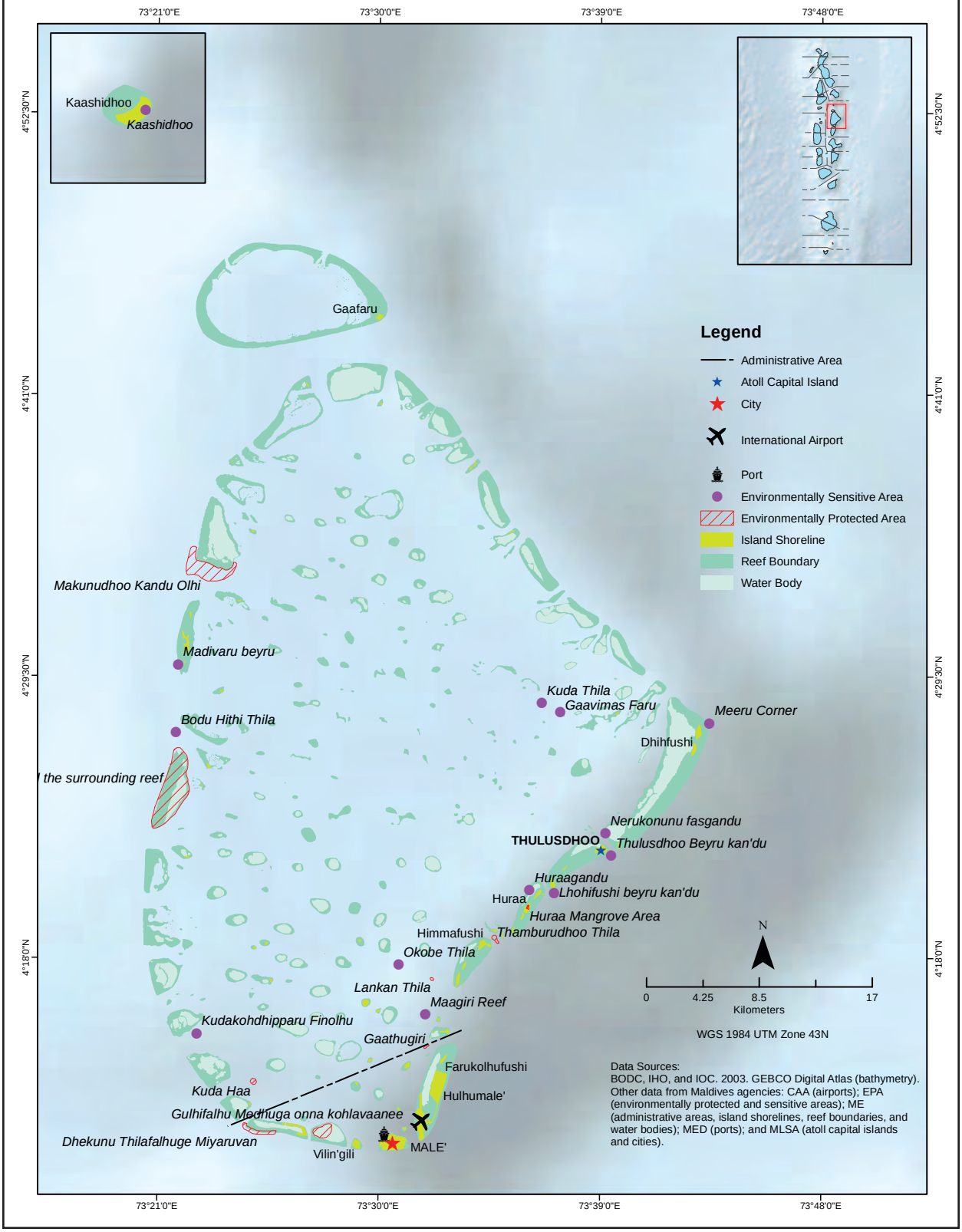
Map IV.15: Meemu Atoll, Environmentally Protected and Sensitive Areas



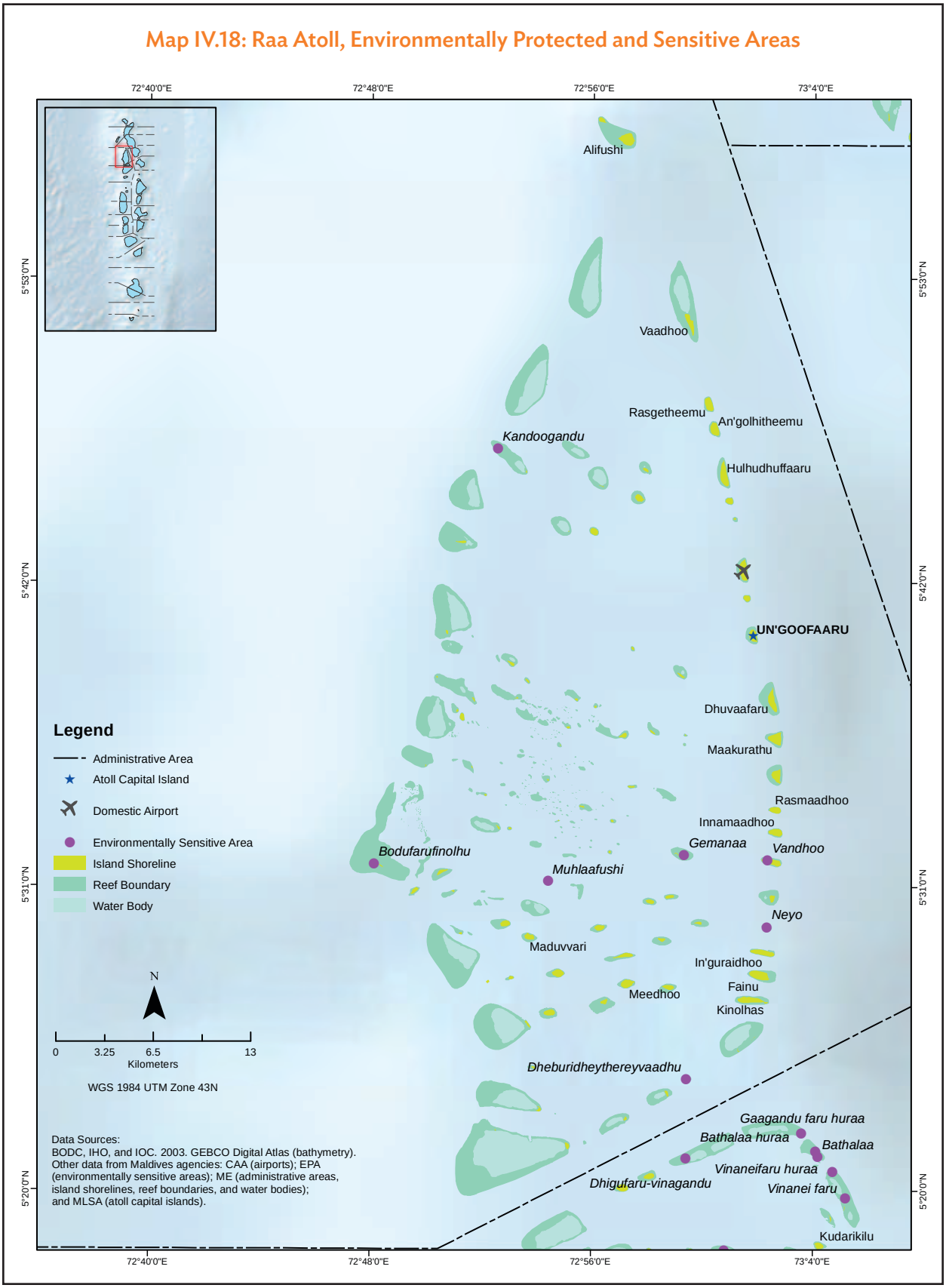
Map IV.16: Noonu Atoll, Environmentally Protected and Sensitive Areas



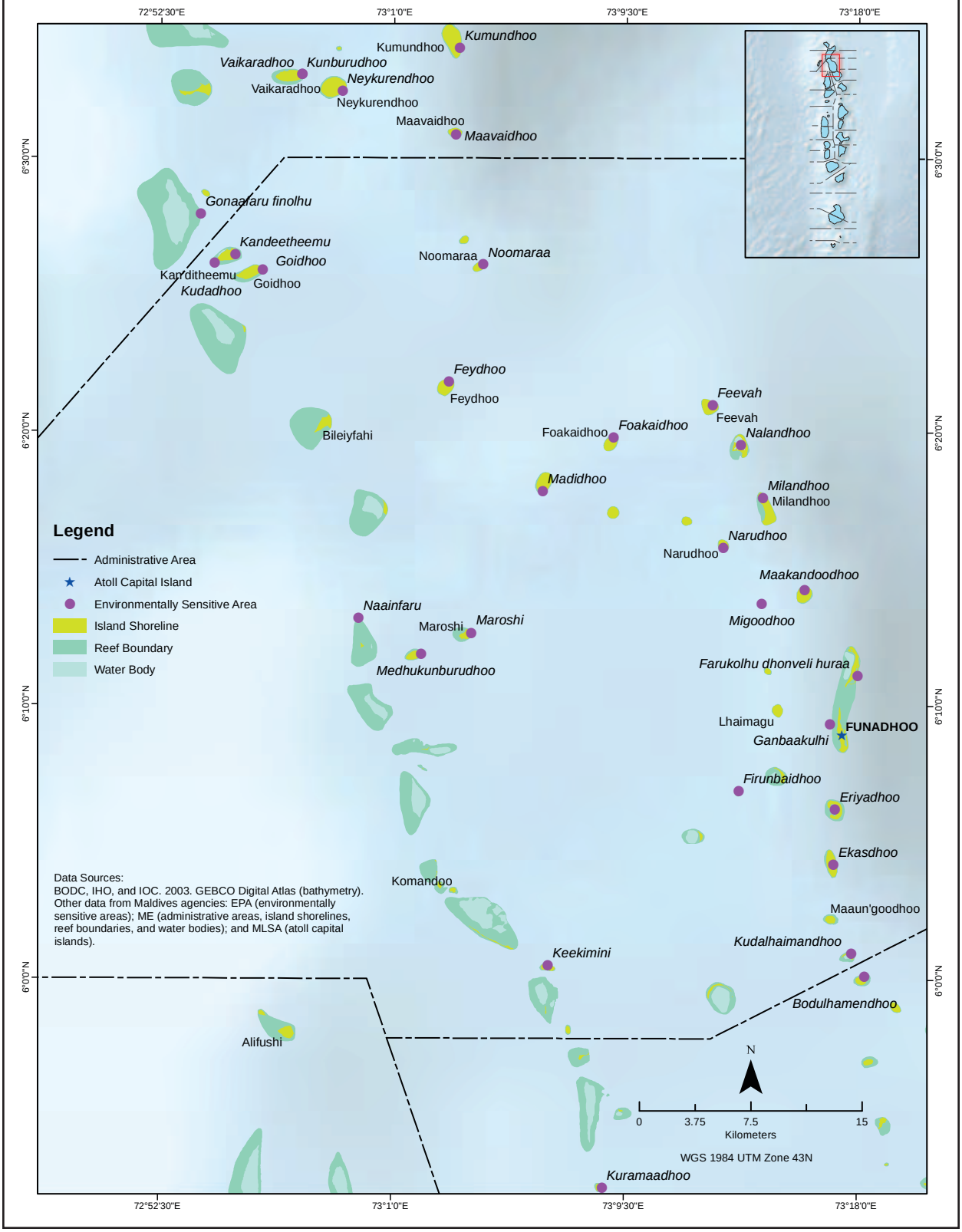
Map IV.17: North Malé Atoll, Environmentally Protected and Sensitive Areas



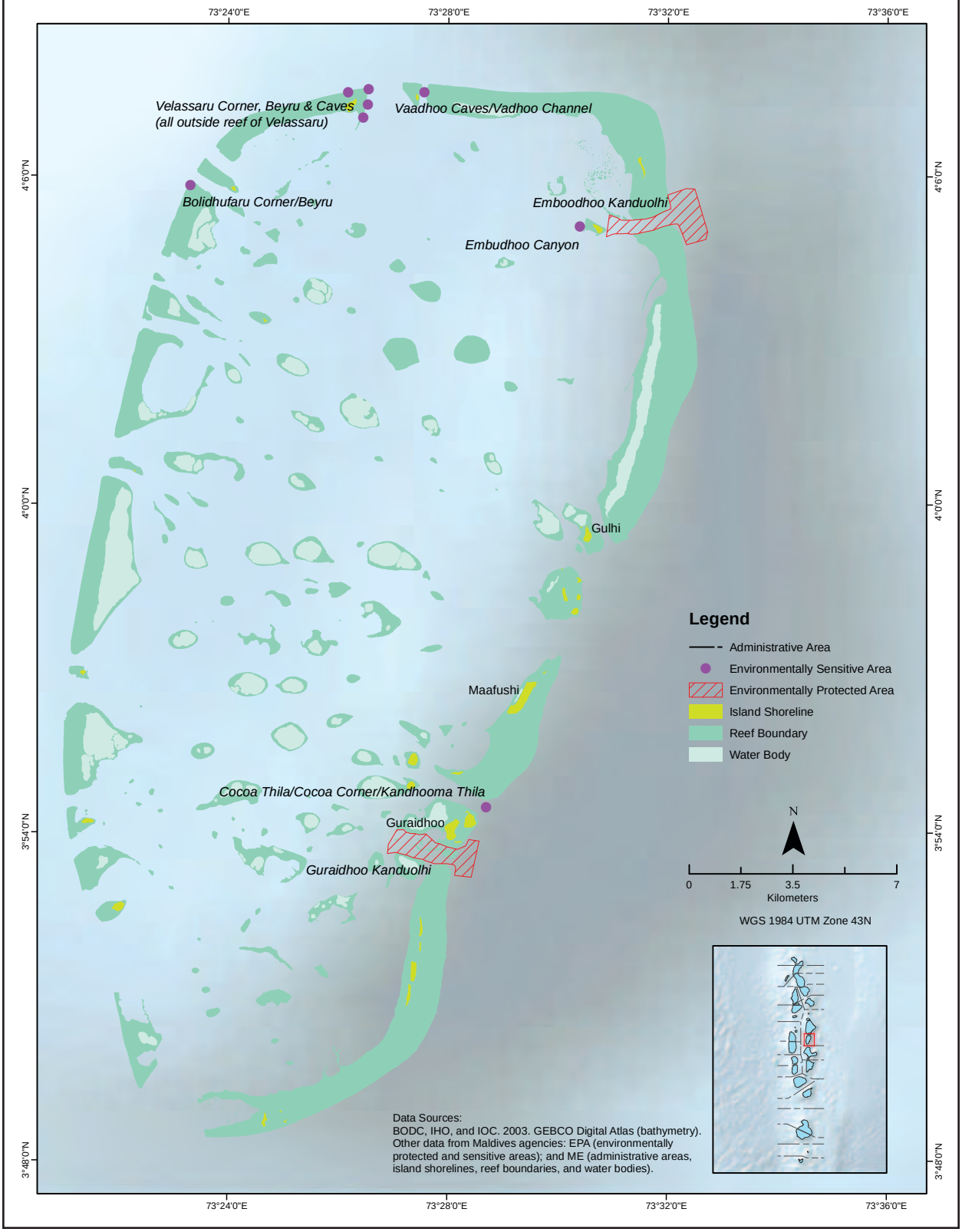
Map IV.18: Raa Atoll, Environmentally Protected and Sensitive Areas



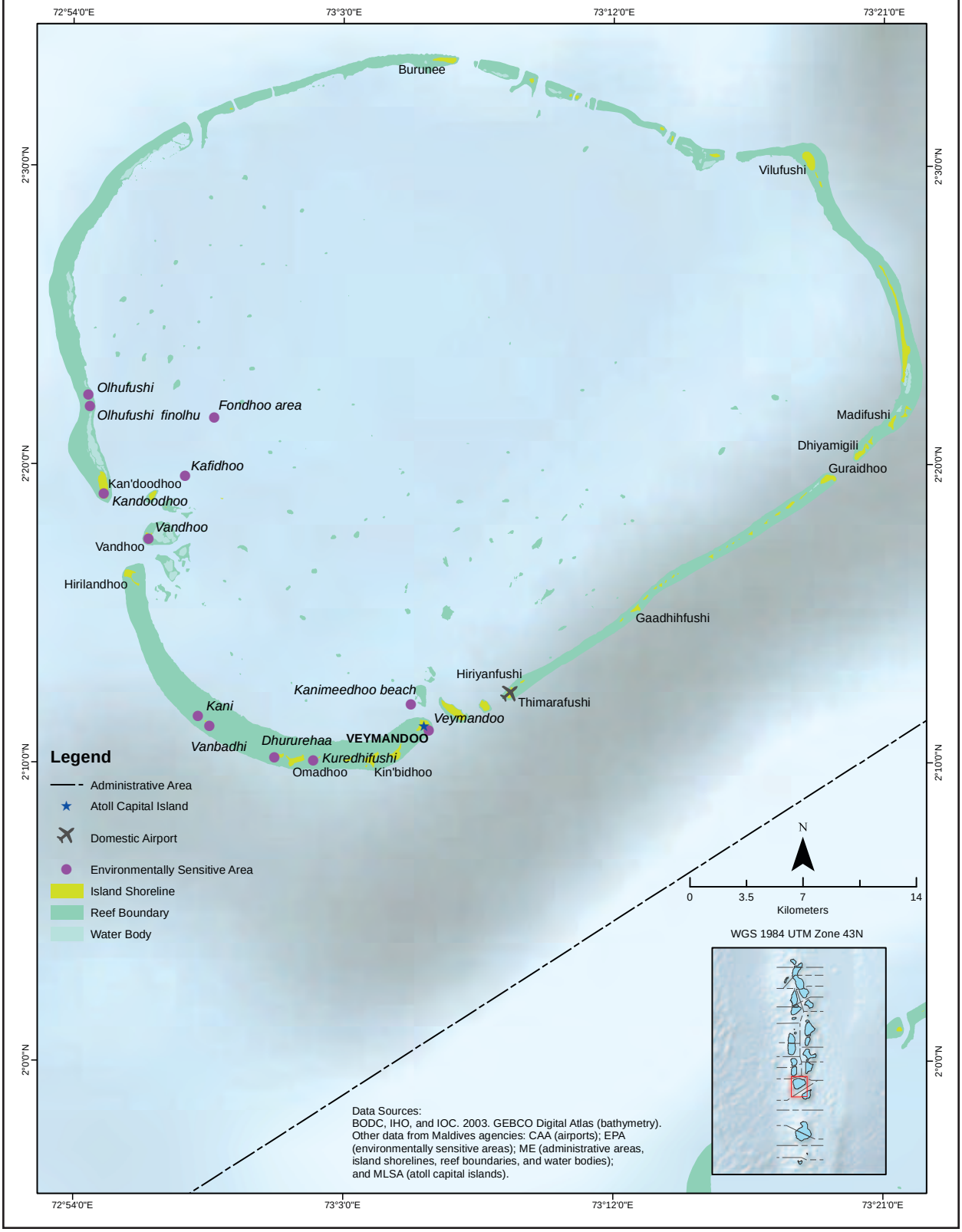
Map IV.19: Shaviyani Atoll, Environmentally Protected and Sensitive Areas



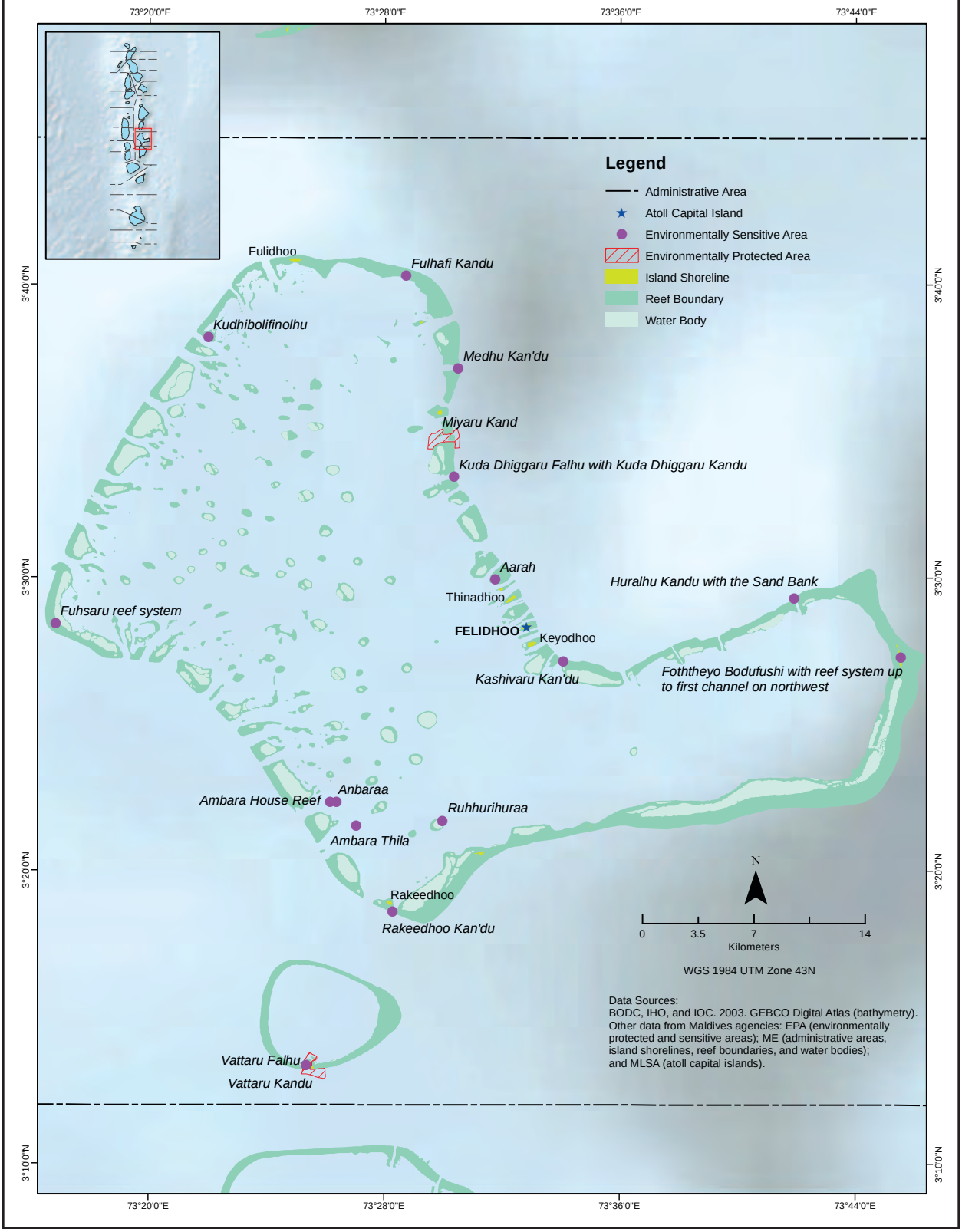
Map IV.20: South Malé Atoll, Environmentally Protected and Sensitive Areas



Map IV.21: Thaa Atoll, Environmentally Protected and Sensitive Areas



Map IV.22: Vaavu Atoll, Environmentally Protected and Sensitive Areas



Coastal Protection

Ocean waves, the changing mean sea level, beach erosion, and anthropogenic activities such as coral and sand mining threaten the coastal ecosystems. To protect their precious resources, the people of Maldives have identified sites to be safeguarded against coastal erosion. The coasts of 51 inhabited islands have coastal protection sites. Coastal protection is an important task for Maldivians as the coastal ecosystems—specifically the mangroves and coral reefs—also serve as a buffer from storm surges, inundation, and tsunamis. Having a well-protected coast also preserves the country's rich aquatic resources.

Table IV.1: Maldives, Islands with Coastal Protection

Atoll	Number	Island	Atoll	Number	Island
Addu City	1	Feydhoo	Laamu	1	Gaadhoo
Alifu Alifu	3	Bodufolhudhoo	Lhaviyani	2	Hinnavaru
		Rasdhoo[a]			Kurehdhoo
		Ukulhas	Malé City	5	Hulhule
Alifu Dhaalu	2	Kun'burudhoo			HulhuMalé
		Maamigili			Malé[b]
Baa	3	Eydhafushi[a]			Thilafushi
		Fares			Vilin'gili
		Thulhaadhoo	Meemu	3	Dhiggaru
Dhaalu	4	Kudahuvadhoo[a]			Mulia
		Maaen'boodhoo			Naalaafushi
		Meedhoo	Noonu	2	Holhudhoo
		Rin'budhoo			Maafaru
Faafu	1	Nilandhoo[a]	Raa	3	Dhuvaafaru
Gaafu Alifu	3	Vilin'gili[a]			Fainu
		Faresmaathodaa			Maduvvari
		Gahdhoo	Shaviyani	2	Bileiyfahi
Haa Alifu	3	Dhidhdhoo[a]			Komandoo
		Ihavandhoo	Thaa	6	Dhiyamigili
		Kelaa			Guraidhoo

continued on next page

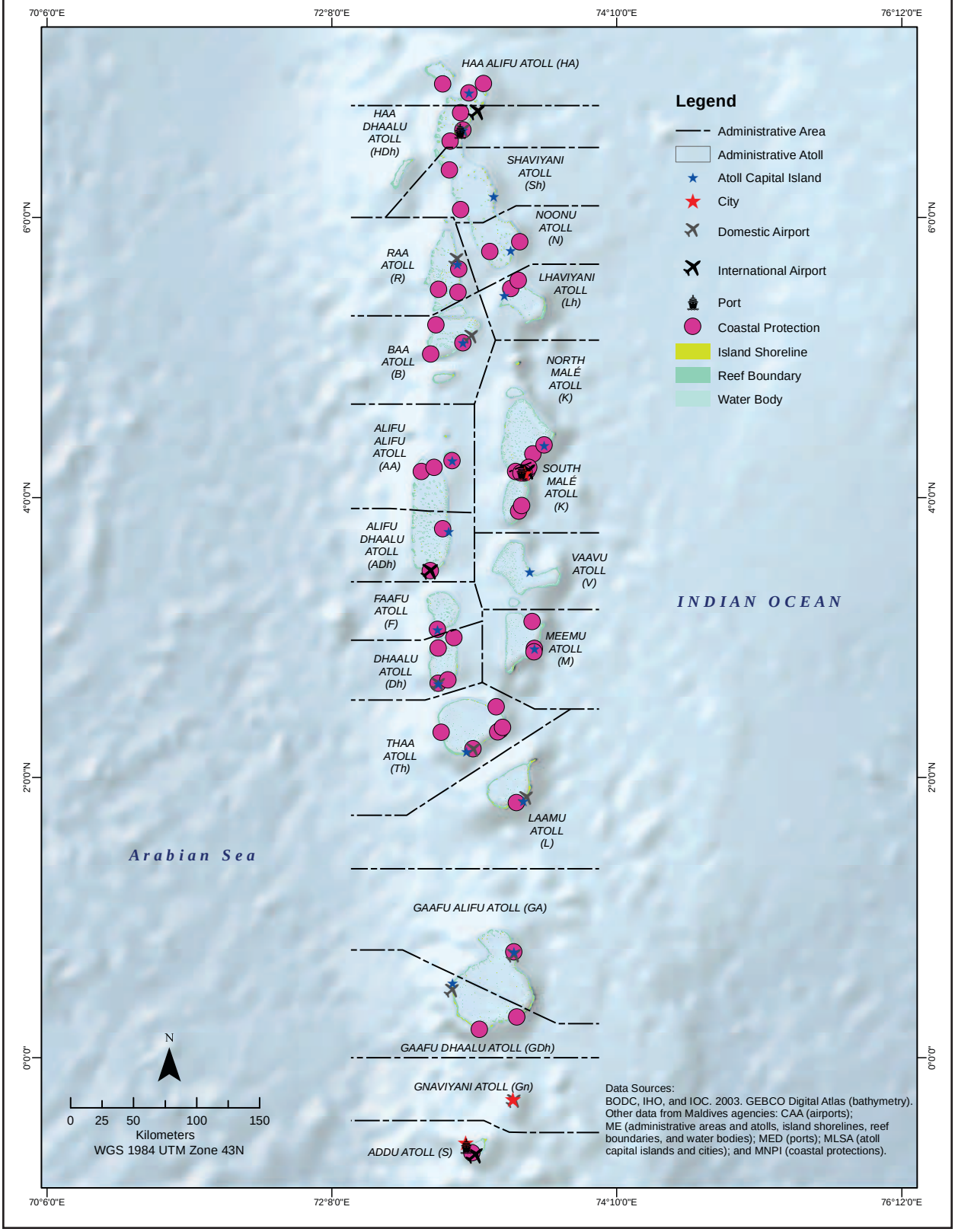
Table IV.1 *continued*

Atoll	Number	Island	Atoll	Number	Island
Haa Dhaalu	3	Finey			Kan'doodhoo
		Kulhudhuffushi[a]			Madifushi
		Neykurendhoo			Thimarafushi
Kaafu	4	Guraidhoo			Vilufushi
		Himmafushi			
		Maafushi			
		Thulusdhoo[a]			

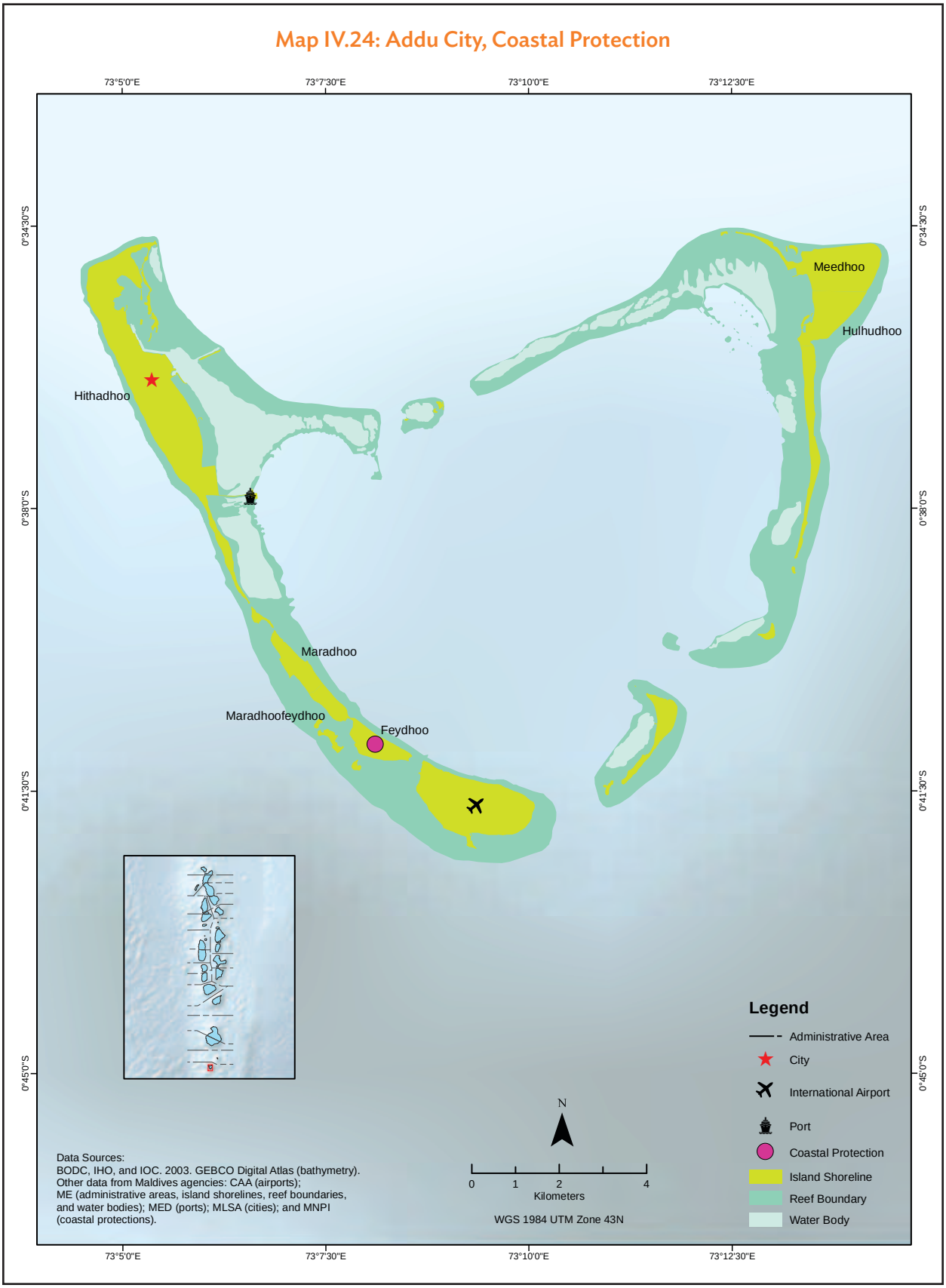
Notes:
[a] Atoll capital.
[b] City.

Source: Ministry of National Planning and Infrastructure, 2017.

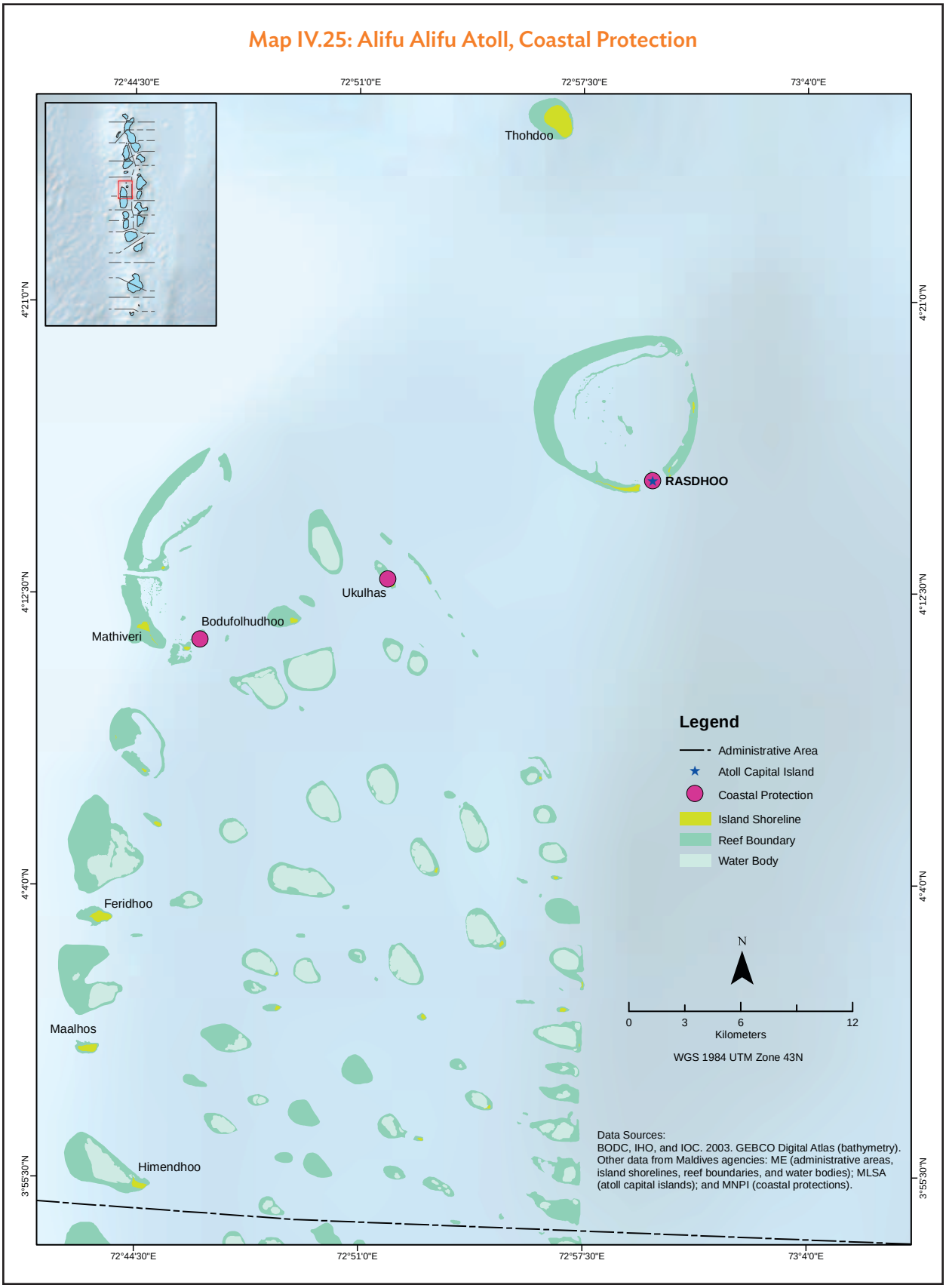
Map IV.23: Maldives, Coastal Protection



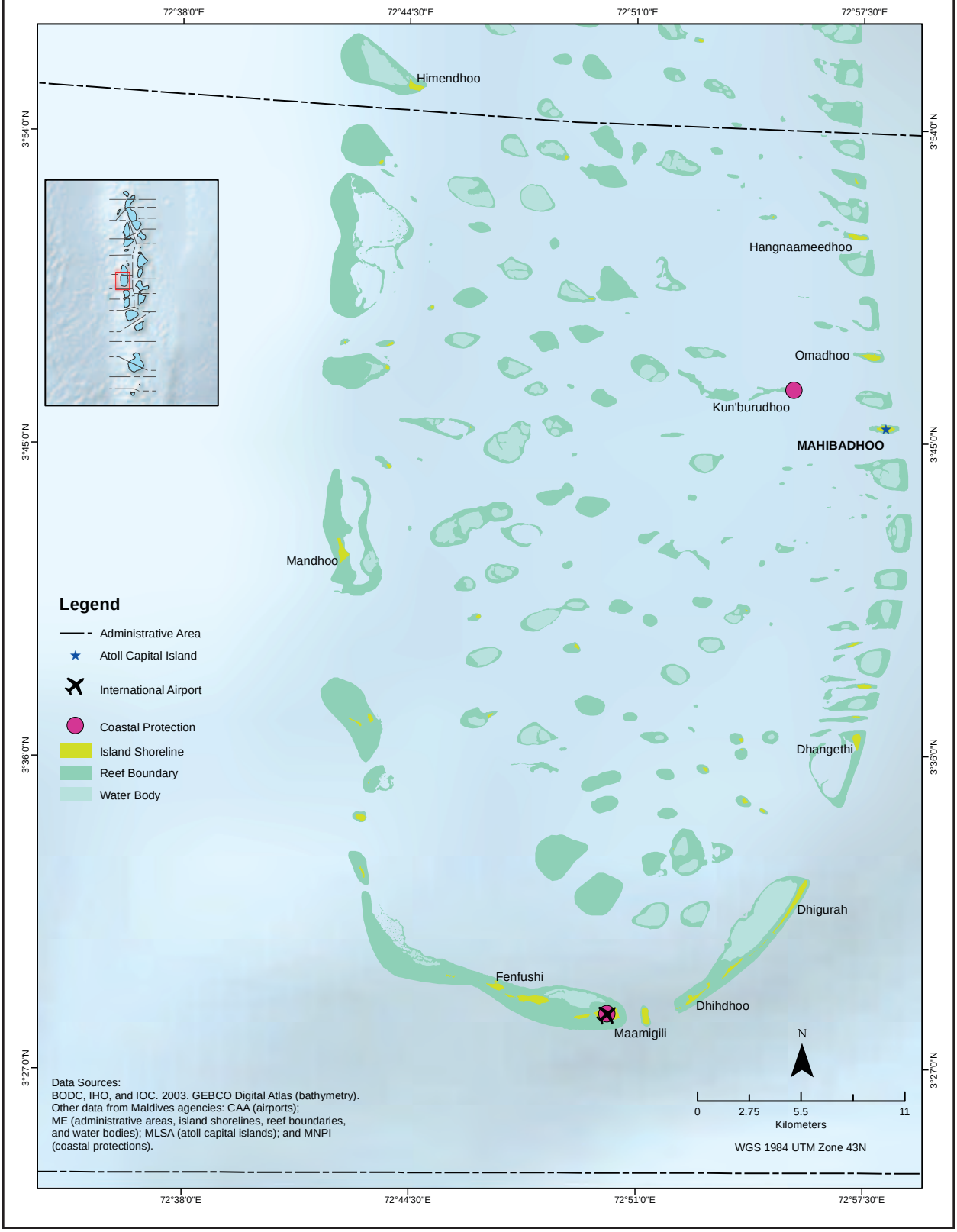
Map IV.24: Addu City, Coastal Protection



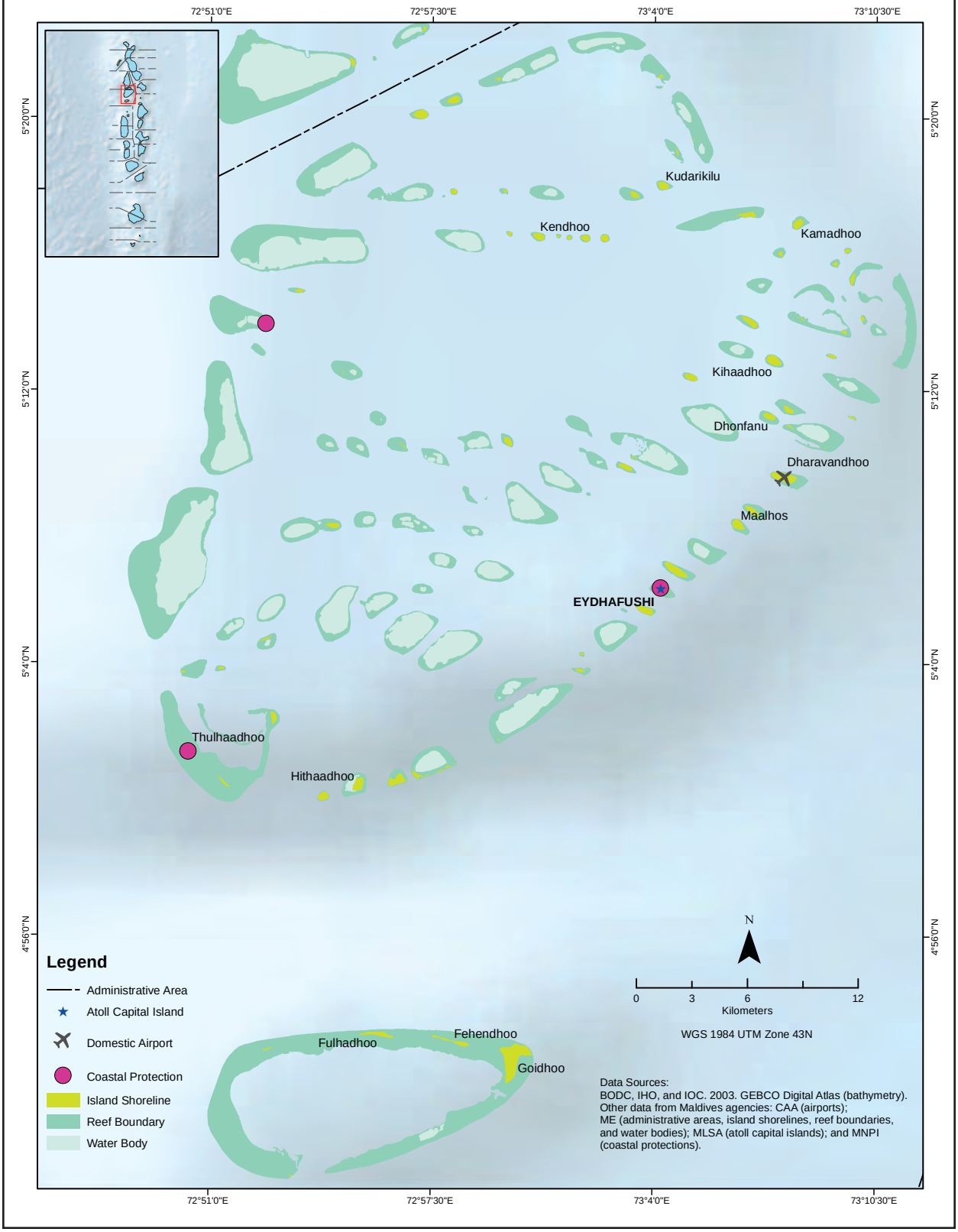
Map IV.25: Alifu Alifu Atoll, Coastal Protection



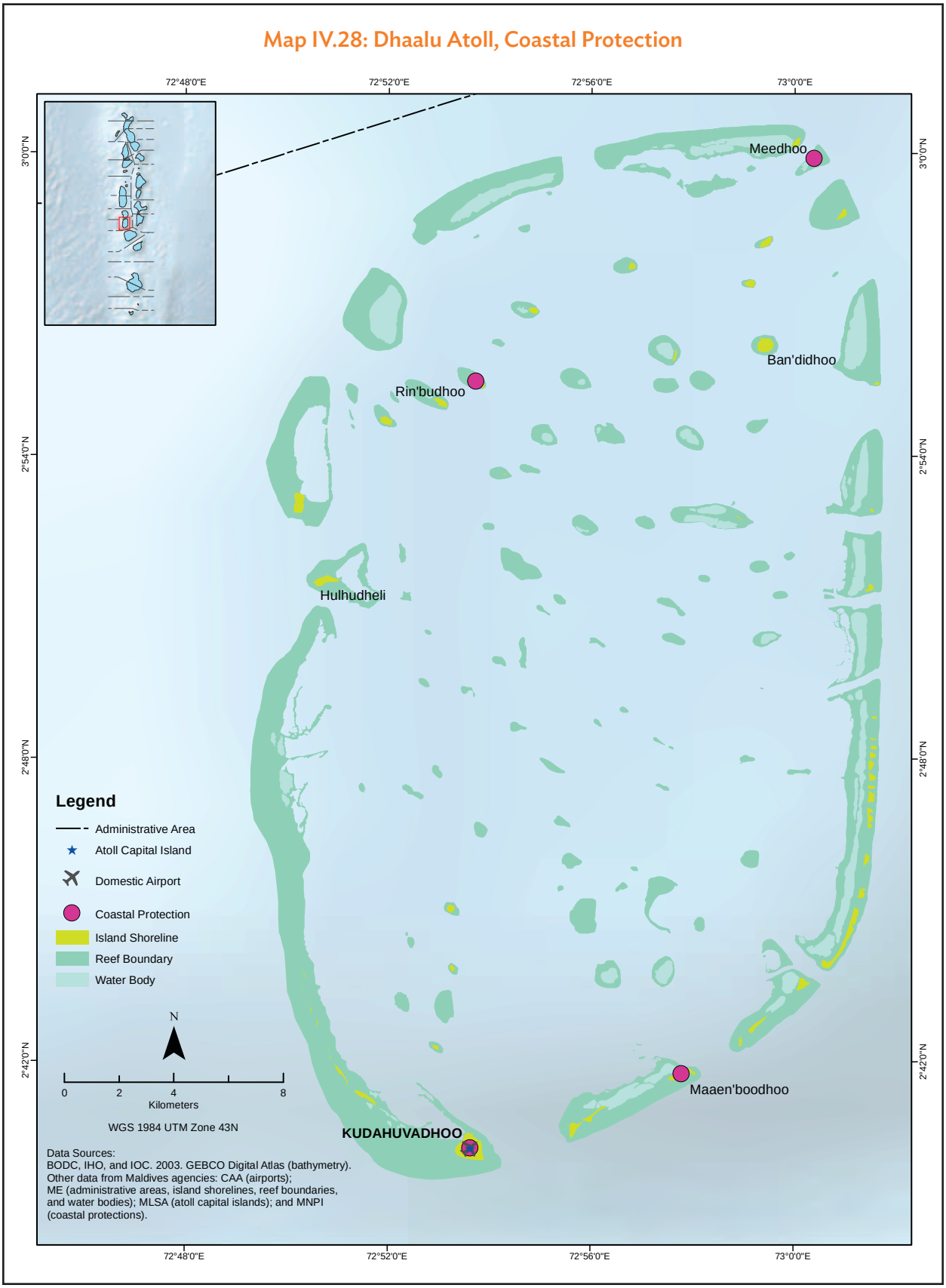
Map IV.26: Alifu Dhaalu Atoll, Coastal Protection



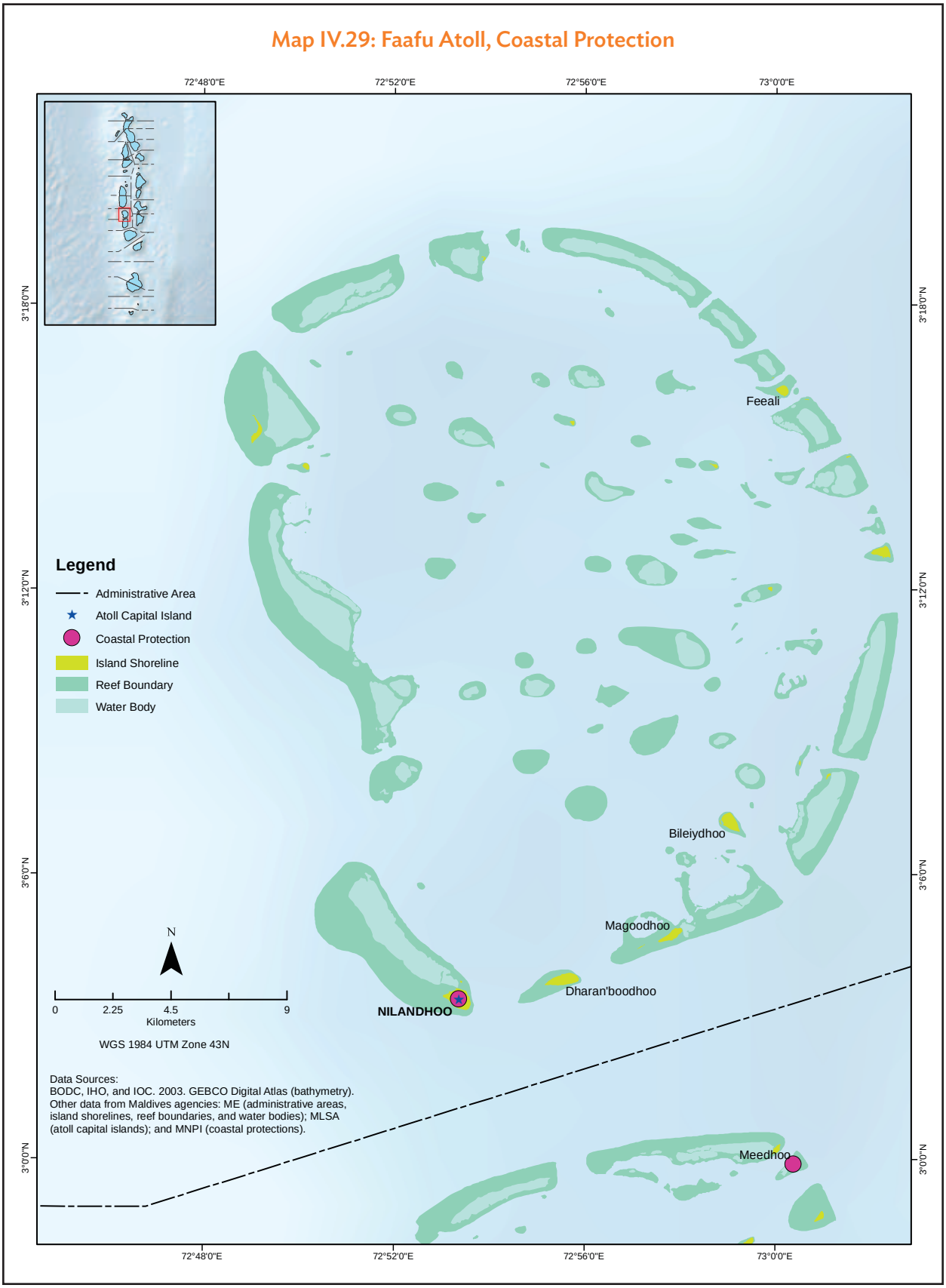
Map IV.27: Baa Atoll, Coastal Protection



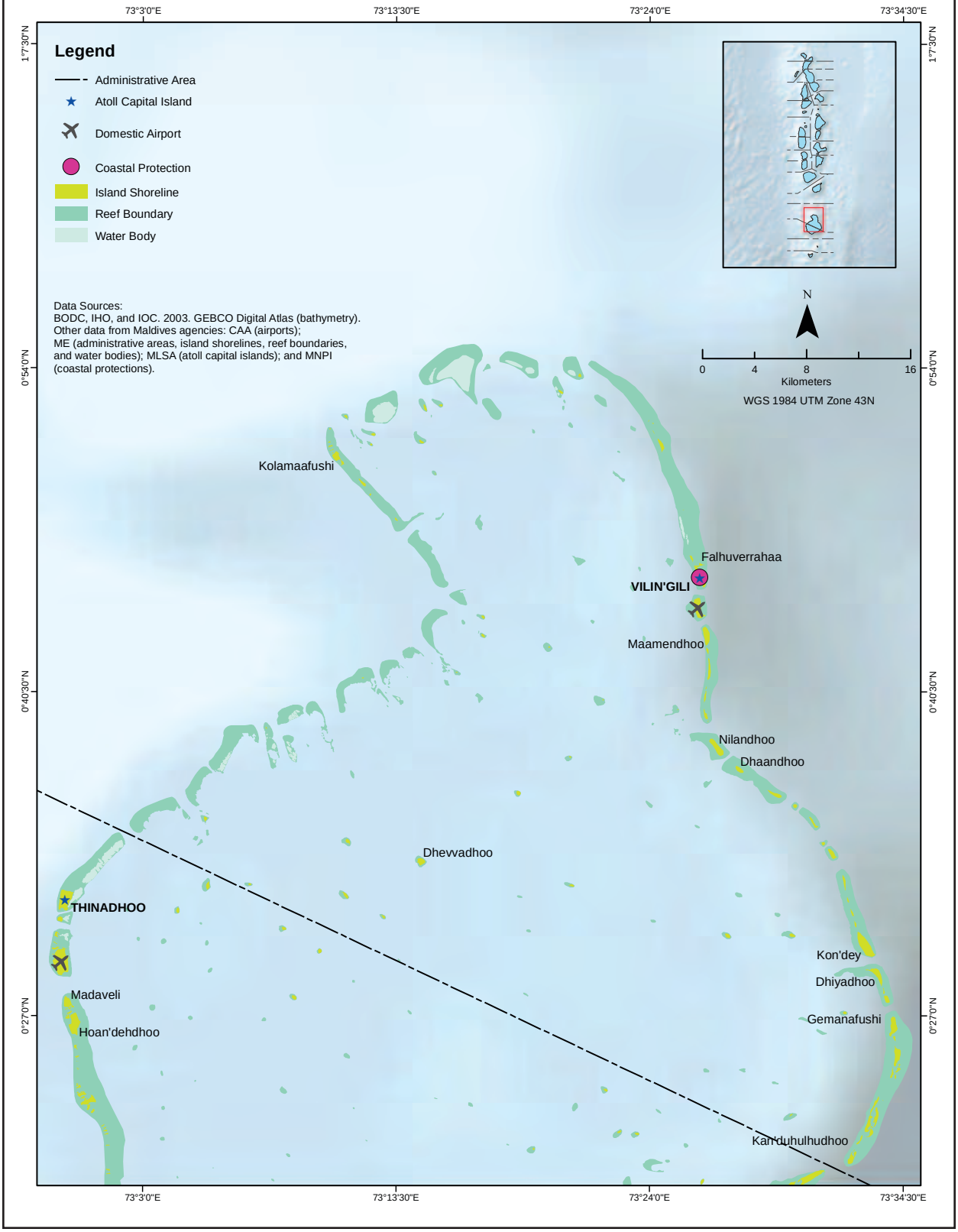
Map IV.28: Dhaalu Atoll, Coastal Protection



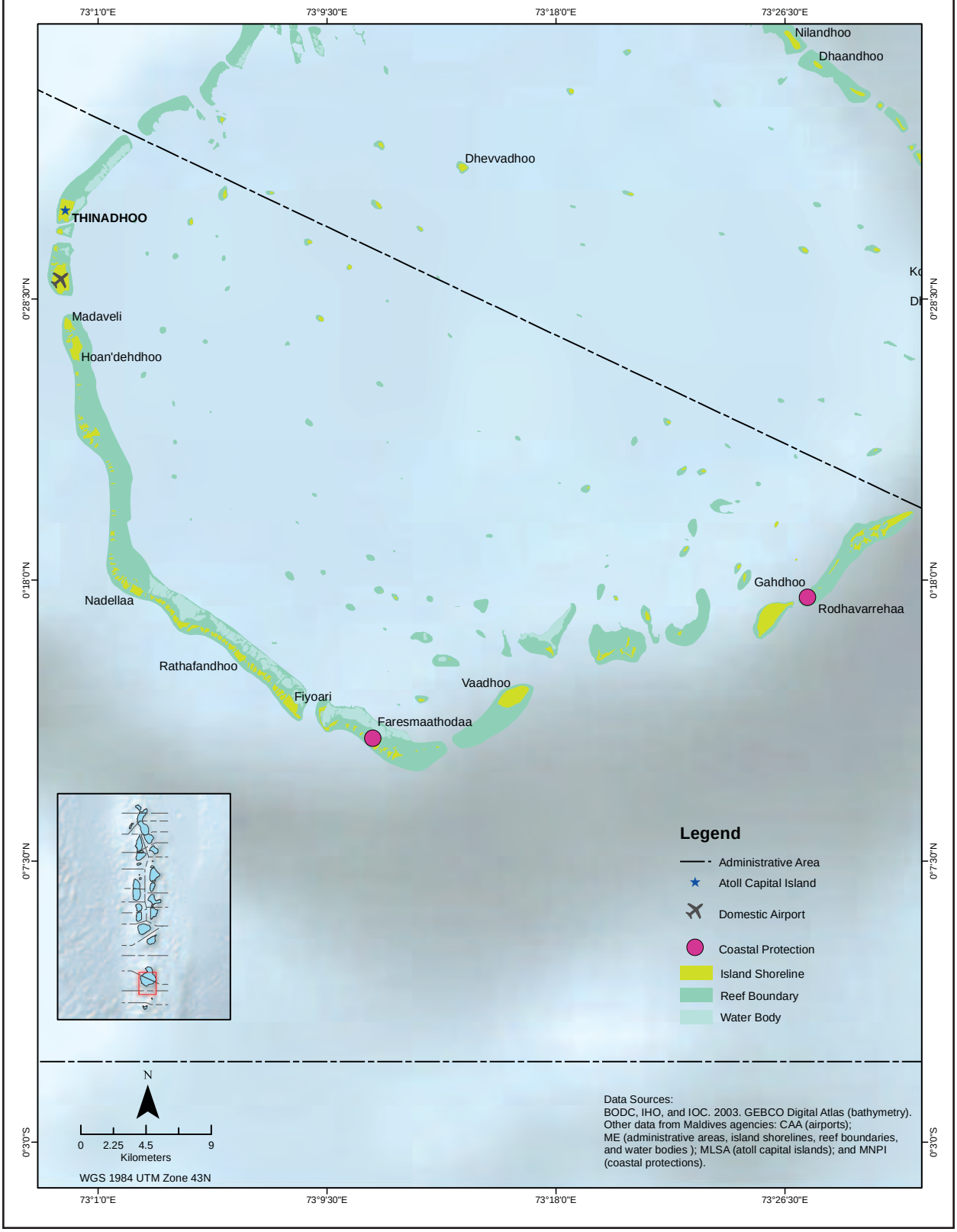
Map IV.29: Faafu Atoll, Coastal Protection



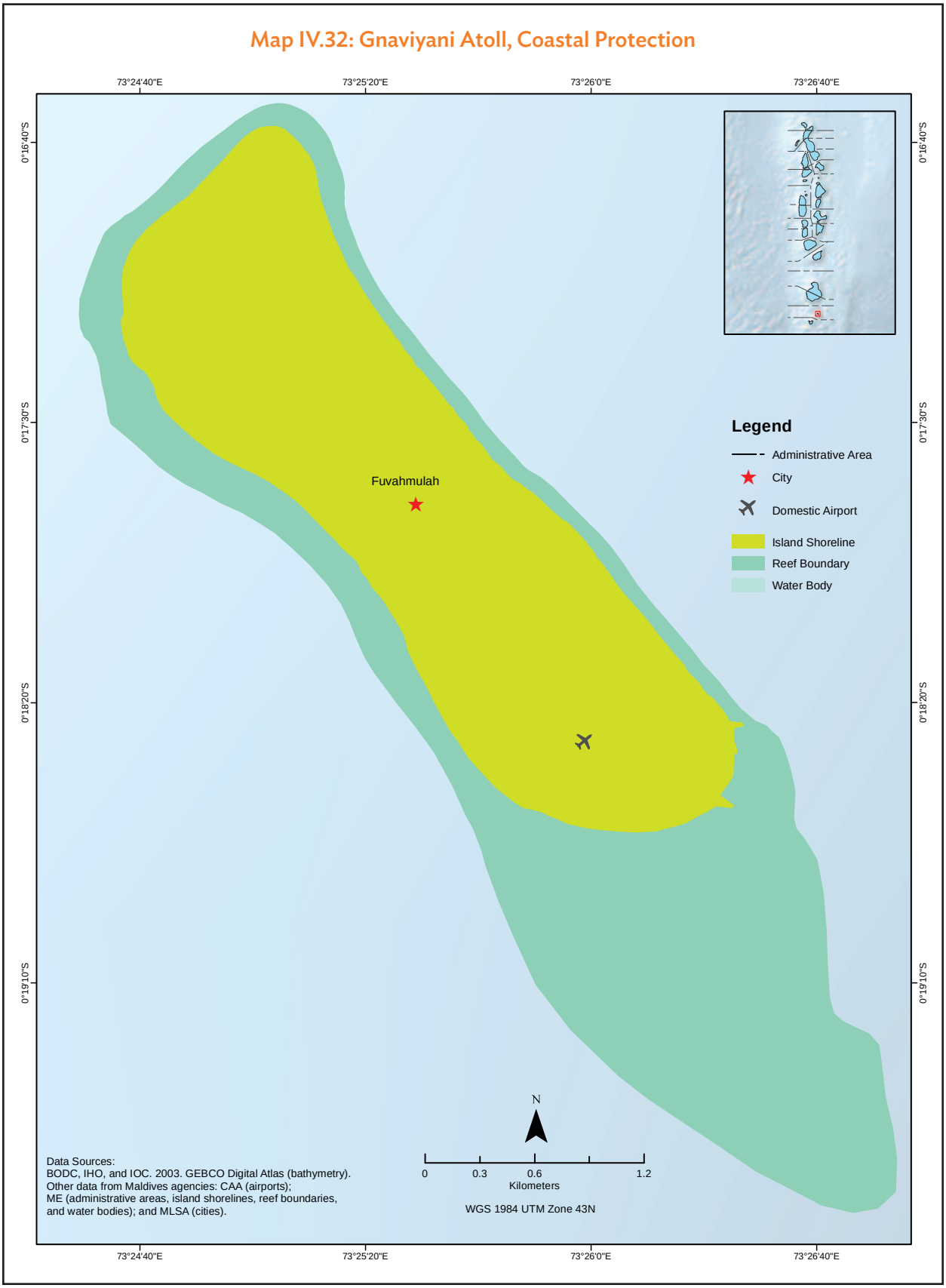
Map IV.30: Gaafu Alifu Atoll, Coastal Protection



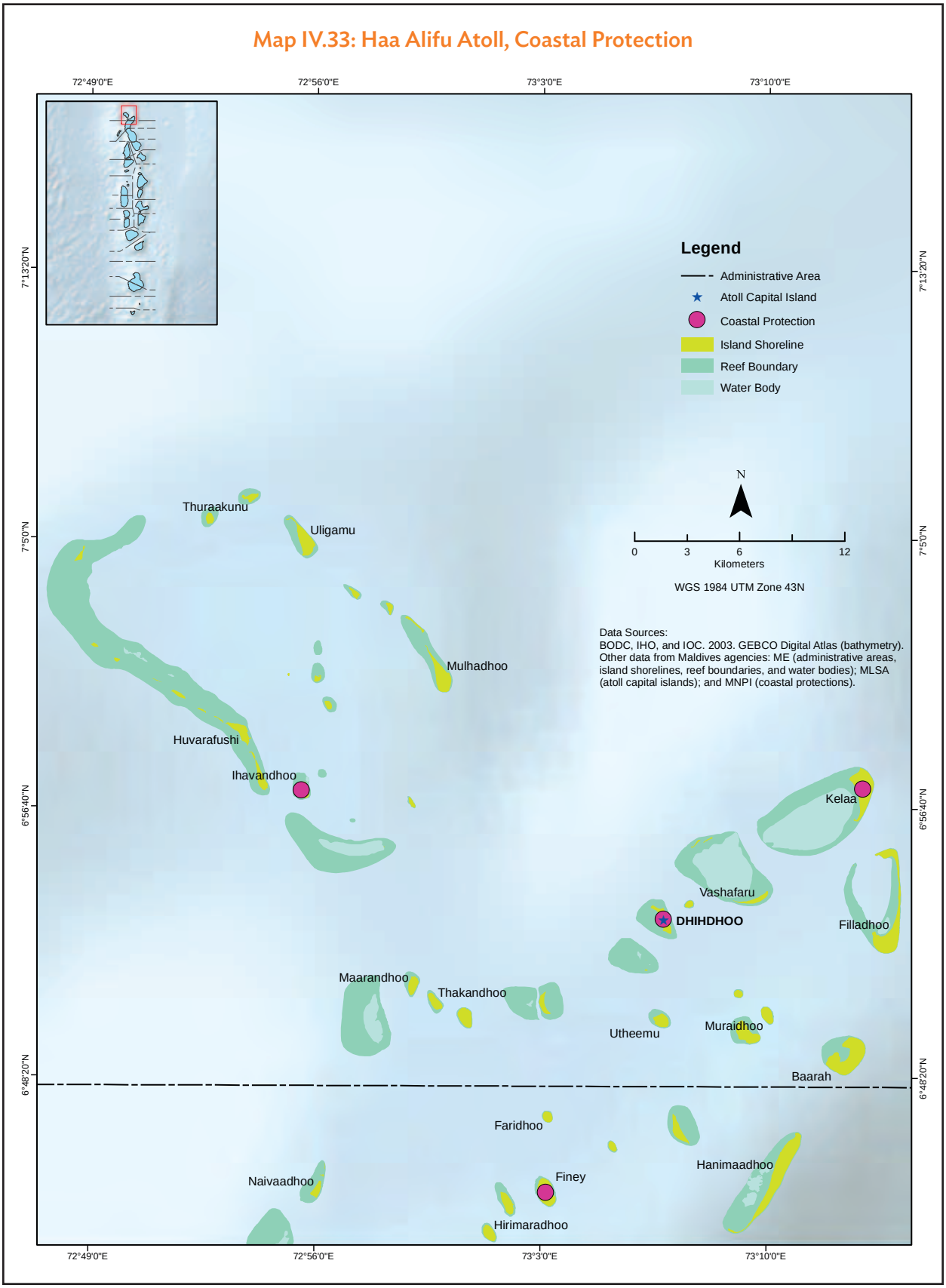
Map IV.31: Gaafu Dhaalu Atoll, Coastal Protection



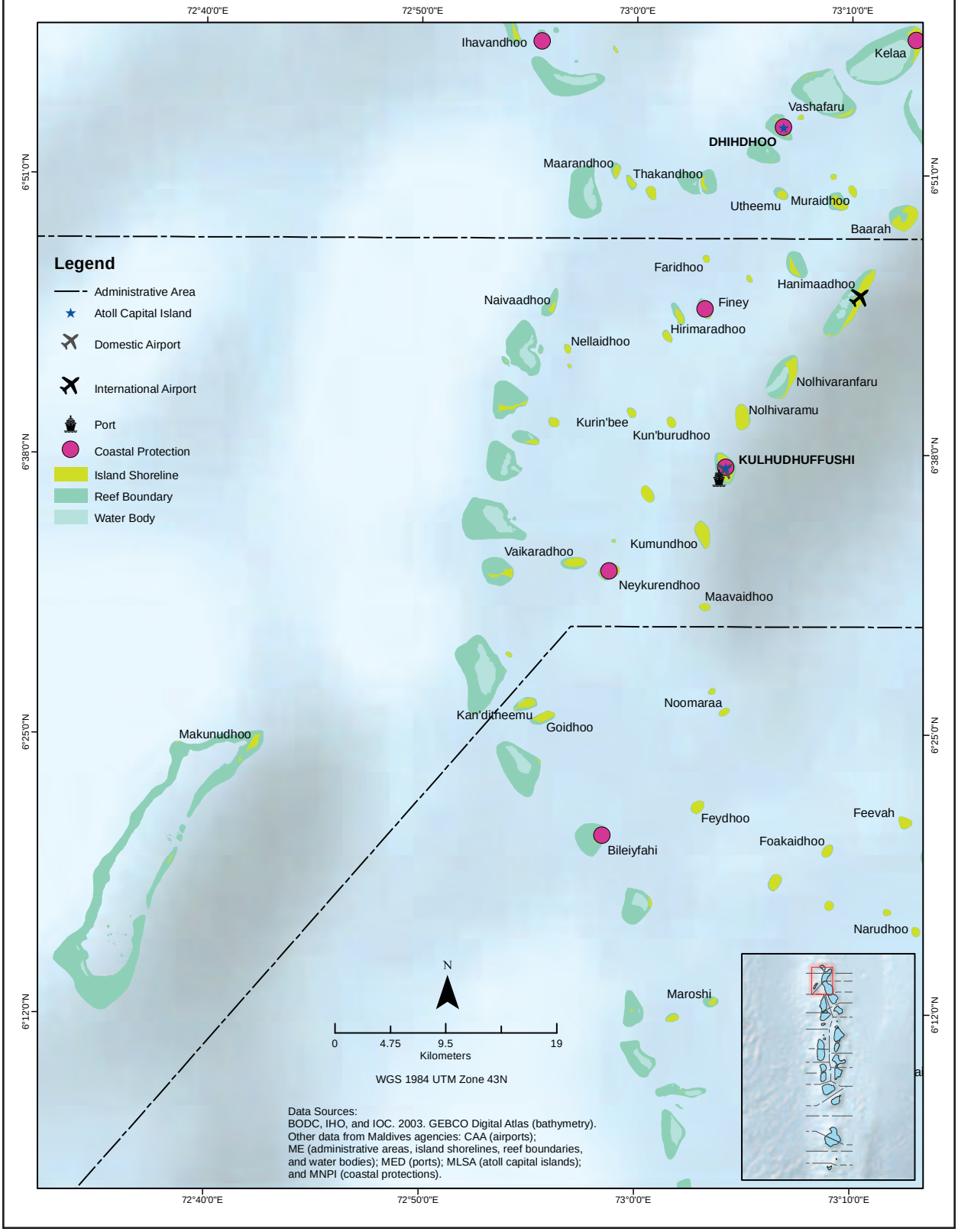
Map IV.32: Gnaviyani Atoll, Coastal Protection



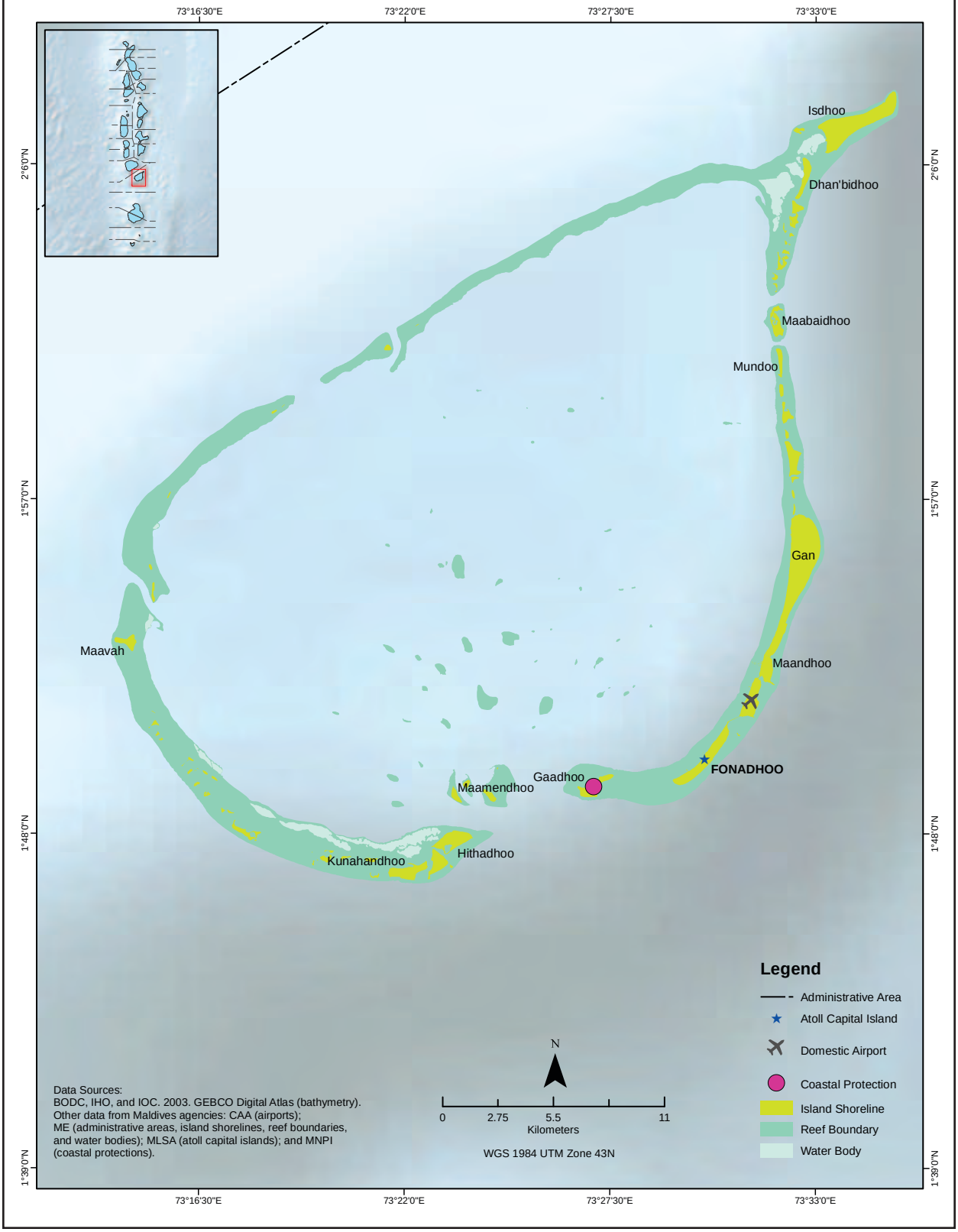
Map IV.33: Haa Alifu Atoll, Coastal Protection



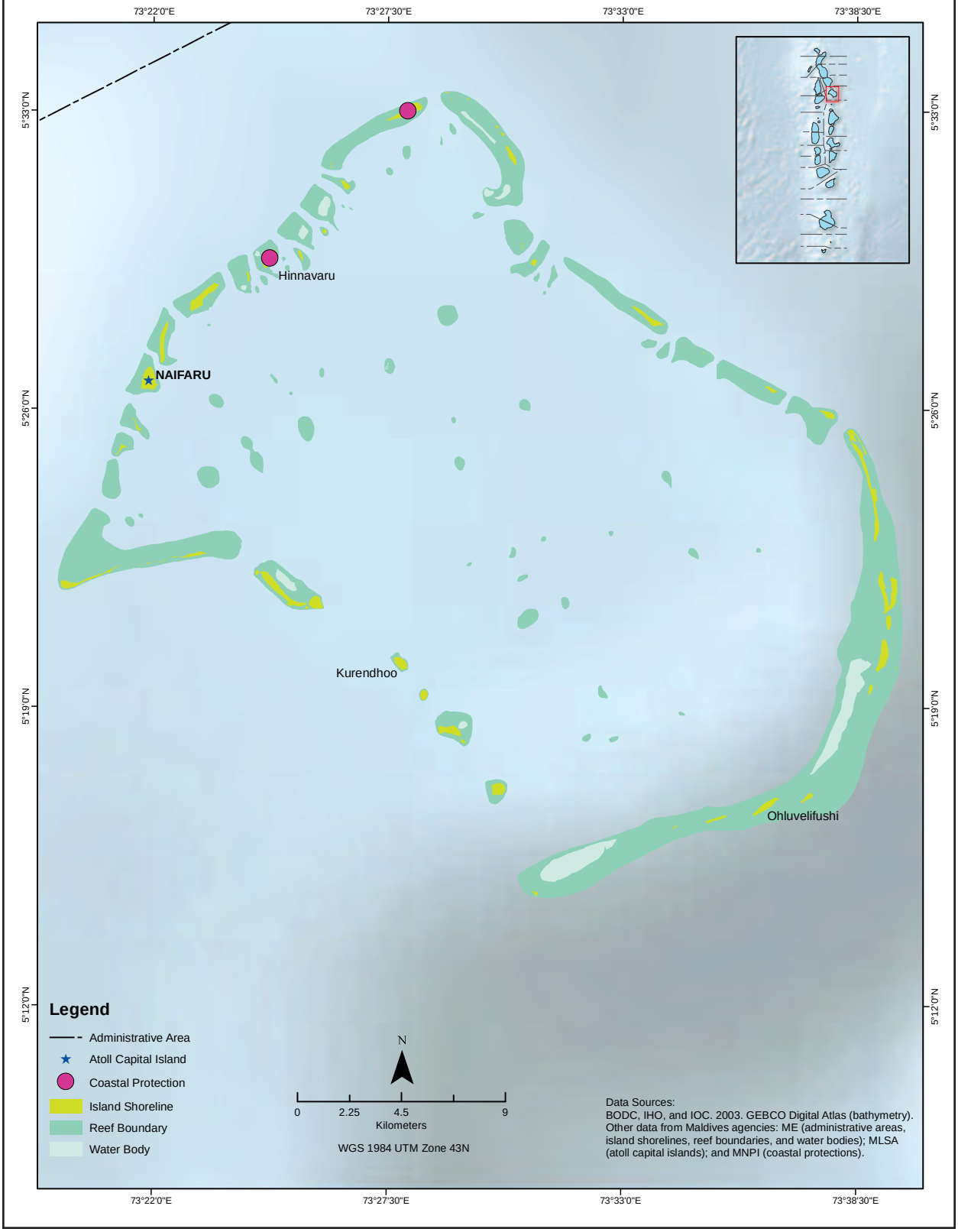
Map IV.34: Haa Dhaalu Atoll, Coastal Protection



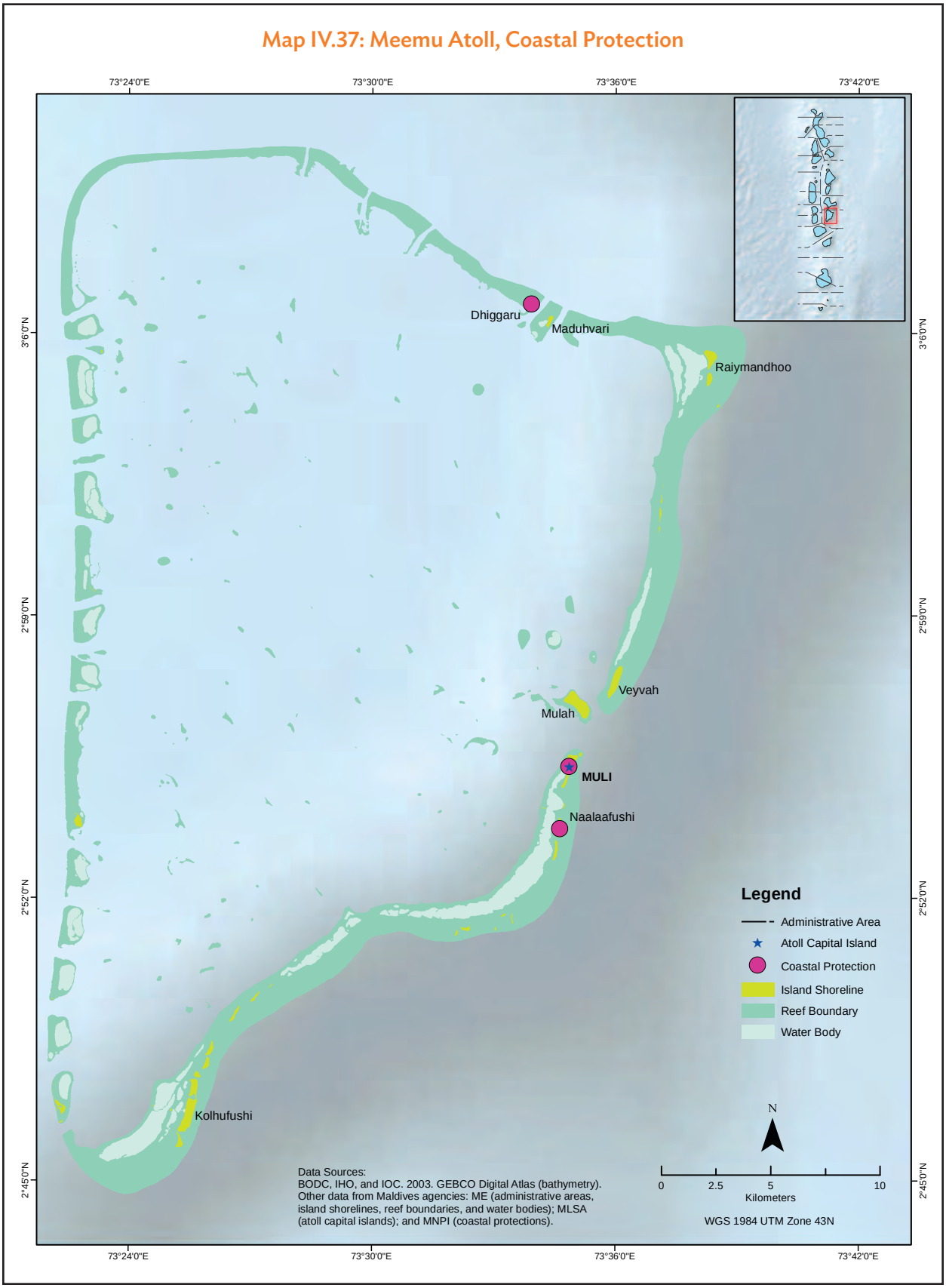
Map IV.35: Laamu Atoll, Coastal Protection



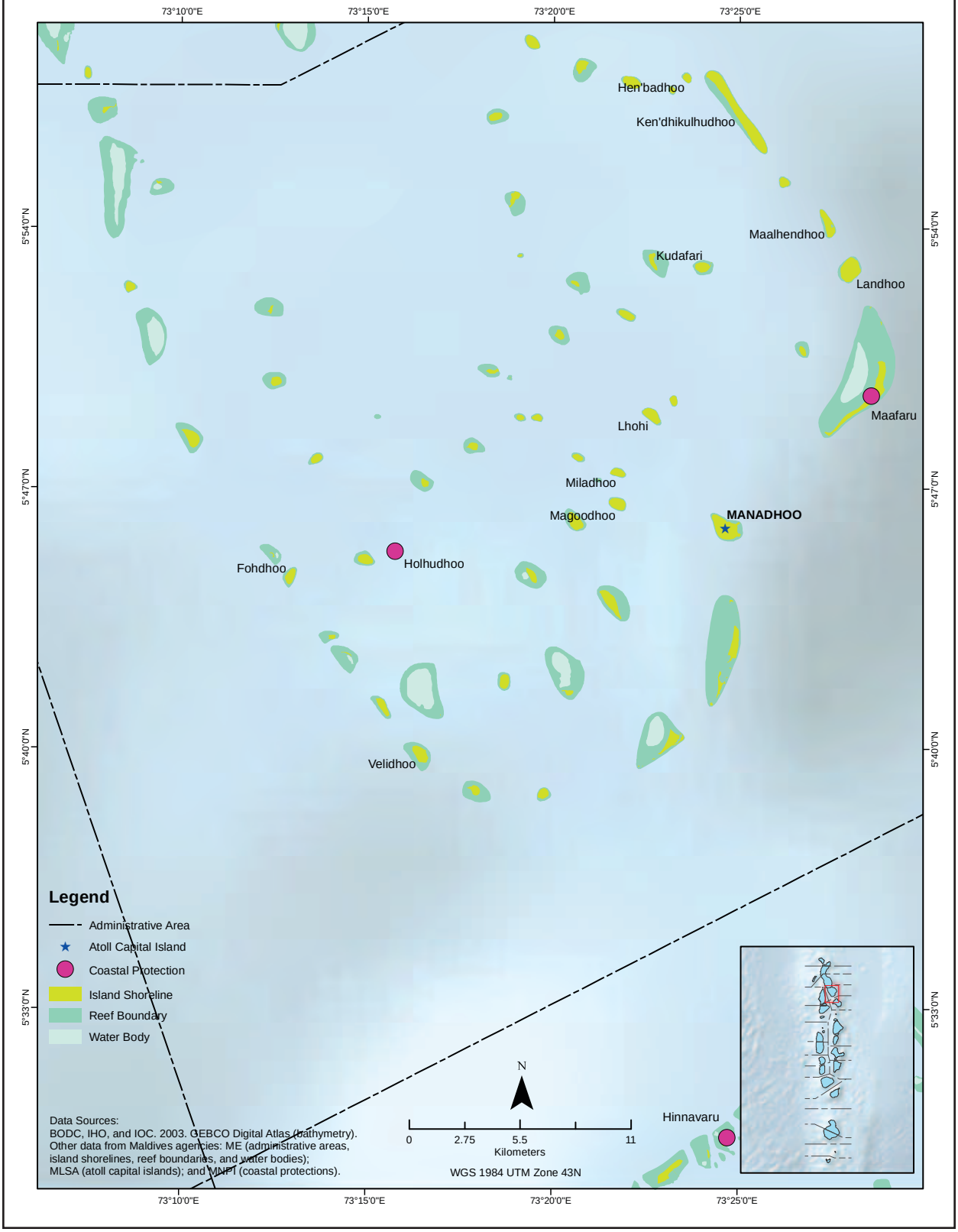
Map IV.36: Lhaviyani Atoll, Coastal Protection



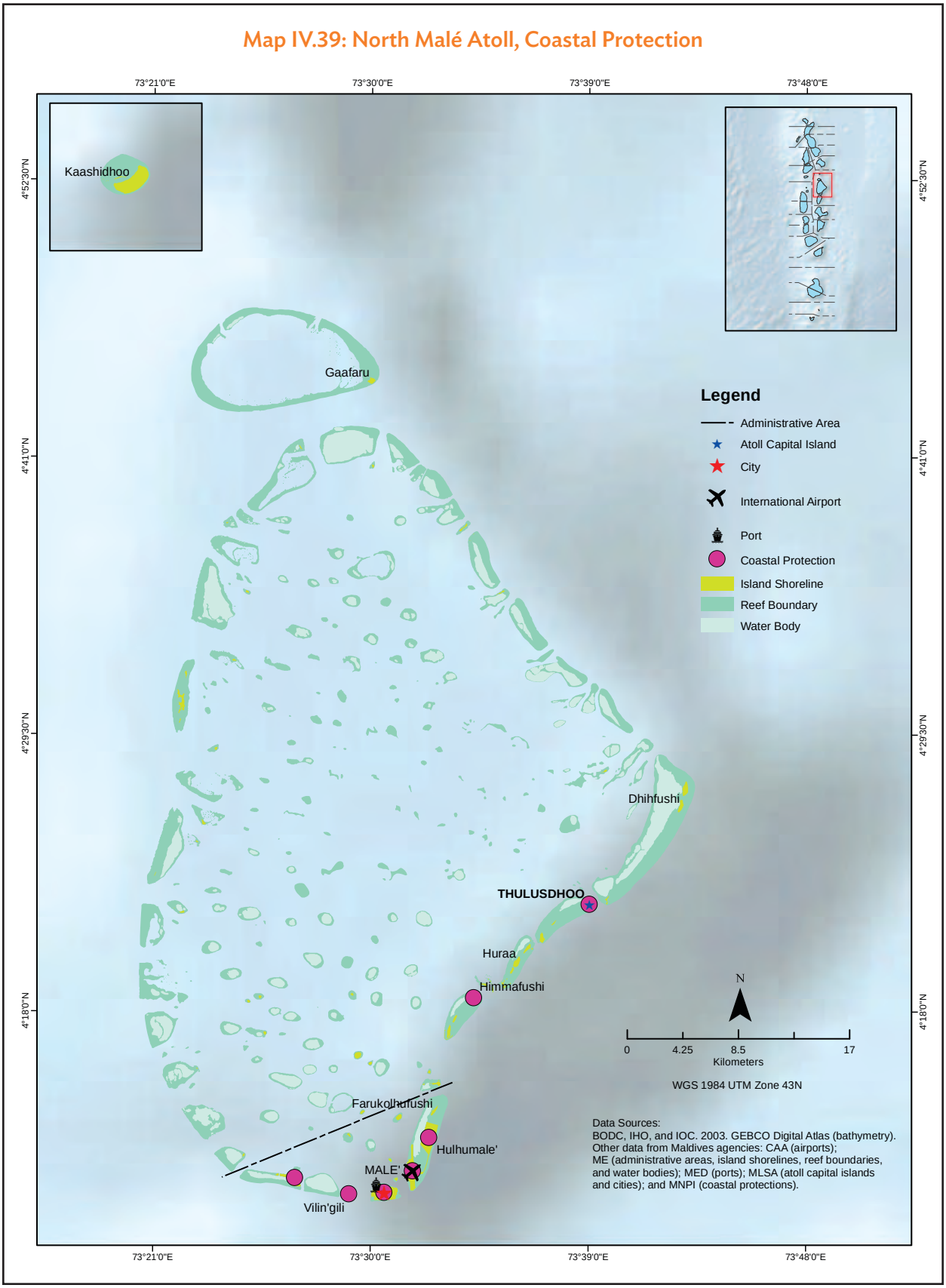
Map IV.37: Meemu Atoll, Coastal Protection



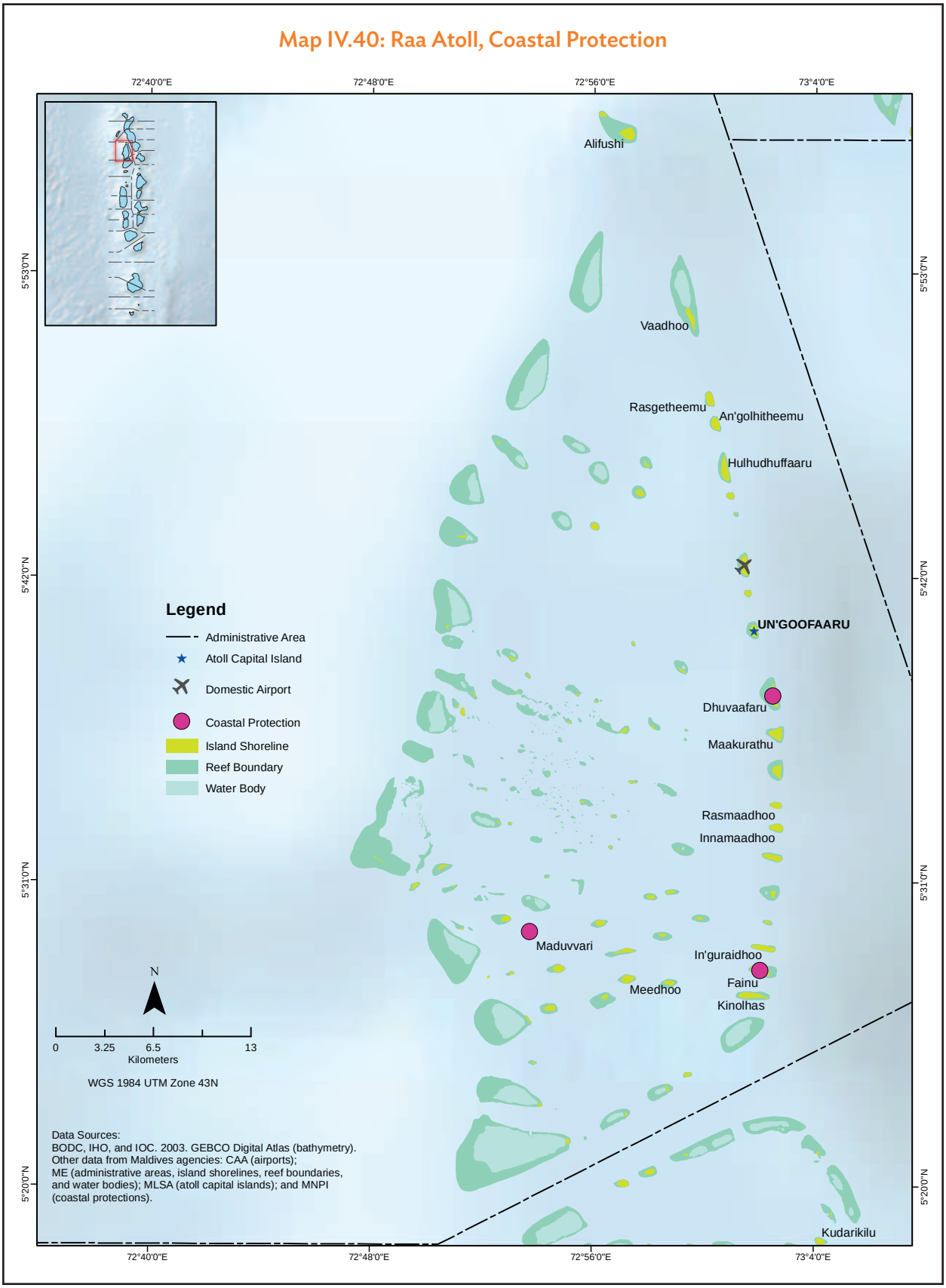
Map IV.38: Noonu Atoll, Coastal Protection



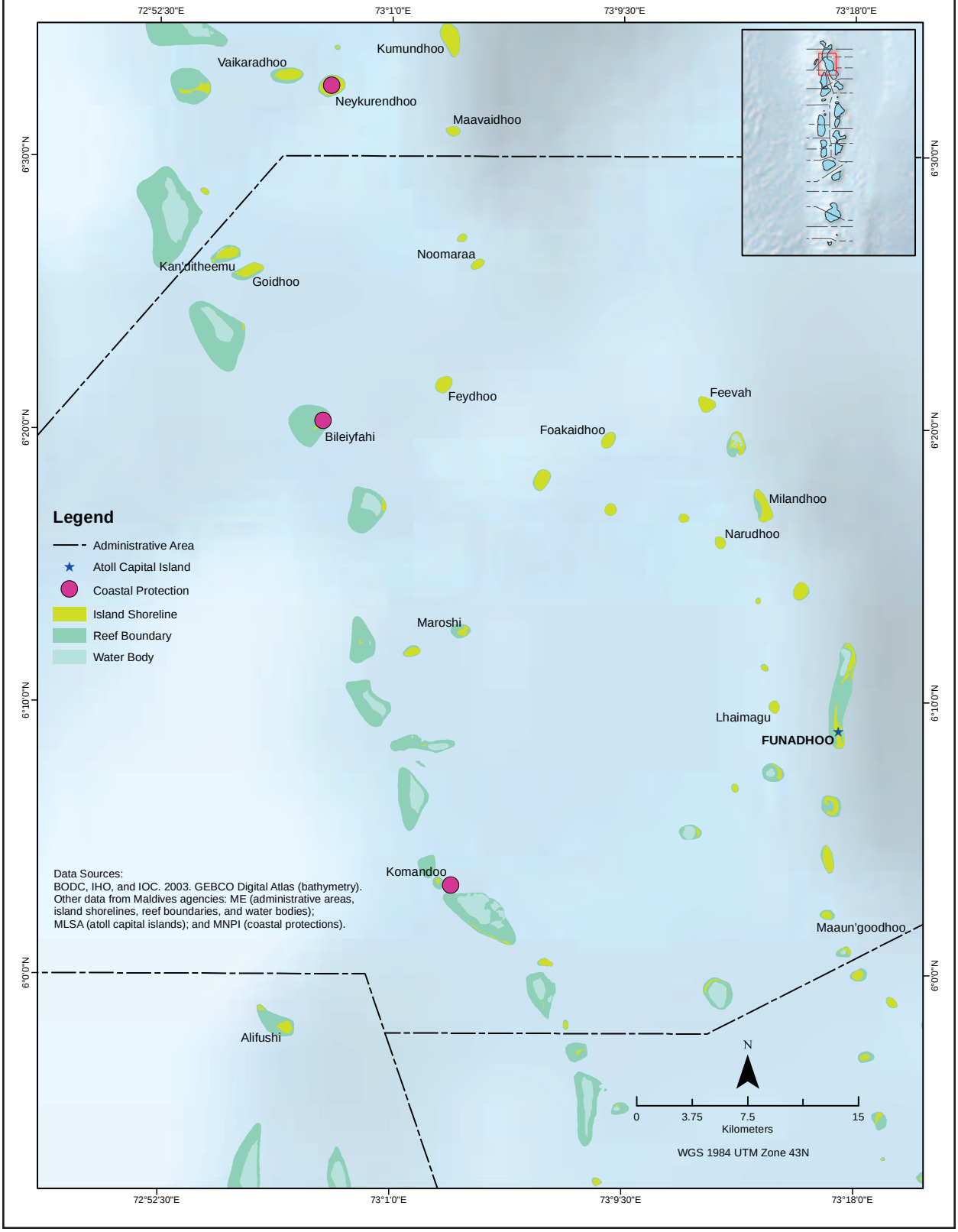
Map IV.39: North Malé Atoll, Coastal Protection



Map IV.40: Raa Atoll, Coastal Protection

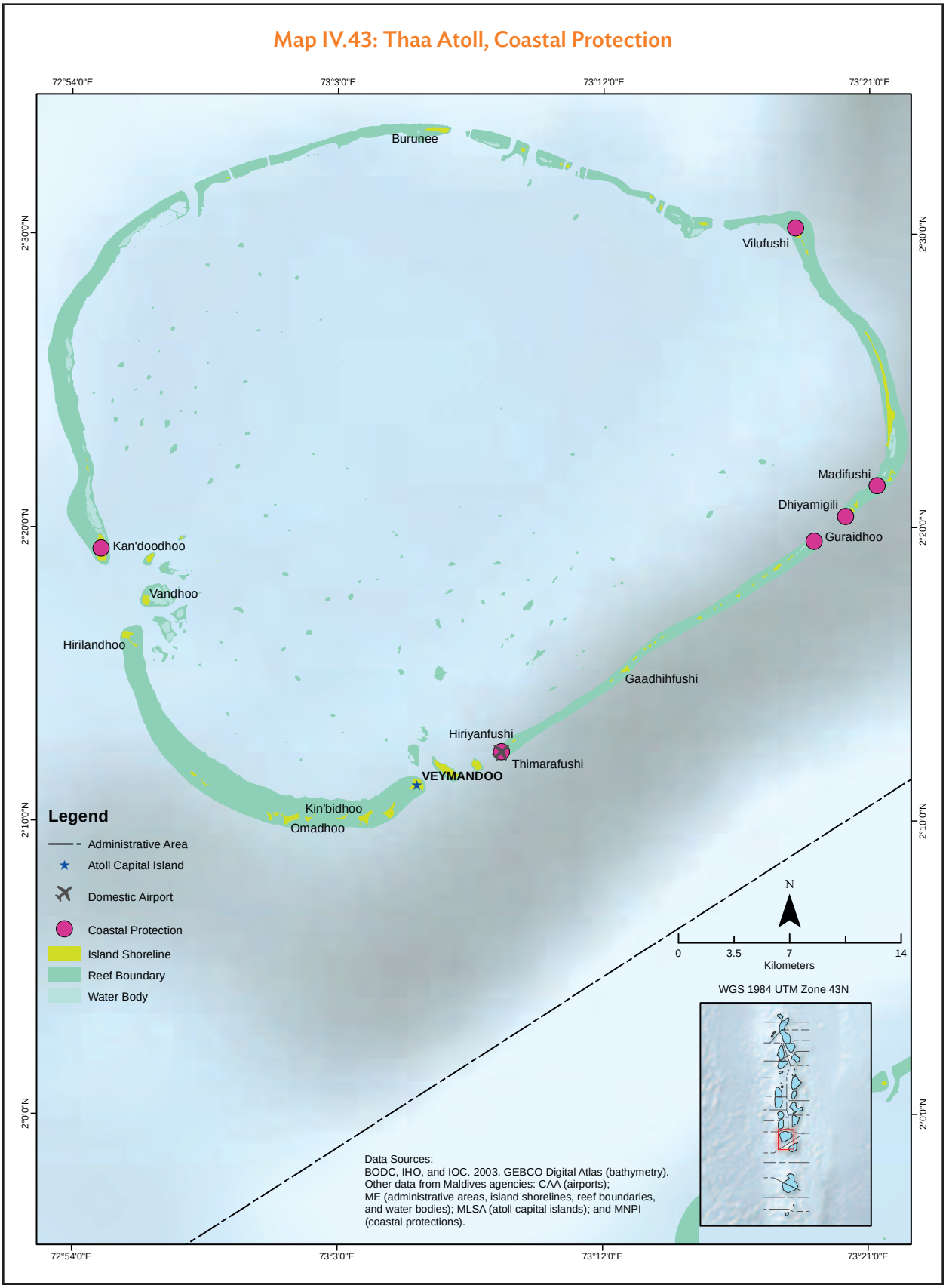


Map IV.41: Shaviyani Atoll, Coastal Protection

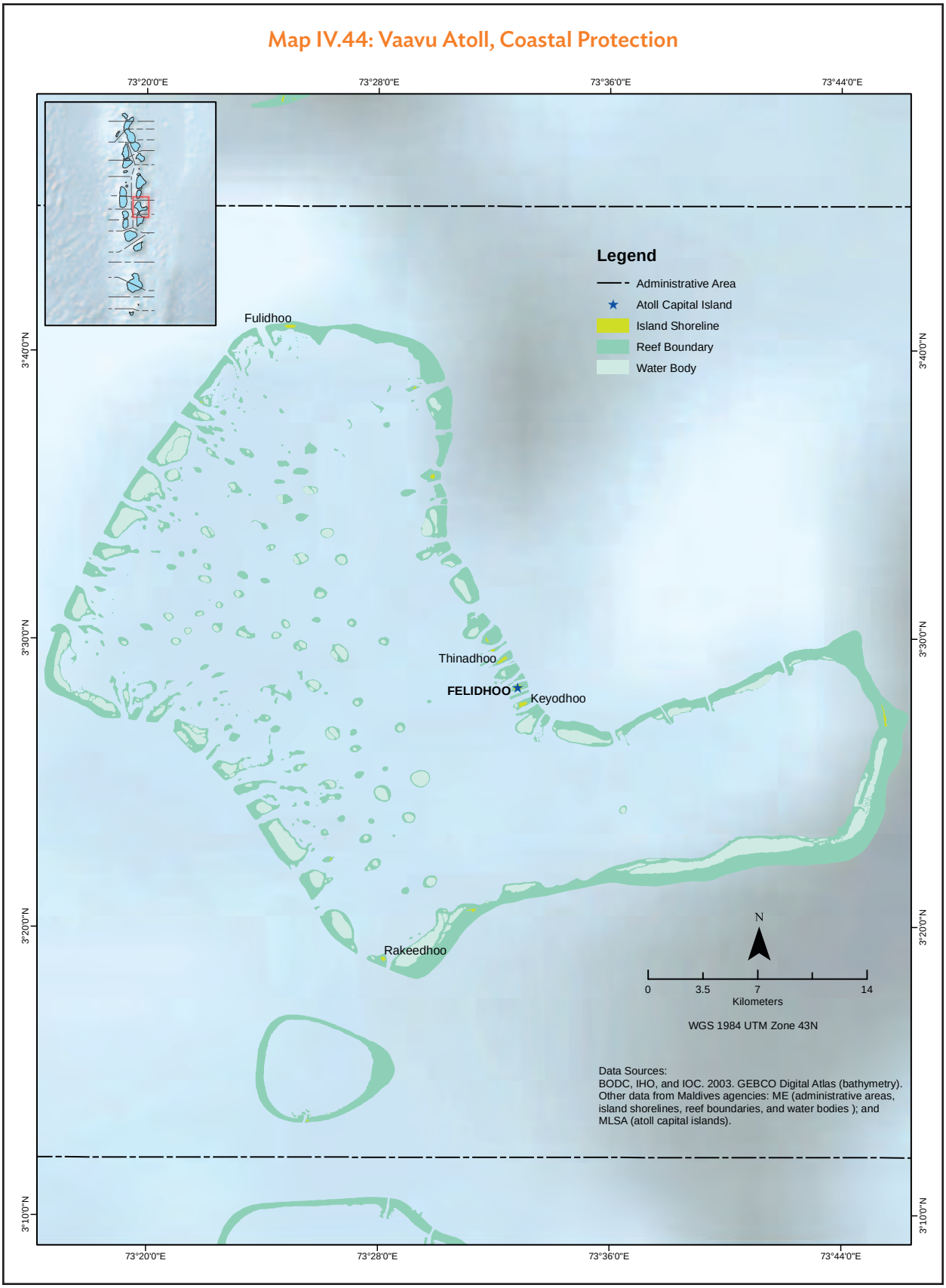


Map IV.42: South Malé Atoll, Coastal Protection

Map IV.43: Thaa Atoll, Coastal Protection



Map IV.44: Vaavu Atoll, Coastal Protection



Marine Conservation and Biodiversity

Maldives has greater coral reef coverage than available dry land. It has diverse and rich coral reefs, lagoons teeming with aquatic life, mangrove ecosystems where fingerlings as well as avian creatures find refuge, beaches where turtles lay their eggs, and seagrass beds. Human activities, coastal erosion, and changing climate patterns—specifically warmer seas—threaten the rich marine resources, particularly leading to coral bleaching. To protect this, the Marine Research Centre (now called 'Marine Research Institute') established coral reef monitoring sites in the 1990s to address the coral bleaching event that occurred in 1998 (Ibrahim et al. 2017). Coral reef monitoring sites can be found in the islands of Addu City and Alifu Alifu, Gaafu Alifu, Haa Dhaalu, North Malé, Seemu, and Vaavu atolls.

Table IV.2: Maldives, Islands with Coral Reef Monitoring Sites

Atoll	Island
Haa Dhaalu	Hondaafushi
Haa Dhaalu	Finey
Haa Dhaalu	Hirimaradhoo
North Malé	Bodubandos
North Malé	Udhafushi
North Malé	Enboodhoofinolhu
Alifu Alifu	Fesdhoo
Alifu Alifu	Maayaafushi
Alifu Alifu	Velidhoo
Alifu Alifu	Kandhonlhudhoo
Vaavu	Anbaraa
Vaavu	Vattaru
Vaavu	Foththeyo
Gaafu Alifu	Kooddoo
Seemu	Hithadhoo
Seemu	Gan
Seemu	Vilingili

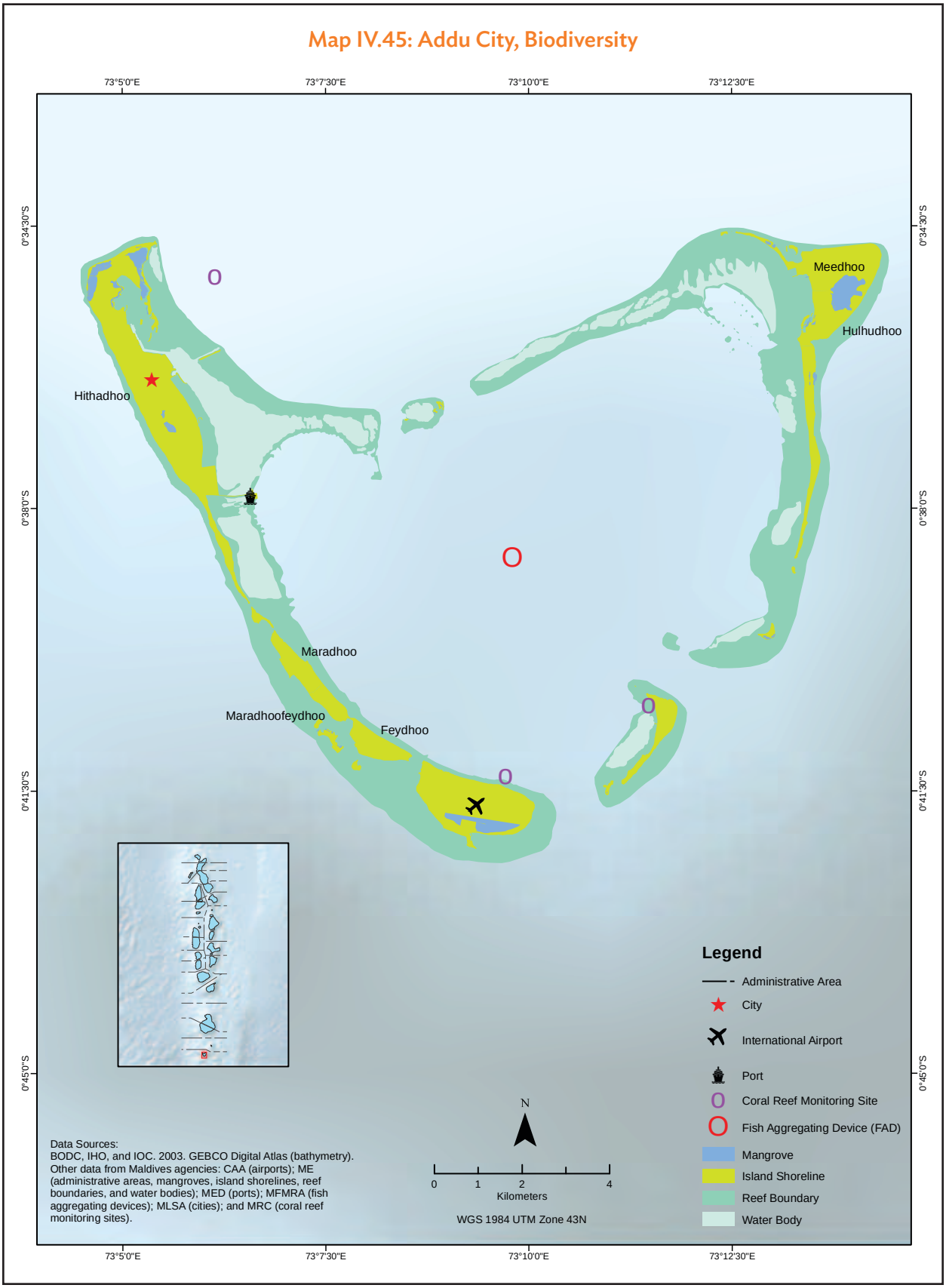
Source: Maldives Marine Research Centre, 2017.

Diverse and rich coral reefs. About 100,000 divers visit Maldives every year (photo by Fonthip Warrd).

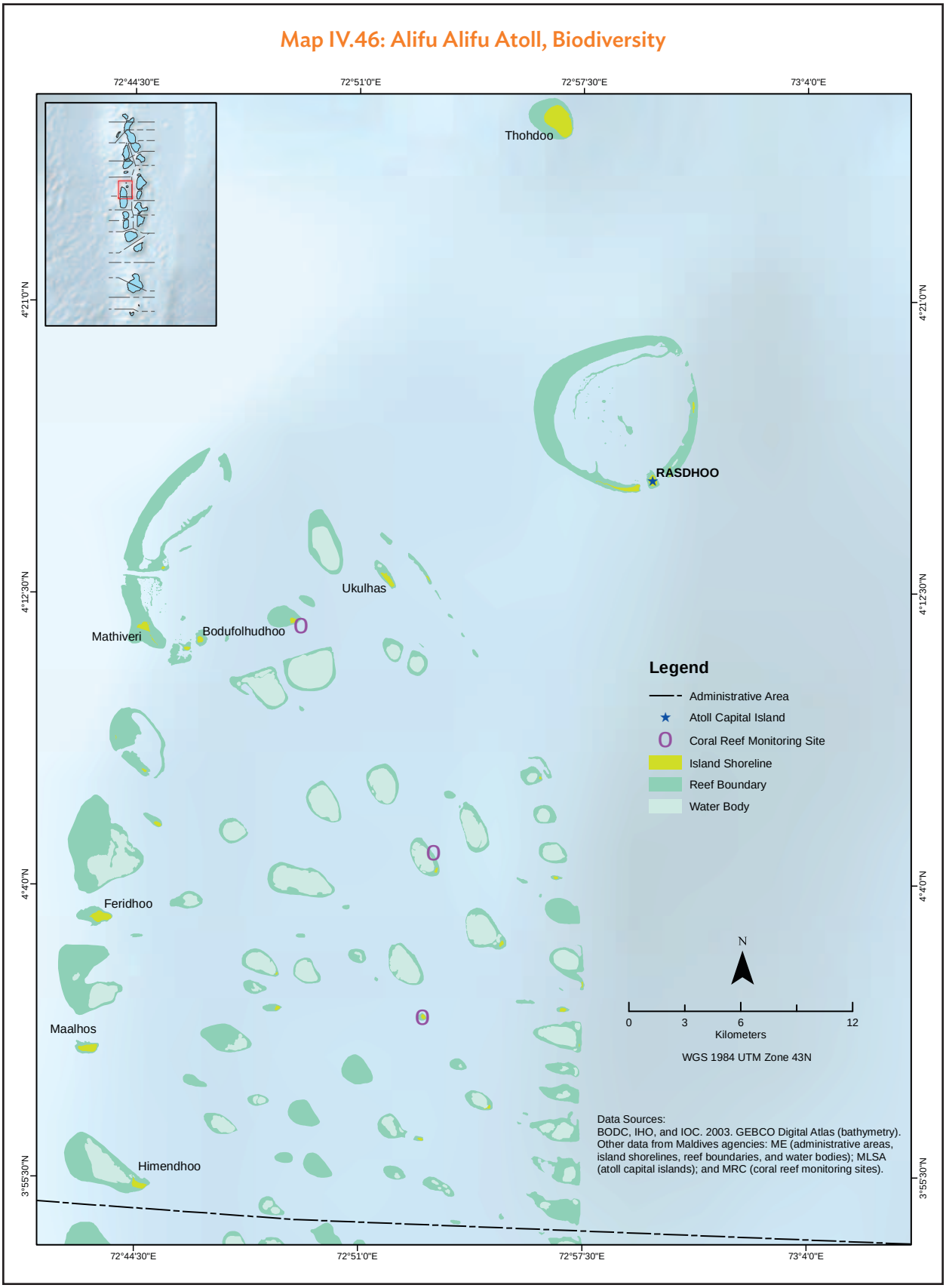
Aquatic life. Moray eels on corals (photo by Julian Svoboda).

Biodiversity. Coral reef teeming with life (photo by Fonthip Warrd).

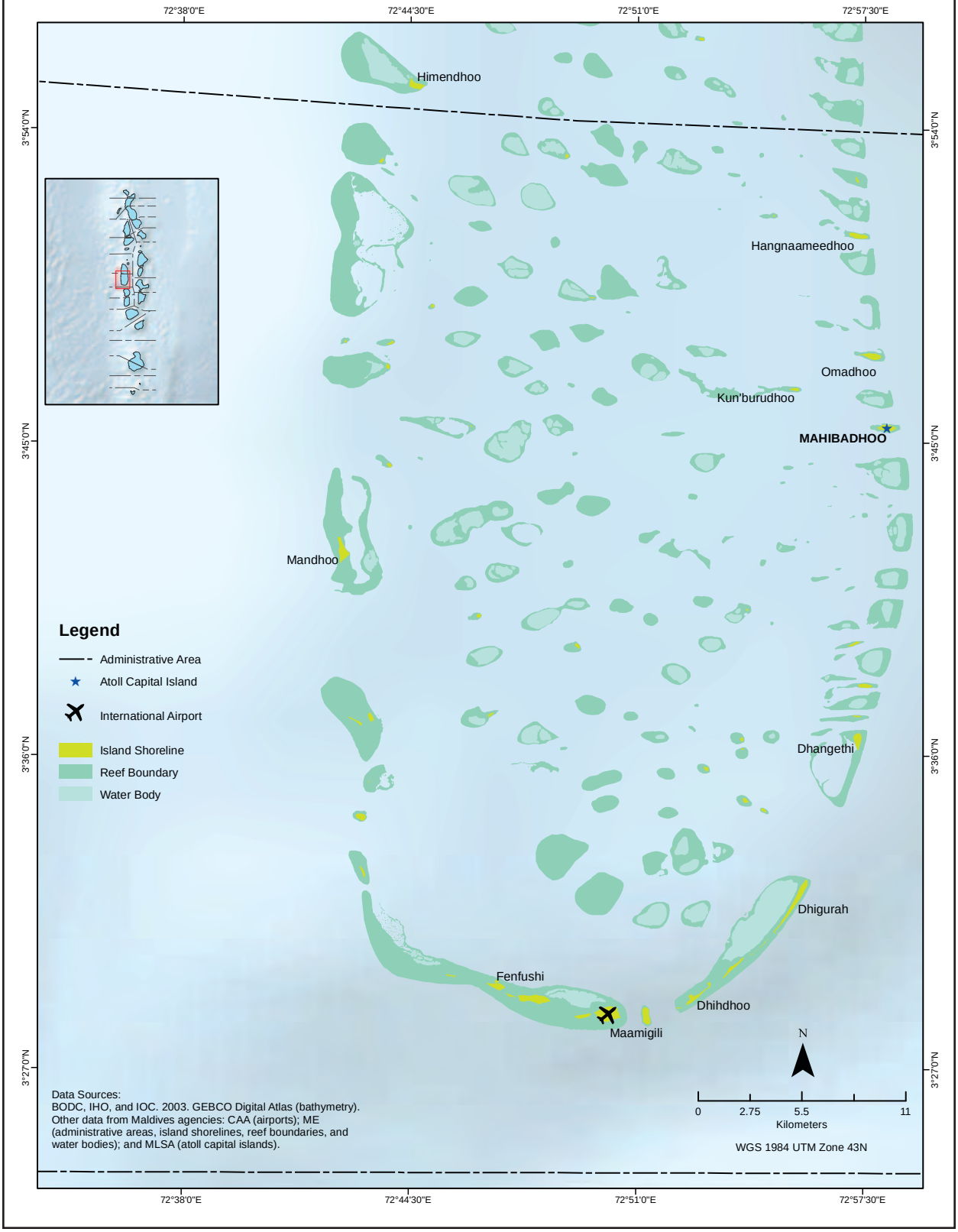
Map IV.45: Addu City, Biodiversity



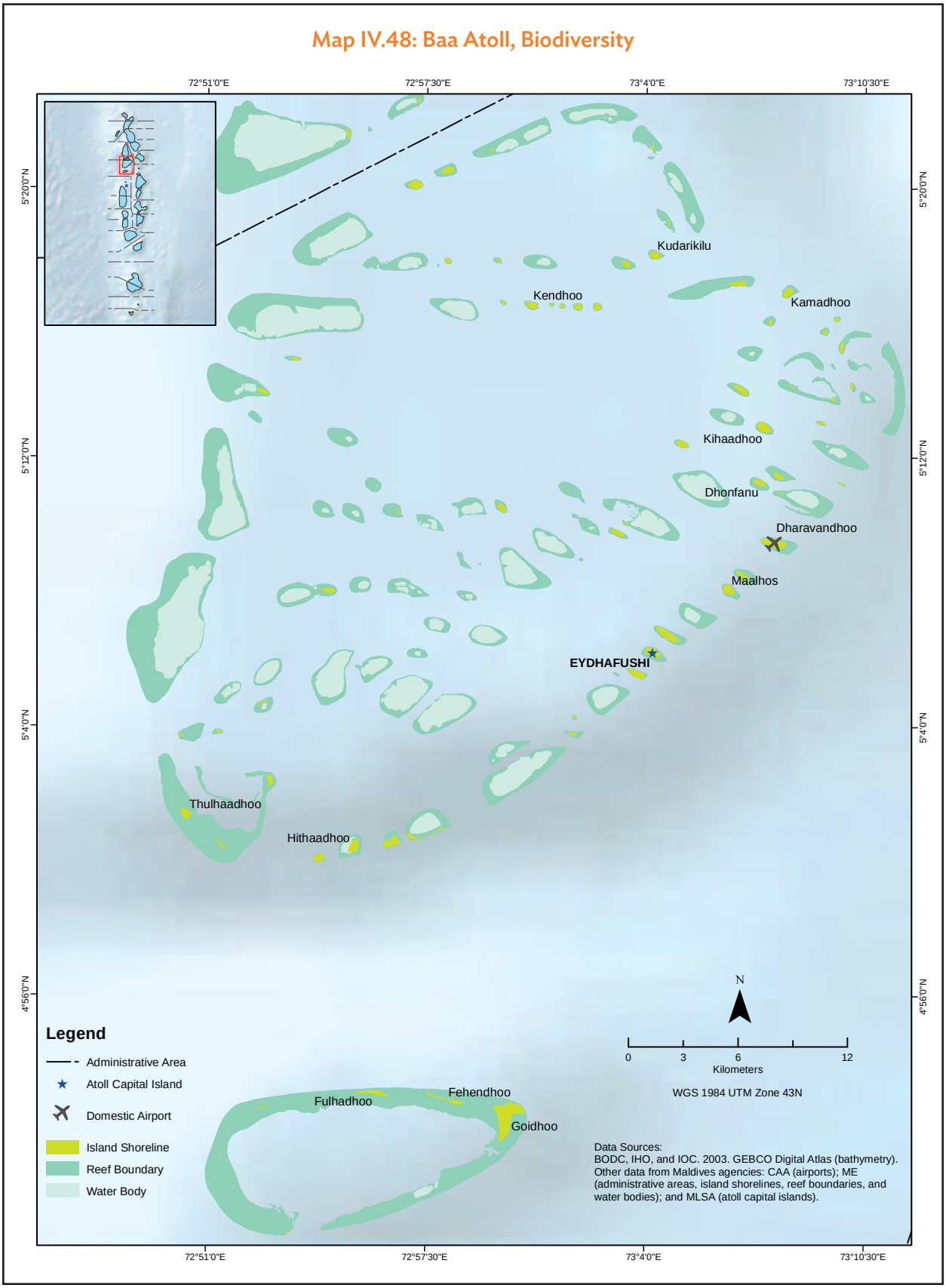
Map IV.46: Alifu Alifu Atoll, Biodiversity



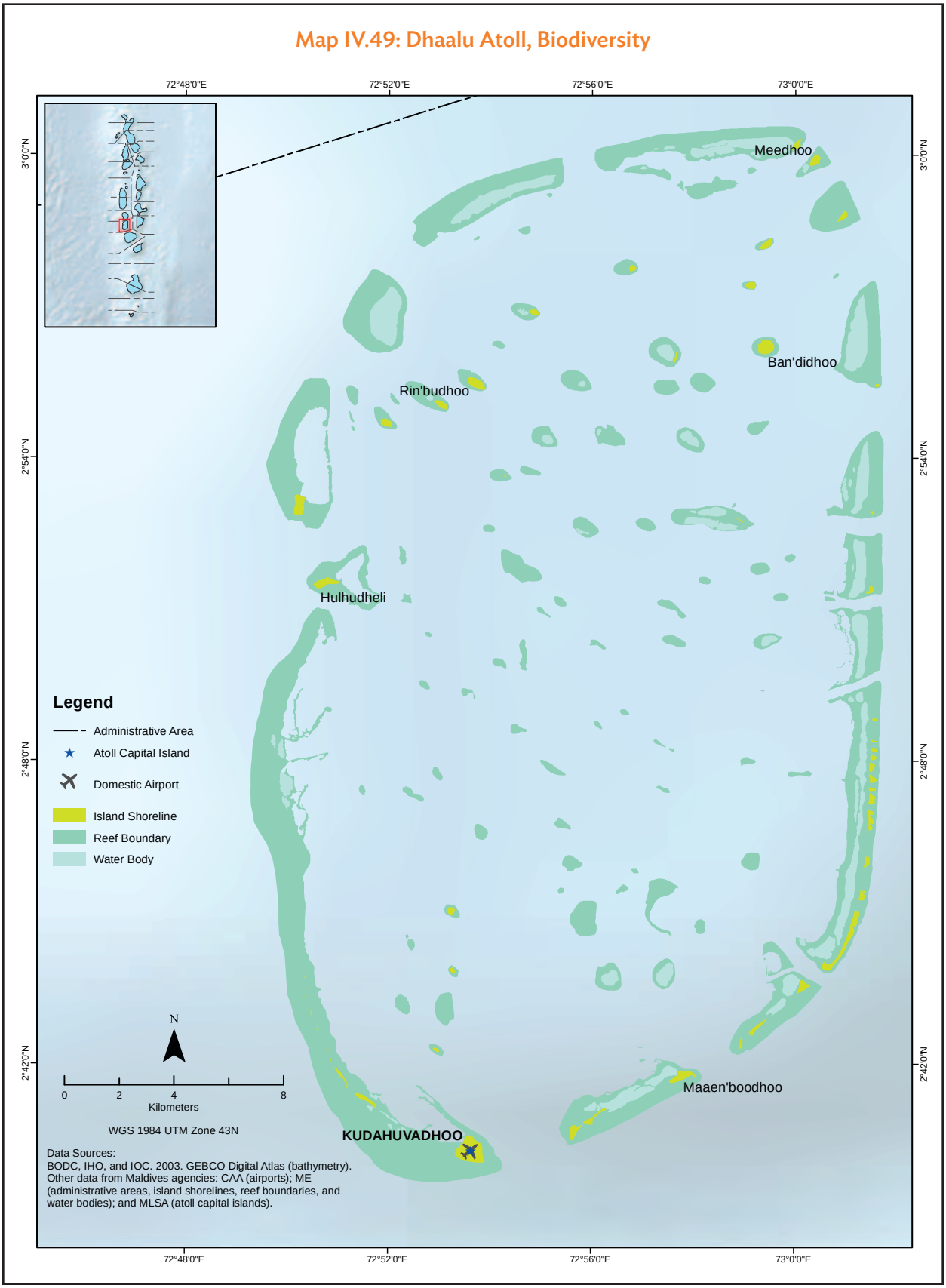
Map IV.47: Alifu Dhaalu Atoll, Biodiversity



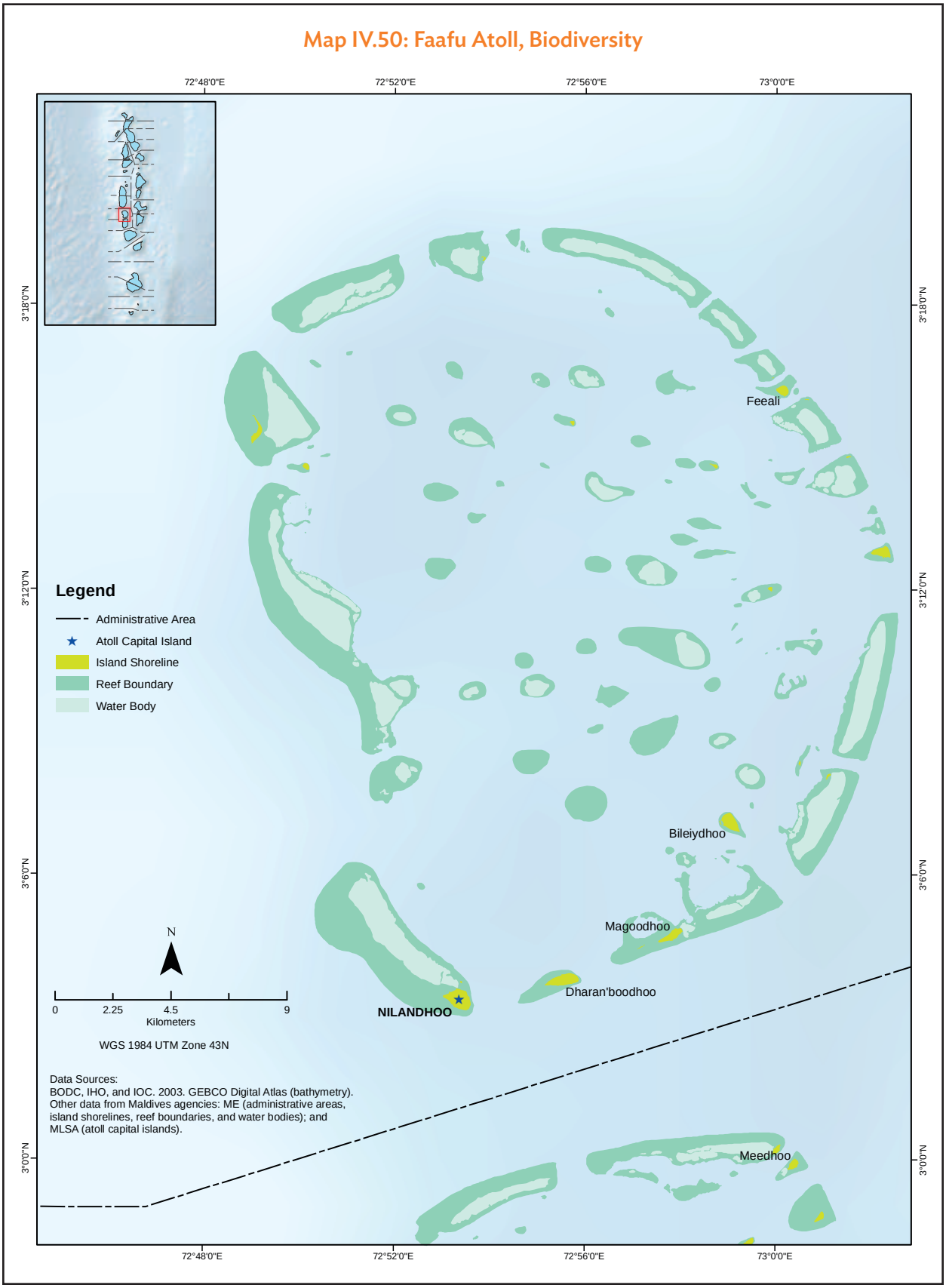
Map IV.48: Baa Atoll, Biodiversity



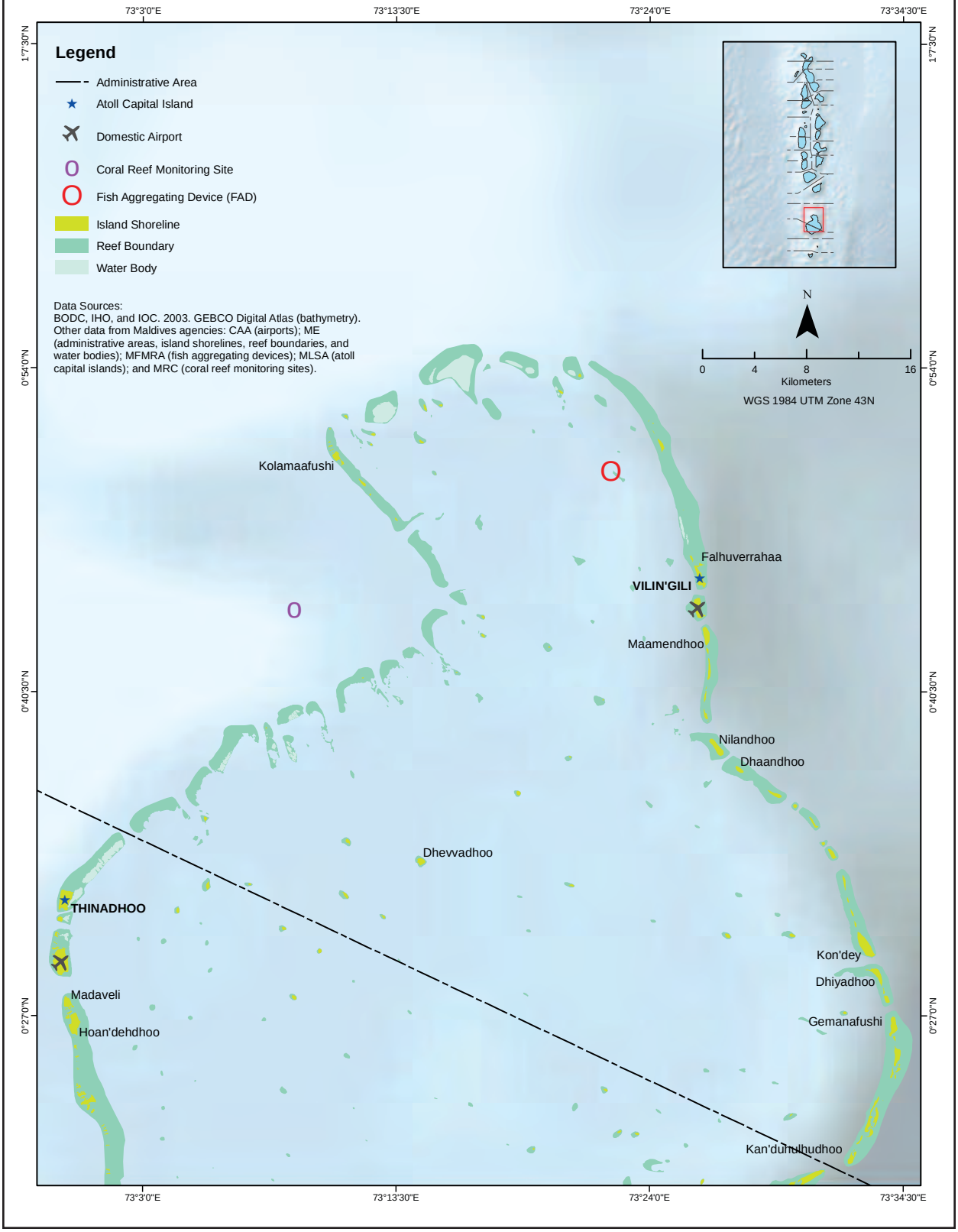
Map IV.49: Dhaalu Atoll, Biodiversity



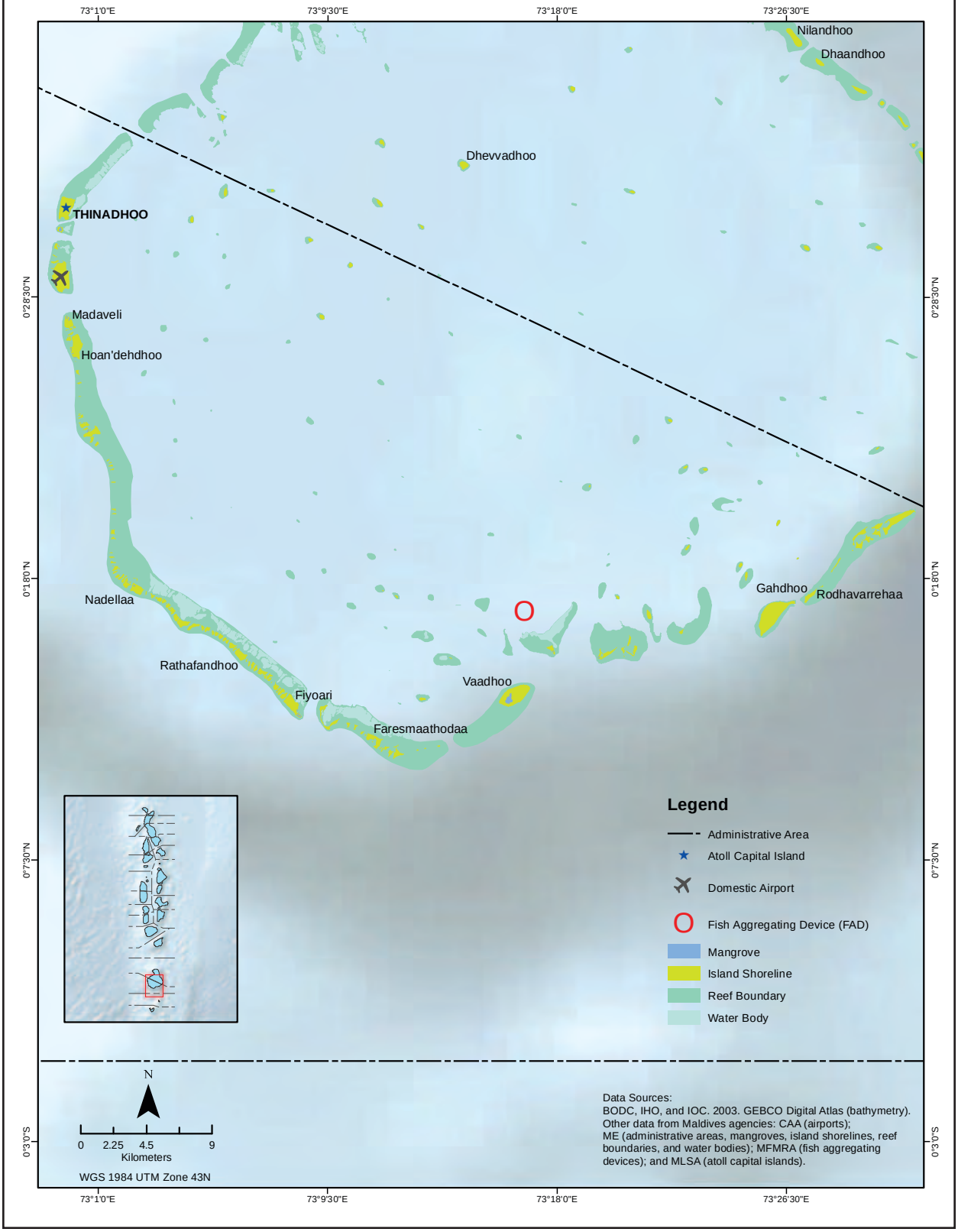
Map IV.50: Faafu Atoll, Biodiversity



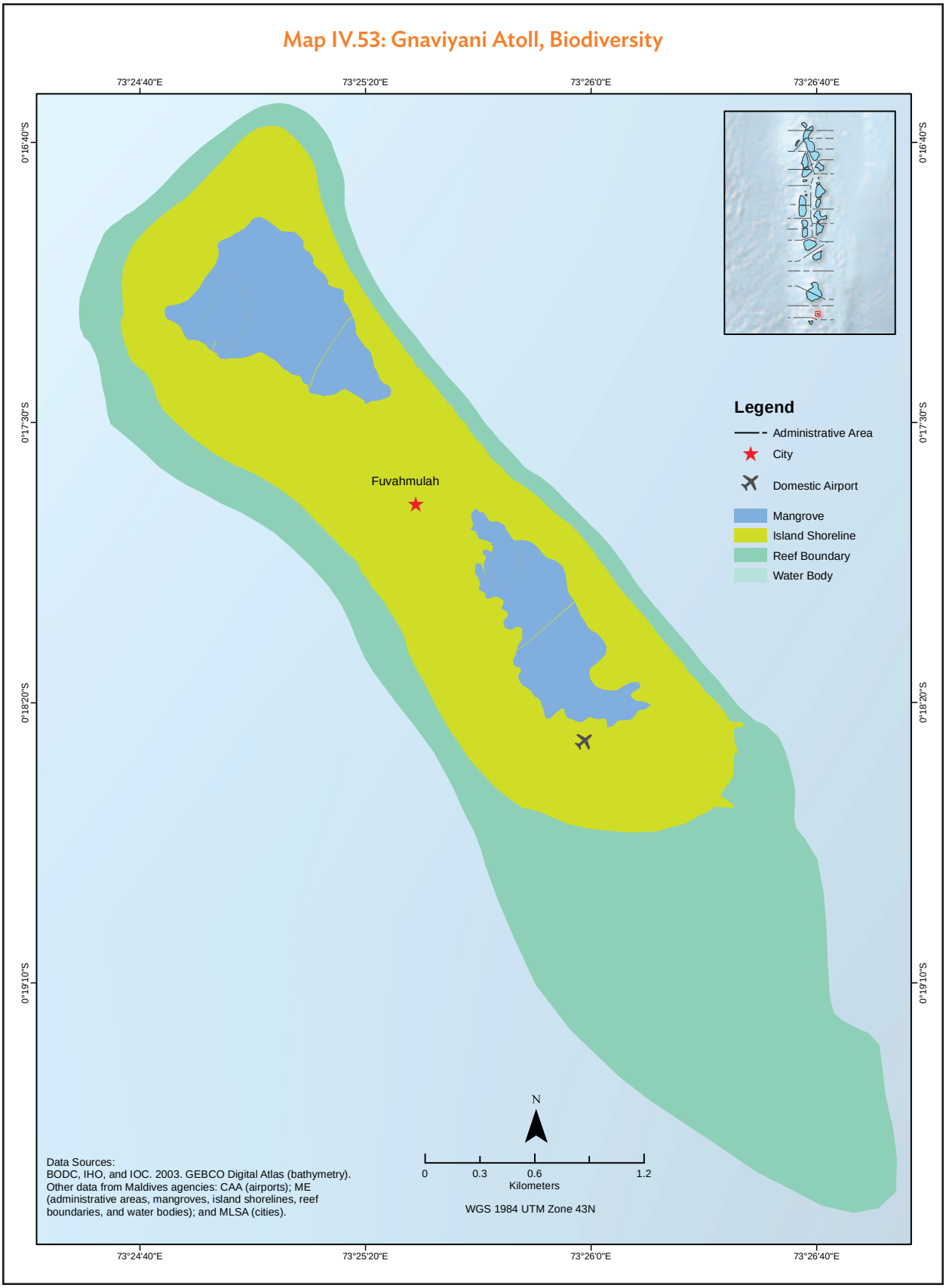
Map IV.51: Gaafu Alifu Atoll, Biodiversity



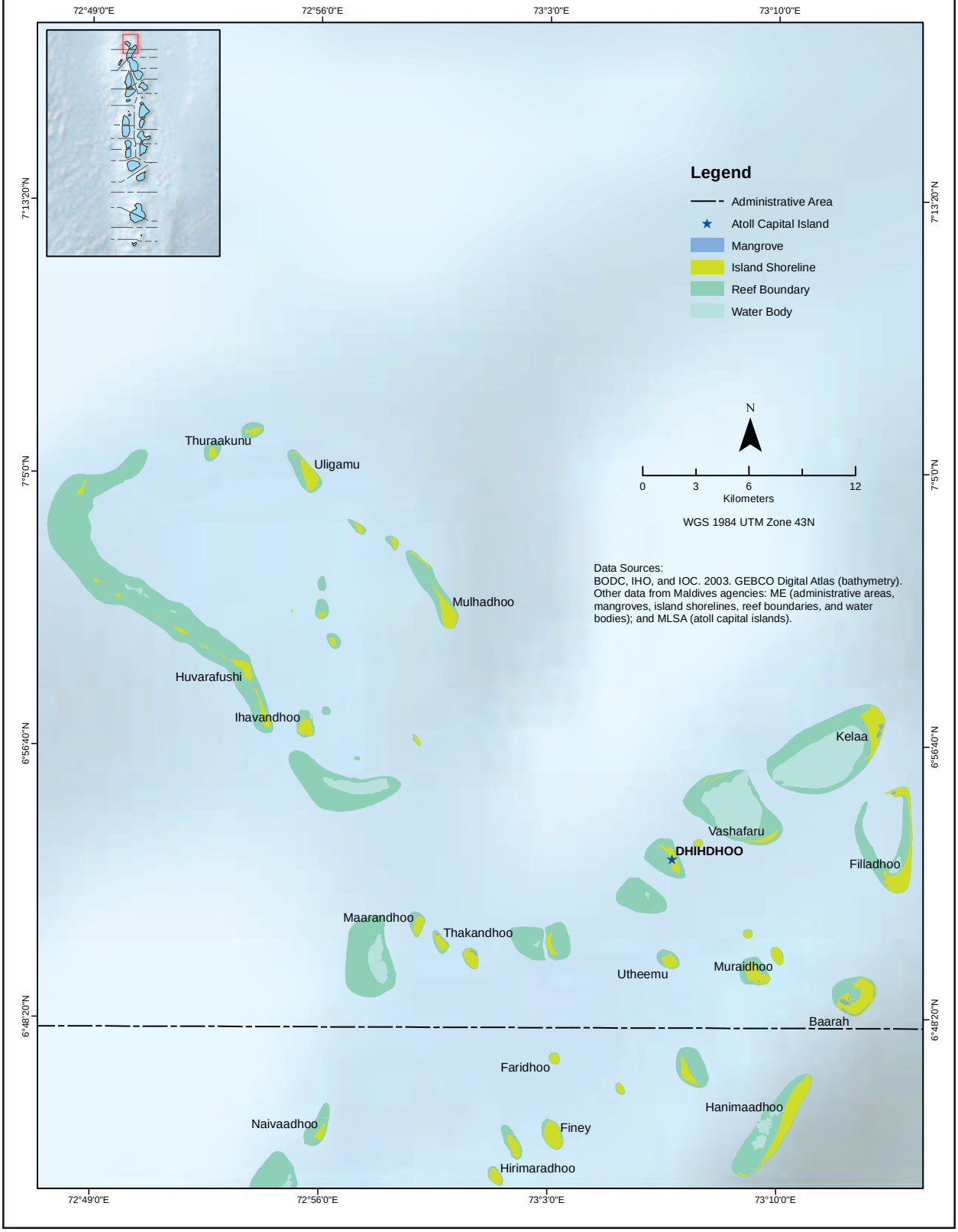
Map IV.52: Gaafu Dhaalu Atoll, Biodiversity



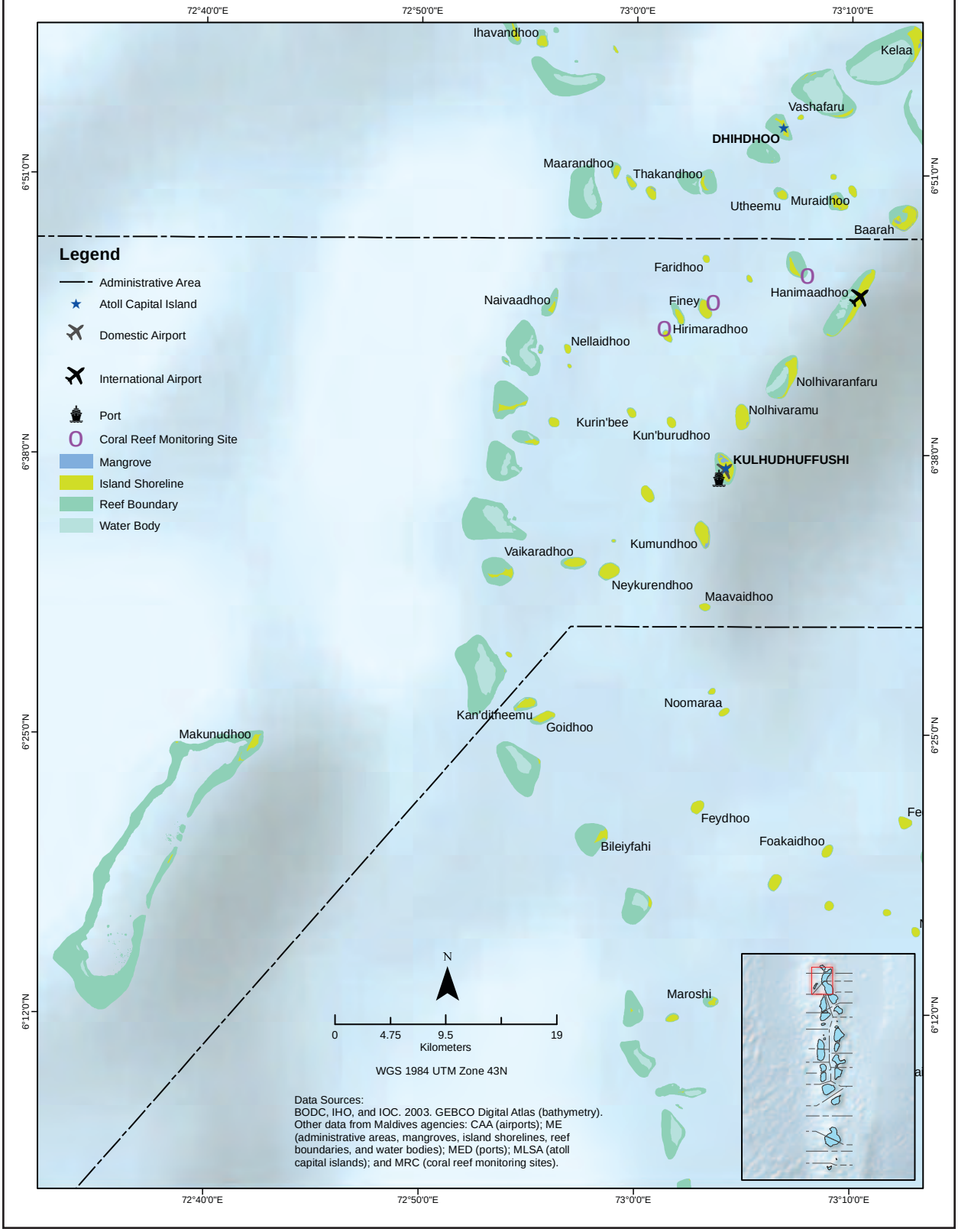
Map IV.53: Gnaviyani Atoll, Biodiversity



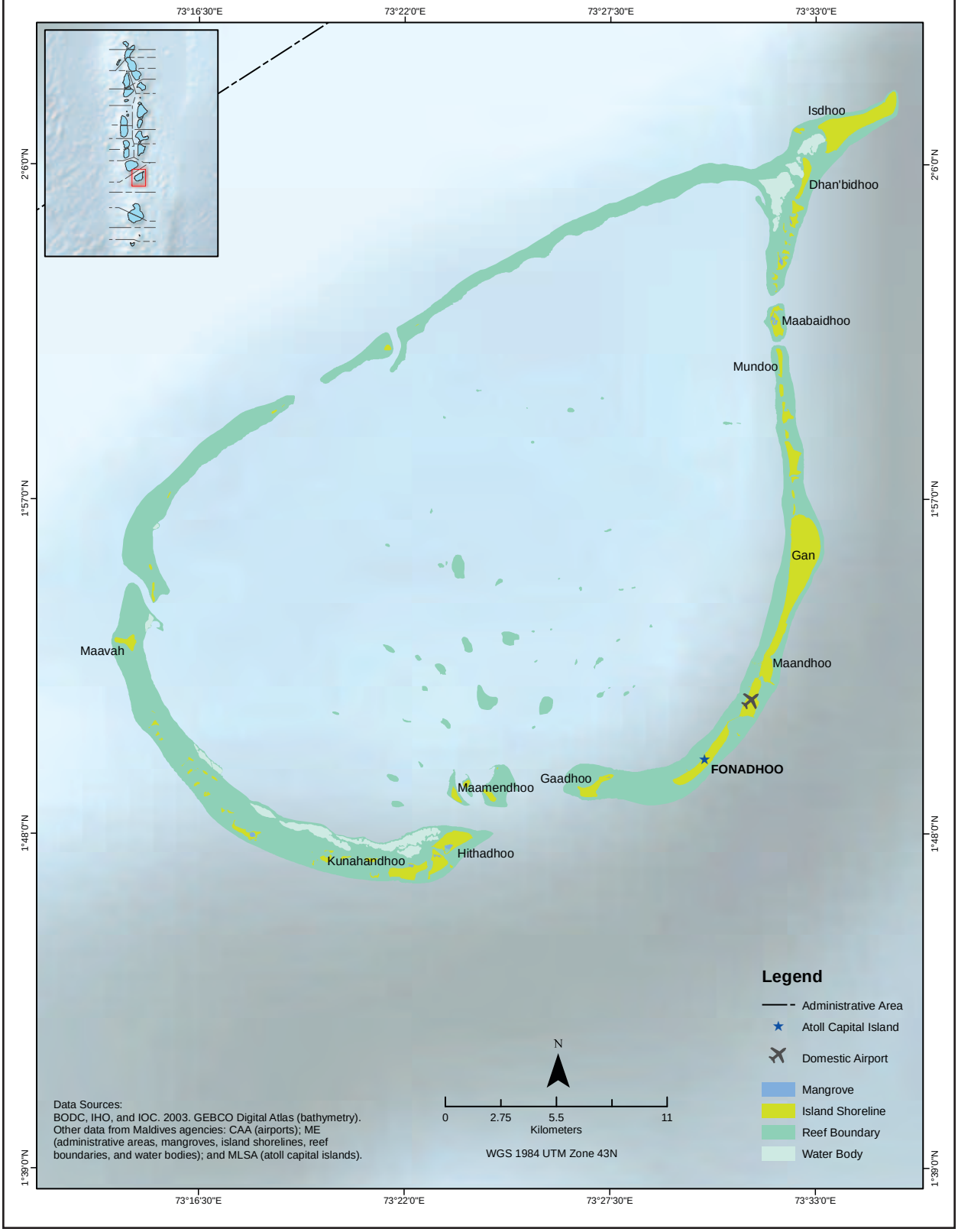
Map IV.54: Haa Alifu Atoll, Biodiversity



Map IV.55: Haa Dhaalu Atoll, Biodiversity

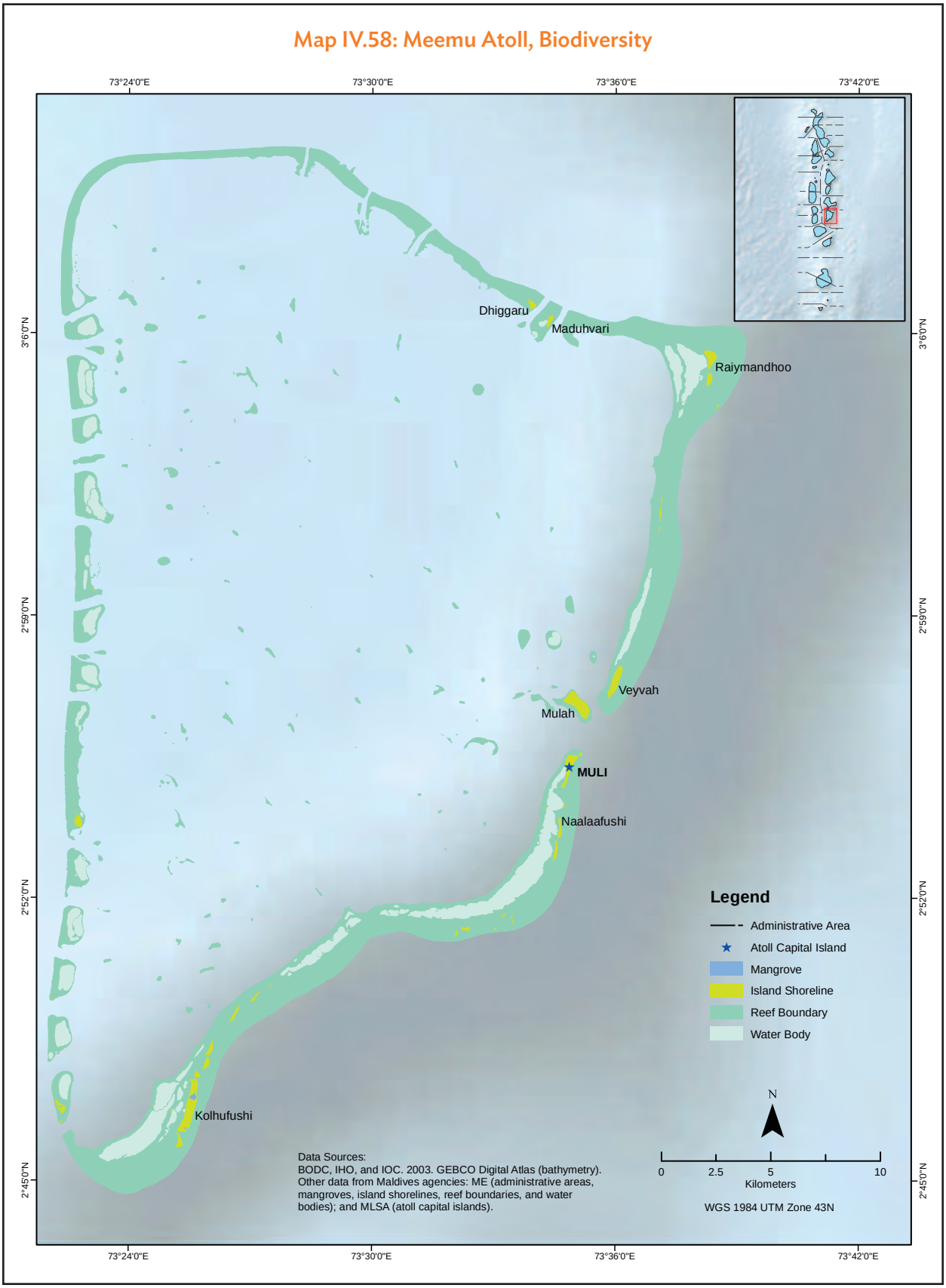


Map IV.56: Laamu Atoll, Biodiversity

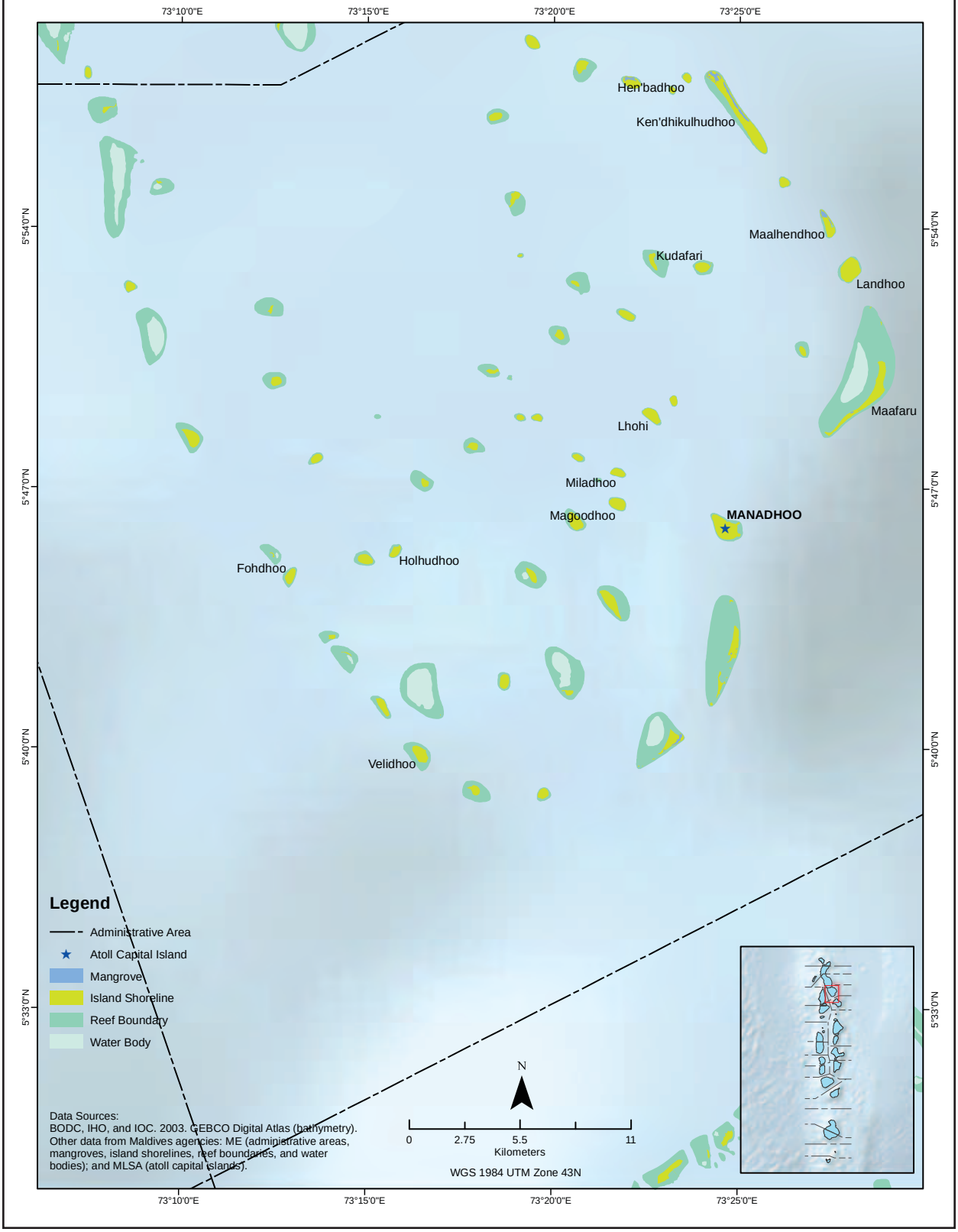


Map IV.57: Lhaviyani Atoll, Biodiversity

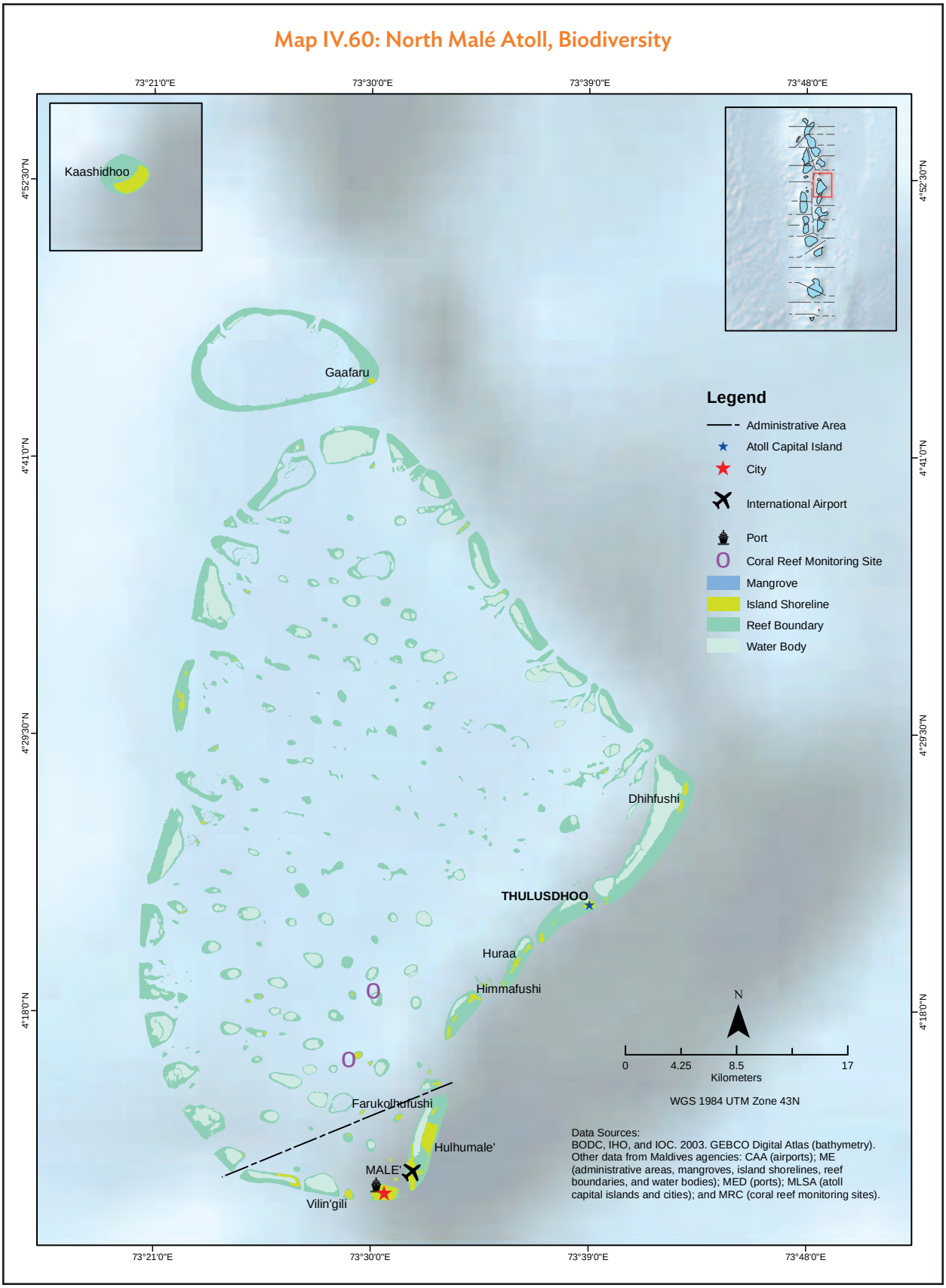
Map IV.58: Meemu Atoll, Biodiversity



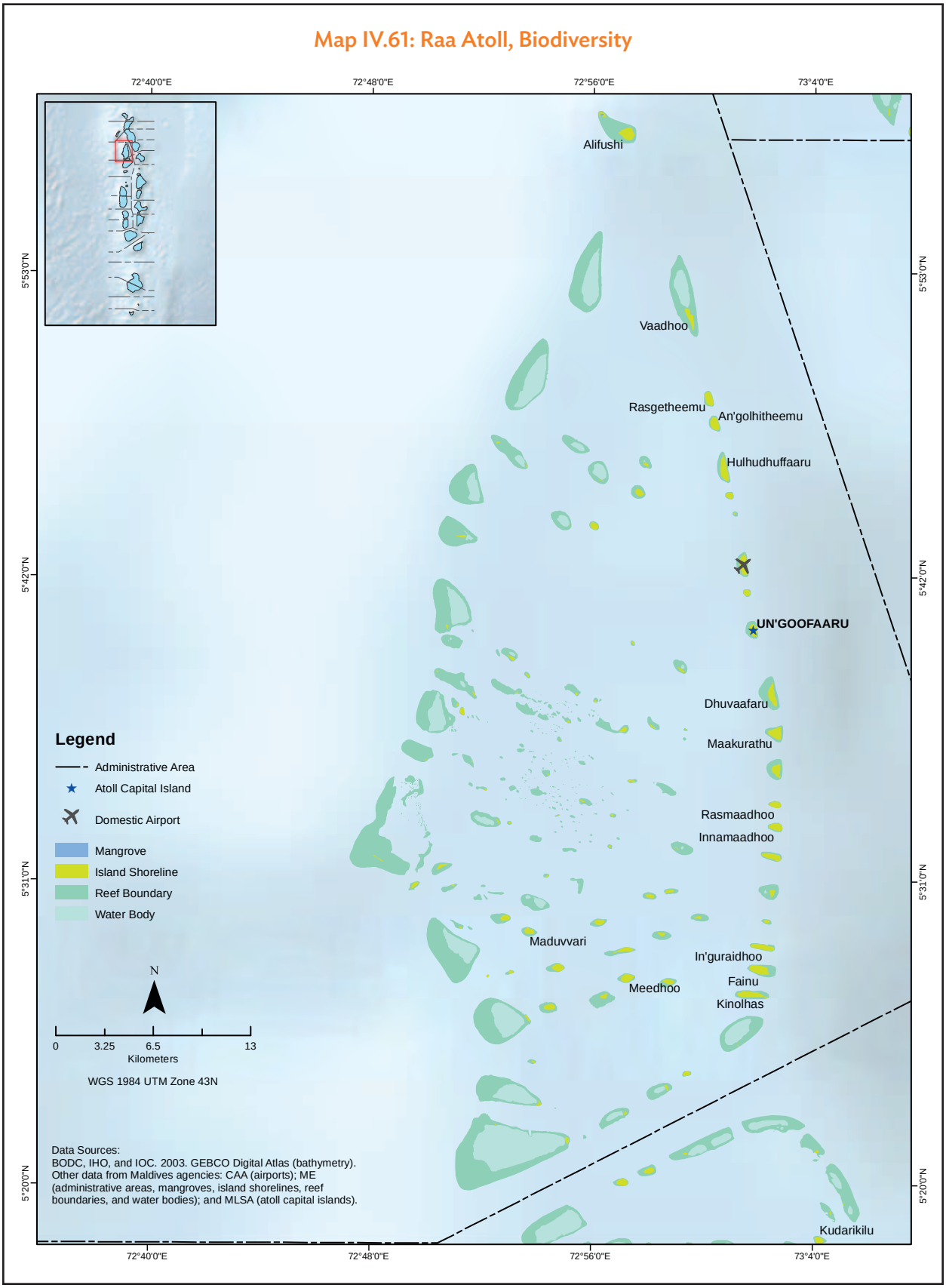
Map IV.59: Noonu Atoll, Biodiversity



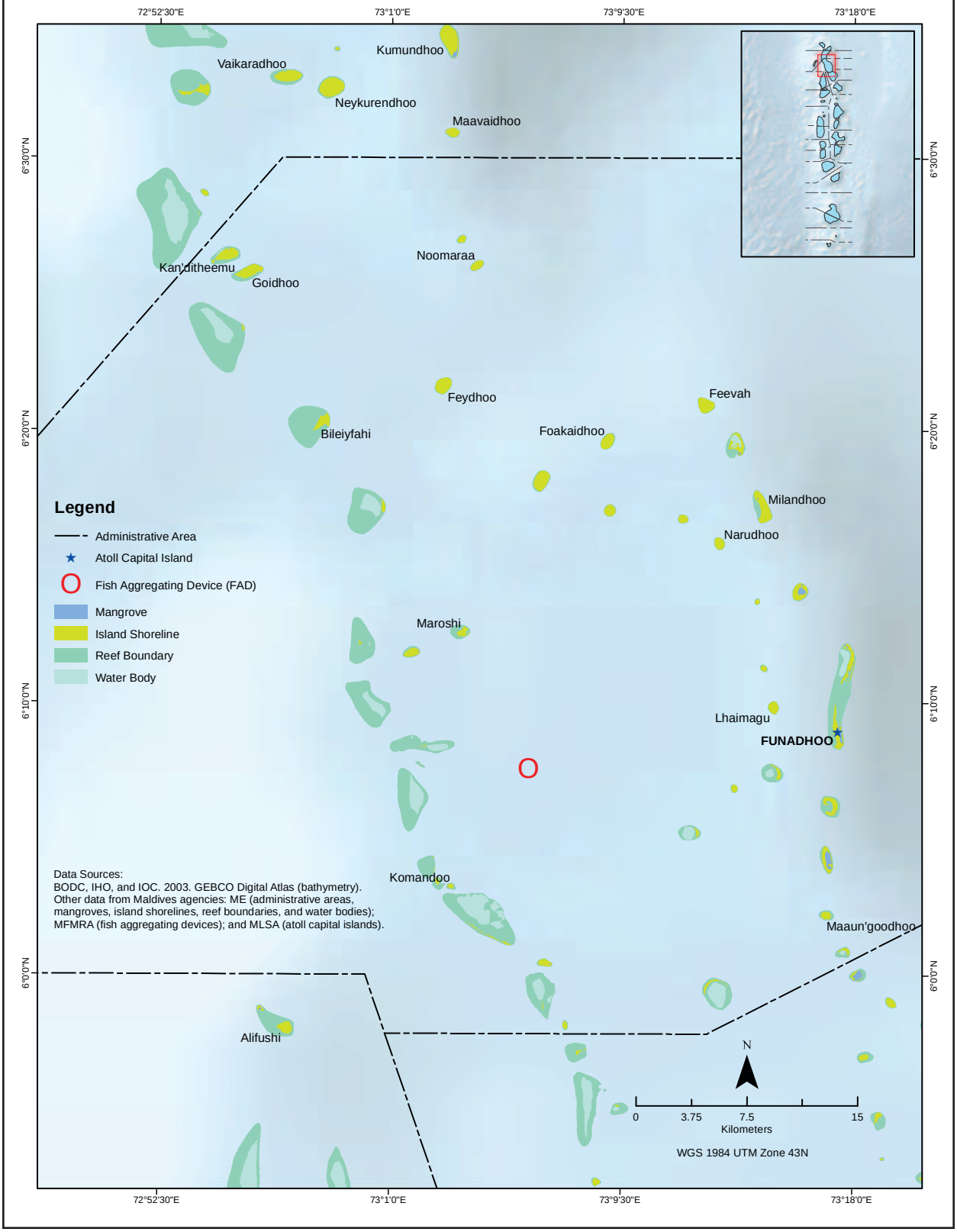
Map IV.60: North Malé Atoll, Biodiversity



Map IV.61: Raa Atoll, Biodiversity

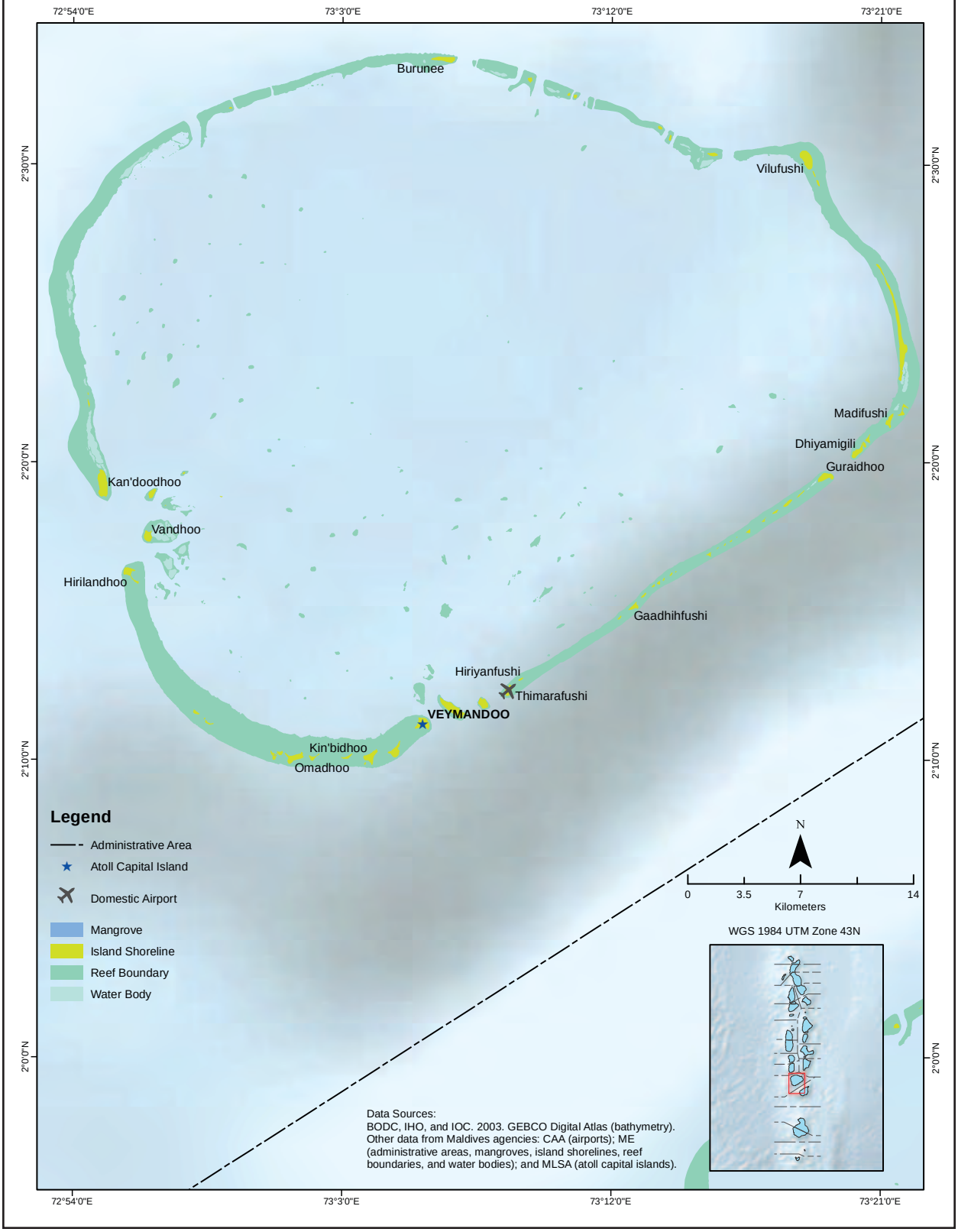


Map IV.62: Shaviyani Atoll, Biodiversity

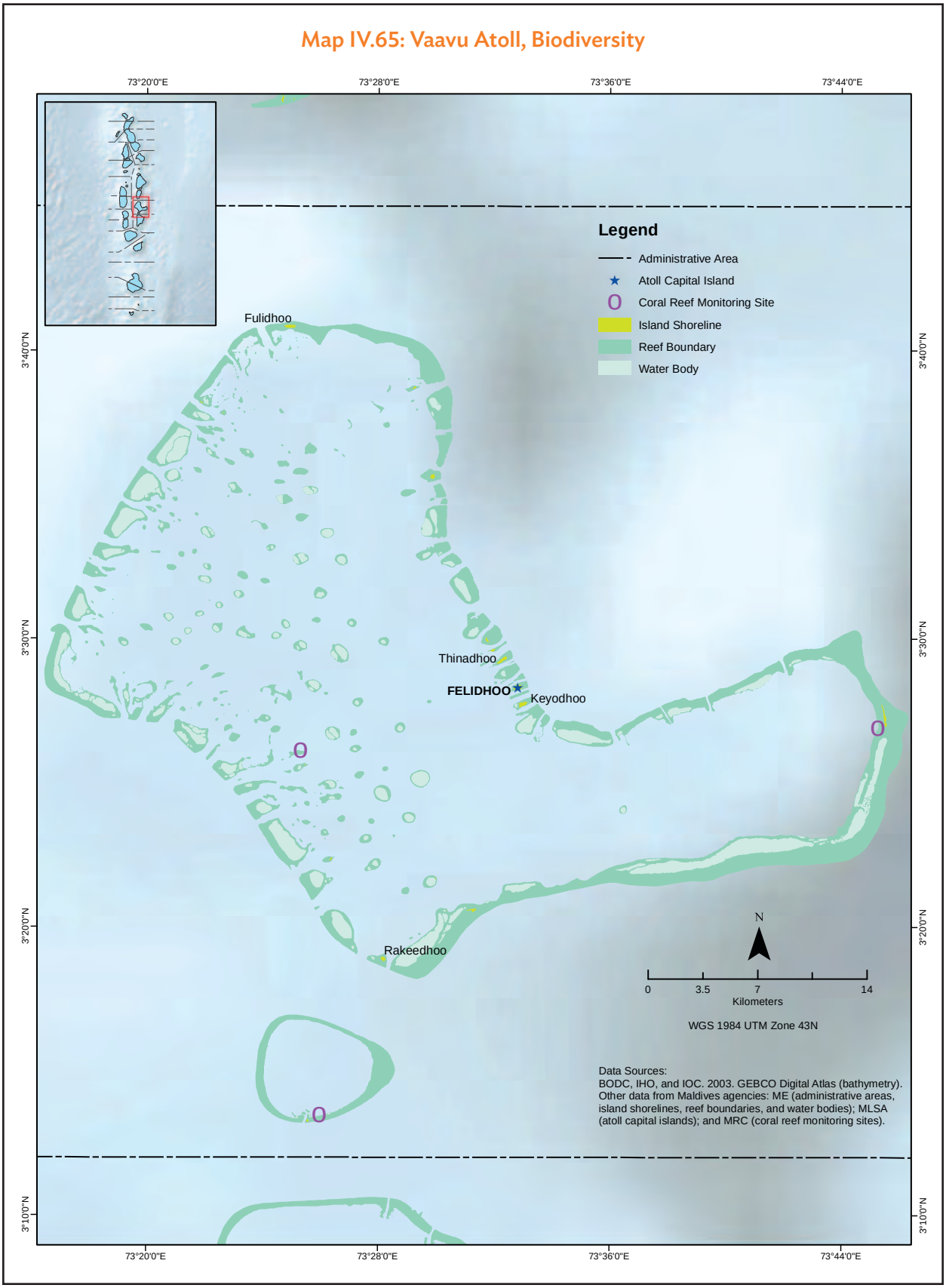


Map IV.63: South Malé Atoll, Biodiversity

Map IV.64: Thaa Atoll, Biodiversity



Map IV.65: Vaavu Atoll, Biodiversity



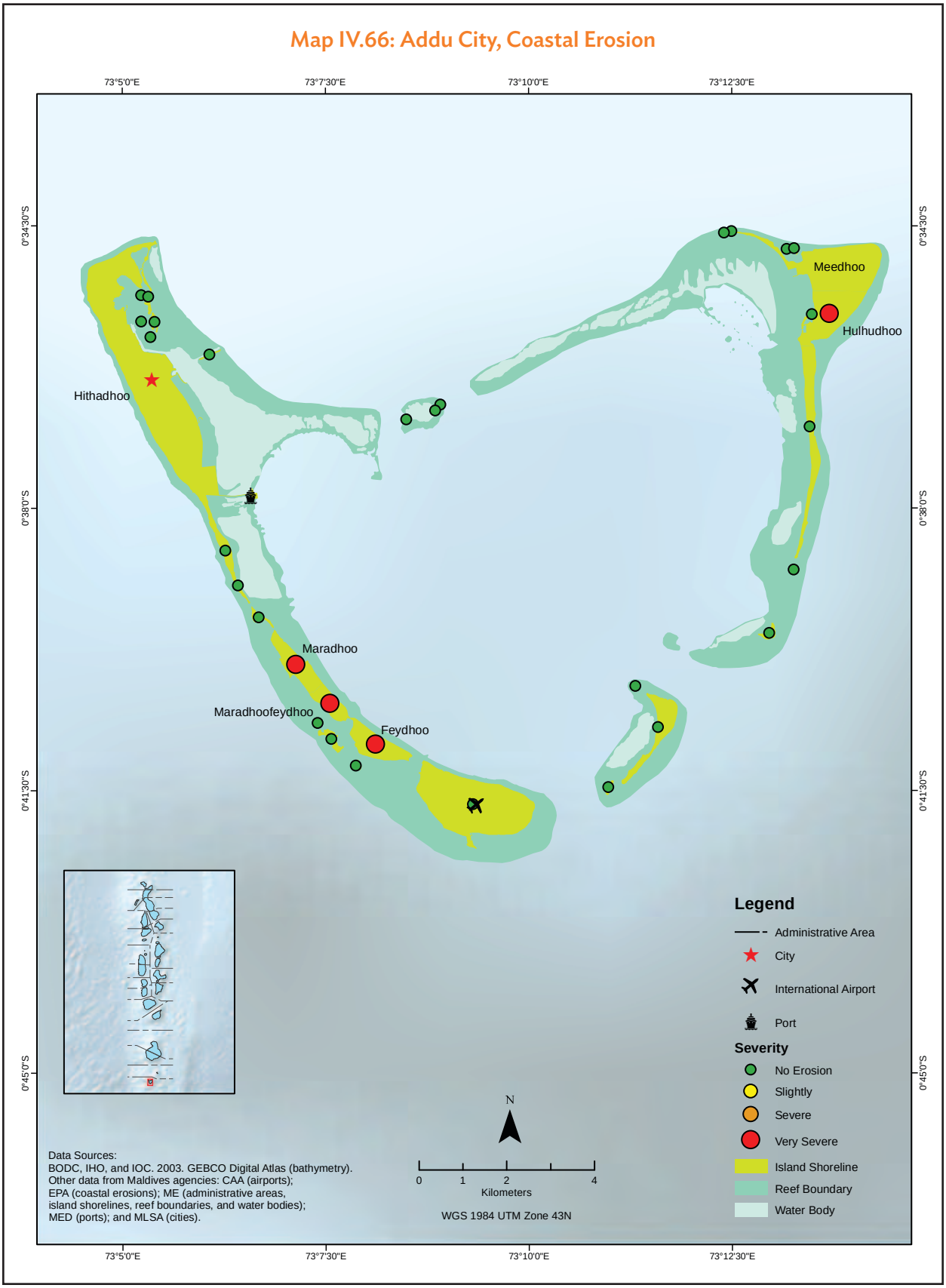
Threats to Marine and Coastal Biodiversity

Coastal Erosion

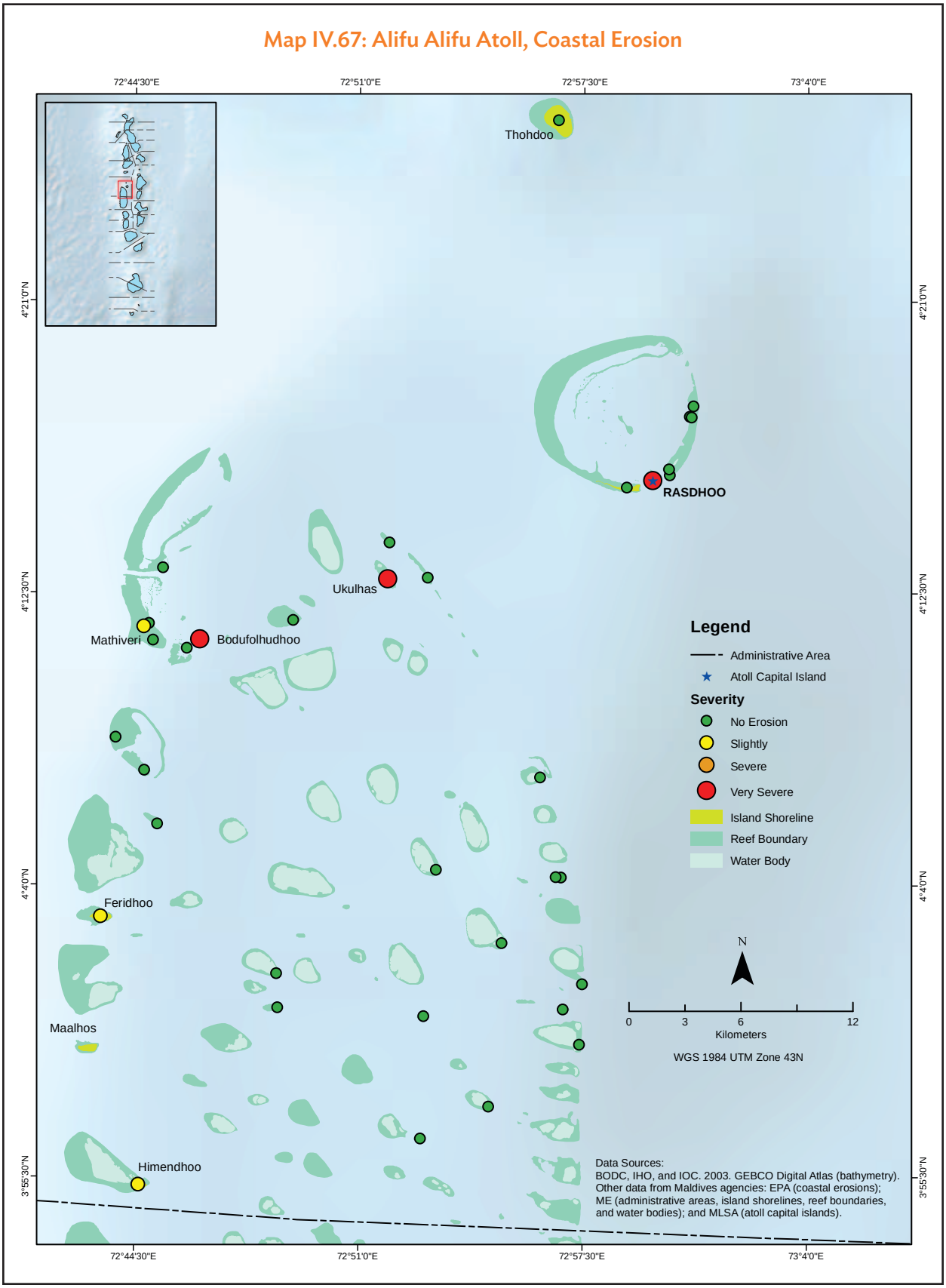
The islands of Maldives, with an average elevation of 1.4 meters above sea level, are prone to coastal erosions and inundation. Natural factors such as tides, waves, and surges cause these coastal erosions. However, human activities such as sand mining increase the severity of beach erosion. The rising global mean sea level is another threatening factor. Global mean sea level, which is connected to rising temperature, would increase the country's coastal erosion. As of 2017, 45 islands are very severely eroded, 20 are severely eroded, and 18 are slightly eroded. Small island resorts are greatly vulnerable to coastal erosions and, as a result, are already losing economic gains (Emerton, Baig, and Saleem 2009).

Coastal erosion. Wave breakers are installed along the coast to protect the beach from erosion (photo by Erwin Österreich).

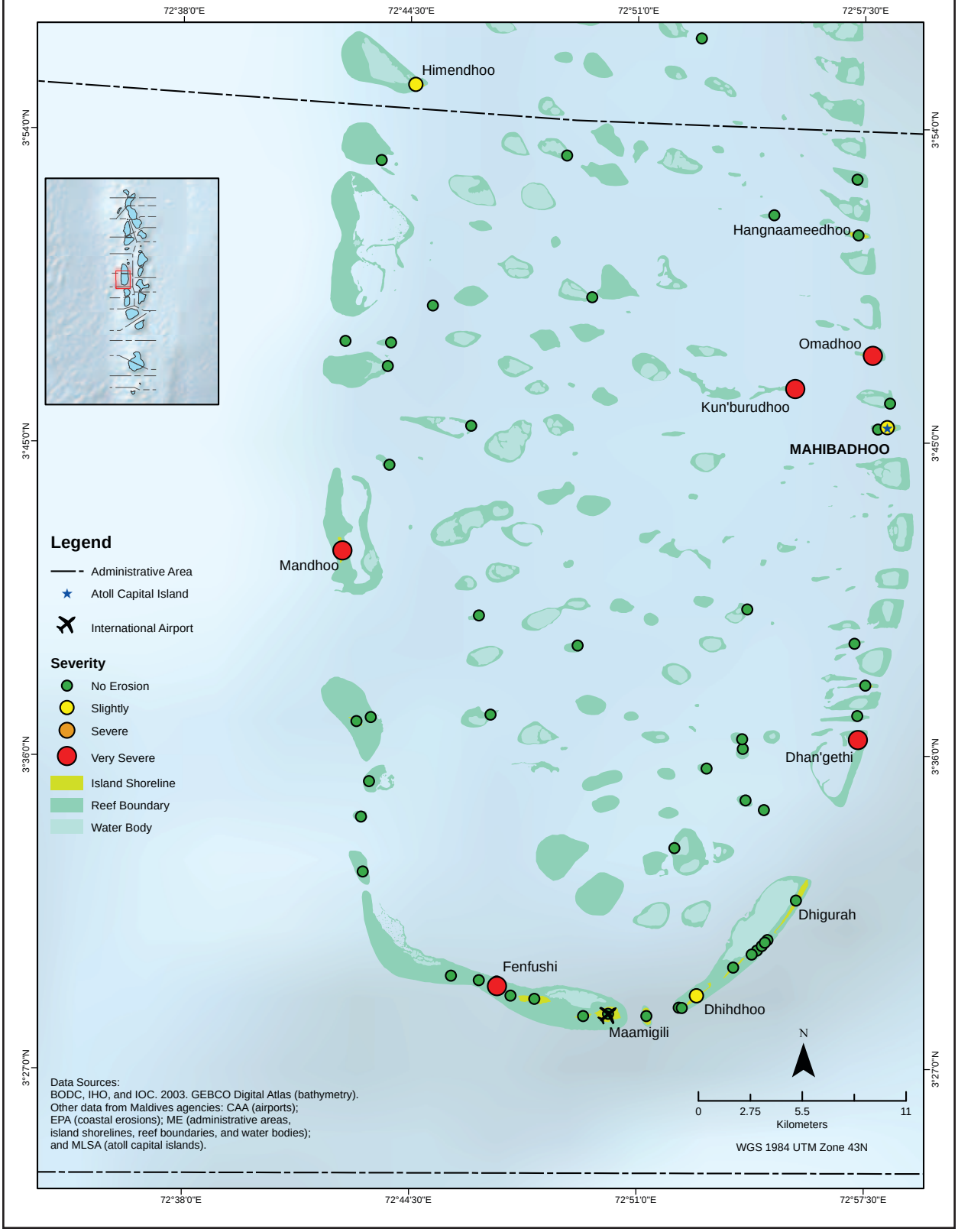
Map IV.66: Addu City, Coastal Erosion



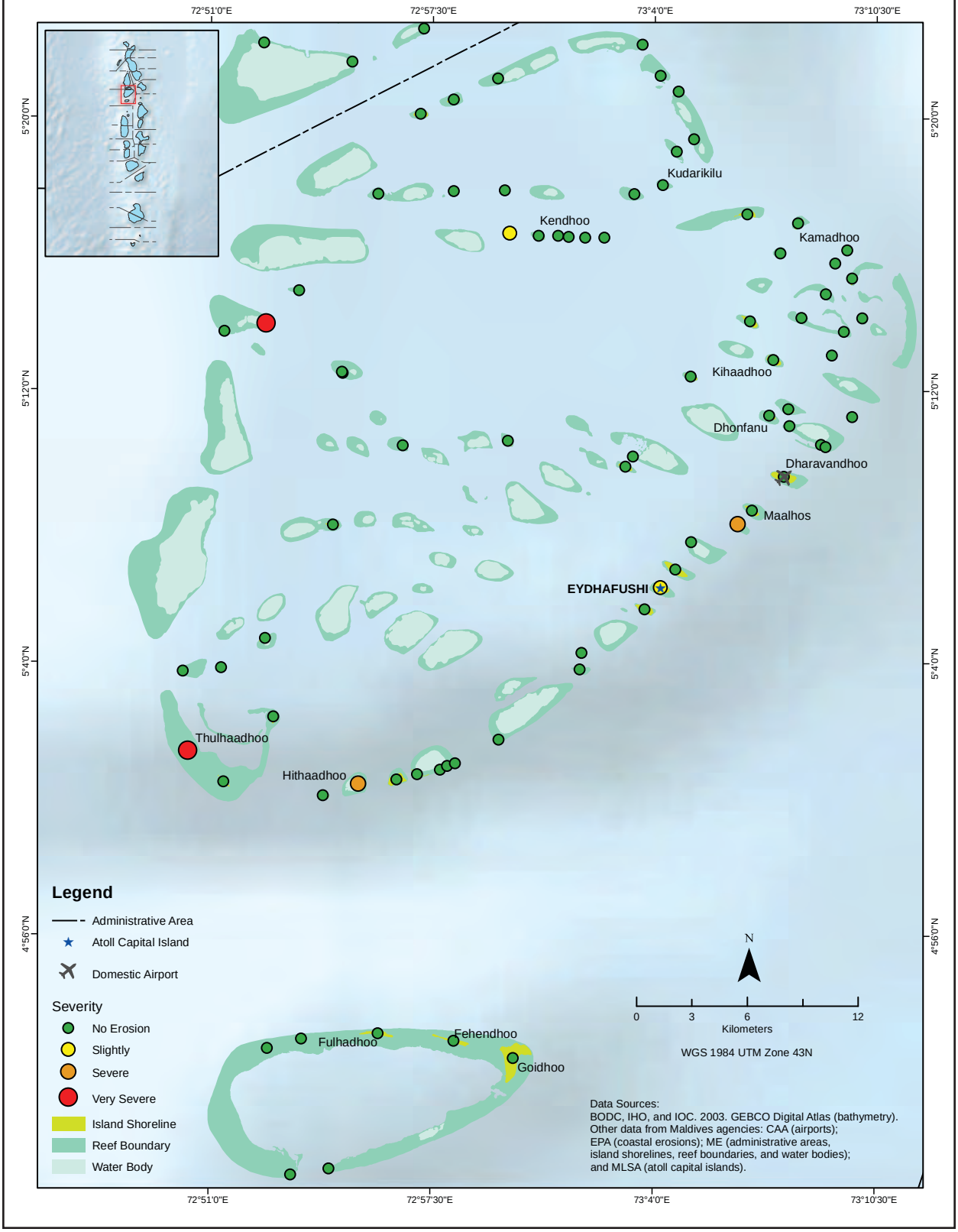
Map IV.67: Alifu Alifu Atoll, Coastal Erosion



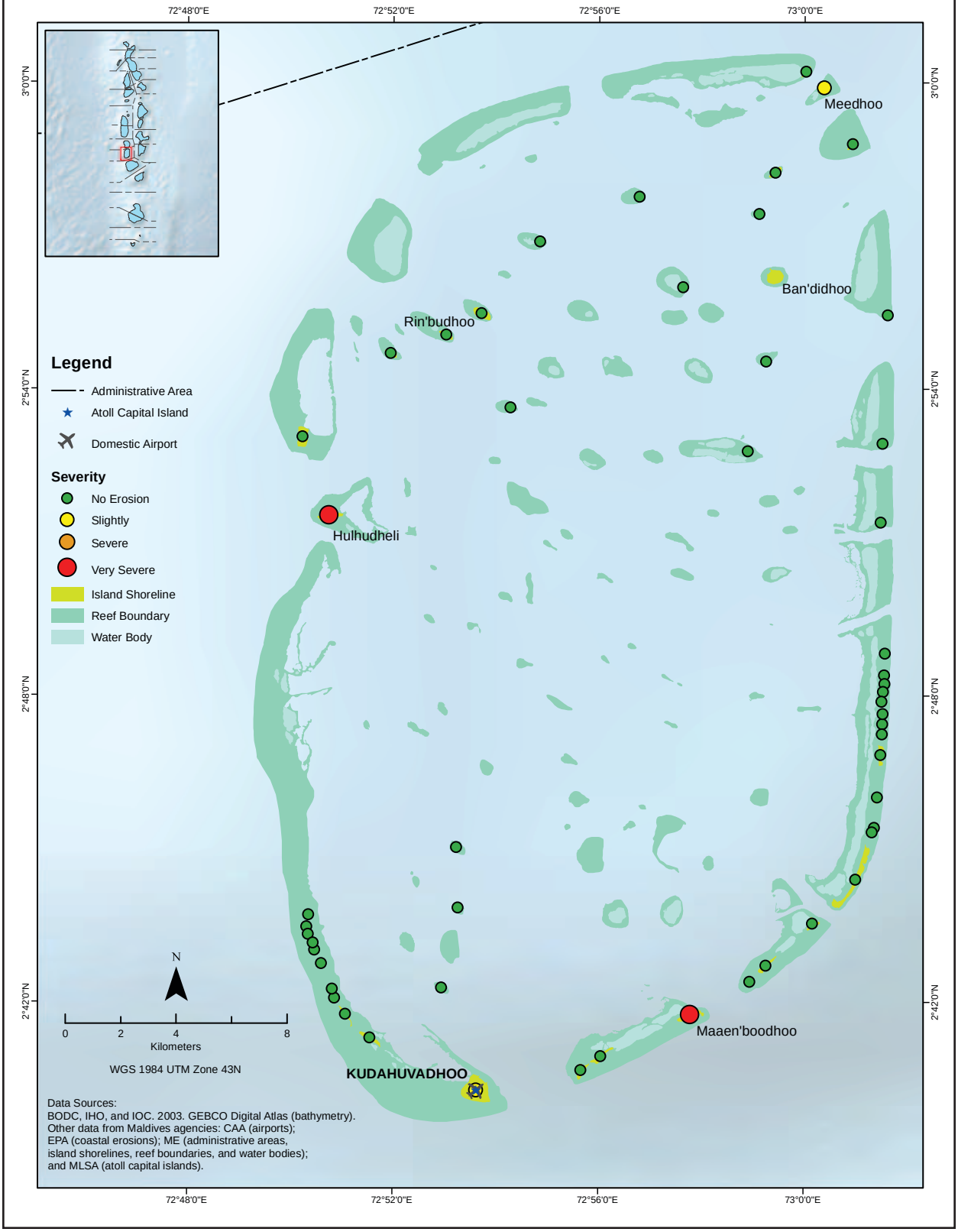
Map IV.68: Alifu Dhaalu Atoll, Coastal Erosion



Map IV.69: Baa Atoll, Coastal Erosion

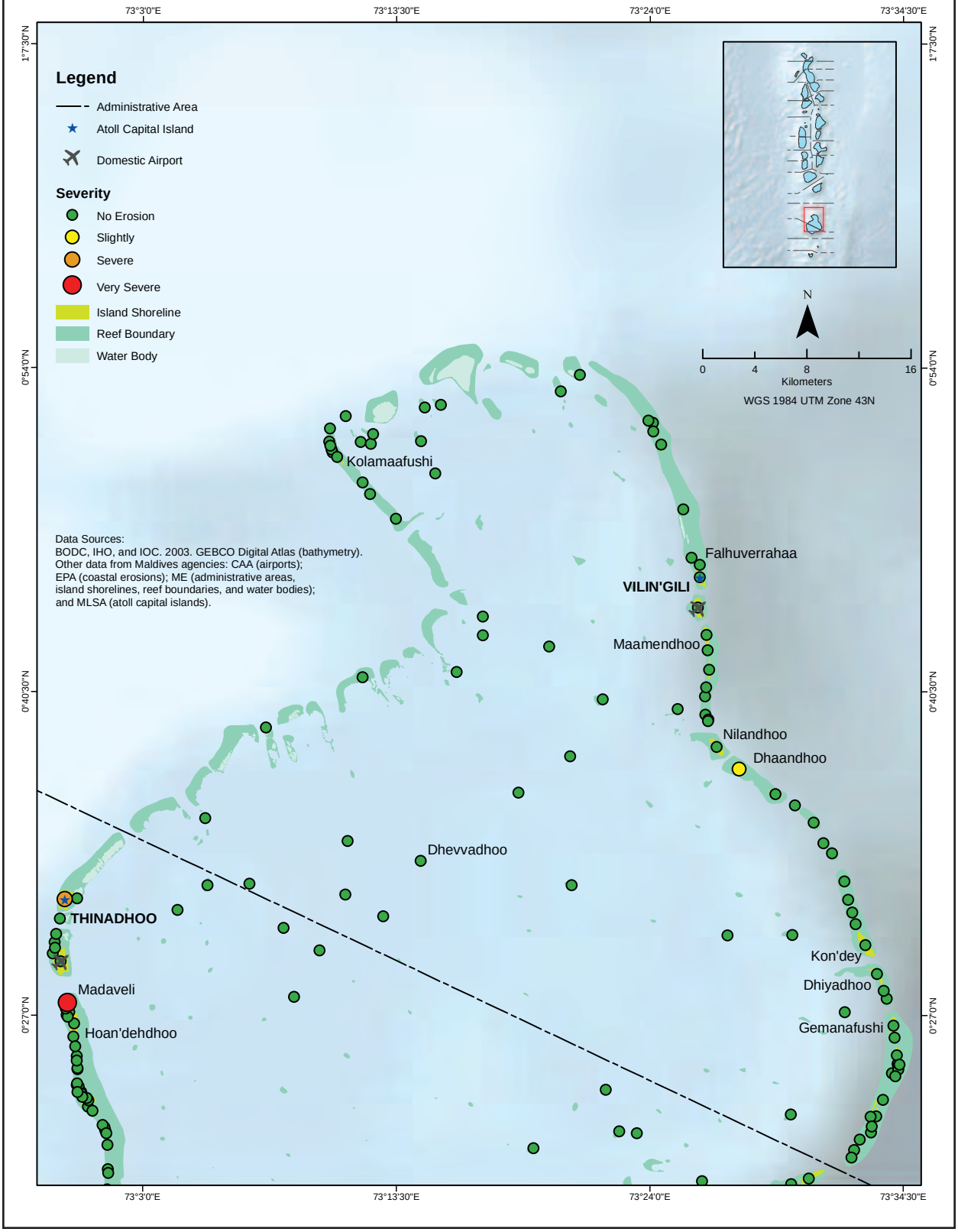


Map IV.70: Dhaalu Atoll, Coastal Erosion

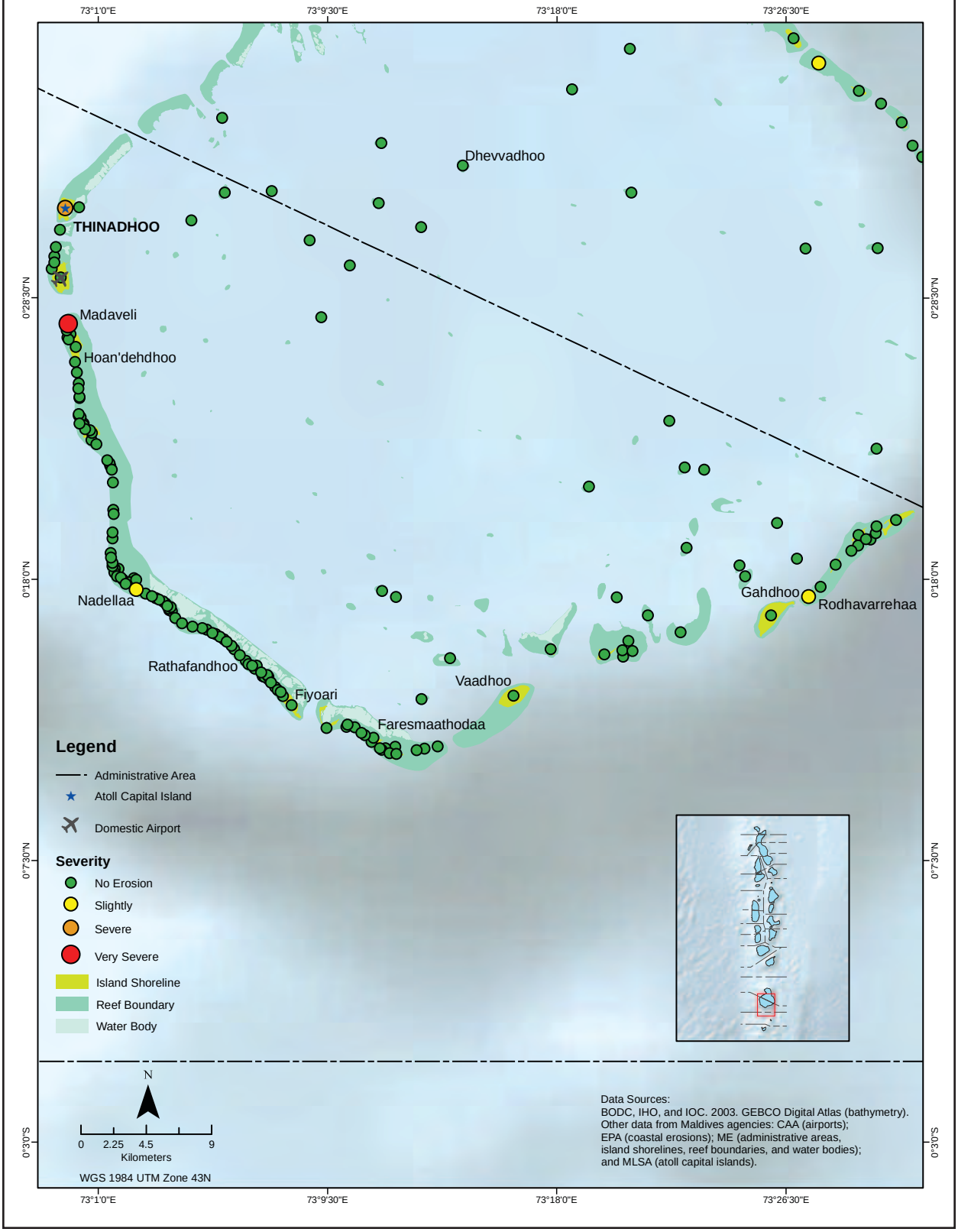


Map IV.71: Faafu Atoll, Coastal Erosion

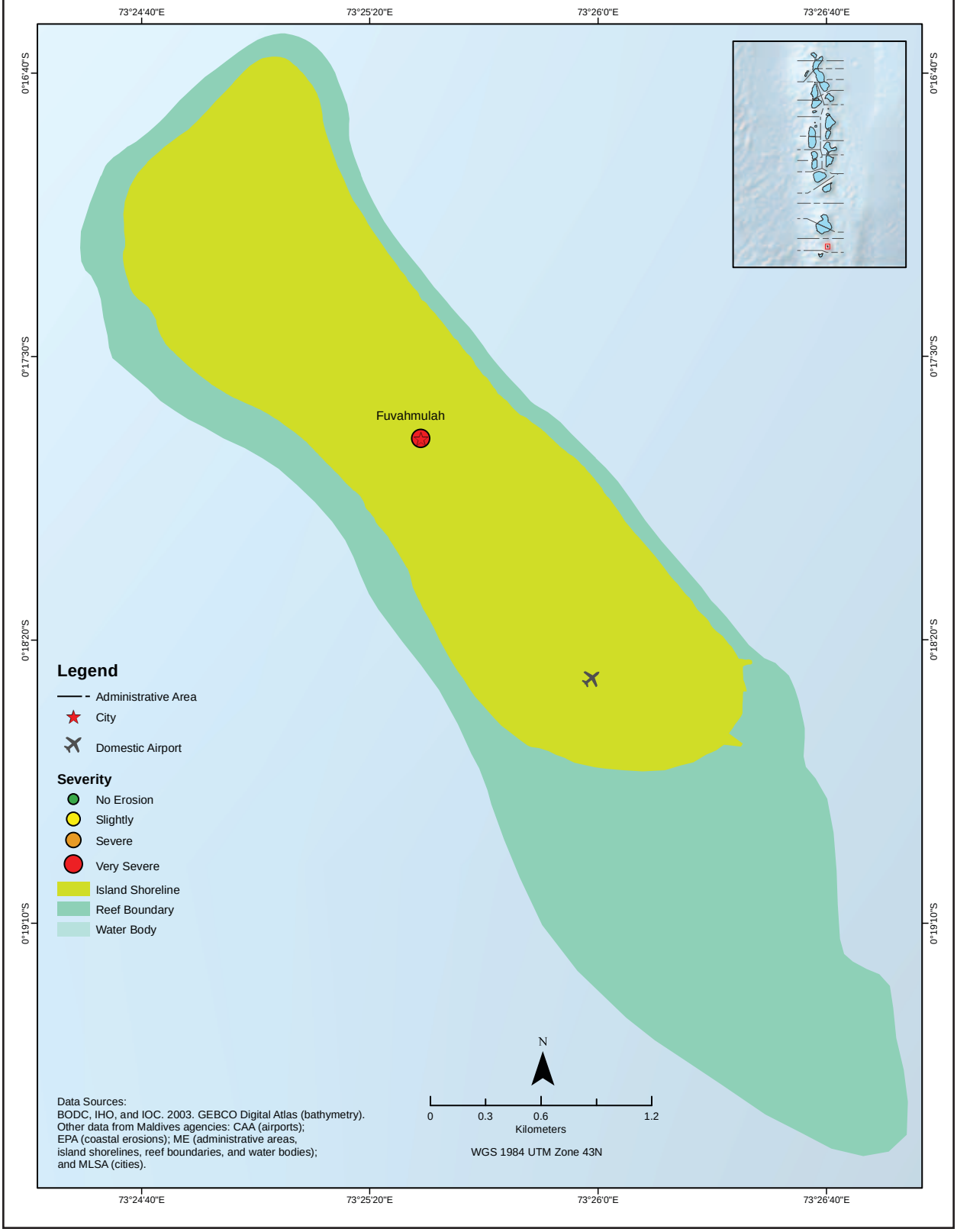
Map IV.72: Gaafu Alifu Atoll, Coastal Erosion



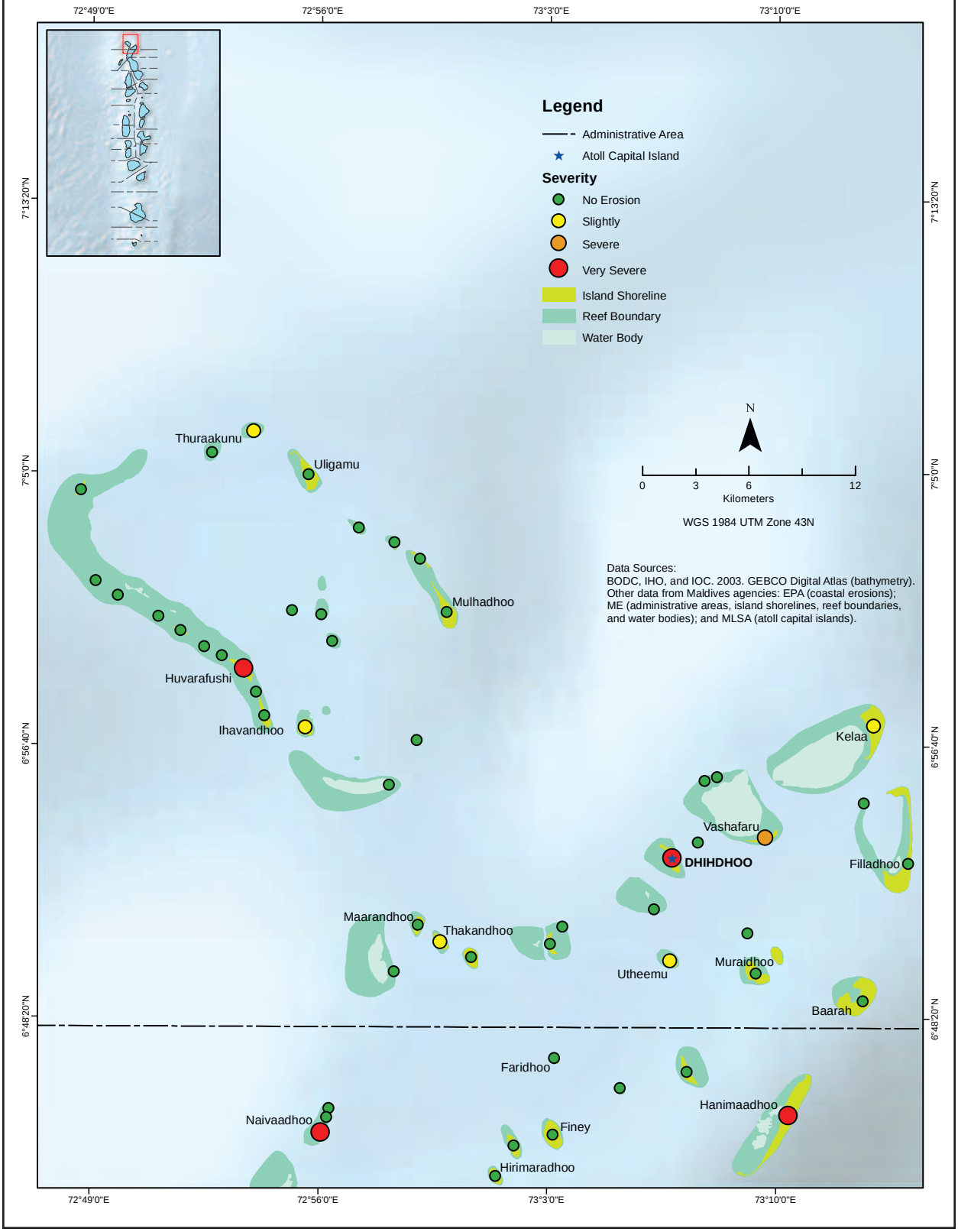
Map IV.73: Gaafu Dhaalu Atoll, Coastal Erosion



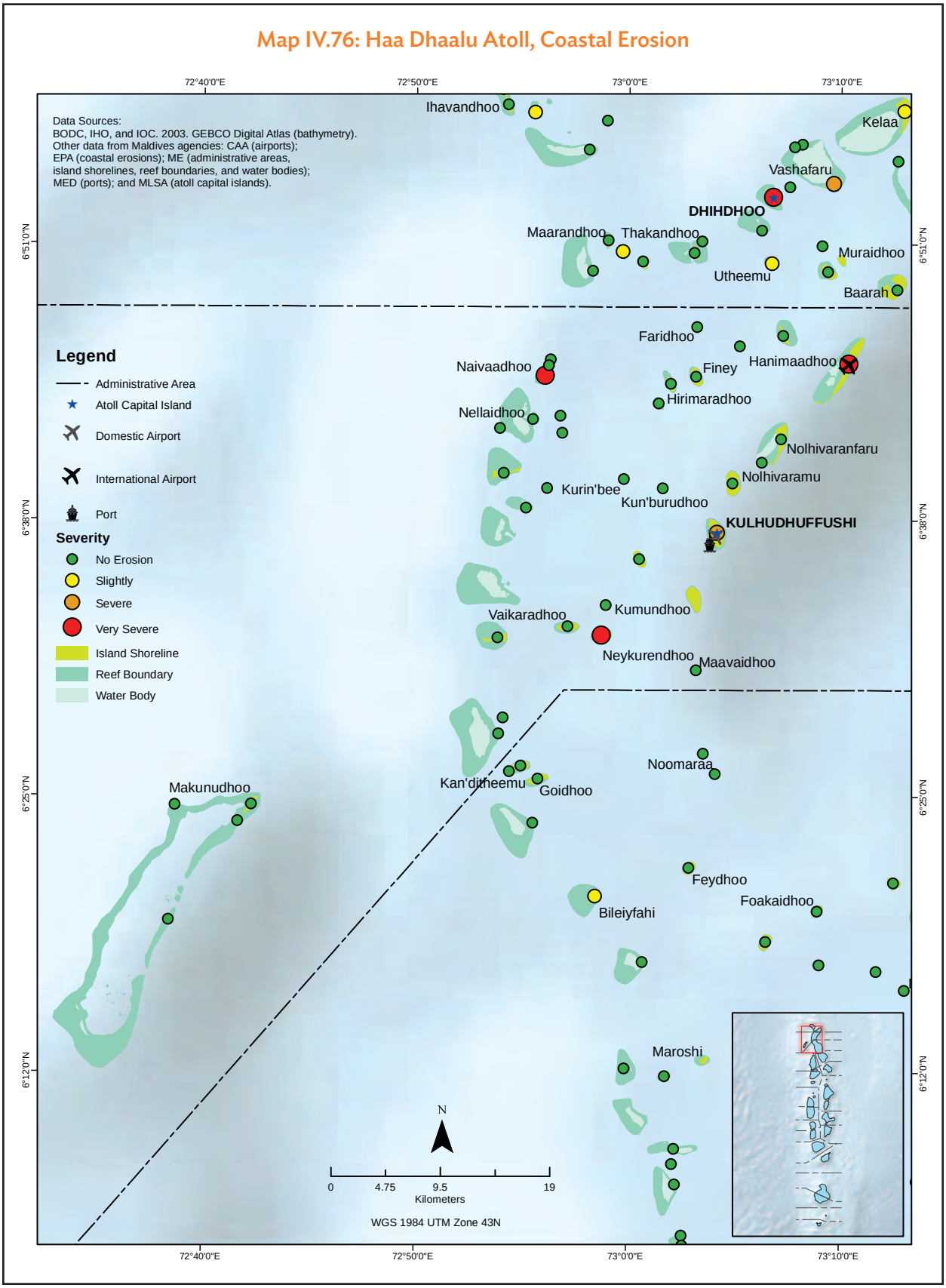
Map IV.74: Gnaviyani Atoll, Coastal Erosion



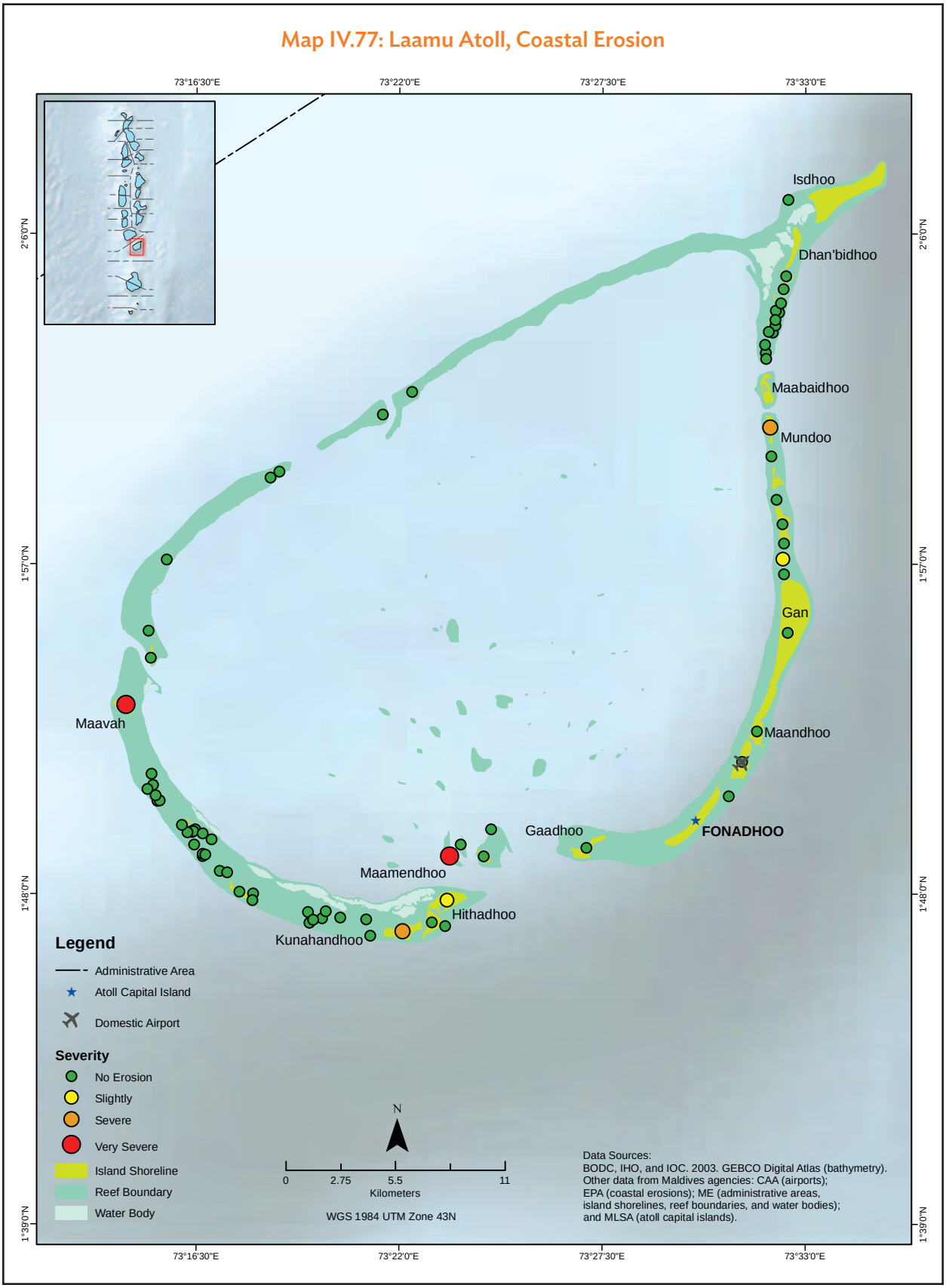
Map IV.75: Haa Alifu Atoll, Coastal Erosion



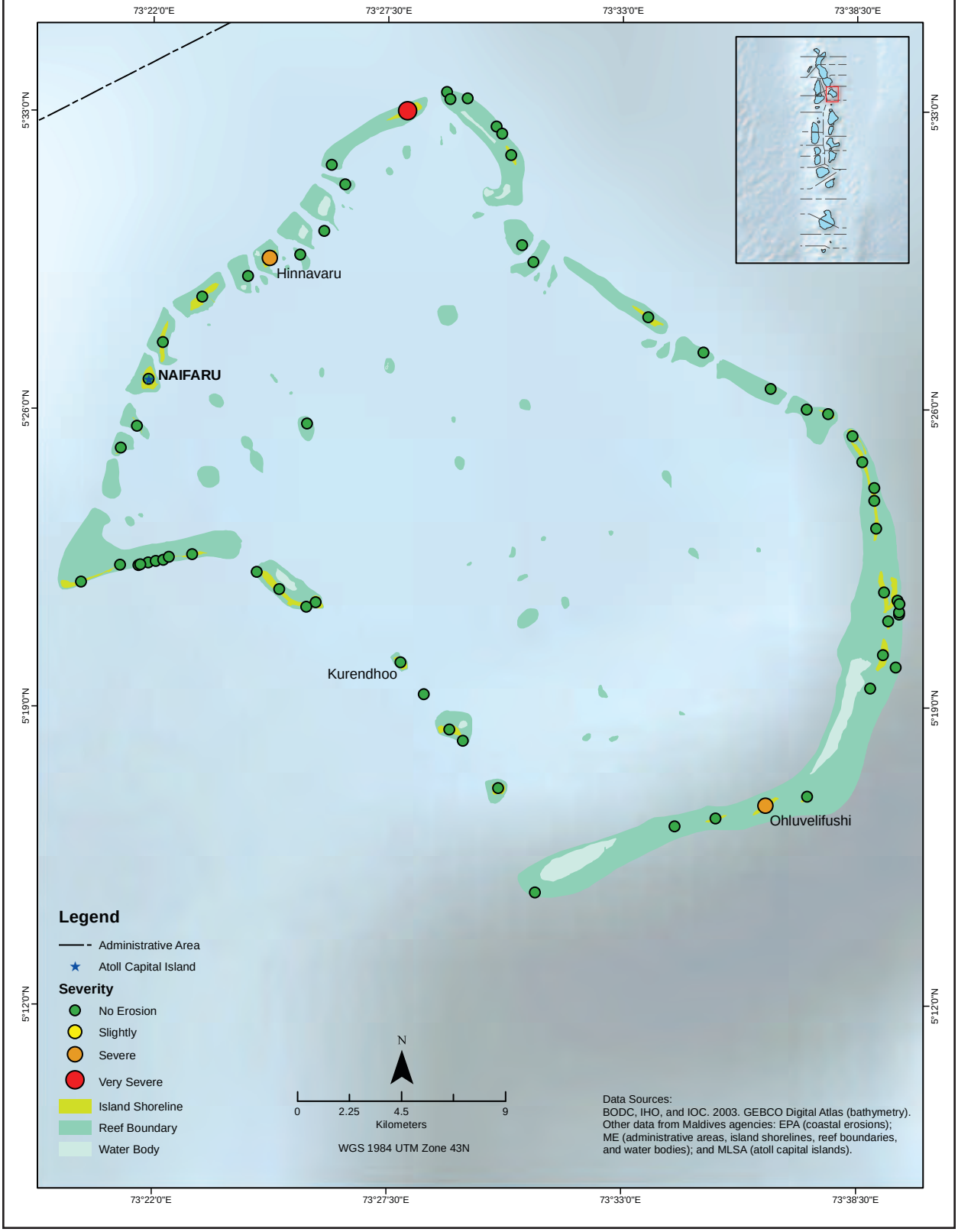
Map IV.76: Haa Dhaalu Atoll, Coastal Erosion



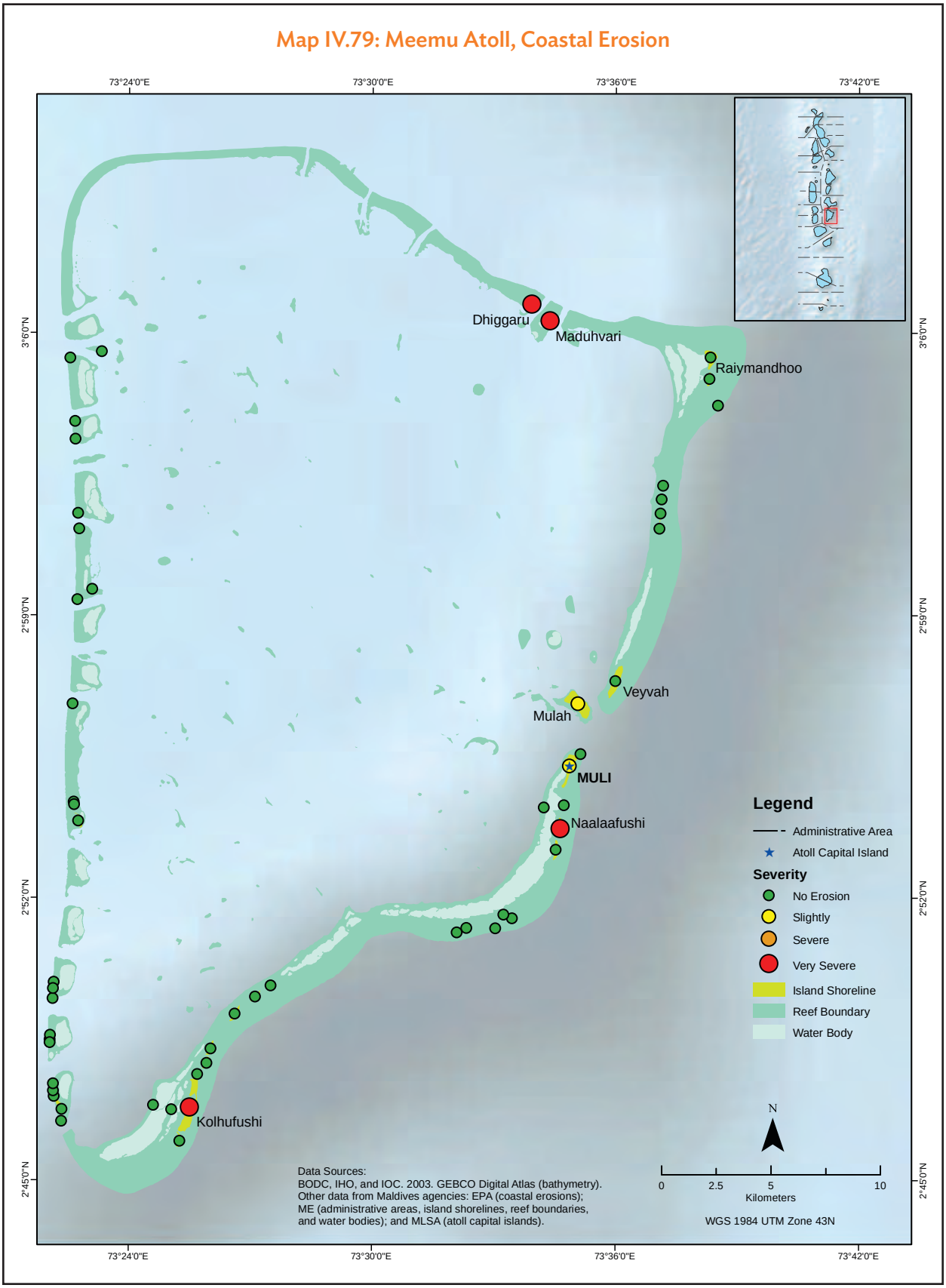
Map IV.77: Laamu Atoll, Coastal Erosion



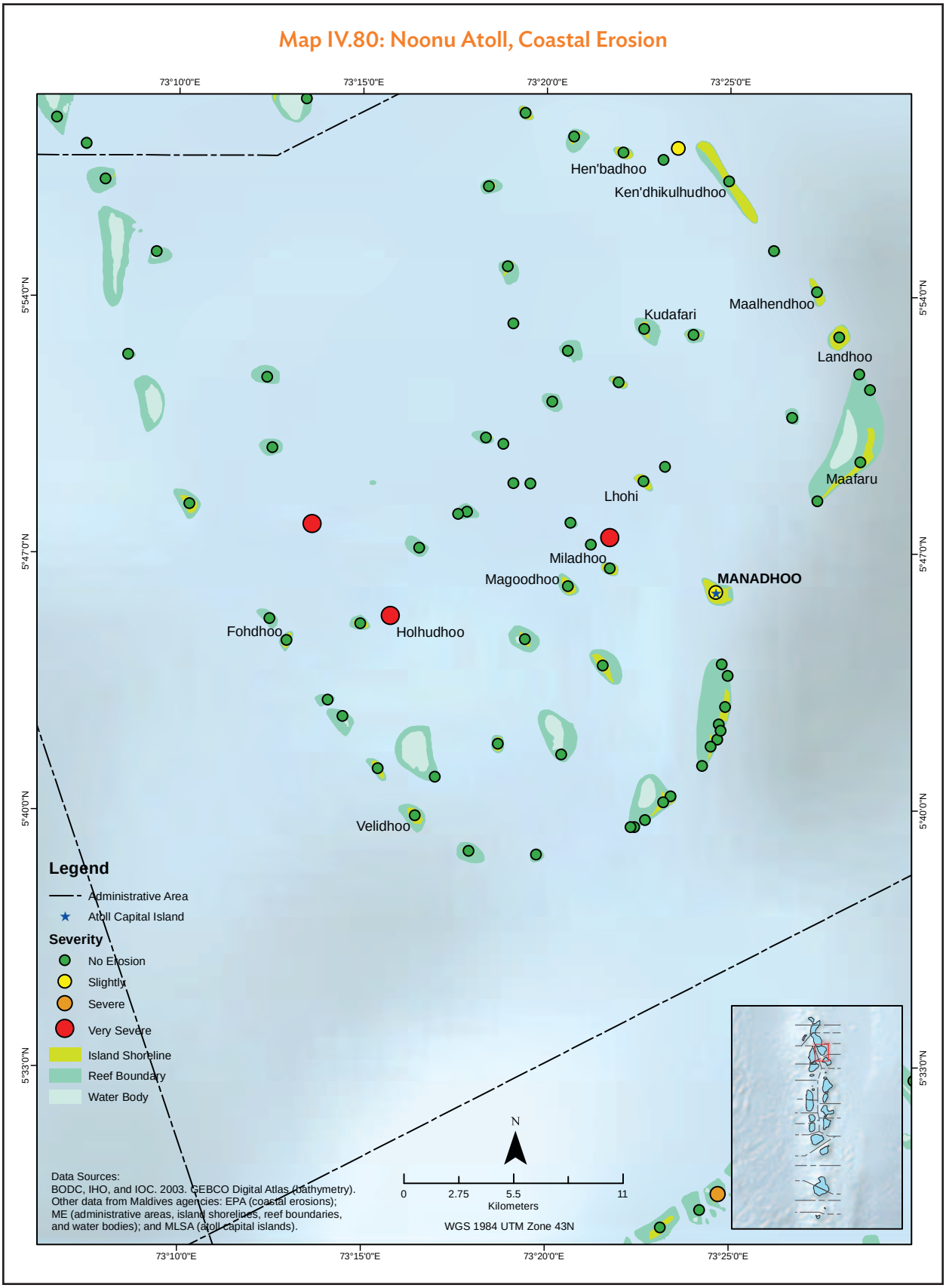
Map IV.78: Lhaviyani Atoll, Coastal Erosion



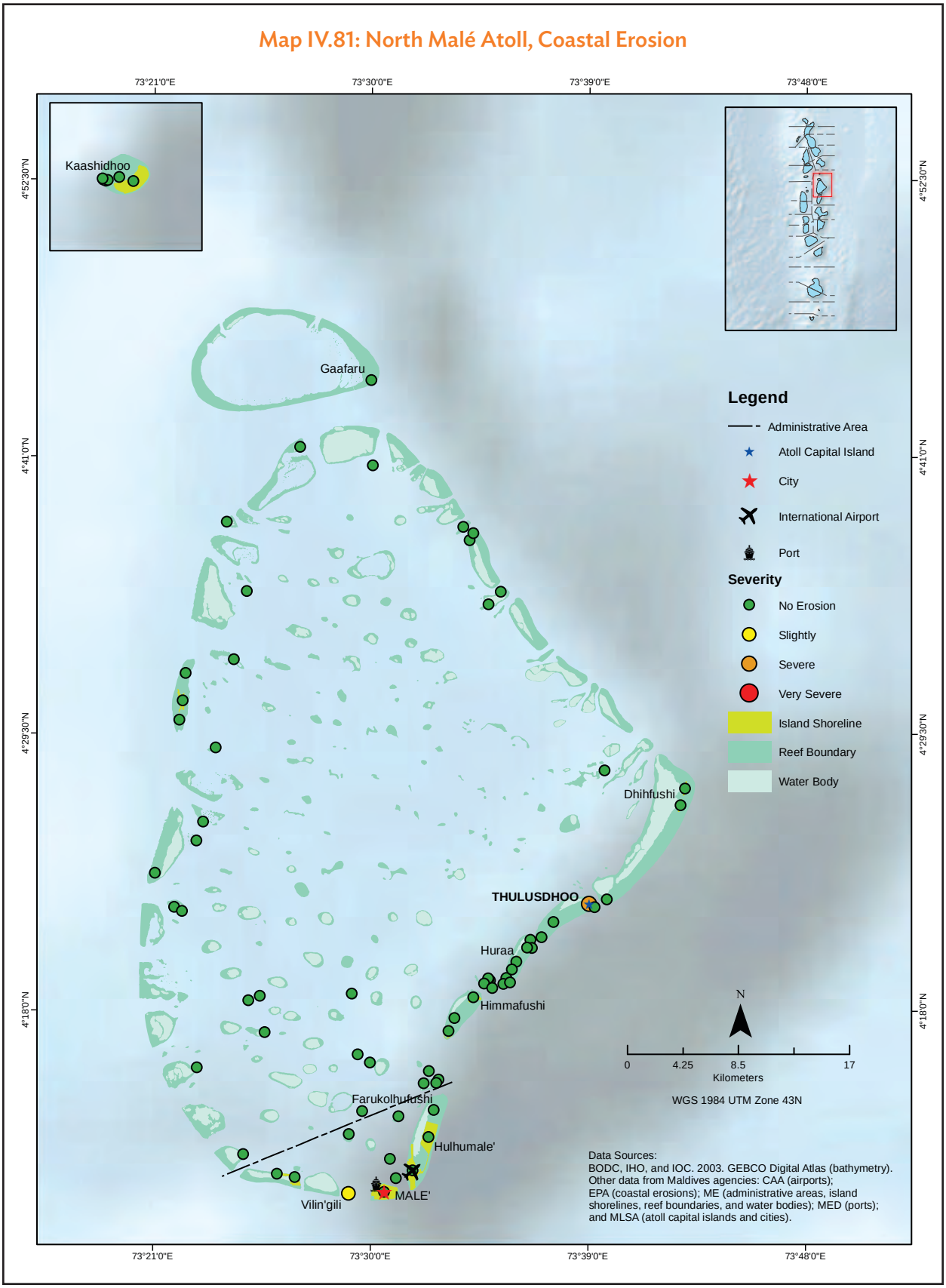
Map IV.79: Meemu Atoll, Coastal Erosion



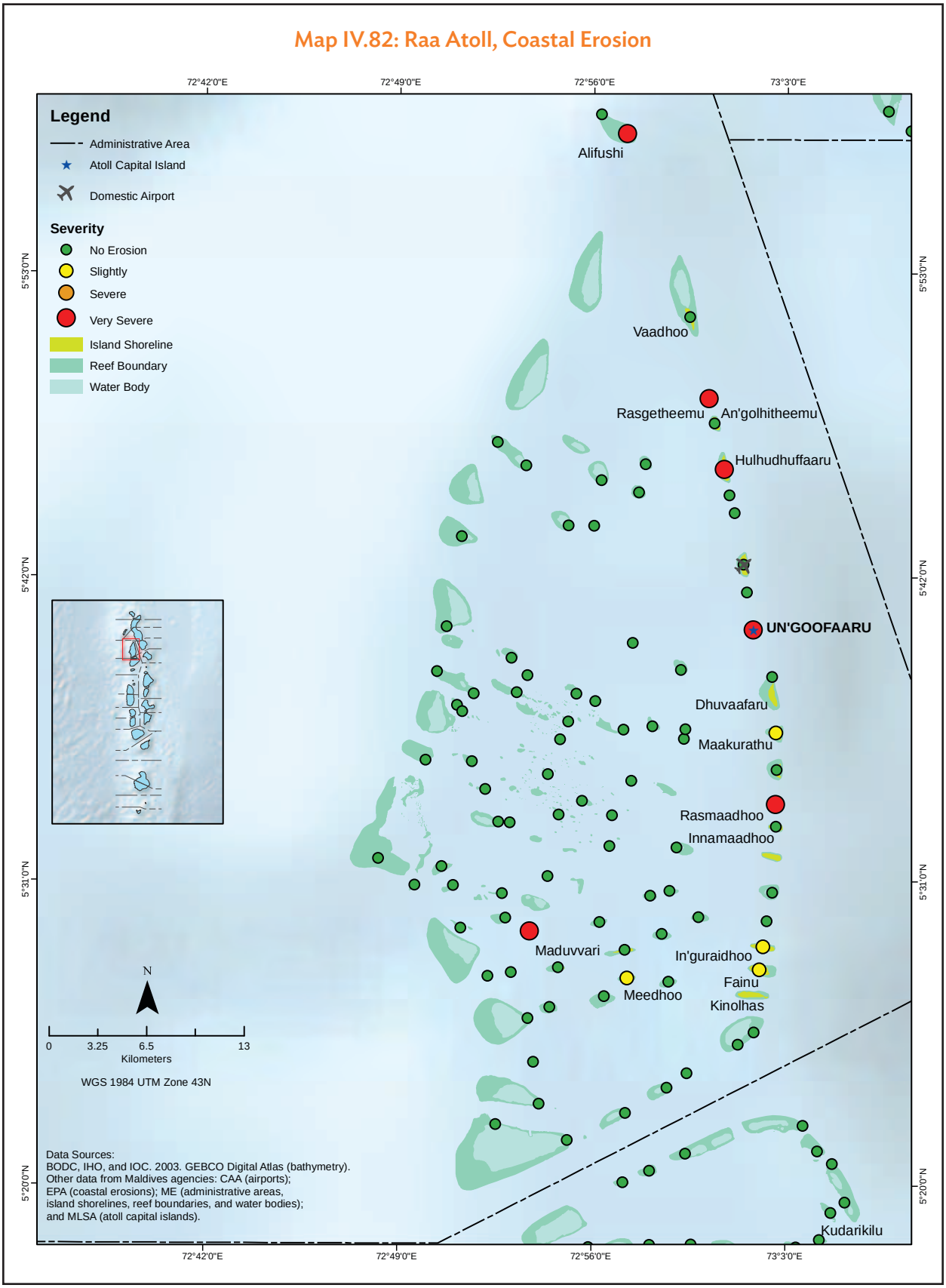
Map IV.80: Noonu Atoll, Coastal Erosion



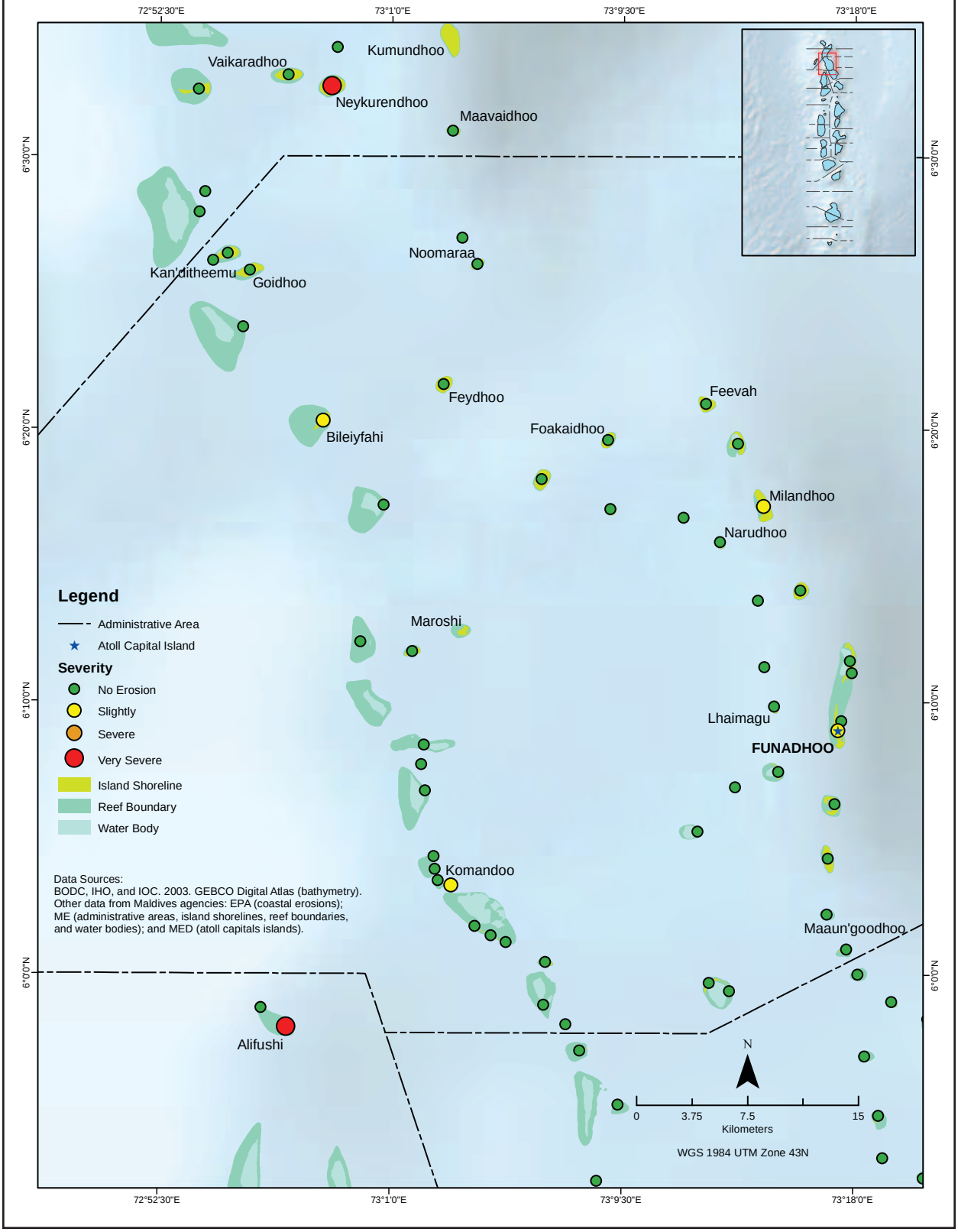
Map IV.81: North Malé Atoll, Coastal Erosion



Map IV.82: Raa Atoll, Coastal Erosion

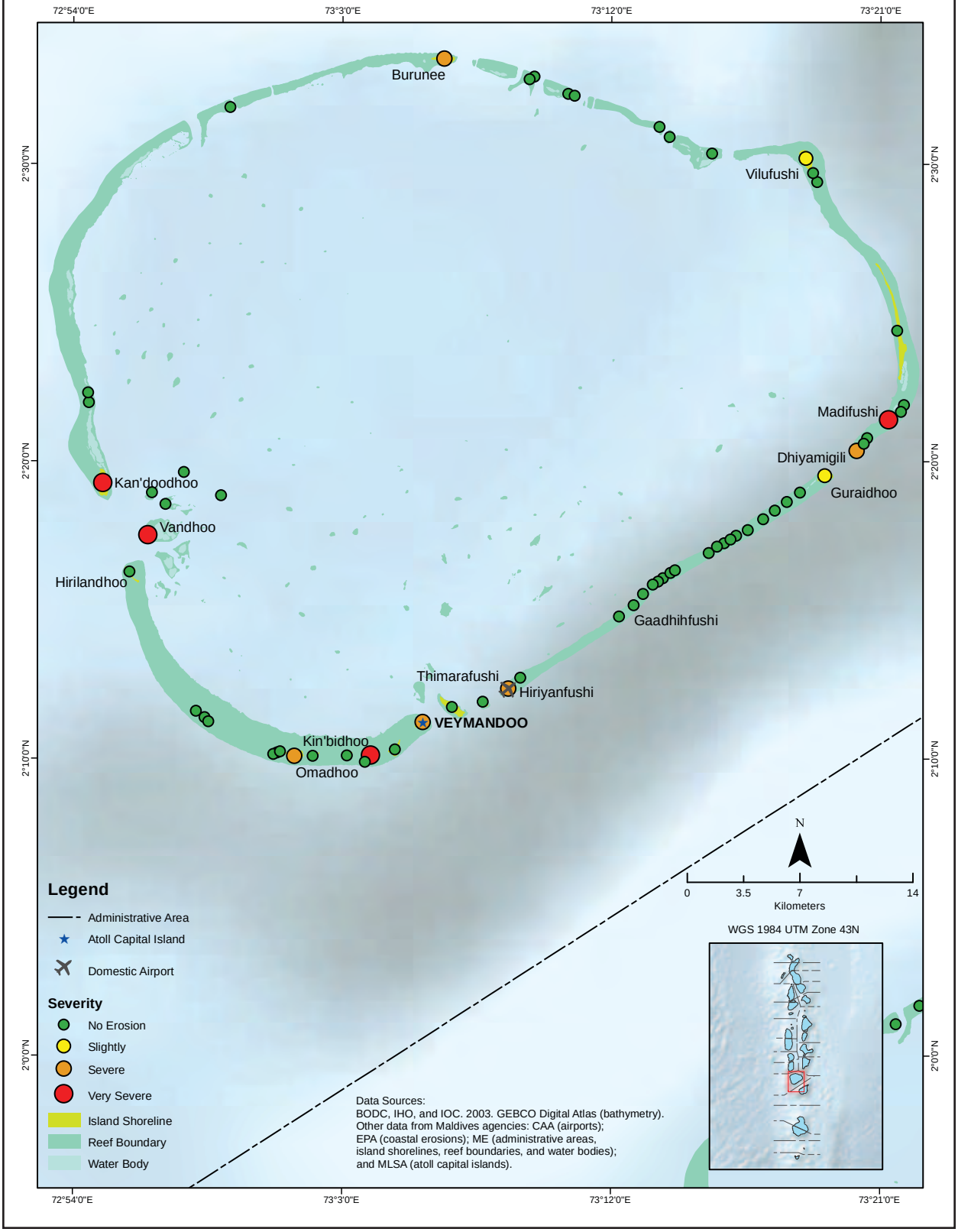


Map IV.83: Shaviyani Atoll, Coastal Erosion



Map IV.84: South Malé Atoll, Coastal Erosion

Map IV.85: Thaa Atoll, Coastal Erosion



Map IV.86: Vaavu Atoll, Coastal Erosion

Threats to Marine and Coastal Biodiversity

Coral Bleaching

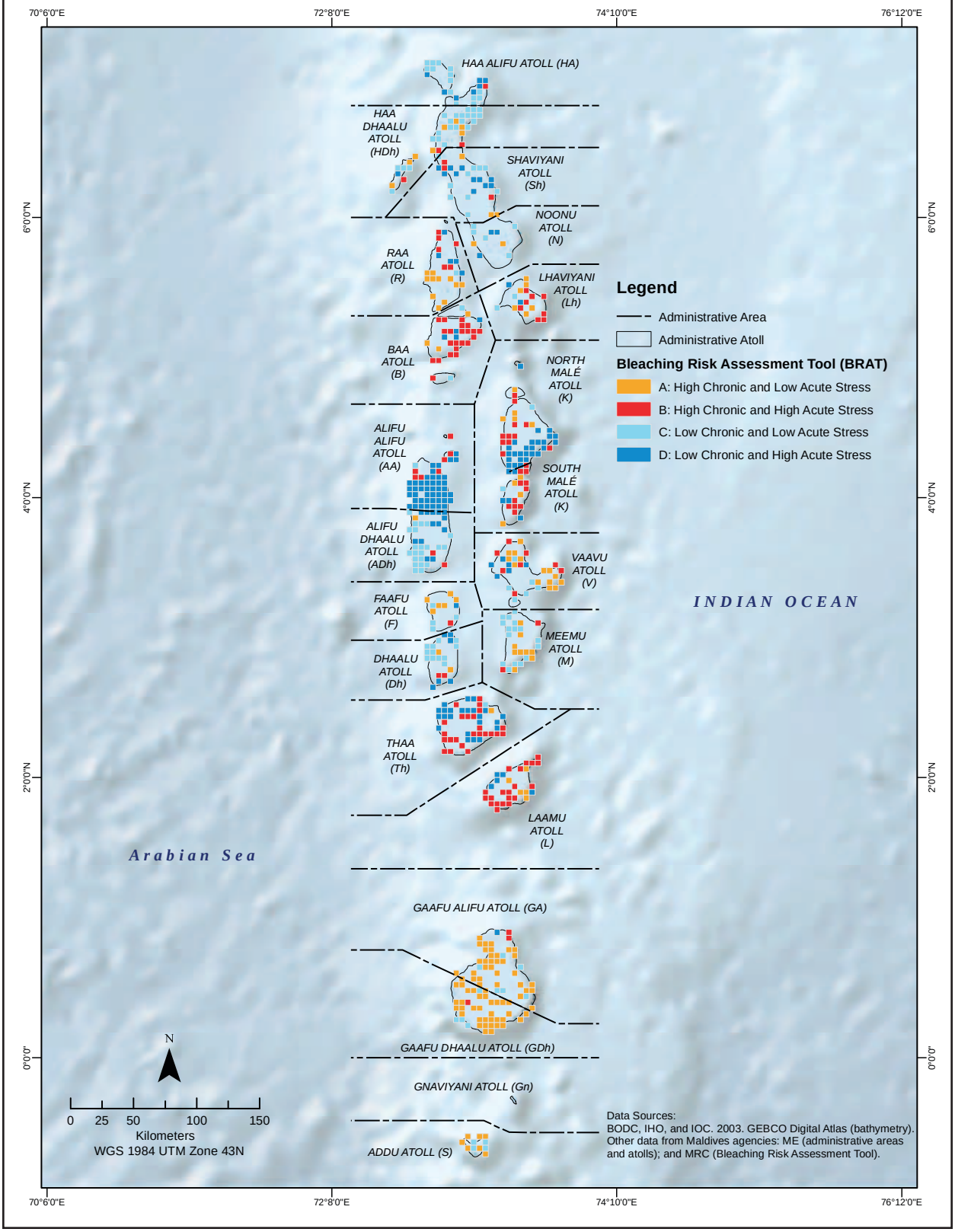
Maldivians benefit from rich coral reefs. From serving as home to aquatic resources—the nation's main source of food—to being one of the country's tourist attractions, coral reefs are undeniably essential to life in Maldives.

Protecting corals is integral to preserving Maldives' marine resources and keeping its fishing industry alive. While corals are now better monitored, threats such as rising temperatures still cannot be controlled.

In 2015–2016, the worst coral bleaching event in Maldives happened due to high temperatures associated with the El Niño phenomenon (Ibrahim et al. 2017). Based on climate projection, annual average temperature will increase by more than 1°C in 30 years (ADB 2017). This could cause greater damage to corals in the coming years.

Coral bleaching. High seawater temperatures can cause coral bleaching, or the whitening of corals due to the loss of a symbiotic algae. Coral bleaching can lead to loss of individual corals and colonies, which in turn can cause the decline in population of numerous marine flora and fauna that depend on them.

Map IV.87: Maldives, Coral Bleaching Risk Assessment



Disaster Risk in Maldives

The four volumes of the *Multihazard Risk Atlas of Maldives* present the various components of disaster risk in the country. *Volume I* looks at the geography of Maldives, land reclamation, and land use and land cover in the islands. *Volume II* examines the historical and projected climate that could affect Maldivians as well as their natural flora and fauna, which are then mapped out in *Volumes III and IV.*

Humans, plants, animals, and physical structures for education, health, tourism, transportation, and power are all elements exposed to natural hazards. These hazards include climate, extreme weather, earthquakes, tsunamis, typhoons, surges, sea level rise, and others. The conditions of elements such as the presence of land reclamation, sand mining activities, and coastal erosion characterize the vulnerability of the exposed islands to storm surges, sea level rise, inundation, and tsunamis. Other factors, such as the human development index, power source, health, education, and transportation, define the vulnerability of the exposed population to various hazards. Environmentally sensitive areas and bleached corals indicate an increased vulnerability of the ecosystem to environmental stresses and hazards, while having coastal protection and monitoring sites indicates adaptation capacity, which lowers vulnerability to disasters.

The following maps were prepared based on indexed risk tables, which were generated from detailed analysis of relevant data obtained from ME and the National Disaster Management Center of Maldives. These maps include physical and social risks. In addition, physical vulnerability or susceptibility maps feature multihazard hydrometeorological as well as rain-induced flooding; tsunamis; big waves or *udha*; and wave, rain, and wind hazards. Table IV.3 shows the numerical ranges of the hazard categories mapped.

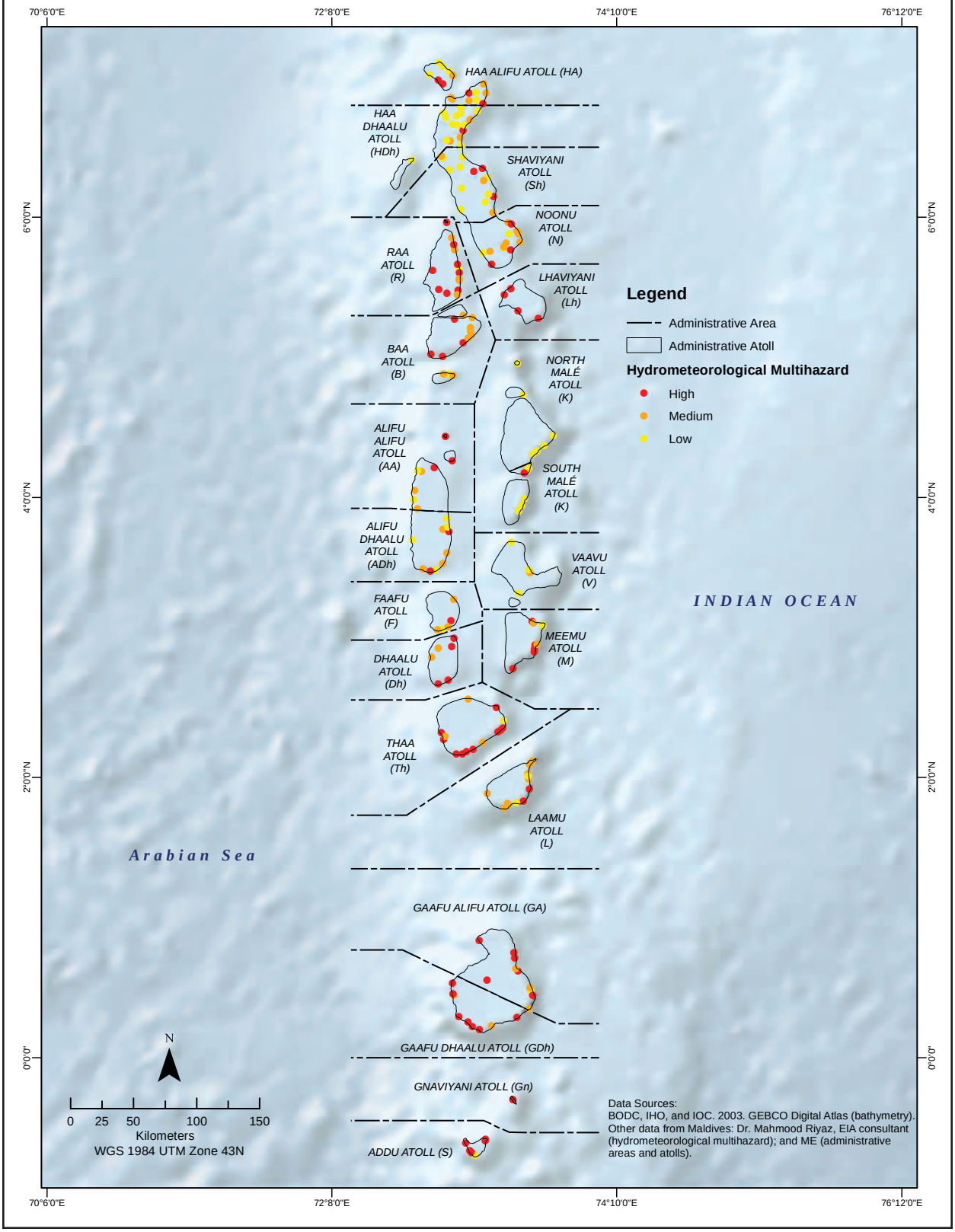
Table IV.3: Hazard Categories and Index Ranges

Category	Minimum	Maximum
Rain-induced Flood		
Low	0.00	0.10
Medium	0.11	0.25
High	0.45	1.26
Udha		
Low	0.00	0.07
Medium	0.14	0.32
High	0.71	7.65
Wave, Rain, Wind (Flood) Hazard		
Low	0.00	0.05
Medium	0.10	0.33
High	0.43	1.43
Wind and Wave Hazard		
Low	0.00	0.09
Medium	0.10	0.36
High	0.45	5.26
Hydrometeorological Multihazard		
Low	0.009	
Medium	0.132	0.367
High	0.403	15.301

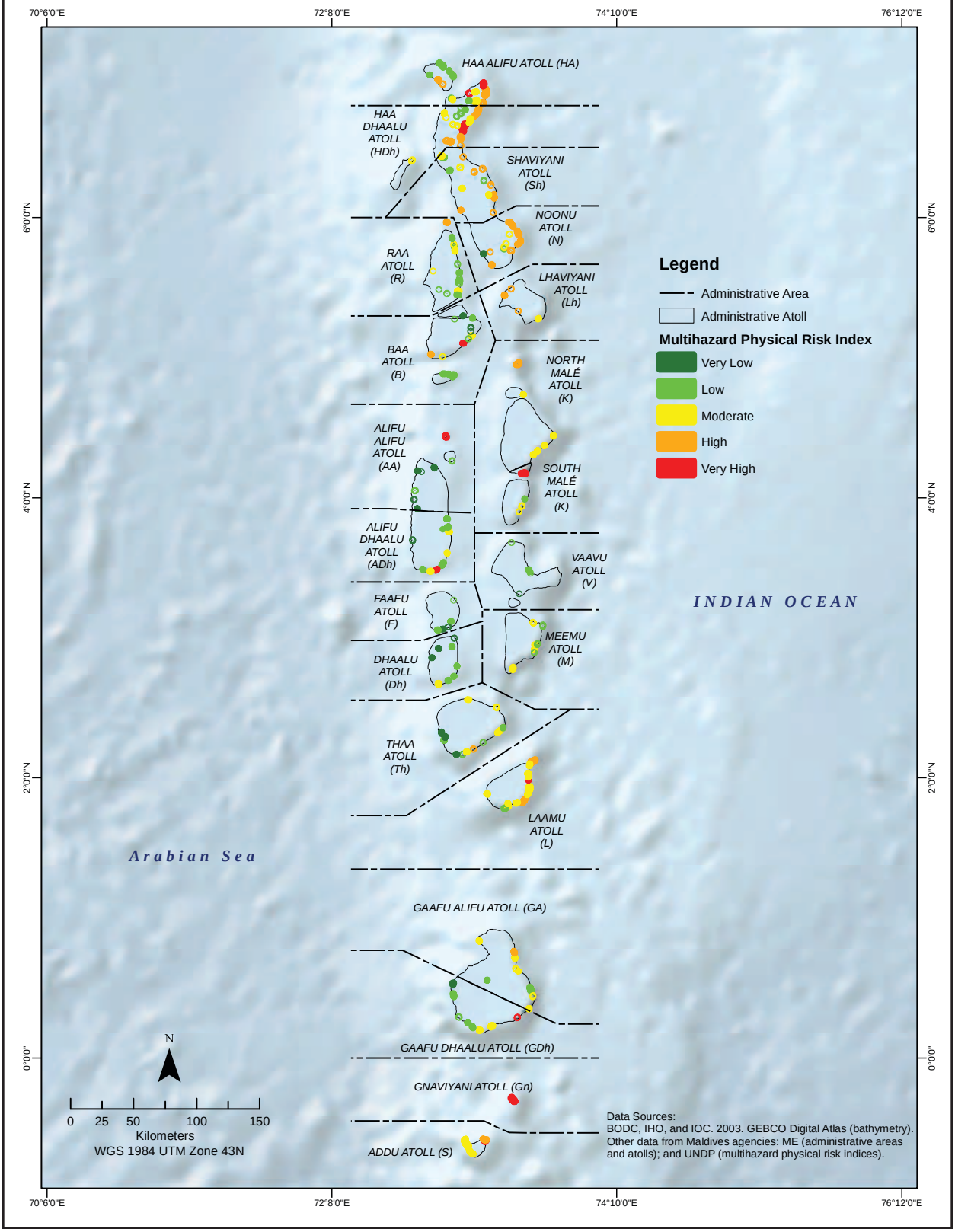
udha = big wave.

Source: Asian Development Bank.

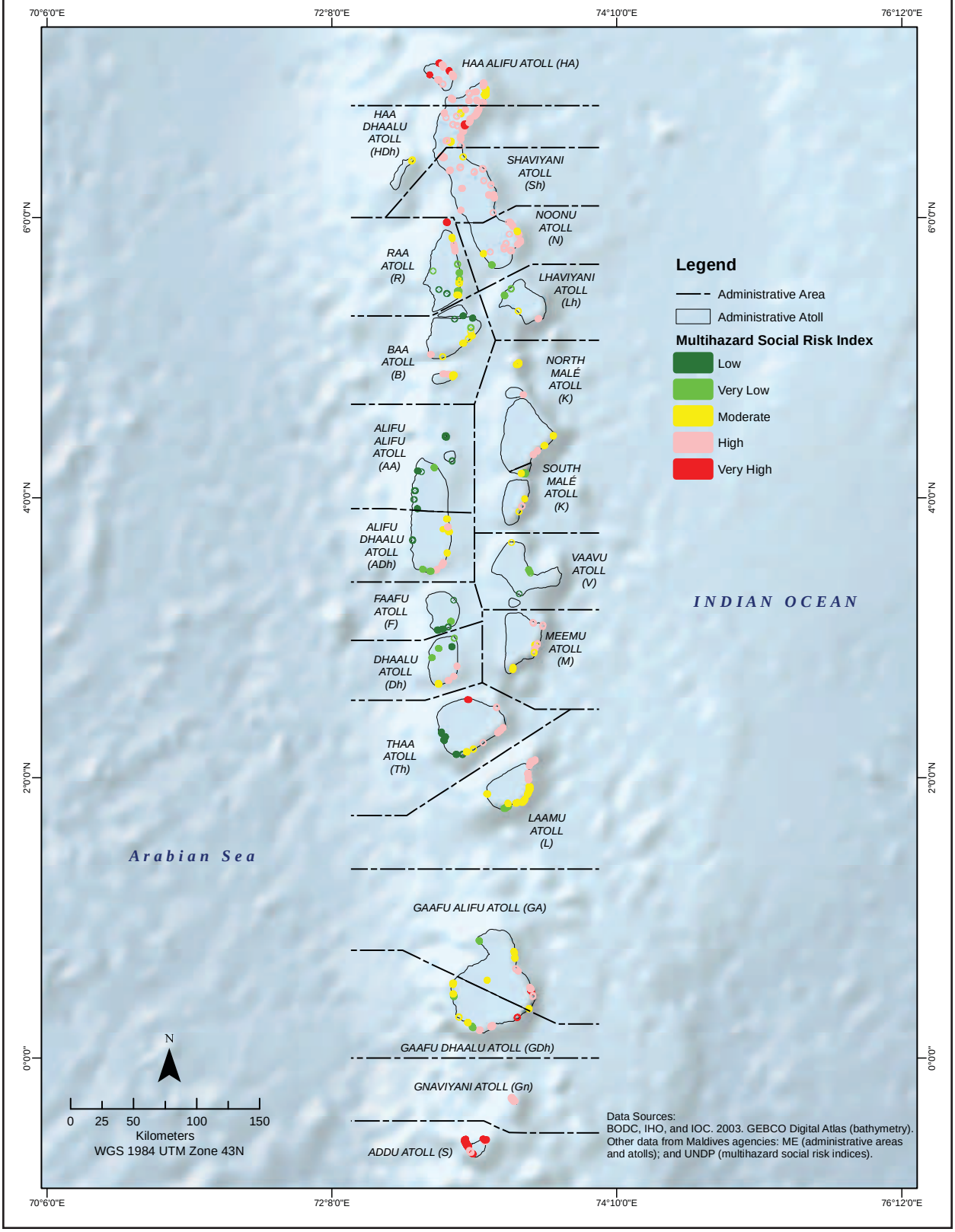
Map IV.88: Maldives, Hydrometeorological Multihazard (Islands)



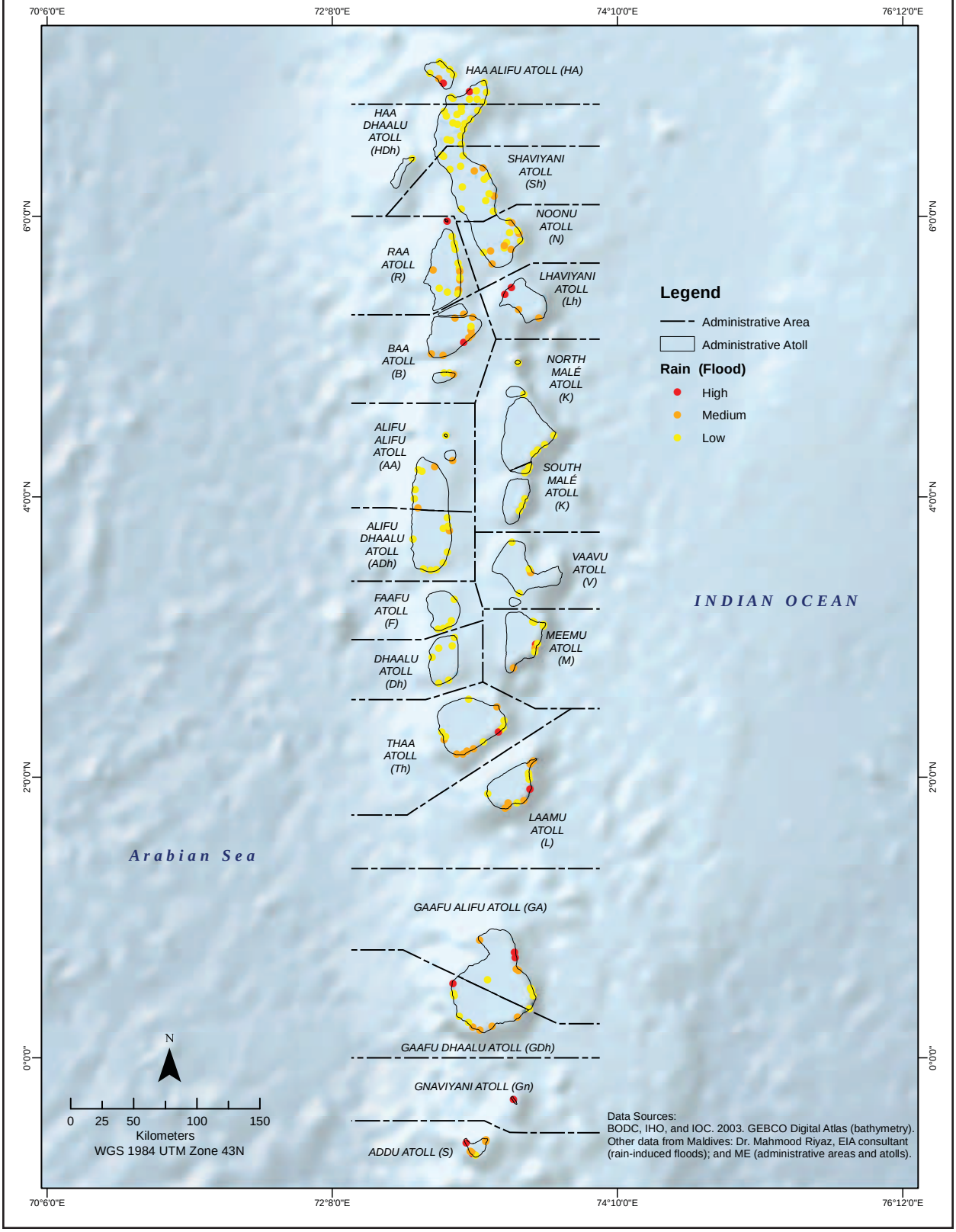
Map IV.89: Maldives, Multihazard Physical Risk Index



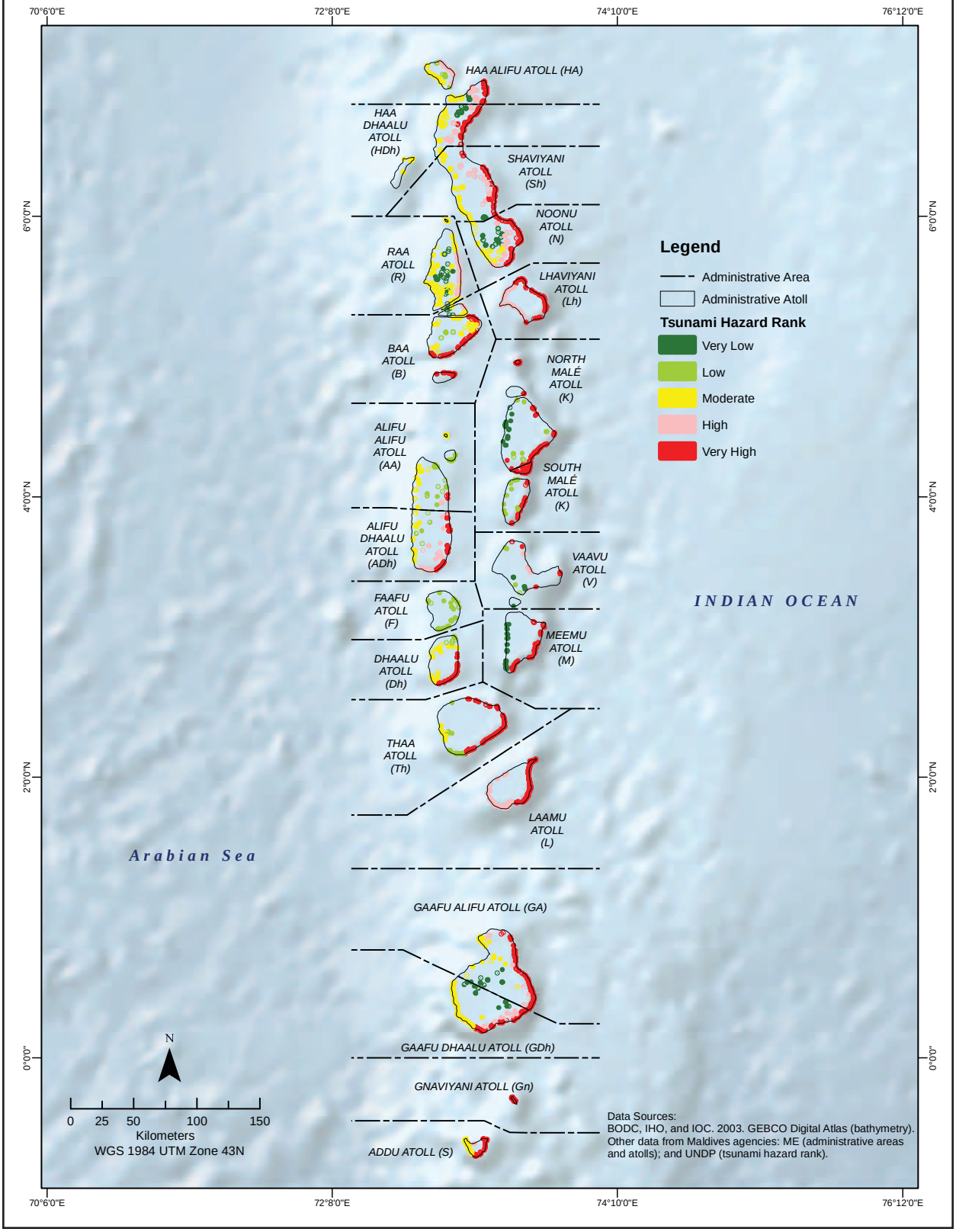
Map IV.90: Maldives, Multihazard Social Risk Index



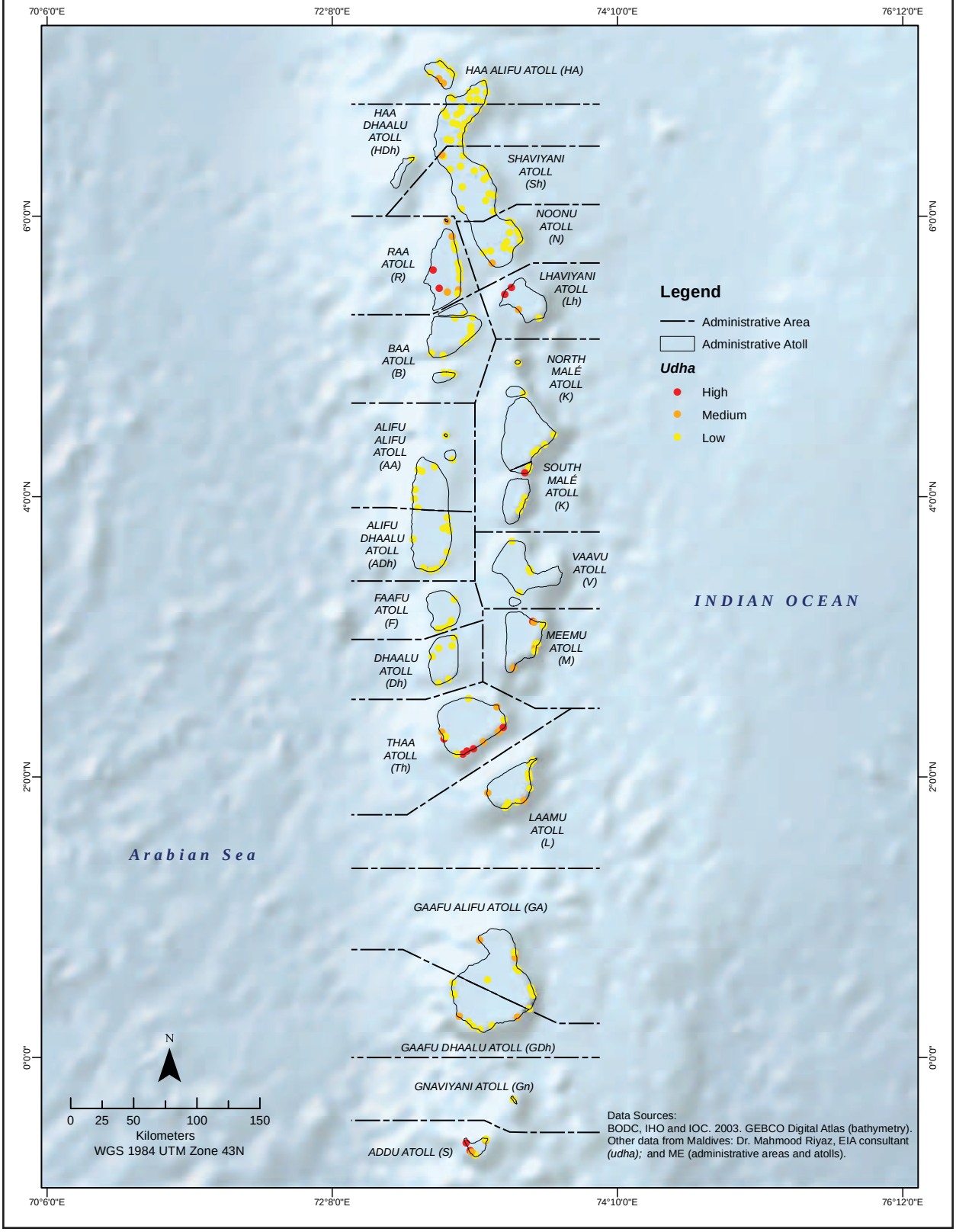
Map IV.91: Maldives, Rain-Induced Flood (Islands)



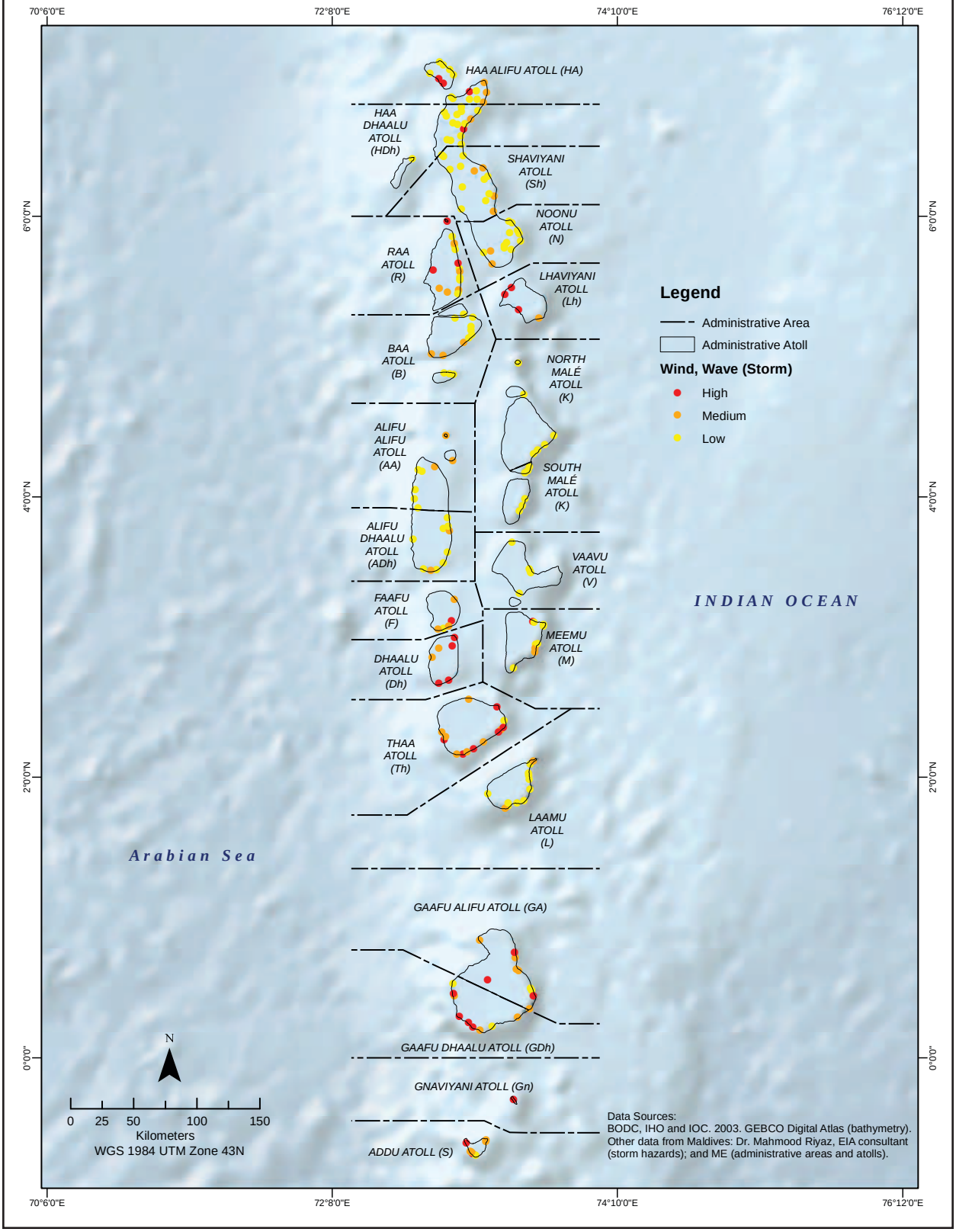
Map IV.92: Maldives, Tsunami Hazard Rank (Islands)



Map IV.93: Maldives, *Udha* Hazard (Islands)



Map IV.94: Maldives, Wind and Wave Hazards



Map Data Sources

Government Ministries, Departments, and Agencies in Maldives
- Civil Aviation Authority
  - Airports
- Environmental Protection Agency
  - Coastal erosion
  - Environmentally protected and sensitive areas
- Land and Survey Authority
  - Atoll capital islands
  - Cities
- Marine Research Centre
  - Coral reef monitoring sites
- Ministry of Economic Development
  - Ports
- Ministry of Environment
  - Administrative areas
  - Administrative atolls
  - Island shorelines
  - Mangroves
  - Reef boundaries
  - Water bodies
- Ministry of Fisheries, Marine Resources and Agriculture
  - Fish aggregating devices
- Ministry of National Planning and Infrastructure
  - Coastal protection

International Institutions
- Marine Spatial Ecology Lab, University of Queensland, Australia
  - Bleaching Risk Assessment Tool

Private Individual
- Mahmood Riyaz, EPA-Licensed Environmental Impact Assessment Specialist
  - Hydrometeorological multihazard
  - Rain-induced flood
  - *Udha* vulnerability
  - Wave, rain, wind (flood) vulnerability
  - Wind, wave (storm) vulnerability

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Maps were prepared by the Country Consultant Team and the Manila Observatory on behalf of the Asian Development Bank.

Multihazard Risk Atlas of Maldives

Biodiversity—Volume IV

This atlas provides spatial information about Maldives and thematic maps necessary for assessing future development investments in terms of climate risks and geophysical hazards. It is also intended to support the formulation of cobeneficial options for climate change adaptation and disaster risk reduction and management. The five-volume atlas is a major output of the project "Establishing a National Geospatial Database for Mainstreaming Climate Change Adaptation into Development Activities and Policies in Maldives" under the Asian Development Bank's regional knowledge and support (capacity development) technical assistance Action on Climate Change in South Asia (2013–2018).

The *Multihazard Risk Atlas of Maldives* is composed of *Geography—Volume I, Climate and Geophysical Hazards —Volume II, Economy and Demographics—Volume III, Biodiversity—Volume IV, and Summary—Volume V.*

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