SPATIAL ANALYSIS TO ACHIEVE 20 MILLION HECTARES OF MARINE PROTECTED AREAS FOR INDONESIA BY 2020

Irfan Yulianto, Yudi Herdiana, Matheus H. Halim, Prayekti Ningtias
Agus Hermansyah, Stuart Campbell

WILDLIFE CONSERVATION SOCIETY

MPAG MARINE PROTECTED AREA GOVERNANCE

CONSERVATION INTERNATIONAL · CORAL TRIANGLE CENTER · The Nature Conservancy · WILDLIFE CONSERVATION SOCIETY · WWF

SPATIAL ANALYSIS TO ACHIEVE 20 MILLION HECTARES OF MARINE PROTECTED AREAS FOR INDONESIA BY 2020

Irfan Yulianto

Yudi Herdiana

Matheus H. Halim

Prayekti Ningtias

Agus Hermansyah

Stuart Campbell

Wildlife Conservation Society
Indonesia Marine Program
Jl. Atletik No.8, Tanah Sareal
Bogor 16161
www.wcs.or.id

SPATIAL ANALYSIS TO ACHIEVE 20 MILLION HECTARES OF MARINE PROTECTED AREAS FOR INDONESIA BY 2020

Irfan Yulianto

Yudi Herdiana

Matheus H. Halim

Prayekti Ningtias

Agus Hermansyah

Stuart Campbell

Suggested Citation:
Yulianto I., Y. Herdiana, M.H. Halim, P. Ningtias, A. Hermansyah, S. Campbell. 2013. Spatial analysis to achieve 20 Million Hectares of Marine Protected Areas for Indonesia by 2020. Wildlife Conservation Society and Marine Protected Areas Governance. Bogor. Indonesia.

This book is made possible partly by the United States Agency for International Development (USAID) through MPAG programs. The contents are the responsibility of Marine Protected Areas Governance (MPAG) and do not necessarily reflect the views of USAID or the United States Government, and the Government of Republic of Indonesia.

Graphic Designer: Pasus Legowo
GIS Analysis and Mapping: Agus Hermansyah
Cover photo: Pulau Banyak © Yudi Herdiana

TABLE OF CONTENTS

PREFACE iv
ACKNOWLEDGMENT v
EXECUTIVE SUMMARY vi

1. INTRODUCTION 1
   1.1 Background 1
   1.2 Objective 2
   1.3 Scope 2

2. APPROACH AND METHODOLOGY 3
   2.1. Spatial Analysis 3
   2.2 Defining Potential Areas 5

3. EXISTING MARINE PROTECTED AREAS IN INDONESIA 7
   3.1 Data Center of Marine Protected Areas 7
   3.2 Nature Sanctuaries (NSA) and Natural Conservation Areas (NCA) 9
   3.3 Distribution of Marine Protected Areas 12

4. POTENTIAL ESTABLISHMENT OF NEW MARINE PROTECTED AREAS 15
   4.1 Clustering Community-based Marine Protected Areas 15
   4.2 Marine Protected Area Network in Aceh Province 18
   4.3 MPA Network in Lesser Sunda Ecoregion 20
   4.4 Priorities of Marine Protected Areas in Bastunamata Region 23
   4.5 Marine Protected Area Plan Atlas 23
   4.6 Geographical Priorities of Marine Biodiversity 26
   4.7 Potential for Other Marine Protected Areas 26
   4.8 Potential Priority Marine Protected Areas 31

5. STRATEGY TO ACHIEVE 20 MILLION HECTARES OF MPAS BY 2020 35
   5.1 Integrating data and information on the Indonesian MPA Network 35
   5.2 Strategy for incorporating Community-based MPAs into the Indonesian MPA network 35
   5.3 Developing new MPAs 36

REFERENCES 39

APPENDIX 41
Appendix 1 42
Appendix 2 45
Appendix 3 48
Appendix 4 50
Appendix 5 83
Appendix 6 94

PREFACE

The President of the Republic of Indonesia, Susilo Bambang Yudhoyono, delivered a speech at the Coral Triangle Initiative Summit in Manado in 2009, in which he declared a target of twenty million hectares of marine protected areas (MPAs) for Indonesia by 2020. Consequently, the government of the Republic of Indonesia, through the Ministry of Marine Affairs and Fisheries, has been developing a nationwide representative system of marine protected areas, that aims to improve the effectiveness of marine protected area governance and achieve the target of twenty million hectares by 2020.

This book outlines a study on the spatial assessment of MPAs in Indonesia and identifies potential new locations for MPA development that include the community-based marine protected areas that have been established by various institutions. The assessment was conducted by examining data and information on the existing MPA network for Indonesia and elucidating the distribution and extent of existing community based MPAs from relevant datasets and reports. The study has been conducted as part of the USAID-MPAG program for Indonesia and its results aim to support the Indonesian government develop strategic recommendations and spatial priorities for its commitment to achieve twenty million hectares of marine protected areas.

The results of our study by no means outline the full set of criteria that are expected to forge the underlying strategy of the government to achieve its MPA targets. Other considerations including socio-economic, political, defense and security factors were not examined in this study. We hope that the results of this study may provide critical supporting data and information for the Indonesian government in its setting of spatial priorities to achieve its stated target of twenty million hectares of effective marine protected areas for Indonesia.

ACKNOWLEDGMENT

This document 'Spatial analysis to achieve 20 Million Hectares of Marine Protected Areas for Indonesia by 2020' is a joint publication of the Wildlife Conservation Society and the USAID's Marine Protected Area Governance Program.

We wish to extend our gratitude to everyone involved in this MPA prioritization exercise and the finalization of the document. We are indebted to the following who contributed to the study and expect it becomes an important resource and reference for MPA design and development in Indonesia:

• Dr. Toni Ruchimat	Director General for Marine, Coasts, and Small Islands
• Dr. Pahala Nainggolan	Chief of Party Marine Protected Area Governance (MPAG)
• Riyanto Basuki	Directorate of Marine Area and Species Conservation, MMAF
• Hary Christijanto	Directorate of Fisheries Resources, MMAF
• Suraji	Directorate of Marine Area and Species Conservation, MMAF
• Rofi Alhanif	Directorate of Marine Area and Species Conservation, MMAF
• Agus WIdayanto	Directorate of Marine Area and Species Conservation, MMAF
• M. Saifudin	Directorate of Marine Area and Species Conservation, MMAF
• Nilfa Rasyid	Directorate of Marine Area and Species Conservation, MMAF
• Ani Kusumaningrum	Directorate of Coastal and Small Islands Spatial Planning, MMAF
• Budy Wiryawan	Bogor Agricultural University
• Handoko Adi Susanto	Marine Protected Area Governance (MPAG)
• Rony Megawanto	Marine Protected Area Governance (MPAG)
• Arisetiarso Soemodinoto	The Nature Conservancy
• M. Khazali	Conservation International
• Sudarsono	WWF Indonesia

We also thank those who participated and contributed to the completion of this study at the national workshop, 'Strategy to Achieve 20 Million Hectares of Marine Protected Areas by 2020', on 31 January 2013.

EXECUTIVE SUMMARY

The President of the Republic of Indonesia, Susilo Bambang Yudhoyono, in his speech at the Convention on Biological Diversity (CBD) in Brazil (2006), declared a target of ten million hectares of marine protected areas (MPAs) for Indonesia by 2012. One of the key steps to achieve Indonesia's MPA target is the selection of appropriate sites for MPA establishment, where ecological functions, environmental services, resource utilization, local knowledge regarding resource management and the socioeconomic welfare of local communities are improved and sustained. The objective of this study is to develop strategic recommendations to the GoI, and define priority areas to achieve the target of twenty million hectares of MPAs by 2020.

Potential areas for new MPA development in Indonesia have been identified through analyses of previous scientific studies that have defined priority areas of marine resource conservation in Indonesia. These included results from the Indonesian Protected Area Plan Atlas (Salm and Halim 1984), on scientific design of resilient MPA Networks in the Lesser Sunda ecoregion (Wilson et al. 2011), on community-based MPAs in Indonesia (Syakur et al. 2012), and on priority areas of marine biodiversity for developing MPAs in Indonesia (Huffard et al. 2012). In addition to these reports, data and reports on areas identified as high potential for MPA development and important areas previously recommended for MPA development were used as information sources. The MPAs and important areas used as information sources are: distribution of community-based MPAs (Wiryawan et al. 2002; CRC-URI 2003; COREMAP Database 2012), distribution of nature sanctuaries and natural conservation areas (Ministry of Forestry Database 2012), and a recommended important area in the Bastunamata (Anambas-Natuna-Karimata) region (Yulianto 2010, Ministry of Marine Affair and Fisheries Database 2011).

Based on available data in the Data Center of Marine Protected Areas, Directorate of Conservation of Areas and Fish Species (KKJI), Ministry of Marine Affairs and Fisheries (MMAF), in July 2012 there were 15,784,129 hectares of MPAs Indonesia wide. This consists of 108 MPAs, of which 32 are managed by Ministry of Forestry (MoF) and 76 by local governments and the MMAF. According to MPA estimation from the Data Center of Marine Protected Areas and additional areas as part of protected areas as defined by MoF (namely NSA and NCA), the total size of marine protected areas in Indonesia is 16,953,377 hectares. In addition, there are also four new MPAs, namely in Southeast Maluku, Morotai, South Halmahera, and East Belitung Districts, which are almost completed in updating their data, to be considered as existing MPAs in this study. The four new MPAs have a size of 280,885 hectares making a total area of MPAs in Indonesia of 17,144,702 hectares.

After combining all potential MPAs from clustering community based MPA, MPA Network in Aceh Province, MPA Network in Lesser Sunda Ecoregion, priority areas in Bastunamata, MPA Plan Atlas, geographical priorities of marine biodiversity, and also comparing them with existing MPAs, sites prioritized to be MPAs were obtained. Potential priority MPAs are 4,530,815 hectares widespread in 26 provinces and 61 districts originating from the Protected Area Plan Atlas of 47%, clustering of community-based MPAs of 47%, and priority areas in Bastunamata, Aceh, and the Lesser Sunda Ecoregion of 2%, respectively.

From this study we proposed the strategies to achieve 20 million hectares of MPAs by 2020 as follows;

a. Integrating data and information on the Indonesian MPA Network
b. Incorporating Community-based MPAs into the Indonesian MPA network
c. Developing new MPAs

1 INTRODUCTION

1.1 Background

The President of the Republic of Indonesia, Susilo Bambang Yudhoyono, in his speech at the Convention on Biological Diversity (CBD) in Brazil (2006), declared a target of ten million hectares of marine protected areas (MPAs) for Indonesia by 2012. The target was exceeded in 2009 when a total of 13.4 million hectares was achieved. This was and announced at the Coral Triangle Initiative Summit in Manado in 2009, with the President further announcing to set a target of twenty million hectares of MPAs to be achieved by 2020. The strategic plan of Ministry of Marine Affairs and Fisheries (MMAF) also set an interim target of 15.5 million hectares of MPAs by 2014. According to the latest official data from the Directorate of Conservation of Areas and Fish Species (KKJI), MMAF, this target for 2014 was exceeded in 2012, with a total of 15,784,129 ha of MPAs achieved for Indonesia.

In addition to the target of twenty million hectares of MPAs for Indonesia, at the CBD-10 meeting in Nagoya in 2010, Indonesia stated its expectation to 10% area of its territorial waters set aside within MPAs. To achieve this target, Indonesia must allocate 31 million hectares of MPAs within its territorial waters. With a total of 310 million hectares of territorial waters in Indonesia, the target of 20 million hectares by 2020 accounts for 6.5% of its territorial waters. With regard to the commitment made at CBD-10, the Government of Indonesia (GoI) has yet to set a date for its achievement.

In order to achieve the twenty million hectare target, over the next eight years, the GoI has to declare an additional 4.22 million hectares of MPAs. One of the key steps to achieve Indonesia's MPA target is the selection of appropriate sites for MPA establishment, where ecological functions, environmental services, resource utilization, local knowledge regarding resource management and the socioeconomic welfare of local communities are improved and sustained.

Potential areas for new MPA development in Indonesia have been identified through analyses of previous scientific studies that have defined priority areas of marine resource conservation in Indonesia. The first comprehensive study was conducted in 1984, producing Indonesia's Marine Conservation Data Atlas published by the Directorate General of Forest Protection and Natural Conservation (PHPA), Ministry of Forestry (MoF) in cooperation with the International Union for Conservation of Nature (IUCN) and the World Wide Fund for Nature (WWF) (Salm and Halim, 1984). The atlas contained information about endangered species and identified 179 priority areas in Indonesia for MPA recommendation. In 1989, Rili Djohani used this study to develop a framework to guide the GoI's commitment and achievement of ten million hectares of MPAs, from 1988 to 1993. This analysis Indonesia's Marine Conservation Data Atlas publishedfocused on seventeen locations throughout Indonesia, divided into three priority levels, and laid the framework for implementing conservation activities rapidly to achieve the 10 million hectare target.

In 2007, a paper titled Marine Ecoregions of the World (MEOW) (Spalding et al. 2007) divided Indonesia into twelve ecoregions, namely; Papua, Banda Sea, Lesser Sundas, Sulawesi Sea, Halmahera, Palawan/North Borneo, Western Sumatra, Tomini Bay, Java Sea, Arafura Sea, Southern Java, and Malacca Strait. This comprehensive study was followed by a relatively rapid evaluation of the relative importance of marine biodiversity within the 12 ecoregions of Indonesia, based on 'expert' consultations and available literature (Huffard et al. 2012). This resulted in the defining of geographical priorities for Indonesia, based on the distribution and abundance of marine biodiversity, MPA distribution, and geographical gaps in MPA establishment in Indonesia. More recently, Wilson et al. (2011) conducted a detailed study on MPA network development potential in the Lesser Sunda ecoregion.

In addition to the recommendations of studies for geographical prioritization for MPA establishment, approximately 430 community-based MPAs have been established by COREMAP, a World Bank and Asian Development Bank funded program in Indonesia. These locations have potential to form an important component of the national MPA system that is currently being developed in Indonesia.

1.2 Objective

The objective of this study is to define priority areas and develop strategic recommendations to the GoI to achieve the target of twenty million hectares of MPAs by 2020.

1.3 Scope

The scope of the study is to spatially identify and define potential areas for MPA development in coastal areas and small islands based on available scientific studies and MPA programs previously conducted in Indonesia, and available data and information.

2 APPROACH AND METHODOLOGY

This study examined a number of studies on marine biodiversity and Marine Protected areas (MPAs) previously conducted in Indonesia as the basis for defining priority areas to achieve the GoI's target of twenty million hectares of MPAs by 2020. These included results from the Indonesian Protected Area Plan Atlas (Salm and Halim, 1984), on scientific design of resilient MPA Networks in the Lesser Sunda ecoregion (Wilson et al. 2011), on community-based MPAs in Aceh (Syakur et al. 2012), and on priority areas of marine biodiversity for developing MPAs in Indonesia (Huffard et al. 2012). In addition to these reports, data and reports on areas identified as high potential for MPA development and important areas previously recommended for MPA development were used as information sources. The MPAs and important areas used as information sources are: distribution of community-based MPAs (Wiryawan et al. 2002; CRC-URI 2003; COREMAP Database 2012), distribution of nature sanctuaries and natural conservation areas (Ministry of Forestry Database 2012), and a recommended important area in the Bastunamata (Anambas-Natuna-Karimata) region (Yulianto 2010, Ministry of Marine Affair and Fisheries Database 2011).

2.1. Spatial Analysis

1. Community-based Marine Protected Areas

Data on locations of community-based MPAs were obtained from the study and implementation of the Coastal Resources Management Project (CRMP) for those located in North Sulawesi (CRC-URI, 2003) and the Coral Reef Rehabilitation and Management Project (Coremap) for those located in Batam, Bintan, Lingga, Natuna, South Nias, Central Tapanuli, Kepulauan Mentawai, Pangkajene Kepulauan, Buton, Selayar, Wakatobi, Sikka, and Raja Ampat (COREMAP Database 2012). Community-based MPAs are very important to be accommodated in this study as adequately recognized by communities. Therefore, the integration of community-based MPAs into the Indonesia's MPA system is expected to obtain significant acceptability and support from the communities.

The data obtained on community-based MPAs consisted of two types; 1) Geographical Information System (GIS) shapefile format and coordinates of stations in Microsoft Word or Microsoft Excel format. In terms of data in GIS format, datum and the map projection system were stan-

dardized according to the Geospatial Information Agency (BIG). The datum used referred to the World Geodetic System (WGS) 1984 and projections of Universal Transverse Mercator (UTM). Data in Microsoft Word or Microsoft Excel formats were available in degrees, minutes, and seconds, and converted in Microsoft Excel to decimal fractions of degrees. Data was transformed into GIS formats using the standardizations used above.

Locations of community-based MPAs were divided into two types; those located inside the existing larger MPA and those located outside an existing larger MPA. Community-based MPAs located inside MPAs were not analyzed, while, community-based MPAs located outside existing MPAs were grouped by connecting locations of the outermost MPA boundaries, to form new MPA polygon. Each community-based MPA was transformed into UTM format to obtain data in the shapefile format in meter units, in order to calculate the area of the MPA in metric units (square meter or hectare).

2. Marine Conservation Data Atlas

Data from the Marine Conservation Data Atlas (Salm and Halim 1984) were obtained from the Directorate Genderal of PHKA, MoF. Areas of high potential for MPA development were identified based on the existing biodiversity at that time, but data from the atlas on MPA boundaries were not clearly defined.

Available data and maps from the Marine Conservation Data Atlas were in digital image formats (jpeg) making them unable to be directly used for spatial analysis by GIS. The first step was to geo-reference the information, by placing images in their true positions on the earth. After obtaining images with coordinate references on the earth, the next step was digitalization to obtain data of the atlas in the vector format (shapefile format) and standardized to make them compatible with other GIS data. Some recommended sites on the atlas were located more than four nautical miles from the coast. The areas of more than four nautical miles distant from shorelines were not used in the analysis and omitted by cutting off up to the limit of four nautical miles. Tabular data in the form of priorities and site codes were put as notes for the planned MPA sites according to the atlas.

3. Priority Areas in the Lesser Sunda Ecoregion

A study on priority areas conducted by The Nature Conservancy (TNC) in the Lesser Sunda Ecoregion, included Bali, West Nusa Tenggara, East Nusa Tenggara, and part of Maluku provinces, and included part of the Java Sea, Flores Sea, Savu Sea, Timor Sea, and the Indian Ocean (Wilson et al. 2011). The study identified existing MPAs and areas of potential for MPA development. The potential MPAs were identified in consultation with stakeholders in the study area and included proposed District-based Marine Protected Areas, and areas of interest near to shore, in deep waters and trans-boundary areas.

Recommended MPA sites as a result of the TNC study were available in PDF format. This format could not be used directly in GIS analysis. Maps in PDF format were converted into the jpeg image format by using the Adobe Photoshop CS2 software. The data standardization process geo-referenced and digitalized data attributes as mentioned previously.

4. Priority Areas in Aceh Province

Data on priority areas in the Aceh Province were identified by Syakur et al. (2012), with information sourced on existing and potential MPAs. MPAs were identified by analysis of marine

biodiversity data and consultation with communities by the Aceh Provincial Government. Data on existing and recommended MPAs were obtained in shapefile formats and used directly in GIS analysis and standardized as previously described. Areas inside existing MPAs were not used in the subsequent analyses.

5. Priority Areas in Bastunamata

The Bastunamata region covers Anambas, Natuna, and Karimata Islands located in the South China Sea. This region is a pilot program for the Directorate of Spatial Planning of Coasts, Oceans, and Small Islands of the MMAF, in developing inter-provincial plans. Administratively, the Bastunamata region covers six provinces, namely Riau, Riau Islands, Jambi, South Sumatra, Bangka-Belitung, and West Kalimantan. The analysis used Marxan to identify and prioritise representative areas for MPA development (Yulianto 2010). The data processing process generalized Marxan outputs into one area for each site. In the event that an area overlapped with an existing MPA, it was not used in the subsequent analysis.

6. Geographical Priorities of Marine Biodiversity

Huffard et al. (2012) conducted a study that used marine biodiversity to rank 12 ecoregions of Indonesia in terms of protected area prioritization, but did not identify MPAs for potential development. Data from sites was spatially analyzed, whereas delineation of each prioritized areas applied expert judgment, while the delineation of outward boundaries was based on the district governments' jurisdiction (four nautical miles from shorelines). The process of obtaining boundaries of four nautical miles was done by making new lines at a distance of four nautical miles from shorelines. The function of "buffer" in GIS software can produce areas at a distance of four nautical miles to be then converted into lines.

7. Nature Sanctuaries (KSA) and Natural Conservation Areas (NSA and NCA)

Nature Sanctuaries (KSA) and Natural Conservation Areas (NSA and NCA) are areas that have been stipulated as MPAs by the Ministry of Forestry. Based on official data of DG of PHKA, many of the areas share borders with marine waters and some have marine waters within their borders. Areas include National Parks (TN), Nature Reserves (CA), Wildlife Sanctuaries (SM), Hunting Parks (TB), and Jungle Parks (Tahura).

Data on NSA and NCA are available in shapefile formats and printed maps. Data in shapefile format were standardized before use in the GIS analysis. Printed maps were digitally scanned before geo-referencing and digitalization. The editing and entry process of data attributes was conducted to obtain ready-to-use maps with data attributes in the analysis.

2.2 Defining Potential Areas

Indonesia wide identification of potential MPA development were identified by spatial analyses of the data and overlaying all data analyzed into selected priority layers:

Layer I : Clustering community-based MPAs
Layer I : Lesser Sundas, Aceh Province, Bastunamata
Layer III : Marine Conservation Data Atlas

In the event that areas overlapped among layers, the higher-level layer was used. For instance, if areas in layers I and II overlapped, the area from layer I was used in the analysis. The output of

this process was the selected potential areas to be proposed as new MPA sites for Indonesia. These potential areas were then analyzed by MPA practitioners and experts from MMAF (Directorat of Spatial Planning and Directorate of Conservation Area and Species), non government organizations, Bogor Agricultural University and individuals who have experience in MPA development in Indonesia for final identification of potential areas. Considerations to be taken were the experts judgment on biodiversity conditions and the government's development plan (Kemenko Ekonomi 2011).

Potential areas were then analyzed based on distributions of both district territories and boundaries and Fisheries Management Areas (WPP). The analytical process was conducted by overlapping maps on potential areas with maps on district administration and WPPs. Administrative maps were obtained from BIG while WPP maps from MMAF. The technique of identifying MPA potential sites in each district was performed by transferring data attributes from a consolidated map of potential areas together with administrative areas and WPPs into Microsoft Excel format. The technique of "pivot table" was applied to cluster and select potential sites based on districts and WPPs. In addition, comparison of potential areas with existing MPAs, as stipulated by MMAF, Ministry of Forestry, and district governments, was performed.

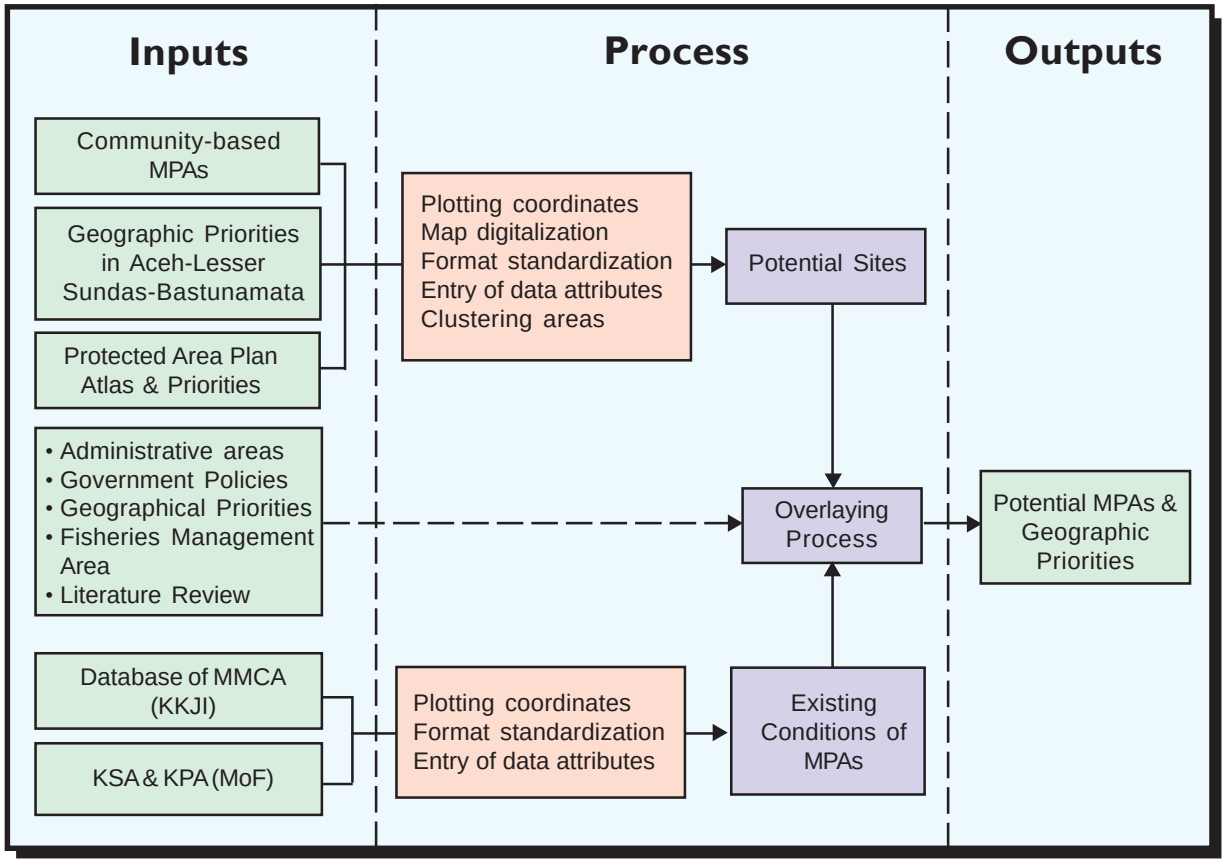


Figure 1. Flow chart of the study

3 EXISTING MARINE PROTECTED AREAS IN INDONESIA

3.1 Data Center of Marine Protected Areas

Based on available data in the Data Center of Marine Protected Areas, Directorate of Conservation of Areas and Fish Species (KKJI), Ministry of Marine Affairs and Fisheries (MMAF), in July 2012 there were 15,784,129 hectares of MPAs Indonesia wide. This consists of 108 MPAs, of which 32 are managed by Ministry of Forestry (MoF) and 76 by local governments and the MMAF (Table 1; Figure 2).

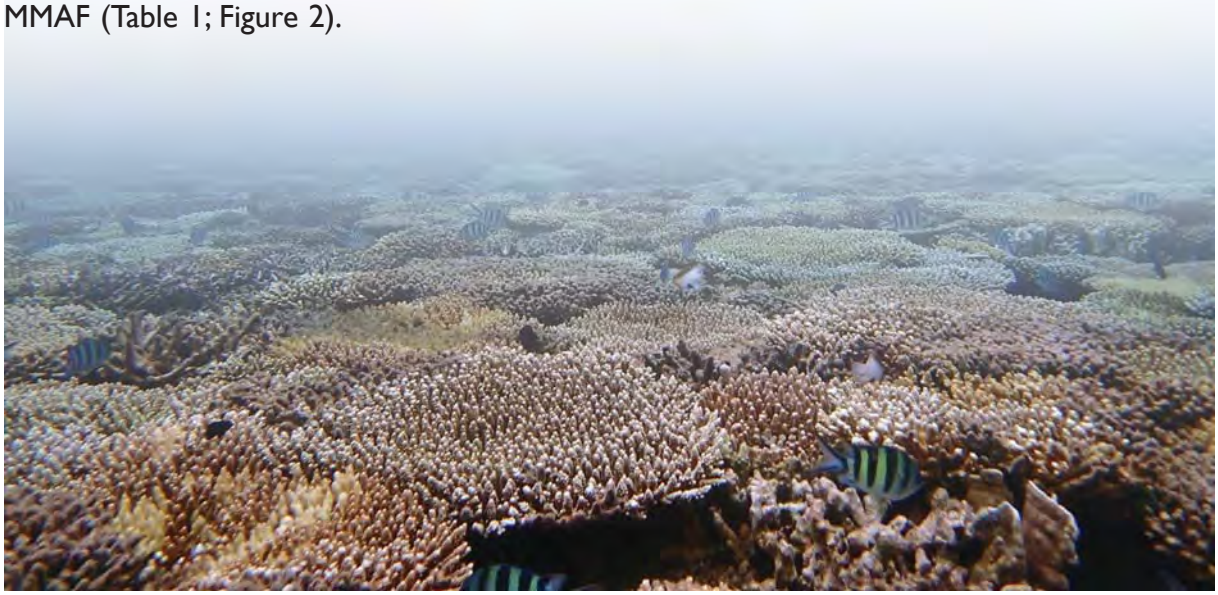


Table 1. Number and size of Marine Protected Areas in Indonesia.

No	MPA	Number	Size (ha)
A	**Managed by MoF**	32	4,694,947.55
1	Marine National Parks	7	4,043,541.30
2	Marine Tourism Parks	14	491,248.00
3	Marine Wildlife Sanctuaries	5	5,678.25
4	Marine Nature Reserves	6	154,480.00
B	**Managed by MMAF and local governments**	76	11,089,181.97
1	Marine National Parks	1	3,521,130.01
2	Marine Nature Parks	3	445,630.00
3	Marine Tourism Parks	6	1,541,040.20
4	District-based Marine Protected Areas	66	5,581,381.76
	Total	108	15,784,129.52

Source: Directorate of KKJI, MMAF, 2012

Figure 2. Distribution of Marine Protected Areas in Indonesia.

3.2 Nature Sanctuaries (NSA) and Natural Conservation Areas (NCA)

Nature Sanctuaries (NSA), covering Wildlife Reserves and Strict Nature Reserves and Natural Conservation Areas (NCA), covering National Parks, Nature Recreational Parks, Grand Forest Park, and Hunting Parks, are protected areas managed by the Ministry of Forestry (MoF) and many border marine waters. In total 155 protected areas consist of 62 Strict Nature Reserves (CA), 28 Wildlife Reserves (SM), 23 National Parks (TN), 33 Nature Recreational Parks (TWA), 3 Grand Forest Parks (Tahura), and 6 Hunting Parks (TB). Eighty two NSA and NCA's have been identified with marine waters by the Directorate of Forest Protection and Nature Conservation, MoF, comprising an additional of 1,169,247 ha (Appendix 2). Inclusion of these areas in the national MPA network results in a total of 16,953,377 ha of MPAs for Indonesia.

The additional area of marine bordering NSA and NCA area categories excludes the 7 Marine National Parks (Seribu Islands, Karimunjawa Islands, Takabonerate, Wakatobi, Bunaken, Togian, and Cendrawasih Bay), 6 Marine Nature Reserves (Anak Krakatau Island, Leuweung Sancang, Pananjung Pangandaran, Riung, Karimata Islands, and Sausapor Beach), 5 Marine Wildlife Reserves (Rambut Island, Semama Island, Sabuda Island and Tataruga Island, Jamursba Medi Beach, and Sindangkerta), and 14 Marine Recreational Parks (Weh Island, Sangiang Island, Moyo Island, 17 islands in Riung, Maumere Bay, Kupang Bay, Sangalaki Island, Lasolo Bay, Kassa Island, Pombo Island, Marsegu Island and surroundings, Banyak Islands, Satonda Island, and Padamarang Islands), which have already been included in the MMAF's national MPA area calculations in 2012.

Table 2. Nature Sanctuaries (NSA) and Natural Conservation Areas (NCA) bordering marine waters in Indonesia.

No	KSA and KPA	Number of areas	Already calculated areas	Area of waters + mangroves (ha)	Additional area (ha)
1	Strict Nature Reserves	62	44	381,841.10	227,361.10
2	Wildlife Reserves	28	21	254,795.85	249,117.60
3	Grand Forest Park	3	2	1,620.70	1,620.70
4	Hunting Parks	6	3	5,843.00	5,843.00
5	National Parks	23	19	4,571,944.70	528,403.40
6	Nature Recreational Parks	33	25	648,149.70	156,901.70
	Total	155	114	5,864,195.05	1,169,247.50

Source: Directorate of KKJI, MMAF, 2012

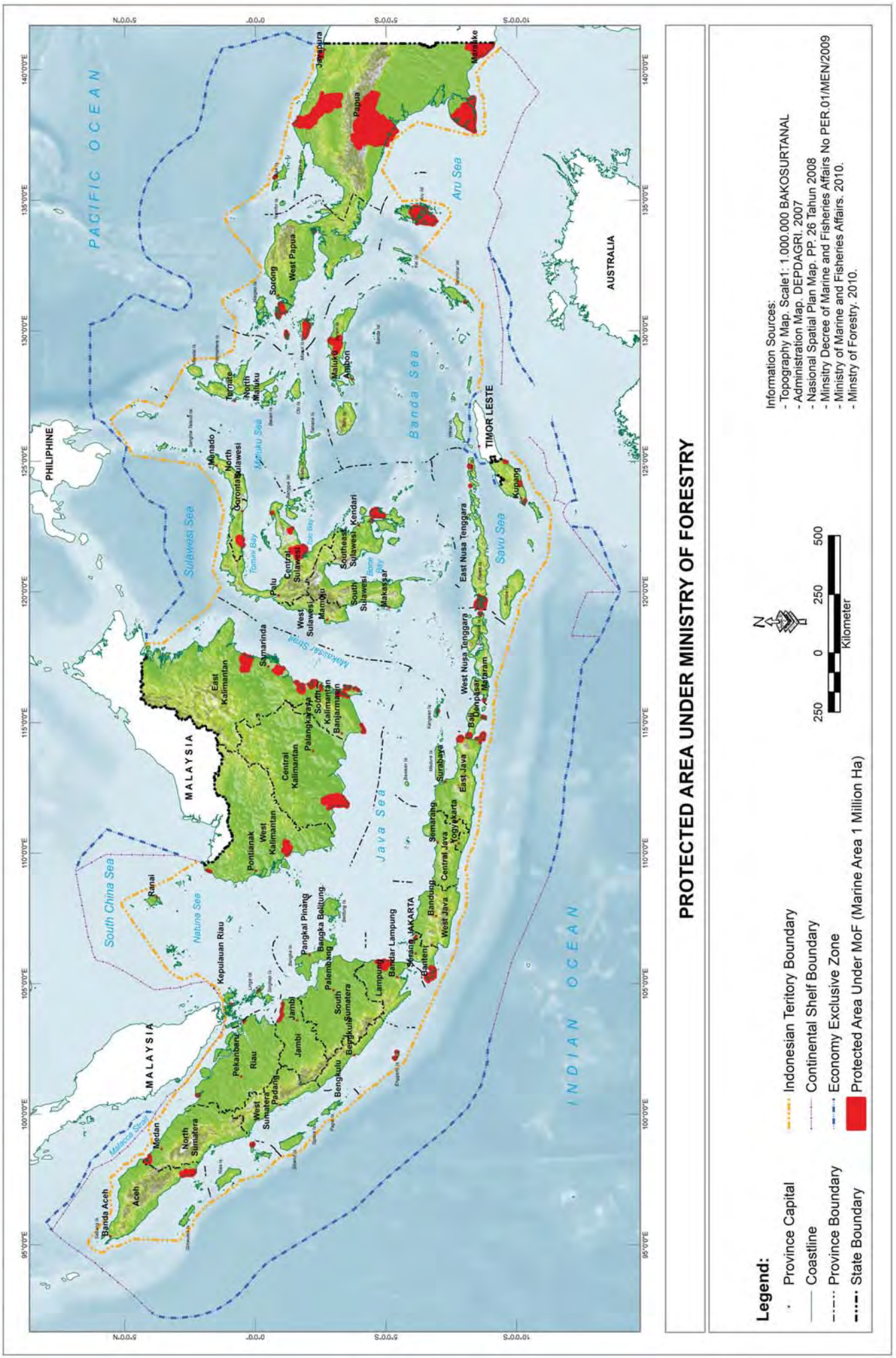


Figure 3. Distribution of Nature Sanctuaries and Natural Conservation Areas in Indonesia.

Data on the precise area of marine waters adjacent to 41 other NSA and NCA's are not available as spatial planning processes conducted by the MoF's Boundary Planning team are yet to be finalized. A Decree of the Minister of Forestry concerning the Appointment of Protected Areas has, however, clarified the boundaries of these protected areas, and therefore we were able to estimate the area of marine waters included for protection, at 967,423.30 hectares (Table 3).

Table 3. Nature Sanctuaries and Natural Conservation Areas in Indonesia adjacent to marine waters.

No	Type and name of MPA	Estimated area of water (ha)
	A. Strict Nature Reserves	
1	Cibanteng	447.00
2	Bojonglarang Jayanti	750.00
3	West Nusa Kambangan	928.00
4	East Nusa Kambangan	277.00
5	Wijaya Kusuma	1.00
6	Karang Bolong	0.50
7	Baron Bay	2.40
8	Nusa Barong Island	6,100.00
9	Maubesi	1,830.00
10	Kaget Island	85.00
11	Tangkoko Batu Angus	3,196.00
12	Mountain Dua Saudara	4,299.00
13	Mas Popaya Raja	160.00
14	Cape Api	4,246.00
15	Seho Island	1,250.00
16	Gunung Api Kisar	80.00
17	Arfak Mountains	68,325.00
18	Supriori Island	42,000.00
	Total A	**133,976.90**
	B. Wildlife Reserves	
1	Cikepuh	8,127.50
2	Harlu	2,000.00
21	Cape Mantop	1,612.50
22	Dolangan	462.50
23	Lampoko Mampie	2,000.00
24	Cape Amelenggo	850.00
25	Manuk Island	100.00
	Total B	**15,152.50**

No	Type and name of MPA	Estimated area of water (ha)
	C. National Parks	
1	Siberut	190,500.00
2	Bukit Barisan	365,000.00
3	Meru Betiri	58,000.00
4	Aopa Watumohai Marsh	105,194.00
	Total C	**718,694.00**
	D. Nature Recreational Parks	
1	Sukawayana	16.00
2	Pananjung Pangandaran	37.70
3	Selok Mountain	126.20
4	Pleihari	1,500.00
5	Batu Angus	635.00
6	Batu Putih	250.00
7	Gn. Api Banda	734.46
8	Yotefa Bay	1,650.00
	Total D	**77,660.90**
	E. Grand Forest Park	
1	Marhun	7,877.00
	Total E	**7,877.00**
	F. Hunting Parks	
1	Ndana Island	1,562.00
2	Dataran Bena	11,000.00
3	Rusa Island	1,500.00
	Total F	14,062.00
	Grand Total (A to F)	**967,423.30**

Source : Directorate of Forest Protection and Nature Conservation, MoF, 2012

3.3 Distribution of Marine Protected Areas

According to MPA estimation from the Data Center of Marine Protected Areas and additional areas as part of protected areas as defined by MoF (namely NSA and NCA), the total size of marine protected areas in Indonesia is 16,953,377 hectares. In addition, there are also four new MPAs, namely in Southeast Maluku, Morotai, South Halmahera, and East Belitung Districts, which are almost completed in updating their data, to be considered as existing MPAs in this study. The four new MPAs have a size of 280,885 hectares making a total area of MPAs in Indonesia of 17,144,702 hectares.

According to district government administrative areas, the MPAs of Indonesia are distributed among 31 Provinces (Figure 4.). Provinces with no MPAs include DIY Yogyakarta and South Sumatra Province. Provinces with MPAs more than one million hectares in area are, among others, Southeast Sulawesi, West Papua, Papua, Riau Islands, and East Kalimantan. Provinces with relatively small MPAs (< 10,000 hectares) are Riau, North Maluku, Central Kalimantan, Jambi, Gorontalo, and Bangka-Belitung Provinces.

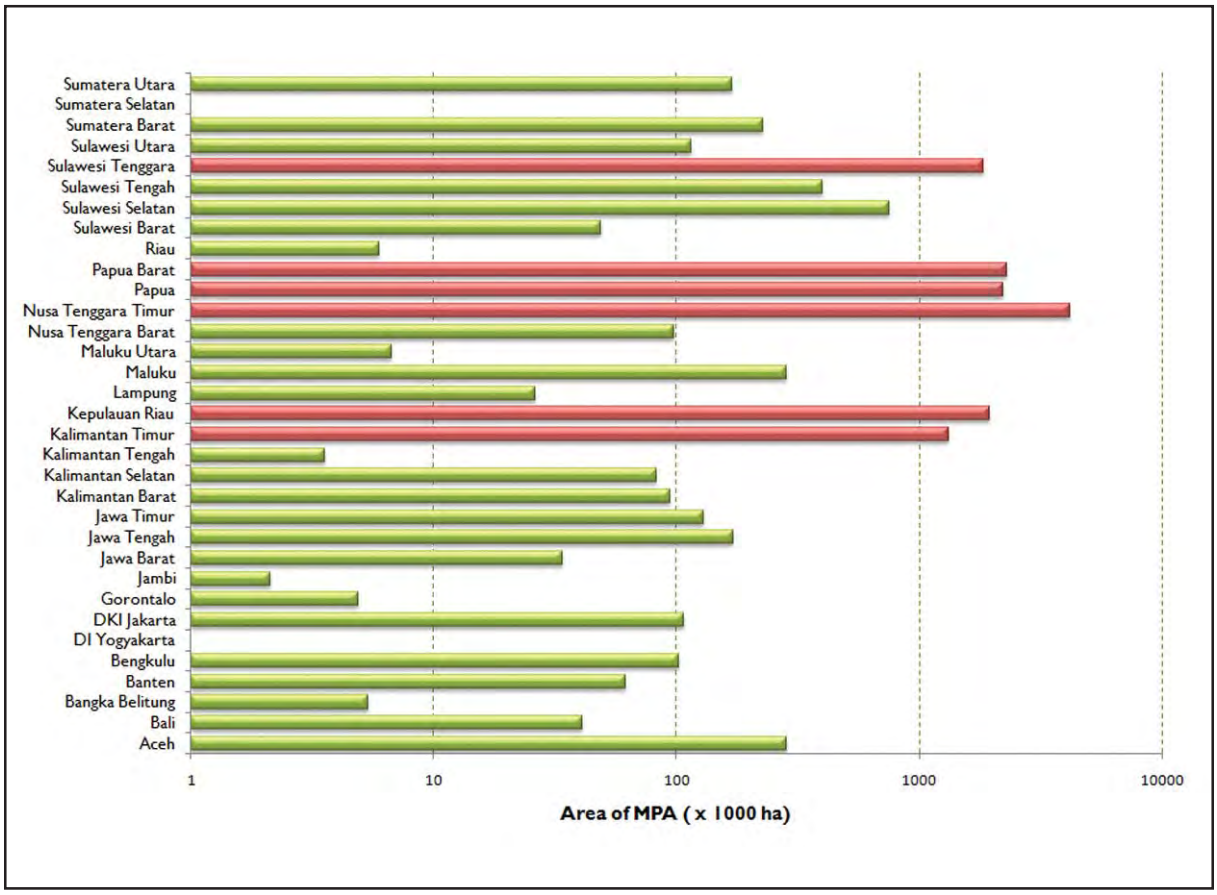


Figure 4. The total area (ha) of Marine Protected Areas in each of 31 Provinces in Indonesia.

MPAs in Indonesia are distributed within all the 11 existing Fisheries Management Areas (Wilayah Pengelolaan Perikanan - WPP) (Figure 5). The largest combined area of MPAs are located in WPP 573 (Indian Ocean, Southern Java) with 4,200,883 hectares or 24.5% of the total area of MPAs in Indonesia. The smallest combined area of MPAs is located in WPP 572 (Malacca Strait and Andaman Sea) with 12,158 hectares or 0.07% of the total area of MPAs in Indonesia.

As a proportion of each of the 11 WPP areas estimated by GIS software, the combined area of MPAs inside WPPs ranged from 0.09% in WPP 571 to 4.68% in WPP 573 (Figure 6.). WPPs with MPAs less than 1% of their total area included WPP 571 (Malacca Strait and Andaman Sea), WPP 572 (Indian Ocean, Western Sumatra, and Sunda Strait), WPP 712 (Java Sea), and WPP 718 (Aru Sea, Arafuru Sea, and Eastern Timor Sea). MPAs with the largest proportion (4.68%) of total WPP area, are located in WPP 573 (Indian Ocean, Southern Java).

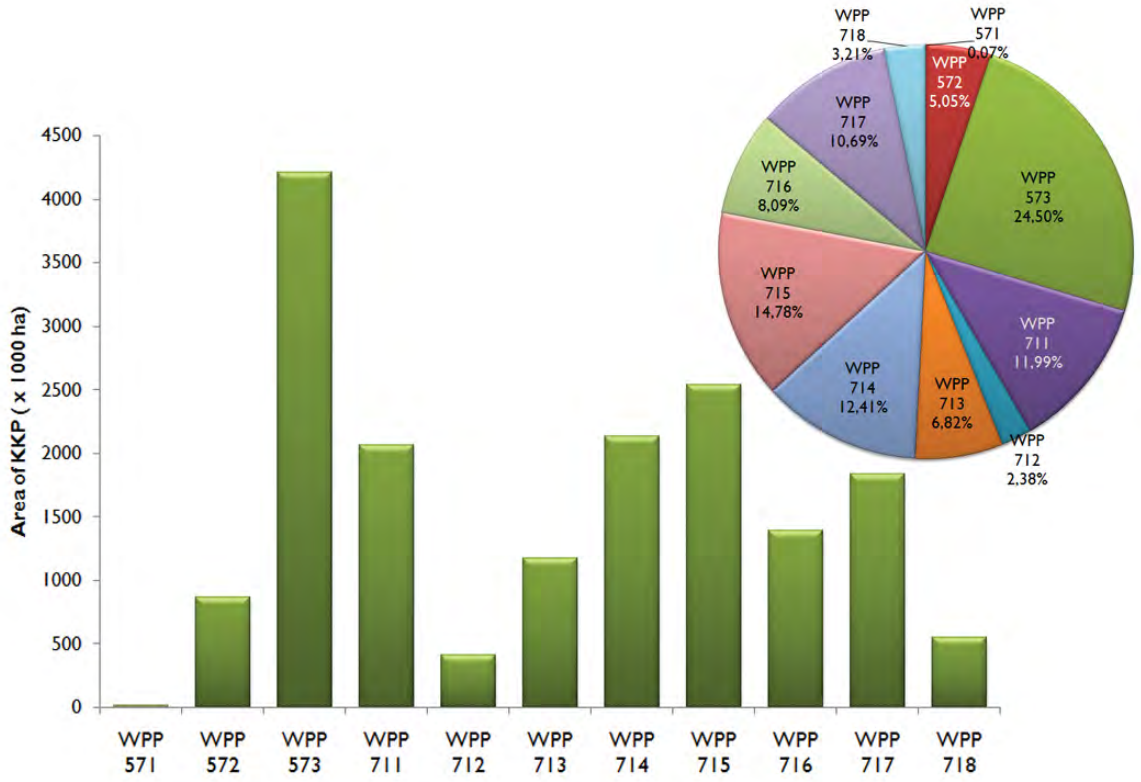
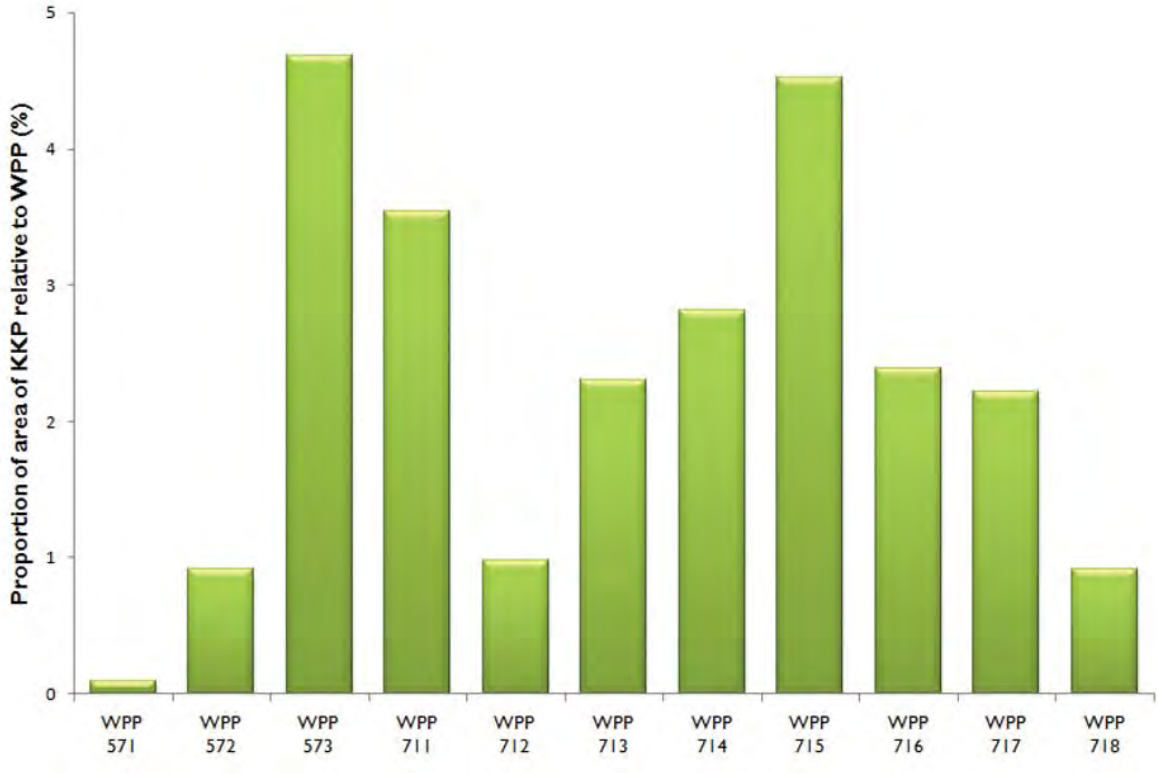


Figure 5. Area of Marine Fisheries Regions (WPPs) and MPAs of each of 11 Indonesian WPPs.



Fiure 6. Proportion (%) of combined MPA areas as a function of WPP area in 11 Indonesian WPPs. g

4 POTENTIAL ESTABLISHMENT OF NEW MARINE PROTECTED AREAS

4.1 Clustering Community-based Marine Protected Areas

In Indonesia, community-based MPAs developed under village laws and known as Daerah Perlindungan Laut (DPL). The DPL were introduced by the Coastal Resources Marine Program (CRMP) with funding by USAID from 1998 to 2003. In Sumatra 4 DPLs in one village were established (Wiryawan et al. 2002) alwhile in North Sulawesi 31 DPLs were established (CRC-URI 2003). The approach to DPL establishment in Indonesia was modeled on a similar program implemented previously in the Philippines during the 1990's. Legislated under village laws and with assistance from community self-support groups and non-government organizations, the development and effective management of these DPLs in Indonesia was highly variable following cessation of USAID funding. In 2004, with funding from the World Bank and Asian Development Bank, the Coremap II project applied the DPL approach in 19 districts of Indonesia. By 2013, more than 342 community-based MPAs have been established with a total area of 9,970 hectares in 19 districts of Indonesia. The nineteen districts include Biak-Numfor, Bintan, Buton, Kepulauan Mentawai, Batam City, Sabang City, Lingga, South Minahasa, Southeast Minahasa, North Minahasa, Natuna, South Nias, Raja Ampat, Selayar, Sikka, Central Tapanuli, Wakatobi, Pesawaran, and South Lampung.

The laws and regulations under which MPAs in Indonesia are legislated and established have no protected area nomenclature under which community-based MPAs can be recognized, and as such community-based MPAs such as DPLs are not nationally recognized by laws pertaining to MPAs across the country. The areas of marine waters within community-based MPAs have therefore not been used in achieving the national target of 20 million hectares of MPAs by 2020. The legal status of community-based MPAs in Indonesia hinders their effective management as funds are lacking for improving sustainable financing, human resources and capacity, management actions and procurement of infrastructure facilities. Although some community-based MPAs may have high level of support and acceptance by local communities, the weak legal status at district and national levels and consequent paucity of resources for effective management hampers management progress of community-based MPAs in Indonesia.

Figure 7. Distribution of Community-based Marine Protected Areas in Indonesia.

For some community-based MPAs efforts to formalize their status and management within local or district government policies and laws has enabled recognition from local government jurisdictions and improved their sustainable management through increased financing, human resources and infrastructure facilities. However, not all community-based MPAs have received such recognition, with 181 (53%) of the 342 community-based MPAs yet to be formally recognized by local governments, as MPAs.

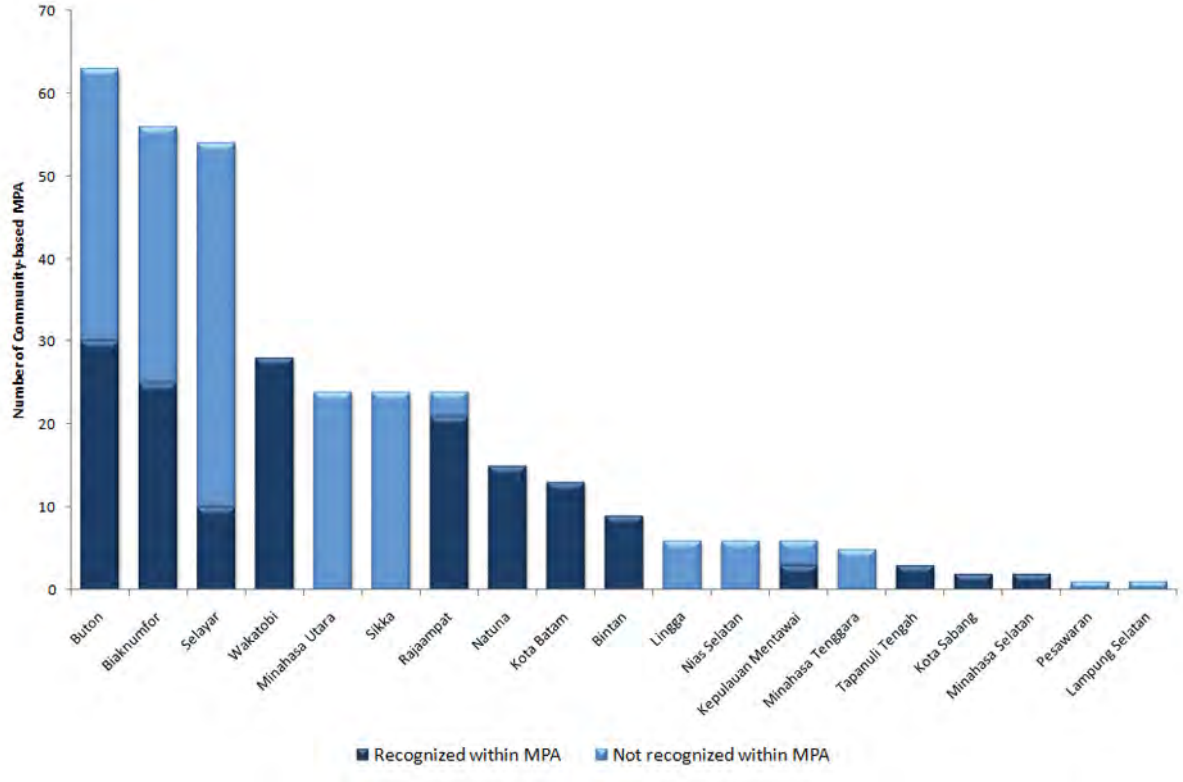


Figure 8. The number of community based MPAs and percentage recognized and not recognized formally as MPAs, among 19 government districts of Indonesia.

Our spatial analyses and clustering of the community-based MPAs in Indonesia has resulted in an estimated 2.17 million hectares across Indonesia. Given that 17,144,702 hectares of MPAs exist in Indonesia, improving the legal status and governance of these MPAs has the potential to achieve the GoI's target of twenty million hectares by 2020. Based on 3 factors eight districts were identified as having the best capacity to develop large MPAs that encompass their network of community based MPAs; namely Lingga, Sikka, Selayar, Buton, Southeast Minahasa, North Minahasa, Kepulauan Mentawai, and South Nias. These factors included; 1) discussions with national and district government agencies responsible for MPA management, 2) evaluation of the political and governance capacity and willingness of district governments to establish MPAs under national and district law that encompass community based MPAs, and 3) the existence of multiple community based MPAs that could be clustered into a larger MPA. The area of potential MPA development under national laws in the 8 districts of Indonesia where clusters of community based MPAs exist is presented in Figure 9.

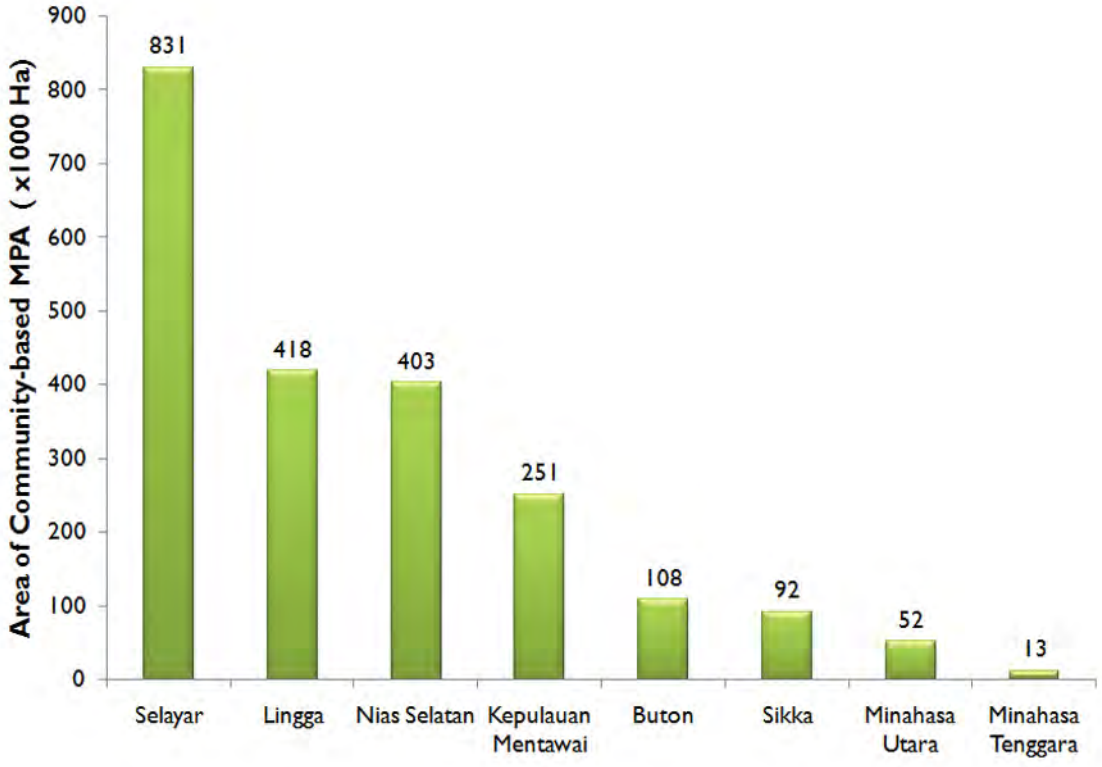


Figure 9. Potential MPA areas encompassing Community-based MPAs in 8 districts of Indonesia.

A possible risk from promoting the legal status of community-based MPAs into a national legislative context, where the small community MPAs may become "zones" within a larger MPA that provides for a range of uses by communities, is that a community support and therefore compliance toward MPA arrangements may change, if it is perceived the community has less influence and stewardship over management of their marine areas. Incorporating existing community based regulations and laws into larger national and district legislated MPAs should therefore become a priority of spatial planning processes for these areas.

4.2 Marine Protected Area Network in Aceh Province

The Aceh MPA network is an arrangement of protected areas designed according to conservation targets for three important ecosystems; coral reefs, seagrass beds, and mangroves. The design of the MPA network in Aceh was developed by the Aceh Provincial Government (Figure 10) and involved inputs from district and city governments, some non-government organizations and a consultation (rather than participatory planning process) with the public in selected districts and cities (Syakur et al. 2012). The potential network of MPAs encompasses 124,995 hectares in the districts of West Aceh, Southwest Aceh, Aceh Besar, Aceh Jaya, South Aceh, Nagan Raya, and Simeulue (Figure 11).

Figure 10. Location of potential MPA network in Aceh, Sumatra.

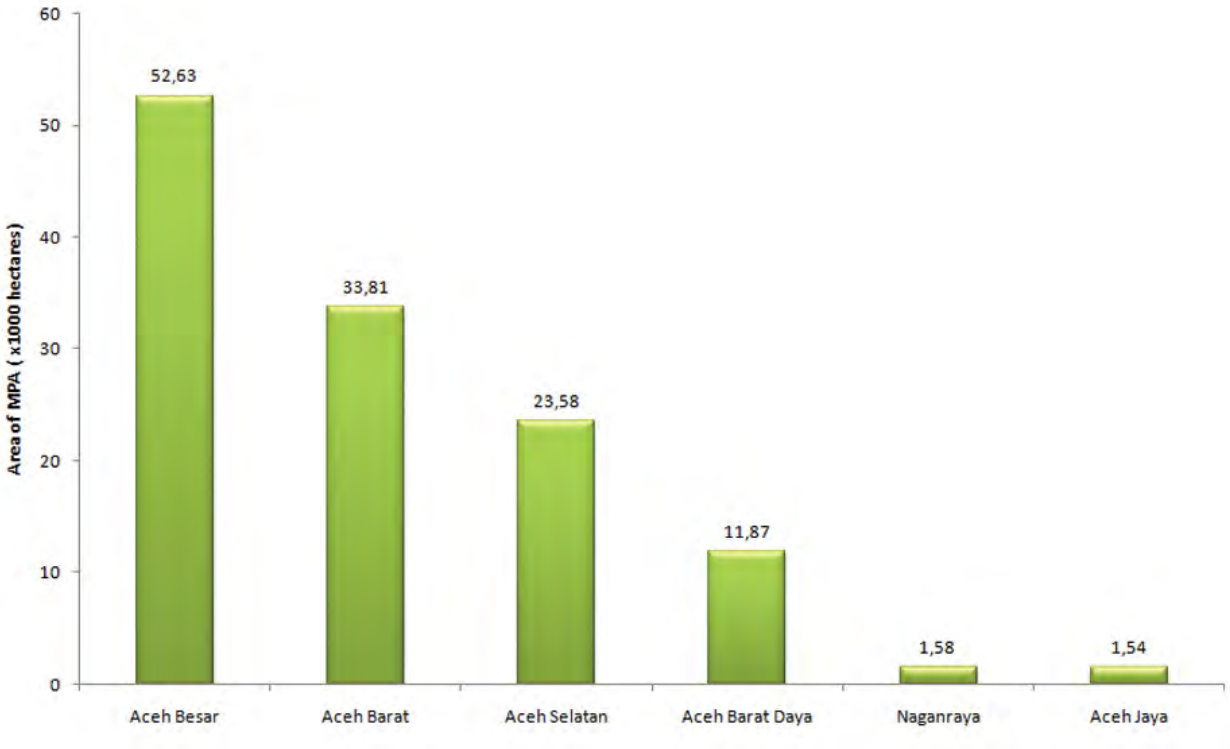


Figure 11. Area (ha) of MPAs in Aceh Province MPA network by district.

4.3 MPA Network in Lesser Sunda Ecoregion

The MPA network in the Lesser Sunda Ecoregion was designed by The Nature Conservancy (TNC) in cooperation with a range of government agencies. This study also involved national and international experts. Site selection for MPAs was based upon marine ecosystem and important wildlife values in the Lesser Sunda Ecoregion. Results of this study recommended relatively small areas of proposed district-based MPAs (CKKPD) and trans-boundary areas that bridge international waters (WPBN), and larger areas of importance (WP) and deep sea areas of importance (WPLD) (Figure 12).

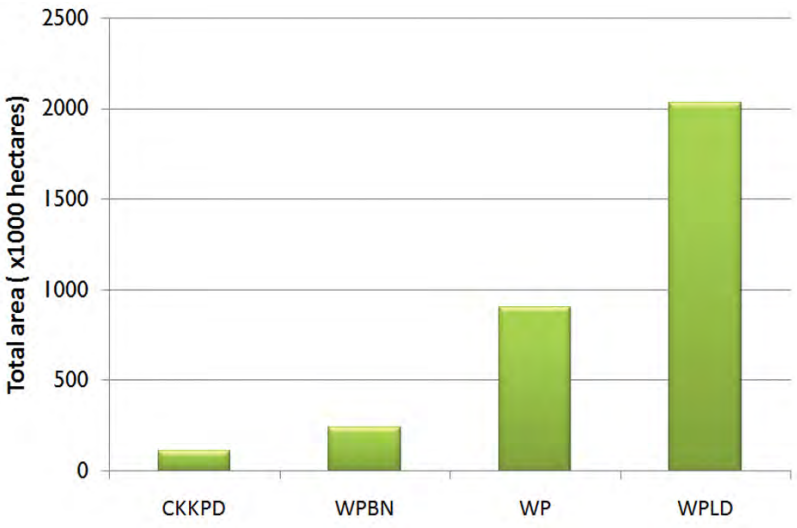


Figure 12. Area and type of potential MPAs in the Lesser Sunda Ecoregion.

Table 4. The number and area of Proposed MPAs proposed for the Lesser Sunda Ecoregion.

No	District/City	Number of MPA	Area (ha)
1	Buleleng	3	8,886.31
2	Karangasem	1	26,485.90
3	Klungkung	1	18,797.24
4	West Lombok	4	7,632.91
5	Sumbawa/West Sumbawa	3	50,489.99
	Total	12	112,292.35

Based on this report a number of MPAs have been proposed or declared by district governments in Buleleng, Klungkung, West Lombok, and Sumbawa (Table 4). Based on our discussions with district governments, the sites shown in Wilson et al. (2011), however, do not always match the actual district government MPAs that have been proposed or declared in West Lombok and Sumbawa Districts. Resolving the discrepancies between what is recorded in Wilson et al. (2011) and what district governments propose to allocate as district level MPAs is a priority for further development of the MPA network for Indonesia.

Figure 13. Location of potential MPAs in the Lesser Sunda Ecoregion.

4.4 Priorities of Marine Protected Areas in Bastunamata Region

The Bastunamata Region encompasses the islands Anambas, Natuna, and Karimata located in the South China Sea. The development of an MPA netowrk is a pilot program of the Directorate of Spatial Planning of Coasts, Oceans, and Small Islands of MMAF, contributing to inter-provincial planning. Administratively, the Bastunamata Region includes six provinces, namely Riau, Riau Islands, Jambi, South Sumatra, Bangka-Belitung, and West Kalimantan. In 2010, a study was conducted to define priority areas to be proposed as MPAs in this region (Yulianto 2010). Two provinces were defined as MPA priorities, namely Riau Islands and Bangka-Belitung. In Riau Islands Province, the priority area identified was Karimun District (in the southern part) covering 61,547 hectares. In Bangka-Belitung Province, the priority areas included South Bangka (352,963 hectares), Belitung (73,018 hectares), Central Bangka (44,981 hectares), and East Belitung (6,976 hectares).

4.5 Marine Conservation Data Atlas

The Indonesian Marine Conservation Data Atlas (Salm and Halim 1984) is an MPA spatial plan prepared by MoF and the International Union for Conservation of Nature (IUCN) in 1984. In the plan, MPAs were categorized into four priorities (1=highest priority, 4=lowest priority) (Figure 14) among thirty provinces and 109 districts (Figure 15). The total area of the 157 selected MPAs in the atlas is 16,759,105 hectares. Districts with large potential MPAs (> 1 million hectares) include Biak, Raja Ampat, Banggai Islands, Sangihe, and Buton. Districts with small potential MPAs (< 1 thousand hectares) include Yapen-Waropen Islands, East Lampung, East Bolaang Mongondow, Lhokseumawe City, Siak, Gianyar, and Pacitan.

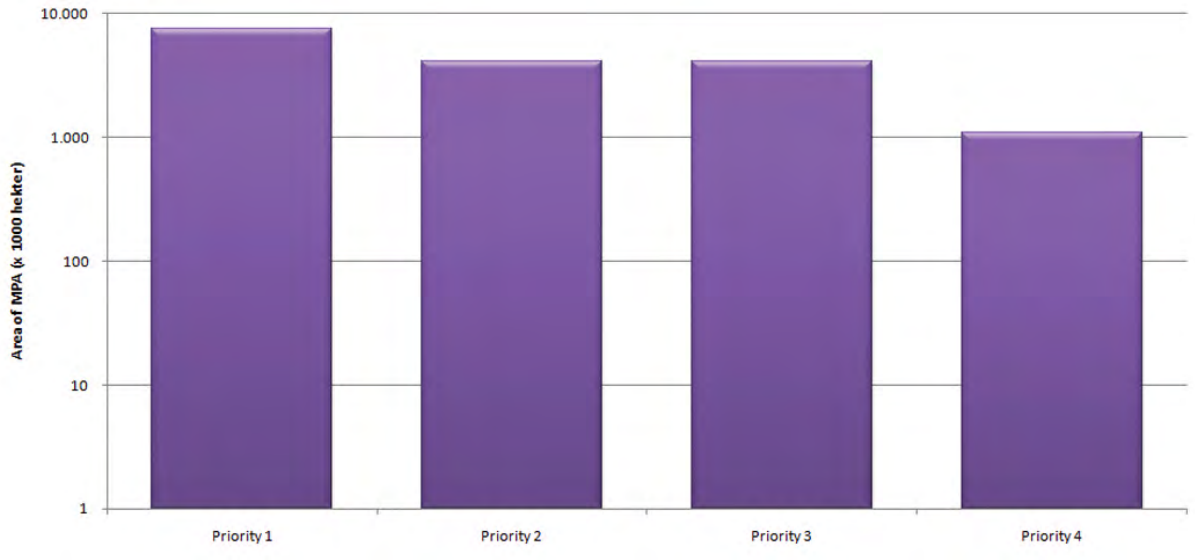


Figure 14. Areas of MPA (ha) in 4 priority categories according to Salm and Halim (1984).

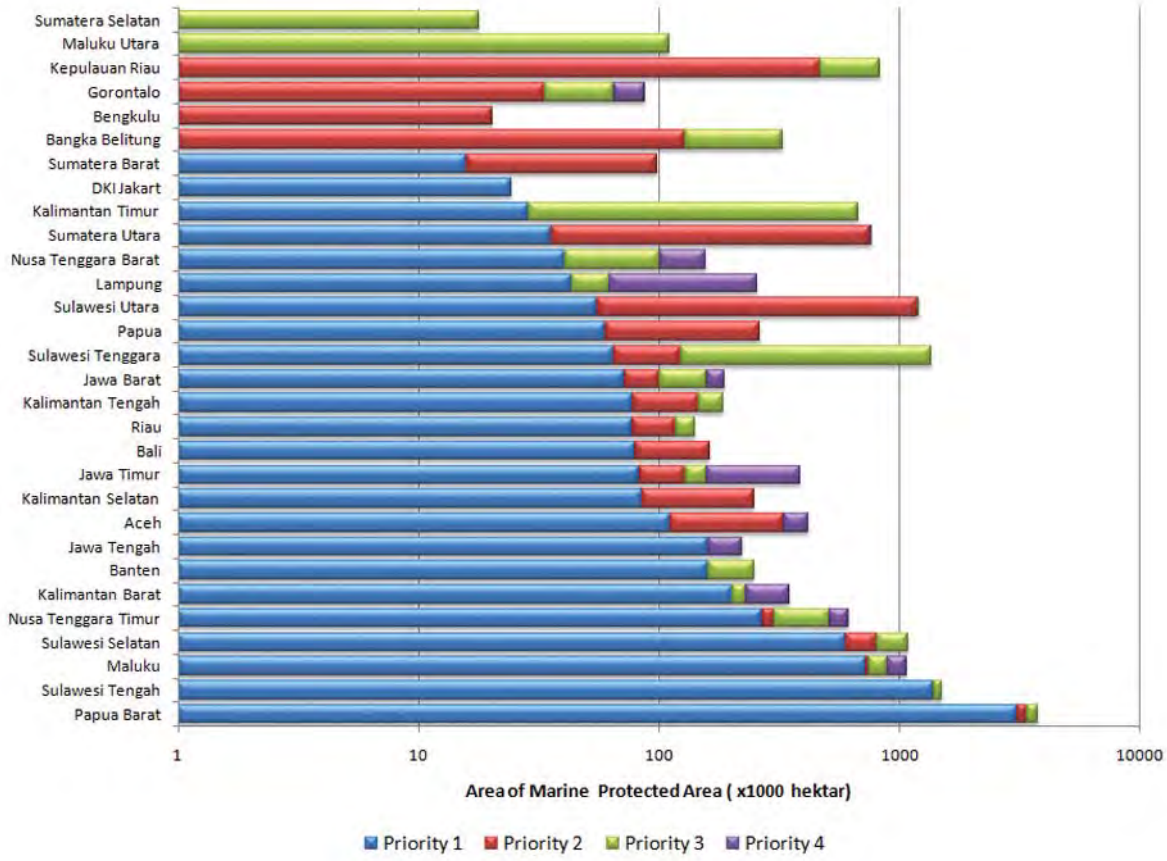


Figure 15. Distribution of MPAs Based on the Protected Area Plan Atlas (Salm and Halim 1984).

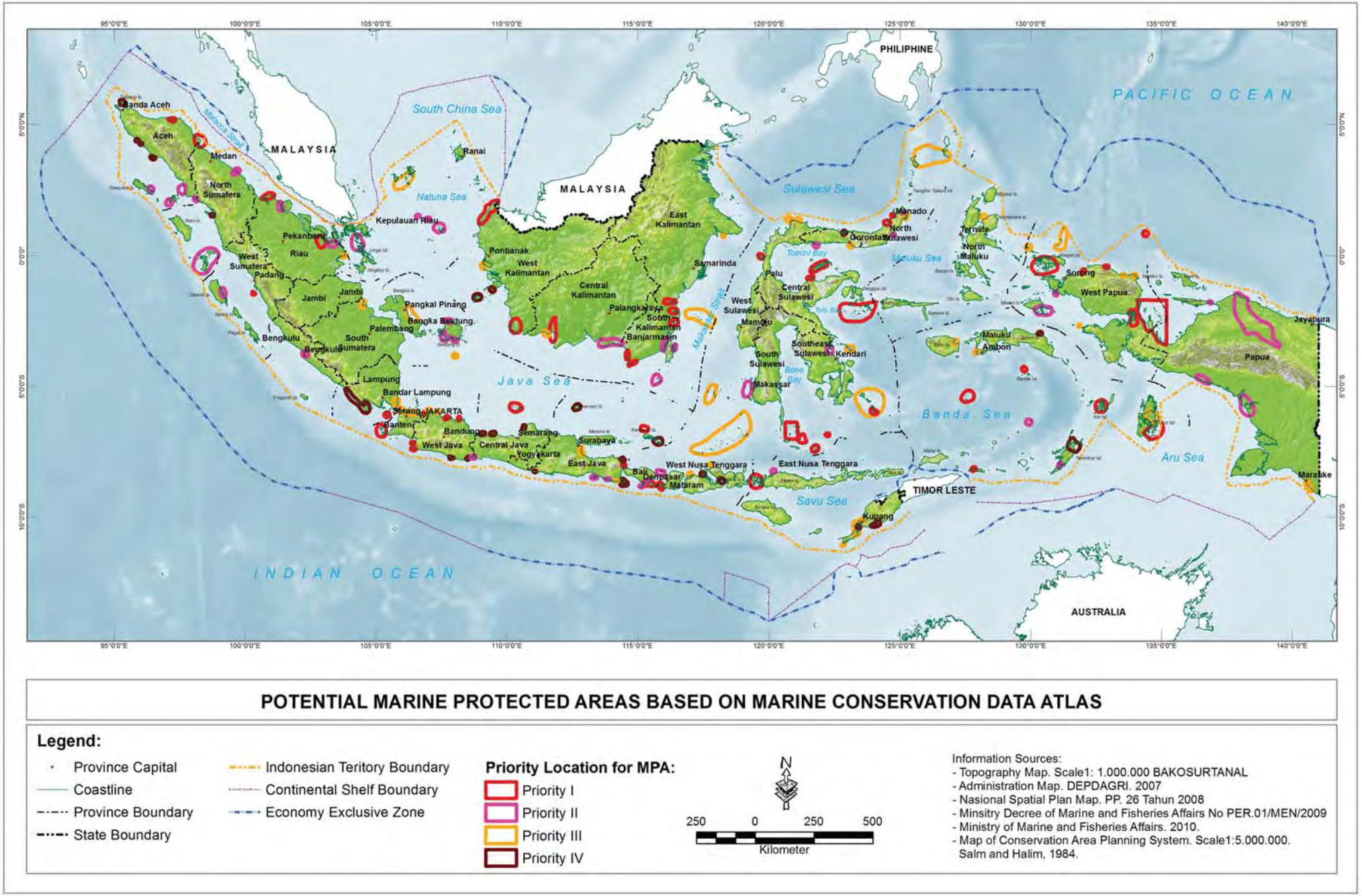


Figure 16. Location of potential MPAs based on Indonesia's Protected Area Plan Atlas

4.6 Geographical Priorities of Marine Biodiversity

A study on geographical priorities of marine biodiversity was conducted based on experts' inputs and opinions on marine biodiversity and current status of marine ecosystems among 12 ecoregions of Indonesia (Huffard et al. 2012). Based on expert inputs and opinion, as well as an analysis of existing marine fauna biodiversity, the 8 ecoregions were ranked for marine biodiversity conservation. The important areas identified in the report include 180 sites, encompassing 17,975,633 hectares in 27 provinces and 106 districts. Unfortunately, important areas referred to in the document were not geographically defined with sufficient precision, and therefore it was not possible to identify specific geographic recommendations from the report on potential or priority MPAs. Considering these shortcomings, important areas as recommended by the document were not used for the identification of potential MPAs, but were used as a general reference on the important values in each ecoregion.

4.7 Potential for Other Marine Protected Areas

Other than potential MPAs based on recommended priority areas, potential MPAs based on the distribution and location of important habitats for marine fauna, including sea turtles, whale sharks (*Rhincodon typus*), coelacanth (*Latimeria manadoensis*), irrawaddy dolphins (*Orcaella brevirostris*) and dugong (*Dugong dugon*) need to be considered. One proposal on new sites is about important areas such as nesting and foraging areas of certain animals which have not yet been covered in a previous list of proposed important areas. For instance, there are 125 nesting and foraging areas of sea turtles in Indonesia's waters, with populations exhibiting migratory behavior among the six countries of the Coral Triangle (CT-6 Countries) as shown in Appendix 3. Another example is that the migratory route of whale sharks in the Madura Strait in East Java, and important areas for tourism at Probolinggo and Situbondo beaches. Important habitats have been mapped for marine fauna in Indonesia, including sea turtles, whale sharks (*Rhincodon typus*) and dugong (*Dugong dugon*) (Figures 17-19), but a comprehensive analysis of their importance as potential areas of connectivity, refugia and critical habitat importance for the identification of MPAs is yet to be undertaken.

Deep-sea priority areas also need to be considered in developing new marine protected areas and such areas have been studied and identified in the Lesser Sunda Ecoregion and Sulawesi Sea. Potential deep-sea marine protected areas in both regions total 8.4 million hectares (Figure 20).

Figure 17. Distribution of sea turtle habitats in Indonesia.

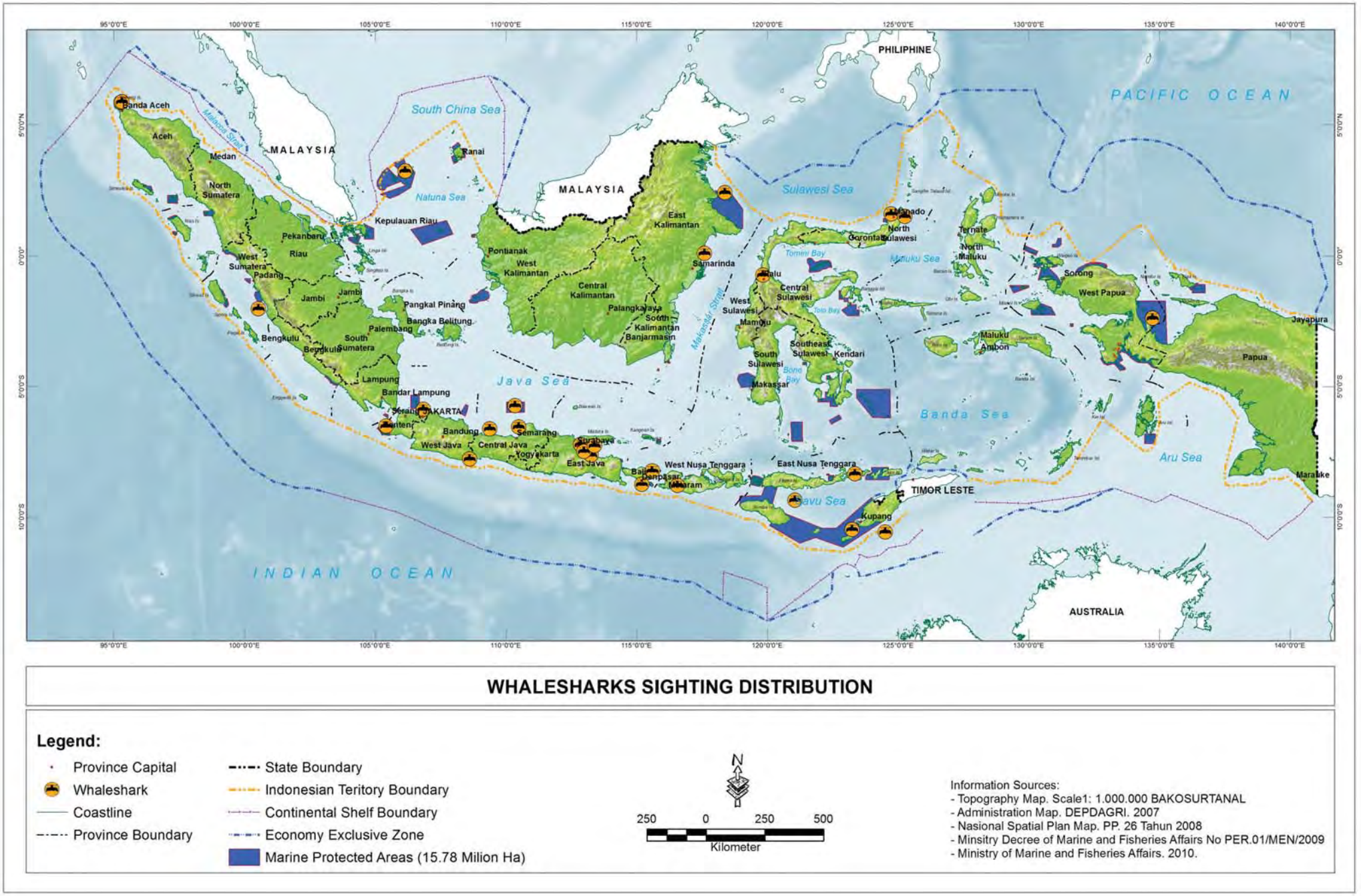


Figure 18. Distribution of whale sharks observed in Indonesia.

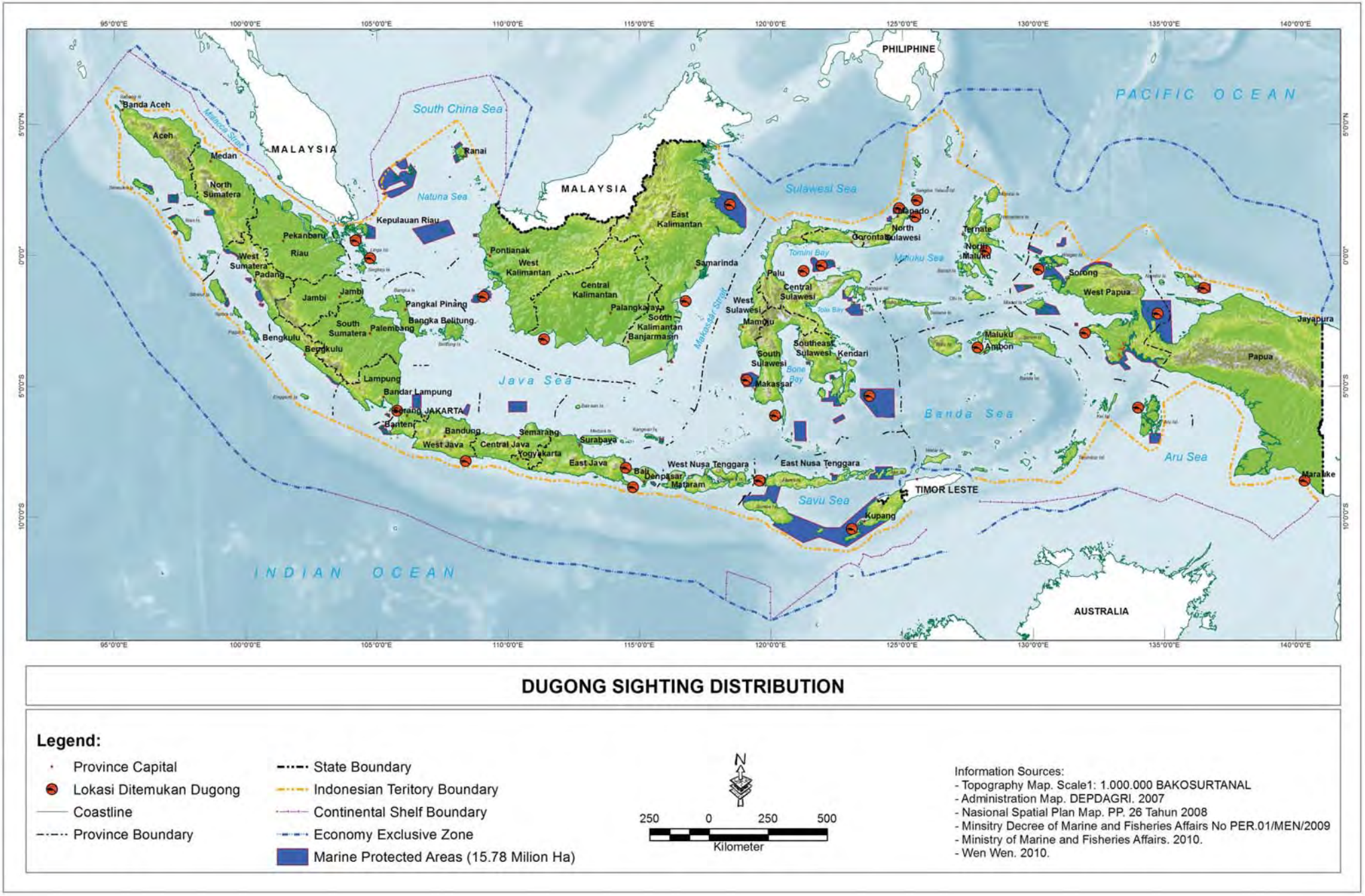


Figure 19. Distribution of dugong observed in Indonesia.

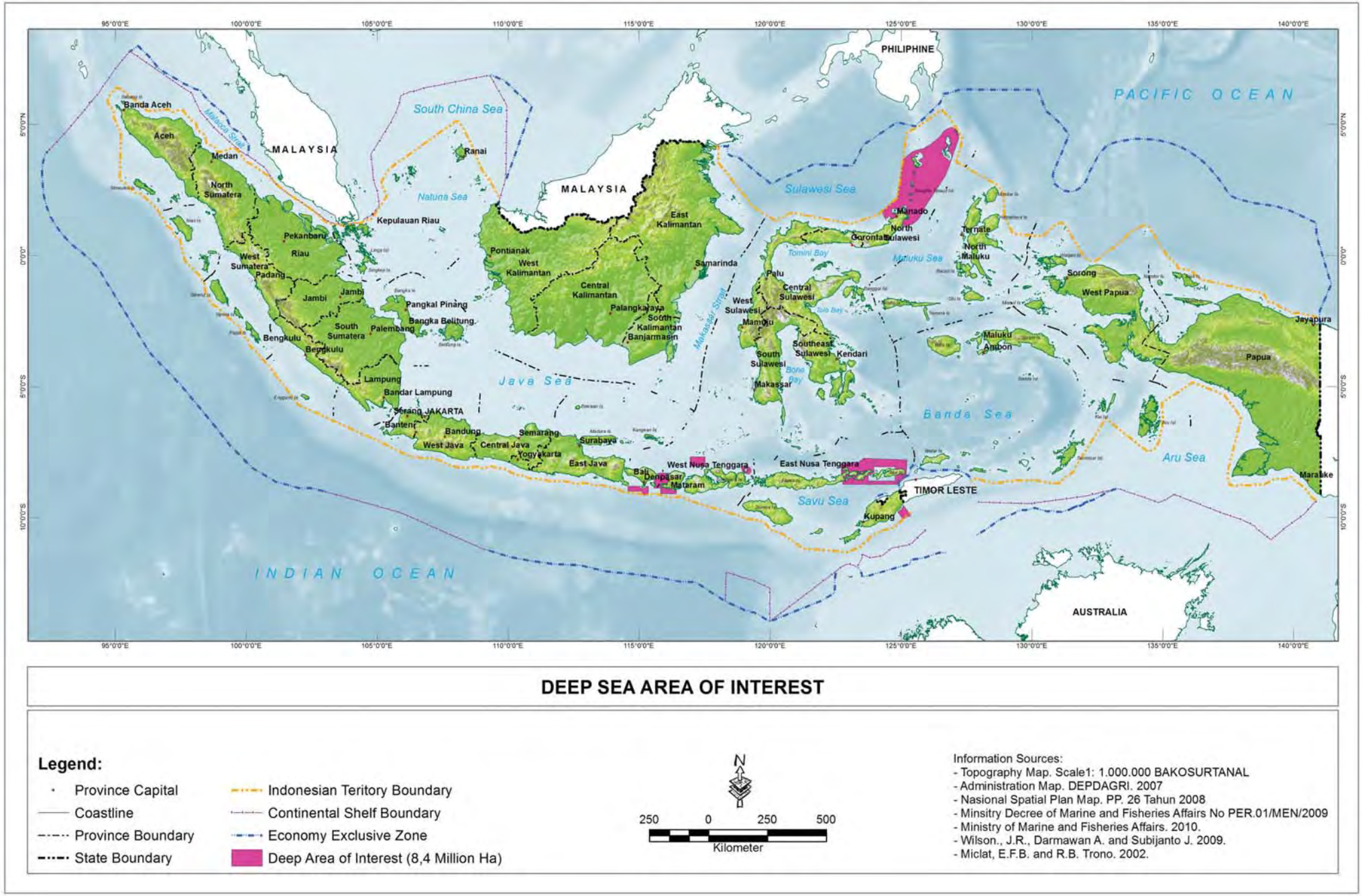


Figure 20. Potential Deep-sea MPAs identified for Indonesia.

4.6 Potential Priority Marine Protected Areas

After combining all potential MPAs and comparing them with existing MPAs, sites prioritized to be MPAs were obtained. Potential priority MPAs are 4,530,815 hectares widespread in 26 provinces and 61 districts (Figure 21) originating from the Protected Area Plan Atlas of 47%, clustering of community-based MPAs of 47%, and priority areas in Bastunamata, Aceh, and the Lesser Sunda Ecoregion of 2%, respectively. By comparing with the planned MPA development program in Directorate of Conservation Area and Species, Directorate General of Marine, Coastal and Small Islands, Ministry Marine Affair and Fisheries in 2013 and 2014, potential MPAs which are in accordance with the plan of Directorate of KKJI are Toli-Toli, West Southeast Maluku, Aceh Province, and Karangasem (Tulamben).

It is expected that the size of those potential MPAs is able to fulfill the target of the GoI in developing MPAs of twenty million hectares by 2020. However, prudence is required in developing MPAs taking into consideration part of marine waters in Indonesia have been allocated for oil and gas mining concessions. Out of 4.5 million hectares of potential areas to be developed as MPAs, 0.4 million hectares are overlapped with oil and gas mining concession areas. Potential MPAs overlapped with oil and gas mining concession areas are shown in Appendix 6.

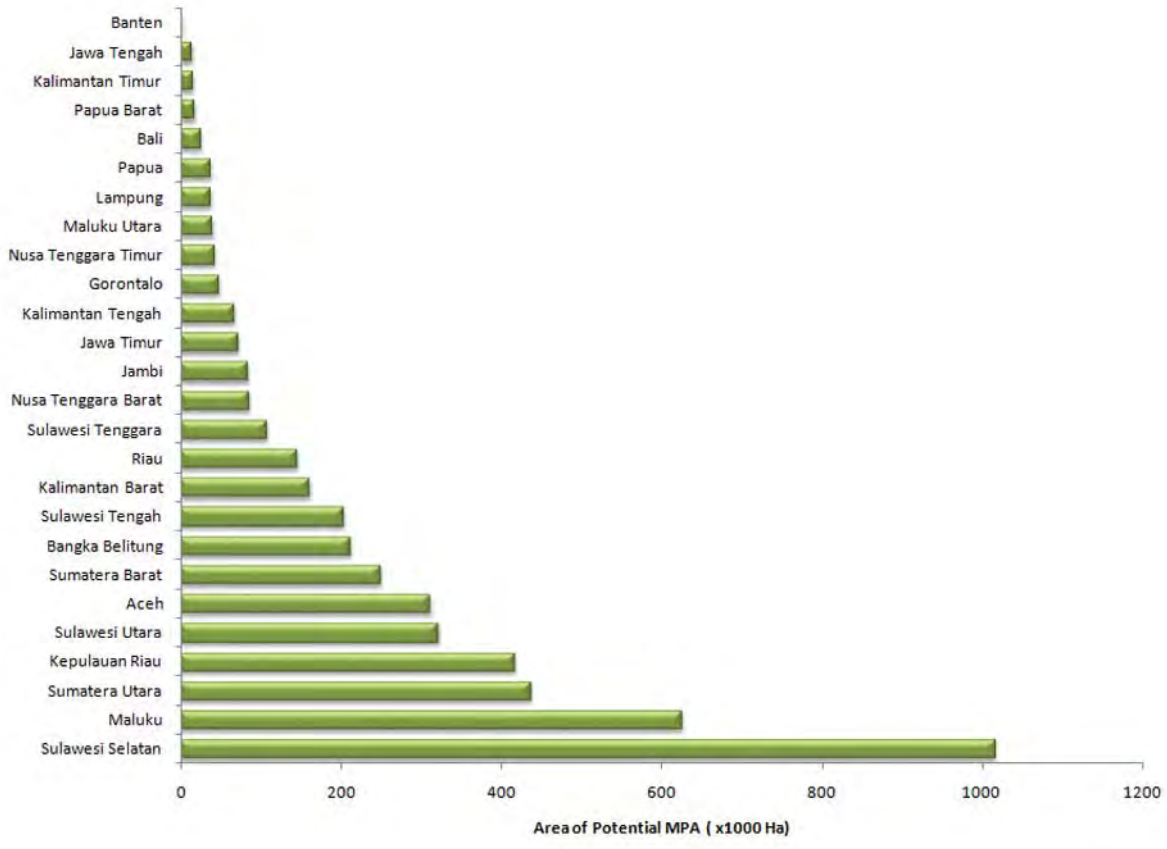


Figure 21. Distribution of Potential Priority MPAs

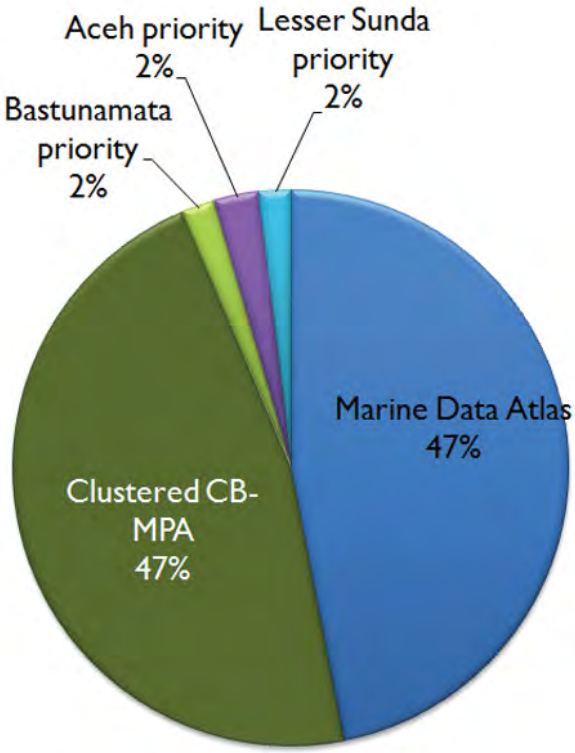


Figure 22. Composition of Potential Priority MPAs

Figure 23. Distributive Map of Potential Priority MPAs

5 STRATEGY TO ACHIEVE 20 MILLION HECTARES OF MPAS BY 2020

5.1 Integrating data and information on the Indonesian MPA Network

Incorporating 1,169,247 ha of the eighty two NSA and NCA's, identified by the Directorate of Forest Protection and Nature Conservation, MoF, into the existing MPA network of Indonesia (15,784,129 hectares), will result in a total of 16,953,377 ha of MPAs for Indonesia. In addition, data being updated by the Directorate of KKJI, MMAF is almost complete, with four new MPAs in Southeast Maluku, Morotai, South Halmahera, and East Belitung Districts (280,885 hectares) contributing to an MPA netowork of Indonesia of 17,144,702 hectares.

Data on the precise area of marine waters adjacent to 41 additional NSA and NCA's are not available as spatial planning processes conducted by the MoF's Boundary Planning team are yet to be finalised. A Decree of the Minister of Forestry concerning the Appointment of Protected Areas has, however, clarified the boundaries of these protected areas, and therefore we were able to estimate the area of marine waters included for protection, at 967,423.30 hectares. Harmonizing these additional MPAs with the Indonesian MPA network is dependent on the MoF completing its spatial planning process for all 41 sites.

5.2 Strategy for incorporating Community-based MPAs into the Indonesian MPA network

In eight districts of Indonesia the priority clusters of community-based MPAs for national MPA incorporation and development include:

1. Expanding existing community-based MPAs in Selayar and Buton Districts.
2. Developing new MPAs such as in North Minahasa District.

general, key steps include:

1. Preparing a mutual agreement between MMAF, district governments, and representatives of community-based MPAs to scale up clusters of community-based MPAs into nationally recognized MPAs;
2. Developing technical recommendations on actions to be taken by various stakeholders to scale up clusters of community-based MPAs into nationally recognized MPAs;

3. Developing a roadmap at district government levels for scaling up clusters of community-based MPAs into nationally recognized MPAs as mutually agreed between district governments and community-based MPA leaders;
4. Strengthening management institutions of community-based MPAs and district governments;
5. Establishing forums for community-based MPA stakeholders at the district level to facilitate MPA development and effective management.

   The timing, sequencing and implementation of the key steps to incorporate and scale up community-based MPAs into nationally recognized MPAs, is highly dependent on local governance and socioeconomic conditions in respective districts.

5.3 Developing new MPAs

In addition to scale up clusters of community-based MPAs, we recommend development of new MPAs in priority areas of Aceh, Bastunamata, the Lesser Sunda Ecoregion, and those identified in the Protected Area Plan Atlas. Key actions to achieve MPA development include:

1. Encourage district governments to conduct rapid ecological, socioeconomic and governance assessments for prioritization of selected areas for MPA development;
2. In high priority areas of national interest, district governments can propose to MMAF for scaling up or upgrading the status of community-based MPAs to be recognized by district and/or national governments.

For areas proposed for MPA priority development by the Protected Area Plan Atlas (Salm and Halim, 1984), MMAF are able to conduct preliminary surveys to initiate development of MPAs, for national and/or district recognition.

For developing MPAs targeted to protect marine species, MMAF can prioritize with District agencies of Marine Affairs and Fisheries preliminary surveys to identify locally based areas of critical importance for sea turtle, whale shark and dugong populations. Feasibility studies can then be undertaken to identify potential MPAs for species protection. Implementation of such areas will require support by Decree from the Head of a District, and application from districts to the Minister of Marine Affairs and Fisheries for national recognition where appropriate.

In addition, for other important species such as coelacanth (*Latimeria manadoensis*), MMAF needs to cooperate with the Research Center for Oceanography, Indonesian Institute of Sciences (P2O, LIPI) to identify and define areas in order to regulate the use of fishing gears used to target the coelacanth and other identified species of importance (eg. Napoleon wrasse – *Cheilinus undulatus*). Regulating fishing gears is required to minimize the unintentional capture of these species.

In developing deep-sea priority areas in the Lesser Sunda Ecoregion and Sulawesi Sea, MMAF needs to conduct studies on the challenges that management strategies face to protect deep-sea areas of critical importance. MMAF should develop clear communication strategies with the deep sea international consortium to learn about the management of deep-sea protection areas. Identifying and creating the enabling conditions for the implementation of effective management strategies and governance of deep-sea protection areas, is a pre-requisite for MMAF to define and prioritize deep sea areas that become part of and complement the network of MPAs that are for most part coastal areas in Indonesia.

CASE STUDY

Strengthening Community-based Marine Protected Areas and scaling up to a District-based Marine Protected Area in North Minahasa District, North Sulawesi

The establishments of community-based MPAs aim to build and enable community awareness, stewardship and management of coastal ecosystem functions and coastal resources (coral reefs, mangroves, and seagrass beds) for sustainable use (Manembu 2004). Community-based MPAs are marine areas managed and protected by local village laws that aim to protect ecosystem services, through appropriate management controls that may include fishery closures, fishing gear restrictions, seasonal fishing restrictions, restrictions on the harvest of species or other restrictions (Thornburn 2000;Aswani and Cinner 2007, Glaser et al. 2010).

In Indonesia the development and management of community-based MPAs are supported by Law No. 32 (2004) concerning Local Governance. To establish community-based MPAs, village laws applying to their establishment and management require community participation and involvement. Community-based MPAs in Indonesia have provided successful models of marine conservation, with strong community support and adoption of regulations leading to effective management. Nonetheless, considerable challenges and constraints to effective management have occurred over time and these include:

- Limited legal authority (through village regulations) so that violations committed by outsiders still occur;
- Lack of the government's support due to lack of recognition of local legislation;
- Limited management measures implemented by communities with low capacities to manage;
- Limited effect on conservation of marine resources due to inadequate size of areas under protection in community-based MPAs.

North Minahasa District, in North Sulawesi, has a history of community-based MPA management, with 17 community-based MPAs declared from 1998 to 2004. The challenges described above, have for the past 10 years, inhibited the sustainable management of these areas (Crawford et al. 2006, Glaser et al. 2010, WCS 2010,WCS 2012).

Since 2010, the North Minahasa District Government has initiated a program to strengthen its existing community-based MPA management through a number of improvements in local management strategies (eg. enforcement, skill

development, resources) and livelihood programs (eg. tourism, handicrafts) (WCS 2012). To improve the level of resources able to be directed to CB-MPA the North Minahasa District Government have recently agreed to scale up the existing cluster of 17 MPAs (417 ha) into a District-based MPA, supported by national laws (the government regulation on fisheries resources conservation, PP No. 60 of 2007). Based on analyses in the previous sections of this book, the indicative area for North Minahasa's clustered MPAs is approximately 52,000 ha.

The plan was initiated through a workshop held on February 28, 2013. The objective of the workshop was to build a roadmap for improved management, build a constituency and increase awareness among government and community stakeholders on:

- The national MPA system of Indonesia;
- Opportunities to strengthen community-based MPAs through support for establishment of District-based MPAs;
- Identifying actions to establish appropriate District-based MPAs for the North Sulawesi Province;

Outcomes of the workshop included:

- A high level of support by the North Minahasa District Government for planning to commence that strengthens community-based MPA management through establishment of a District-based MPA;
- Support from government and communities for initiating and facilitating legislation process for a District-based MPA in North Minahasa;
- Support from government and community stakeholders for public awareness campaigns in the North Minahasa District;
- Support from government and community stakeholders for assessments of community support and required levels of community participation to scale up and incorporate community-based MPAs into a District-based MPA in the North Minahasa District.

REFERENCES

Cinner J.E. and S. Aswani. 2007. Integrating customary management into marine conservation. *Biological Conservation*.140:201-216

Crawford, B., M. Kasmidi, F. Korompis, and R. Polnac. 2006. Factors influencing progress in establishing community-based marine protected areas in Indonesia. *Coastal Management* 34:39–64

[CRC-URI] Costal Resources Center University of Rhode Island. 2003. Fostering marine conservation in Indonesia: Developing capacity to implement community-based marine sanctuaries. Final report (October 1999-April 2003) submitted to the david and Lucile pacard foundation.

Djohani R. 1989. Marine conservation development of Indonesia. A World Wildlife Fund Report for the WWF Indonesia Programme. Jakarta: 109 hal.

Glaser M, Baitoningsih W, Ferse SCA, Neil M, Deswandi R. 2010. Whose sustainability? Top-down participation and emergent rules in marine protected area management in Indonesia. *Mar. Pol* 34:1215-1225

Huffard, C.L., M.V. Erdmann, T.R.P. Gunawan (Eds). 2012. Geographic Priorities for Marine Biodiversity Conservation in Indonesia. Ministry of Marine Affairs and Fisheries and Marine Protected Areas Governance Program. Jakarta-Indonesia.

Kemenko Perekonomian. 2011. Acceleration And Expansion Of Indonesia Economic Development 2011-2025. Coordinator Ministry for Economic Affairs. Jakarta

Manembu I.S. 2004. Kajian partlslpasl masyarakat dalam pengelolaan daerah perlindungan laut dl pulau gangga, bangka dan talise proplnsl sulawesi utara. Tesis. Institut Pertanian Bogor. Bogor.

Salm R.V. and M. Halim (1984) Marine Conservation Data Atlas: Planning for the survival of Indonesia's seas and coasts. IUCN/WWF/PHPA. Jakarta.

Spalding, M.D. H.E. Fox, G. R. Allen, N. Davidson, Z. A. Ferdaña, M. Finlayson, Halpern, B.S., M.A. Jorge, A. Lombana, S.A. Lourie, K.D. Martin, E. McManus, J. Molnar, C. A. Recchia, and J. Robertson. 2007. Marine ecoregions of the world: a bioregionalization of coastal and shelf areas. *Bioscience*, 57 (7): 573–583.

Syakur, A., Wibowo, J. T., Firmansyah, F., Azam, I., and Linkie M. 2012. Ensuring local stakeholder support for marine conservation: establishing a locally managed marine area network in Aceh. *Oryx*, 46: 516-524

Thornburn, C.C. 2000. Changing customary marine resource management practice and institutions: The case of Sasi Lola in the Kei Islands, Indonesia. *World Development*, 28, 1461–1479.

WCS [Wildlife Conservation Society]. 2010. Improving Community based Fishery and MPA Management in Fiji and Indonesia. Final Report to The David and Lucile Packard Foundation. New York. Unpublished.

WCS [Wildlife Conservation Society]. 2012. Improving Community based Fishery and MPA Management in Fiji and Indonesia. Interim Report to The David and Lucile Packard Foundation. New York. Unpublished.

Wilson, J., Darmawan, A., Subijanto. J., Green, A., and S. Sheppard. 2011. Scientific design of a resilient network of marine protected areas. Lesser Sunda Ecoregion, Coral Triangle. The Nature Conservancy - Asia Pacific Marine Program. Bali.

Wiryawan, B, Yulianto, I., and Haryanto B. 2002. Rencana Pembangunan dan Pengelolaan Desa Tejang Pulau Sebesi. Proyek Pesisir Lampung. Lampung.

Yulianto, I. 2010. Harmonisasi KKP, Tata Ruang, dan Pengelolaan Pulau-pulau Kecil. Laporan Internal untuk Coral Triangle Support Program dan Kementrian Kelautan dan Perikanan. Jakarta.

APPENDIX

APPENDIX 1

The potential list of Priority Marine Protected Areas

No	Provinces	Districts/Cities	Potency				Notes
			Number	Area (ha)	Sources	FMA	
1	Aceh	Aceh Besar	3	25127,98	LLMA Study	571	
2	Aceh	Aceh Besar	5	27498,2	LLMA Study	572	
3	Aceh	Aceh Jaya	2	1536,28	LLMA Study	572	
4	Aceh	Aceh Barat	2	33810,07	LLMA Study	572	
5	Aceh	Naganraya	1	1578,83	LLMA Study	572	
6	Aceh	Aceh Utara	1	16994,01	Atlas	571	Oil Concession
7	Aceh	Kota Lhokseumawe	1	7914,65	Atlas	571	Oil Concession
8	Aceh	Aceh Barat Daya	2	11866,93	LLMA Study	572	
9	Aceh	Aceh Timur	1	97598,56	Atlas	571	Oil Concession
10	Aceh	Aceh Selatan	3	16544,75	LLMA Study	572	
11	Sumatera Utara	Batubara	1	35396,08	Atlas	571	
12	Sumatera Utara	Nias Selatan	1	402678,14	DPL	572	
13	Riau	Kota Dumai	1	27860,12	Atlas	571	
14	Riau	Kepulauan Meranti	1	3269,55	Atlas	571	
15	Riau	Pelalawan	3	27623,72	Atlas	571	
16	Riau	Indragiri Hilir	2	32877,86	Atlas	571	
17	Kepulauan Riau	Lingga	1	418498,52	DPL	711	
18	Sumatera Barat	Kepulauan Mentawai	1	250863,06	DPL	572	
19	Jambi	Tanjungjabung Timur	1	85354,13	Bastunamata	711	
20	Bangka Belitung	Bangka	1	12304,65	Atlas	711	
21	Bangka Belitung	Kota Pangkalpinang	1	11492,22	Atlas	711	
22	Bangka Belitung	Bangka Tengah	1	97260,14	Atlas	711	
23	Bangka Belitung	Belitung	2	91998,17	Atlas	711	
24	Lampung	Tanggamus	1	38605,05	Atlas	572	
25	Banten	Kota Serang	1	3257,95	Atlas	712	
26	Jawa Tengah	Jepara	1	15787,54	Atlas	712	Oil Concession
27	Jawa Timur	Gresik	1	67259,09	Atlas	712	Oil Concession

No	Provinces	Districts/Cities	Potency				Notes
			Number	Area (ha)	Sources	FMA	
28	Jawa Timur	Pacitan	1	5620,58	Atlas	573	Oil Concession
29	Bali	Karangasem	1	14138,83	TNC	573	
30	Bali	Karangasem	1	12347,07	TNC	713	
31	NTB	Lombok Barat	5	7632,91	TNC	573	
32	NTB	Sumbawa Barat	2	2279,36	TNC	573	
33	NTB	Sumbawa	1	48456,97	TNC	713	
34	NTB	Dompu	1	28143,89	Atlas	713	
35	NTT	Sikka	1	16175	DPL	713	
36	NTT	Sikka	1	27366,29	DPL	713	
37	Kalimantan Barat	Kuburaya	1	30647,15	Atlas	711	
38	Kalimantan Barat	Ketapang	1	44424,17	Atlas	711	
39	Kalimantan Tengah	Kapuas	1	68211,34	Atlas	712	
40	Kalimantan Timur	Kutai Timur	1	16444,9	Atlas	713	
41	Sulawesi Selatan	Jeneponto	1	169357,64	Atlas	713	
42	Sulawesi Selatan	Selayar	2	827478,14	DPL	713	Oil Concession
43	Sulawesi Selatan	Selayar	1	20155,99	Atlas	714	
44	Sulawesi Tenggara	Buton	1	108492,44	DPL	714	
45	Sulawesi Tengah	Morowali	1	70629,46	Atlas	714	
46	Sulawesi Tengah	Tojounauna	1	25422,91	Atlas	715	Oil Concession
47	Sulawesi Tengah	Donggala	1	27087,54	Atlas	713	
48	Sulawesi Tengah	Tolitoli	2	81033,98	Atlas	716	
49	Gorontalo	Gorontalo	1	28379,52	Atlas	715	
50	Gorontalo	Gorontalo	1	20846,94	Atlas	716	
51	Sulawesi Utara	Bolaangmongondow Timur	1	6526,09	Atlas	715	
52	Sulawesi Utara	Minahasa Tenggara	1	12572,93	DPL	715	
53	Sulawesi Utara	Minahasa Utara	1	52007,75	DPL	716	
54	Sulawesi Utara	Kota Bitung	1	18369,36	Atlas	716	

No	Provinces	Districts/Cities	Potency				Notes
			Number	Area (ha)	Sources	FMA	
55	Sulawesi Utara	Kepulauan Sangihe	2	233607,45	Atlas	716	
56	Maluku	Buru	3	100870,65	Atlas	714	
57	Maluku	Maluku Tengah	1	15328,87	Atlas	714	
58	Maluku	Kota Ambon	1	19910,68	Atlas	714	
59	Maluku	Seram Bagian Timur	1	37358,42	Atlas	714	
60	Maluku	Seram Bagian Timur	1	16409,88	Atlas	715	
61	Maluku	Maluku Tenggara	1	163268,39	Atlas	714	Oil Concession
62	Maluku	Maluku Tenggara Barat	1	142766,09	Atlas	714	
63	Maluku Utara	Halmahera Timur	1	41141,22	Atlas	715	
64	Papua Barat	Manokwari	2	18975,19	Atlas	717	
65	Papua	Mimika	1	30709,42	Atlas	718	Oil Concession
66	Papua	Kepulauan Yapen Waropen	1	7812,37	Atlas	717	Oil Concession
67	Papua	Biaknumfor	1	49551,38	Atlas	717	

APPENDIX 2

List of NSA and NCA

No	NSA and NCA with waters area	Area (Ha)	Marine Areas (Ha)	Note
	A. STRICT NATURE RESERVES			
1	Pulau Berkeh	7.355	5.978,10	
2	P. Burung	1.140	302,40	
3	P. Laut	200	200,00	
4	Kelompok Ht. Bakau pantai Timur	12.836	2.127,40	
5	P. Anak Krakatau	11.653	11.200,00	Included in MMAF data*
6	P. Dua	52	25,50	
7	Cibanteng	447		
8	Bojonglarang Jayanti	750		
9	Leuweng Sancang	1.980	1.150,00	Included in MMAF data*
10	Pananjung Pangandaran	2.145	470,00	Included in MMAF data*
11	P. Bokor	19	19,30	
12	Nusa Kambangan Barat	928		
13	Nusa Kambangan Timur	277		
14	Wijaya Kusuma	1		
15	Karang Bolong	1		
16	Teluk Baron	2		
17	P. Sempu	877	877,00	
18	P. Saobi (Kangean)	1.187	493,20	
19	P. Nusa Barong	6.100		
20	P. Noko & P. Nusa	7	6,60	
21	Wae Wuul Mburak	1.337	0,20	
22	Riung	420	2.000,00	Included in MMAF data*
23	Maubesi	1.830		
24	Kep. Karimata	209.135	77.000,00	Included in MMAF data*
25	P. Kaget	85		
26	Teluk Kelumpang, Sei. Laut, Sei. Sebuku	60.951	34.881,50	
27	Tel. Apar	48.616	18.780,40	
28	Tangkoko Batu Angus	3.196		
29	G. Dua Saudara	4.299		
30	Mas Popaya Raja	160		
31	Panua	49.601	343,10	
32	Tg. Api	4.246		
33	Morowali	224.003	6.252,30	
34	Napabalano	1.032	35,80	
35	P. Seho	1.250		
36	G. Api Kisar	80		
37	P. Angwarmase	519	35,40	
38	P. Nustaram	65.069	417,90	
39	P. Nuswatar	3.508	557,10	
40	P. Larat	3.690	10,40	
41	Misol Selatan	111.108	5.824,30	
42	Batanta Barat	17.161	2.031,90	
43	Salawati Timur	67.529	765,90	
44	Pegunungan Arfak	68.325		
45	P. Supriori	42.000		
46	Biak Utara	45.216	51,60	
47	Kioyo I/II	953	597,40	
48	Maubesi (RTK.189)	7.445	4.204,50	
49	Pegunungan Cycloop	32.886	218,60	
50	Pulau Kofiau	12.840	7.393,30	
51	Pulau Panjang	12.856	12.609,30	
52	Sungai Bahewo Reg.57	587	272,00	
53	Sungai Bulan dan Sungai Lulan	2.360	1.377,00	
54	Tafermaar	3.005	152,00	
55	Tanjung Laksaha Reg.98	406	307,50	
56	Tanjung Panjang	7.300	2.100,70	
57	Teluk Adang	57.255	21.884,70	
58	Teluk Bintuni	94.243	84.521,30	

No	NSA and NCA with waters area	Area (Ha)	Marine Areas (Ha)	Note
59	Teluk Klowe Reg.96	153	122,70	
60	Teluk Pamukan	20.784	11.364,90	
61	Toffo Kota Lambu	3.977	217,90	
62	Pantai Sausapor	40.715	62.660,00	Included in MMAF data*
	Sub total CA	**1.380.085**	**381.841,10**	
	B. WILDLIFE RESERVES			
1	Rawa Singkil Barat	103	102,50	
2	Karang Gading dan Langkat Timur Laut	13.156	1.039,90	
3	Cikepuh	8.128		
4	Muara Angke	31	19,10	
5	P. Rambut	88	90,00	Included in MMAF data*
6	Harlu	2.000		
7	Perhatu	457	33,30	
8	Pleihari Tanah Laut	1.444	366,30	
9	P. Semama	78	220,00	Included in MMAF data*
10	Tanjung Mantop	1.613		
11	Dolangan	463		
12	Pati-pati	2.144	268,50	
13	Bangkiriang	12.660	220,00	
14	Lampoko Mampie	2.000		
15	Tanjung Amelenggo	850		
16	Tanjung Batikolo	4.336	331,90	
17	Buton Utara	102.668	777,50	
18	P. Manuk	100		
19	P. Baun	65.994	1.421,30	
20	P. Sabuda dan P. Tataruga	16.618	5.000,00	Included in MMAF data*
21	Mamberamo Foja	1.666.909	15.991,50	
22	P. Dolok	720.844	186.344,80	
23	Danau Tuadale (RTK.191)	867	170,70	
24	Pulau Kobror	8.234	2.890,70	
25	Pulau Komolon	78.770	38.838,20	
26	Tanjung Santigi	1.591	301,40	
27	Pantai Jamursba Medi	394.081	278,25	Included in MMAF data*
28	Sindangkerta	201	90,00	Included in MMAF data*
	Sub Total SM	**3.106.424**	**254.795,85**	
	C. NATIONAL PARKS			
1	Bunaken	89.065	89.065,00	Included in MMAF data*
2	Taka Bone Rate	530.765	530.765,00	Included in MMAF data*
3	Teluk Cendrawasih	1.453.500	1.453.500,00	Included in MMAF data*
4	Kepulauan Seribu	107.489	107.489,00	Included in MMAF data*
5	Wakatobi	1.390.000	1.390.000,00	Included in MMAF data*
6	Karimunjawa	110.117	110.117,30	Included in MMAF data*
7	Togean	362.605	362.605,00	Included in MMAF data*
8	Siberut	190.500		
9	Bukit Barisan	365.000		
10	Way Kambas	127.962	4.559,70	
11	Ujung Kulon	113.165	53.689,30	
12	Meru Betiri	58.000		
13	Alas Purwo	40.471	676,80	
14	Baluran	19.932	9.005,10	
15	Bali Barat	19.692	5.848,00	
16	Komodo	176.582	121.858,10	
17	Gn. Palung	105.321	1,50	
18	Tanjung Puting	397.135	1.580,80	
19	Kutai	224.353	5.107,70	

No	NSA and NCA with waters area	Area (Ha)	Marine Areas (Ha)	Note
20	Rawa Aopa Watumohai	105.194		
21	Manusela	157.124	801,30	
22	Lorentz	2.276.391	321.133,10	
23	Wasur	429.304	4.142,00	
	Sub Total TN	**4.806.123**	**4.571.944,70**	
	D. NATURE RECREATIONAL PARKS			
1	P. Weh	6.358	3.900,00	Included in MMAF data*
2	Kep. Banyak	226.685	227.500,00	Included in MMAF data*
3	P Sangiang	831	720,00	Included in MMAF data*
4	Sukawayana	16		
5	Pananjung Pangandaran	38		
6	Gunung Selok	126		
7	Bangko-bangko	2.395	133,80	
8	P. Moyo	7.549	6.000,00	Included in MMAF data*
9	P. Satonda	1.098	2.600,00	Included in MMAF data*
10	17 pulau Riung	8.352	9.900,00	Included in MMAF data*
11	Teluk Maumere	51.371	59.450,00	Included in MMAF data*
12	Tuti Adagae	5.583	21,90	
13	Teluk Kupang	56.085	50.000,00	Included in MMAF data*
14	Manipo	3.927	1.101,60	
15	Tanjung Keluang	16.936	1.980,60	
16	P. Kembang	84	84,00	
17	Pleihari	1.500		
18	P. Sangalaki	93	280,00	Included in MMAF data*
19	Batu Angus	635		
20	Batu Putih	250		
21	Teluk Lasolo	58.278	81.800,00	Included in MMAF data*
22	P Kassa	62	1.100,00	Included in MMAF data*
23	P. Pombo	866	998,00	Included in MMAF data*
24	P. Masegu dsk	10.137	11.000,00	Included in MMAF data*
25	Gn. Api Banda	734		
26	Taman Laut Banda	2.500	2.500,00	
27	Teluk Yotefa	1.650		
28	Pulau Lapang	238	28,60	
29	Sungai Liku	1.193	821,00	
30	Tanjung Belimbing	1.348	836,60	
31	Kepulauan Padamarang	29.729	36.000,00	Included in MMAF data*
32	Pulau Biawak	122.125	121.986,80	
33	Selat Tiworo	29.423	27.406,80	
	Sub Total TWA	**647.459**	**648.149,70**	
	E. GRAND FOREST PARKS			
1	Ngurah Rai	1.993	1.238,60	
2	Bukit Soeharto	63.200	382,10	
3	Marhun			
	Sub Total THR	**65.193**	**1.620,70**	
	F. HUNTING PARKS			
1	P. Pini	9.763	383,10	
2	P. Rempang	15.645	3.965,70	
3	Gn. Nanu'a	7.494	1.494,20	
4	P. Ndana	1.562		
5	Dataran Bena	11.000		
6	P. Rusa	1.500		
	Sub Total TN	**46.964**	**5.843,00**	
	TOTAL	**10.052.248**	**5.864.195,05**	

Note * : The area following MMAF data
Sources : Dit. KK, PHKA KEMENHUT, 2012

APPENDIX 3

List of Potencial Areas for Turtle MPA

No	Name	Province
1	P. Beras	Aceh
2	P. Nasi	Aceh
3	P. Mursala	Sumatera Utara
4	P. Telo, P. Pono, P. Bintuang (Kep. Batu)	Sumatera Utara
5	Kepulauan Lingga	Riau Kepulauan
6	P. Natuna, P. Laut, P. Midai (Kep. Natuna)	Riau Kepulauan
7	Kepulauan Tujuh	Riau Kepulauan
8	Kep. Tambelan Besar	Riau Kepulauan
9	P.Penyu	Sumatera Barat
10	P. Pagai Selatan	Sumatera Barat
11	P. Keraba Besar	Sumatera Barat
12	P. Keraba Kecil	Sumatera Barat
13	P. Gosong	Sumatera Barat
14	P. Ketang-ketangan	Sumatera Barat
15	P. Beringin	Sumatera Barat
16	P. Mega	Bengkulu
17	Pantai Air Hitam	Bengkulu
18	Pantai Pendak	Bengkulu
19	Pantai Sawangkatung	Bengkulu
20	Kep. Lima	SUMSEL dan Bangka-Belitung
21	P. Kalinambang	SUMSEL dan Bangka-Belitung
22	P. Langkuas	SUMSEL dan Bangka-Belitung
23	Kep. Momperang	SUMSEL dan Bangka-Belitung
24	P. Plamer	SUMSEL dan Bangka-Belitung
25	P. Manggar	SUMSEL dan Bangka-Belitung
26	P. Segamat Besar	Lampung
27	P. Segamat Kecil	Lampung
28	Pantai Wai Tabulih	Lampung
29	Pantai Sumber gelap	Lampung
30	Pantai Siging	Lampung
31	Pantai Way Haru	Lampung
32	P. Batuah	Lampung
33	Pantai Krui	Lampung
34	Pantai Tg Cina	Lampung
35	Cikalong	Jawa Barat
36	P Sepanjang	Jawa Timur
37	Pantai Kuta	Bali
38	Pantai Tegal Besar	Bali
39	Pantai Hotel Nikkon	Bali
40	Pantai Desa Sulanya	Bali
41	Pantai Peracak	Bali
42	Pantai Semawang	Bali
43	Pantai Desa Serangan	Bali
44	Pantai Desa Pamunteran	Bali
45	Pantai Teluk Pakeh	Bali
46	Pantai Desa Seseh	Bali
47	Pantai desa Selamadeg	Bali
48	Pantai Bla Batu	Bali
49	Pantai Karang Asem	Bali
50	P. Gili Nanggu	Nusa Tenggara Barat
51	Pantai Senggigi Lombok	Nusa Tenggara Barat
52	Pantai Luwu	Nusa Tenggara Barat
53	Ai Ketapang	Nusa Tenggara Barat
54	P. Gili Poh	Nusa Tenggara Barat
55	Pantai Tanjung Bima	Nusa Tenggara Barat
56	P. Betek	Nusa Tenggara Timur
57	P. Rote	Nusa Tenggara Timur
58	P. Kabung	Kalimantan Barat
59	Pantai Tg Belimbing	Kalimantan Barat
60	Pantai Kumai	Kalimantan Tengah
61	Kep.Laut Kecil	Kalimantan Selatan
62	Kep. Marabatua	Kalimantan Selatan
63	P Birah-birahan	Kalimantan Selatan
64	Tg Layar	Kalimantan Selatan
65	Kep. Sambar Gelap	Kalimantan Selatan

No	Name	Province
66	Pantai Balikpapan	Kalimantan Timur
67	Pantai Popareng	Sulawesi Utara
68	Kep. Nanusa	Sulawesi Utara
69	P. Simatang	Sulawesi Tengah
70	P. Pasoso	Sulawesi Tengah
71	Kep. Banggai	Sulawesi Tengah
72	Pantai Sirarao	Sulawesi Tengah
73	Tanjung Deko	Sulawesi Tengah
74	P. Lari-larian	Sulawesi Selatan
75	P. Ambo	Sulawesi Selatan
76	Kep. Balangan	Sulawesi Selatan
77	Kep. Mamuju	Sulawesi Selatan
78	Kep. Spermonde	Sulawesi Selatan
79	Kep. Masalima	Sulawesi Selatan
80	Kep. Kalikalukuang	Sulawesi Selatan
81	Kep. Dekawang	Sulawesi Selatan
82	Kep. Tengah	Sulawesi Selatan
83	Kep. Sabalama	Sulawesi Selatan
84	Pantai Patama	Sulawesi Selatan
85	Kep Sembilan	Sulawesi Selatan
86	P. Kakabian	Sulawesi Selatan
87	P. Serage	Sulawesi Selatan
88	P. Kauna	Sulawesi Selatan
89	P. Lalao	Sulawesi Selatan
90	P. Ampalasa	Sulawesi Selatan
91	P. Tinajo	Sulawesi Selatan
92	P. Kayu Balang	Sulawesi Selatan
93	P. Selayar	Sulawesi Selatan
94	P. Kabaena	Sulawesi Tenggara
95	P. Telaga Besar	Sulawesi Tenggara
96	Pantai Tg. Kasolamalatu	Sulawesi Tenggara
97	Pantai Tamponokora	Sulawesi Tenggara
98	P Manui	Sulawesi Tenggara
99	P. Saponda	Sulawesi Tenggara
100	P. Batuata	Sulawesi Tenggara
101	Pantai Lintea Tiwolu	Sulawesi Tenggara
102	P. Wowoni	Sulawesi Tenggara
103	P. Burung	Sulawesi Tenggara
104	P. Bahulu	Sulawesi Tenggara
105	P. Lembaki Besar	Sulawesi Tenggara
106	P. Maung	Sulawesi Tenggara
107	P. Lambasuna Besar	Sulawesi Tenggara
108	P. Water	Maluku
109	Pantai Seira	Ambon
110	Kep. Penyu	Ambon
111	Kep. Lucipara	Ambon
112	Pantai Pulau Ambon bagian Selatan	Ambon
113	P. Seram Tinur	Ambon
114	P. Parang	Ambon
115	Pantai Wahai	Ambon
116	Pantai Kayoa	Ambon
117	Pantai Morotai Utara	Ambon
118	P. Piai	Papua dan Papua Barat
119	Mapia	Papua dan Papua Barat
120	Teluk Ayu	Papua dan Papua Barat
121	Kep. Asia	Papua dan Papua Barat
122	Kep. Dua	Papua dan Papua Barat
123	P. Ayawi	Papua dan Papua Barat
124	P. Adi	Papua dan Papua Barat
125	P. Dolok Merauke	Papua dan Papua Barat

Sources: Map " Sea Turtles Nesting Sites and Foraging Areas in The Coral Triangle Countries", PIKA PHKA KEMENHUT 2010

APPENDIX 4


96°0'0"E
97°30'0"E
6°0'0"N
4°30'0"N
3°0'0"N
Weh Is.
KOTA SABANG
Malacca Strait
KOTA BANDAACEH
ACEH BESAR
PIDIE JAYA
BIREUEN
KOTA LHOKSEUMAWE
ACEH UTARA
PIDIE
ACEH JAYA
BENER MERIAH
ACEH TIMUR
ACEH TENGAH
ACEH BARAT
KOTA LANGSA
ACEH TAMIANG
NAGANRAYA
GAYOLUES
ACEH BARAT DAYA
NORTH SUMATERA
INDIAN OCEAN
ACEH TENGGARA
ACEH SELATAN
Simeuleu Is.
SIMEULUE
KOTA SUBULUSSALAM
ACEH SINGKIL
Banyak Isl.
20 0 20 40
Kilometers
Information Sources:
- Topography Map. Scale1: 1.000.000 BAKOSURTANAL
- Administration Map. DEPDAGRI. 2007
- Nasional Spatial Plan Map. PP. 26 Tahun 2008
- Minsitry Decree of Marine and Fisheries Affairs No PER.01/MEN/2009
- Ministry of Marine and Fisheries Affairs. 2010.
- Salm and Halim. 1984.
- Wilson., J.R., Darmawan A. and Subijanto J. 2009.
- Huffard, C.L., M.V. Erdmann & T.R.P. Gunawan. 2012.
- Miclat, E.F.B. and R.B. Trono. 2002.
- GIS Analysis. 2012.
EXISTING AND POTENTIAL MARINE PROTECTED AREA IN ACEH PROVINCE
Legend:
Province Capital
Distrik Capital
Coastline
Province Boundary
Indonesian Teritory Boundary
Economy Exclusive Zone
Marine Protected Area Under MMAF
Marine Protected Area Under MoF
Potential MPA:
Potential MPA
Deep Sea Area of Interest
Map Index
I N D O N E S I A
Aceh Province

EXISTING AND POTENTIAL MARINE PROTECTED AREA IN NORTH SUMATERA PROVINCE

Legend:

- Province Capital
- Coastline
- Province Boundary
- Indonesian Teritory Boundary
- Marine Protected Area Under MMAF
- Marine Protected Area Under MoF

Potential MPA:

- Potential MPA
- Deep Sea Area of Interest

Map Index

EXISTING AND POTENTIAL MARINE PROTECTED AREA IN RIAU PROVINCE

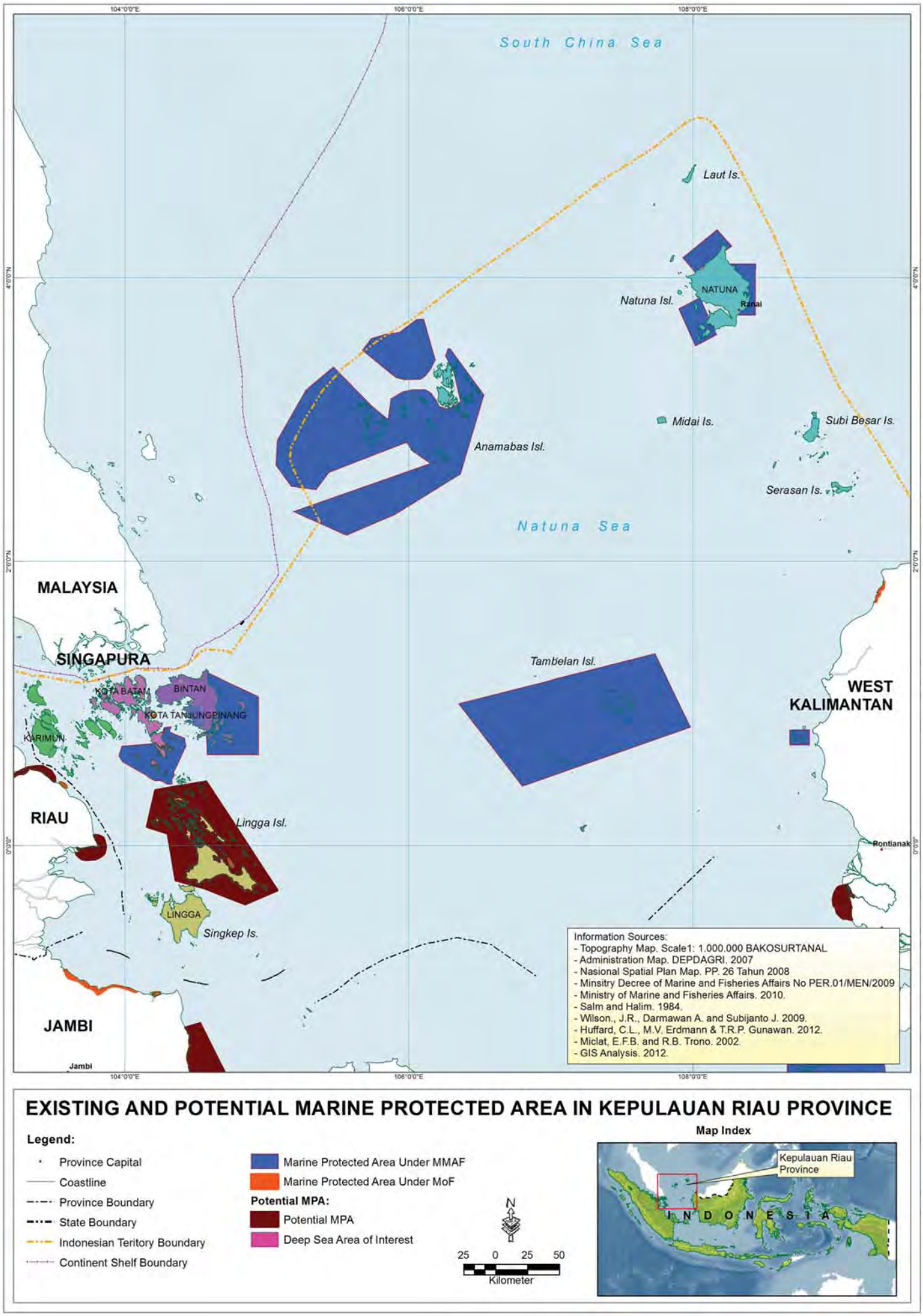
Legend:

- Province Capital
- Coastline
- Province Boundary
- State Boundary
- Indonesian Teritory Boundary
- Continental Shelf Boundary
- Marine Protected Area Under MMAF
- Marine Protected Area Under MoF

Potential MPA:

- Potential MPA
- Deep Sea Area of Interest

Map Index



EXISTING AND POTENTIAL MARINE PROTECTED AREA IN KEPULAUAN RIAU PROVINCE

Legend:

- Province Capital
- Coastline
- Province Boundary
- State Boundary
- Indonesian Teritory Boundary
- Continent Shelf Boundary
- Marine Protected Area Under MMAF
- Marine Protected Area Under MoF

Potential MPA:

- Potential MPA
- Deep Sea Area of Interest

N

25 0 25 50

Kilometer

Map Index

EXISTING AND POTENTIAL MARINE PROTECTED AREA IN WEST SUMATERA PROVINCE

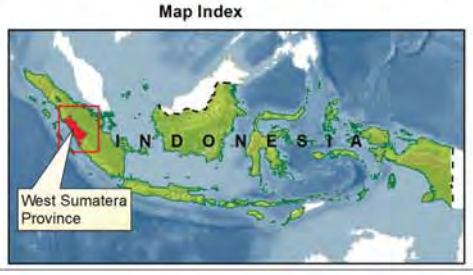
Legend:

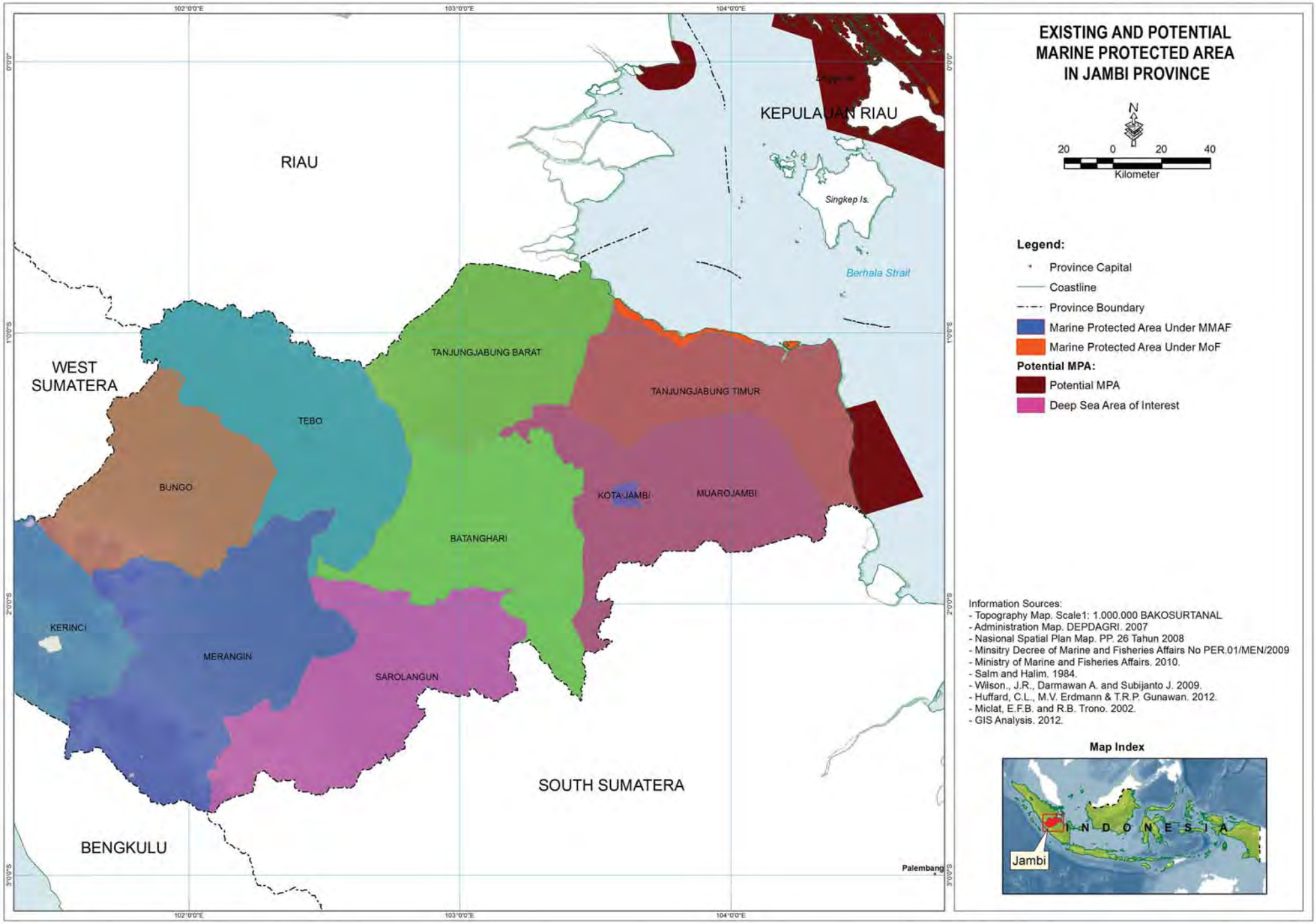
- Ibukota Provinsi
- Coastline
- Province Boundary
- Indonesian Teritory Boundary
- Marine Protected Area Under MMAF
- Marine Protected Area Under MoF

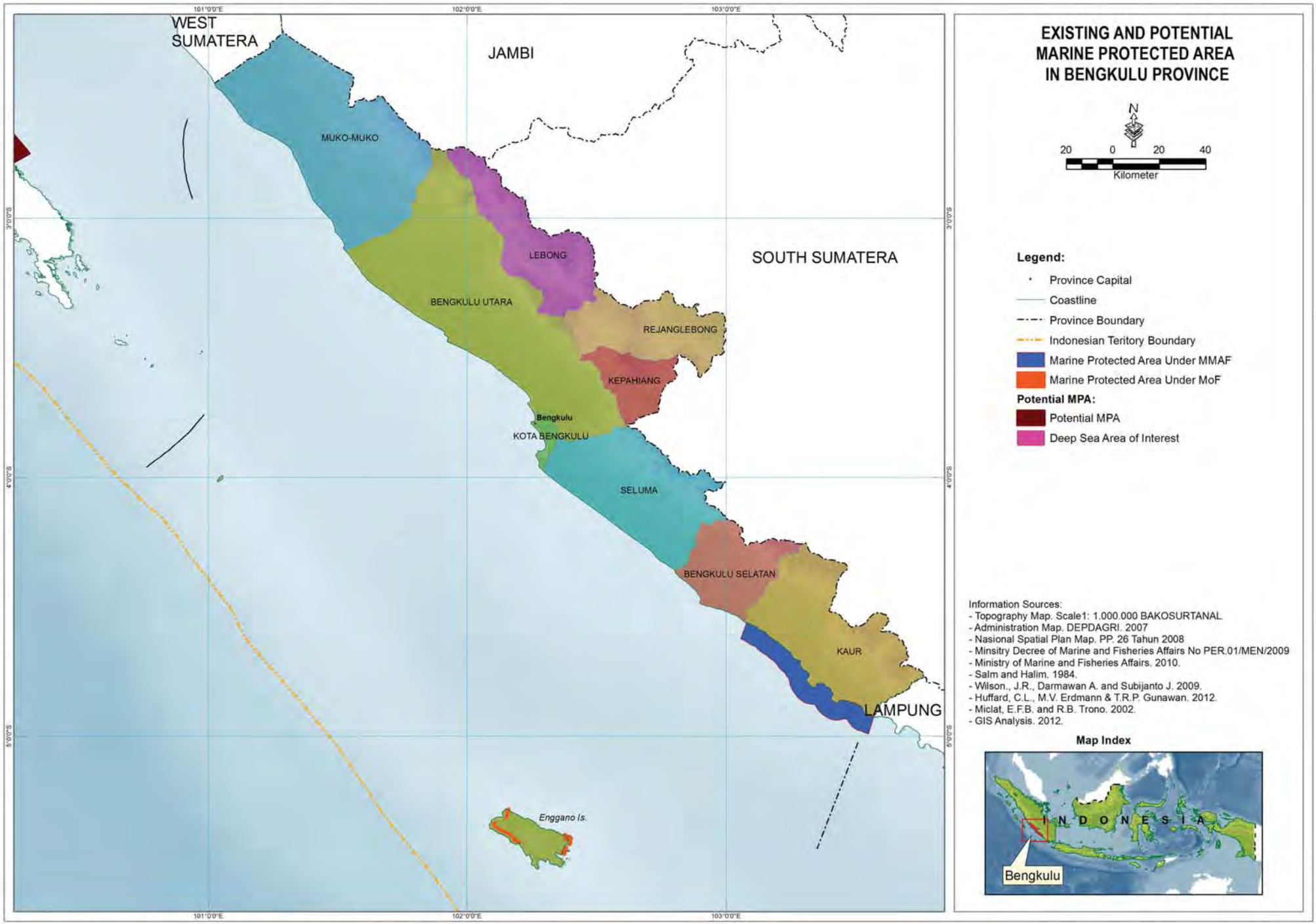
Potential MPA:

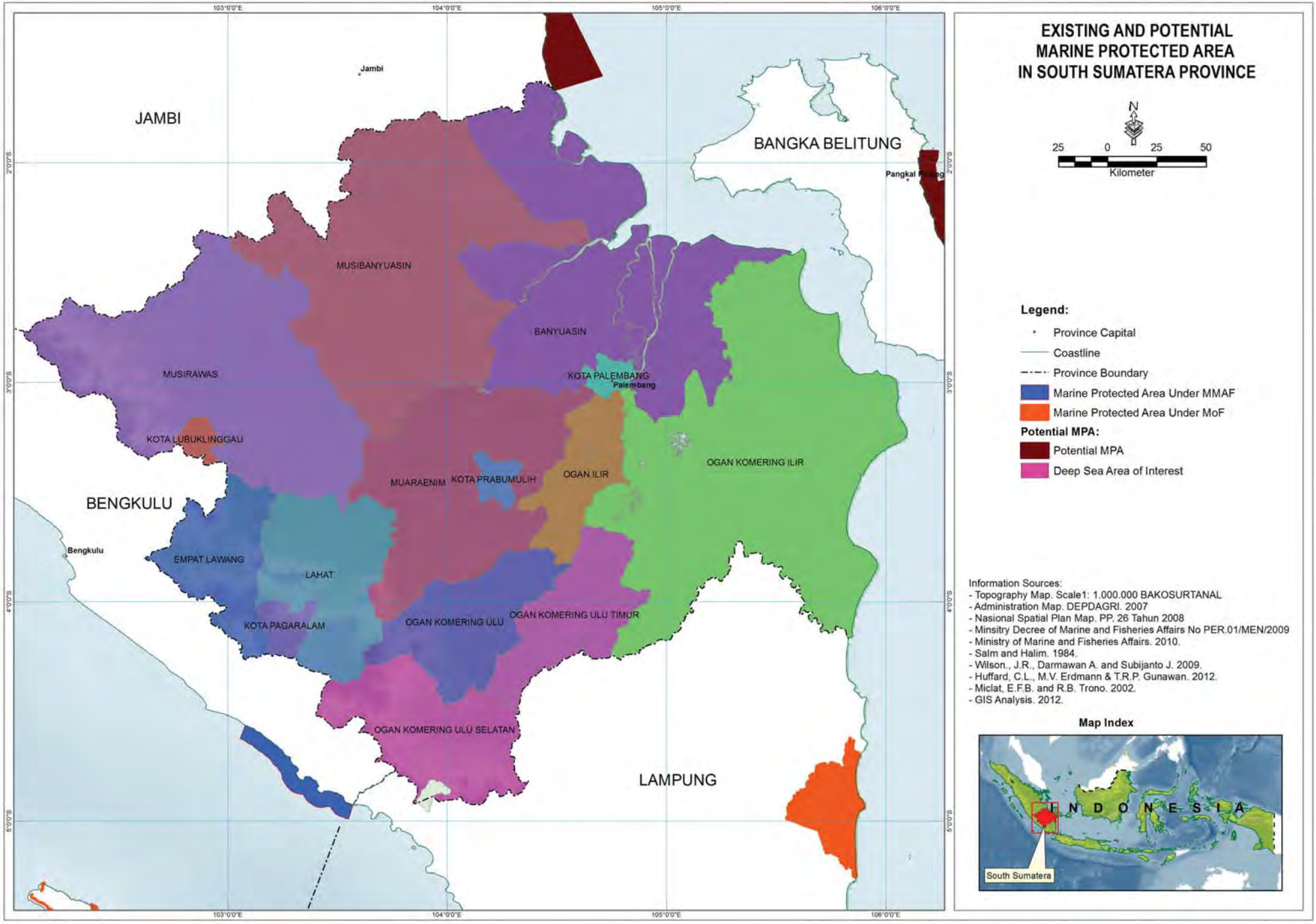
- Potential MPA
- Deep Sea Area of Interest

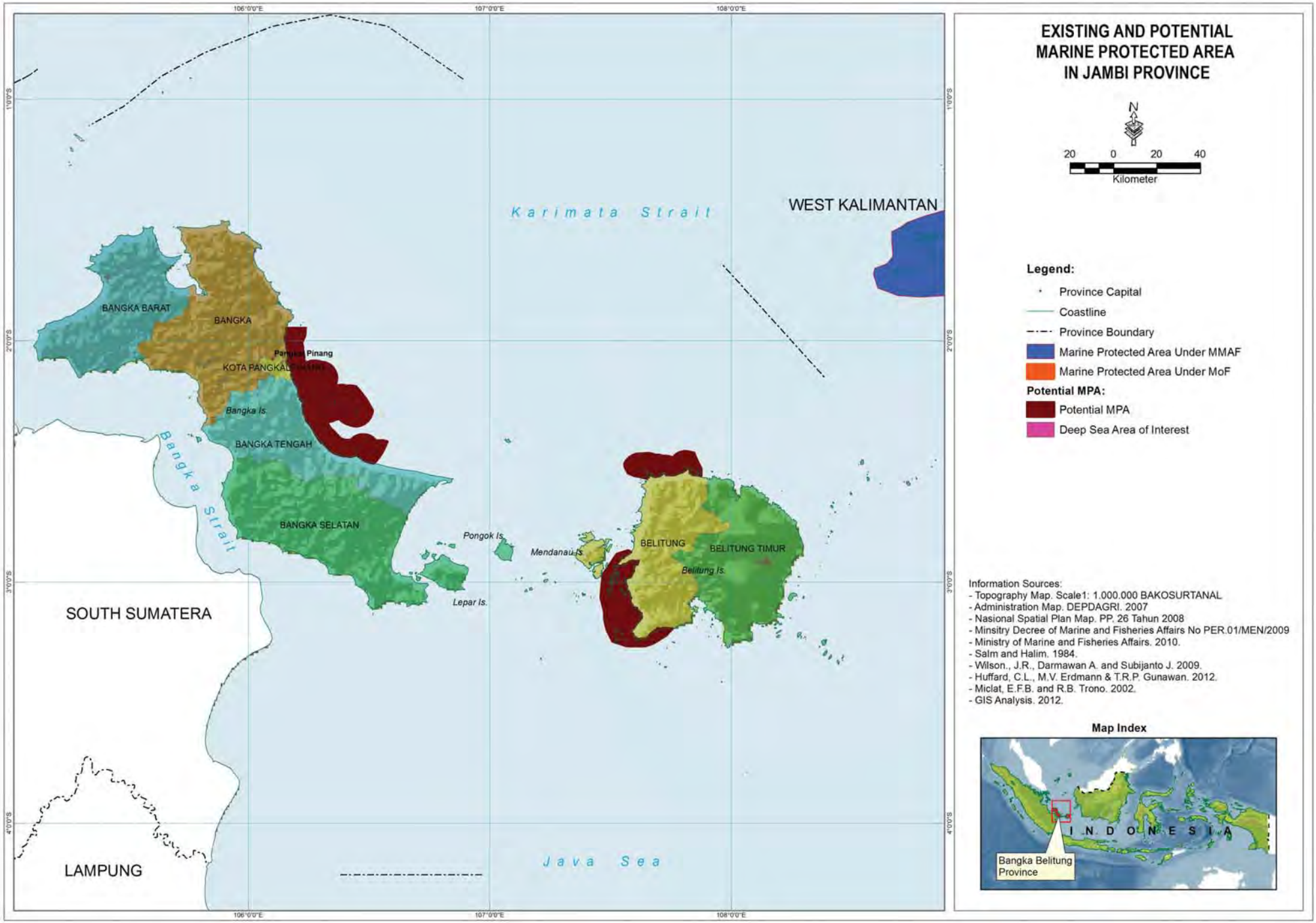
Map Index

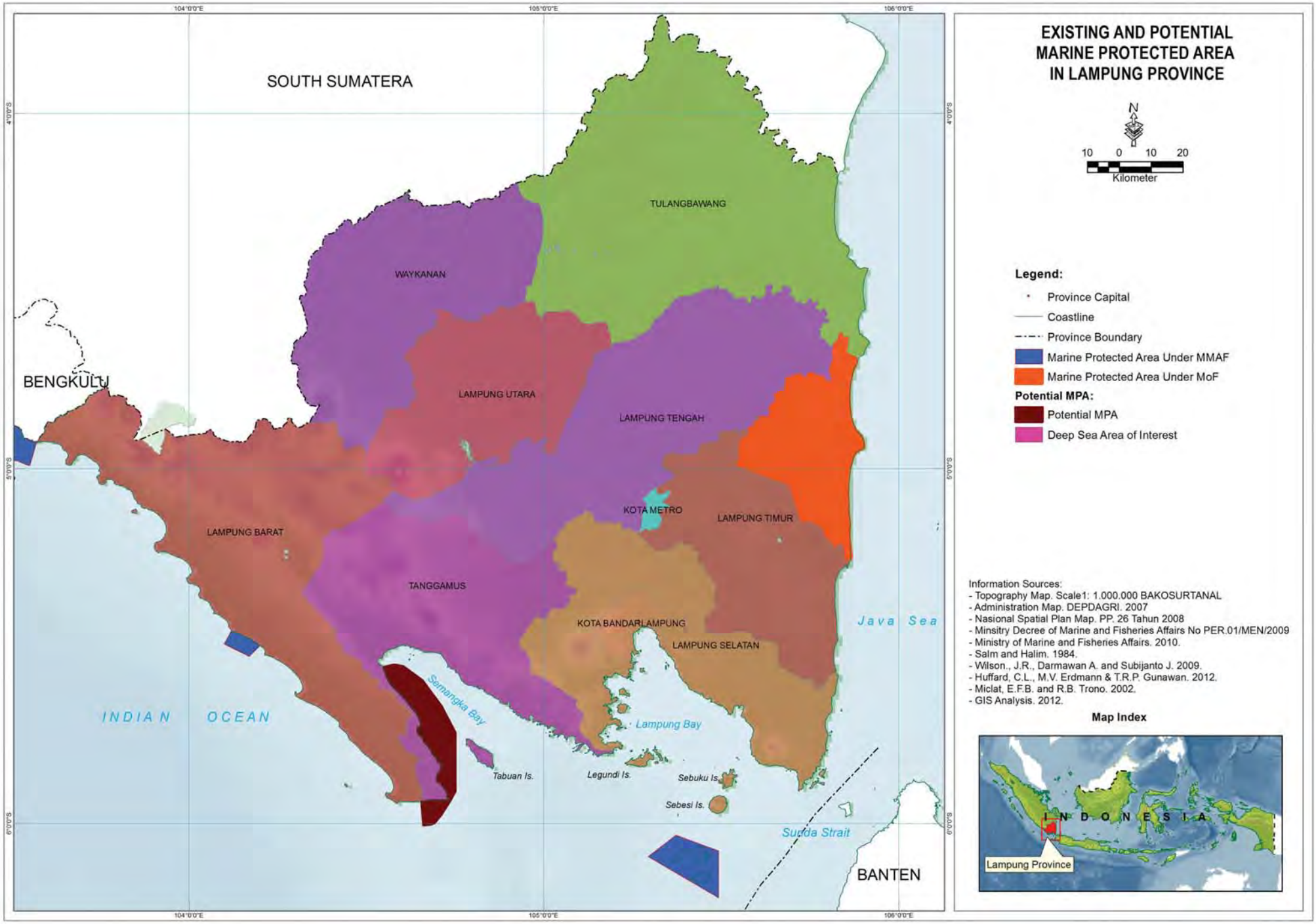


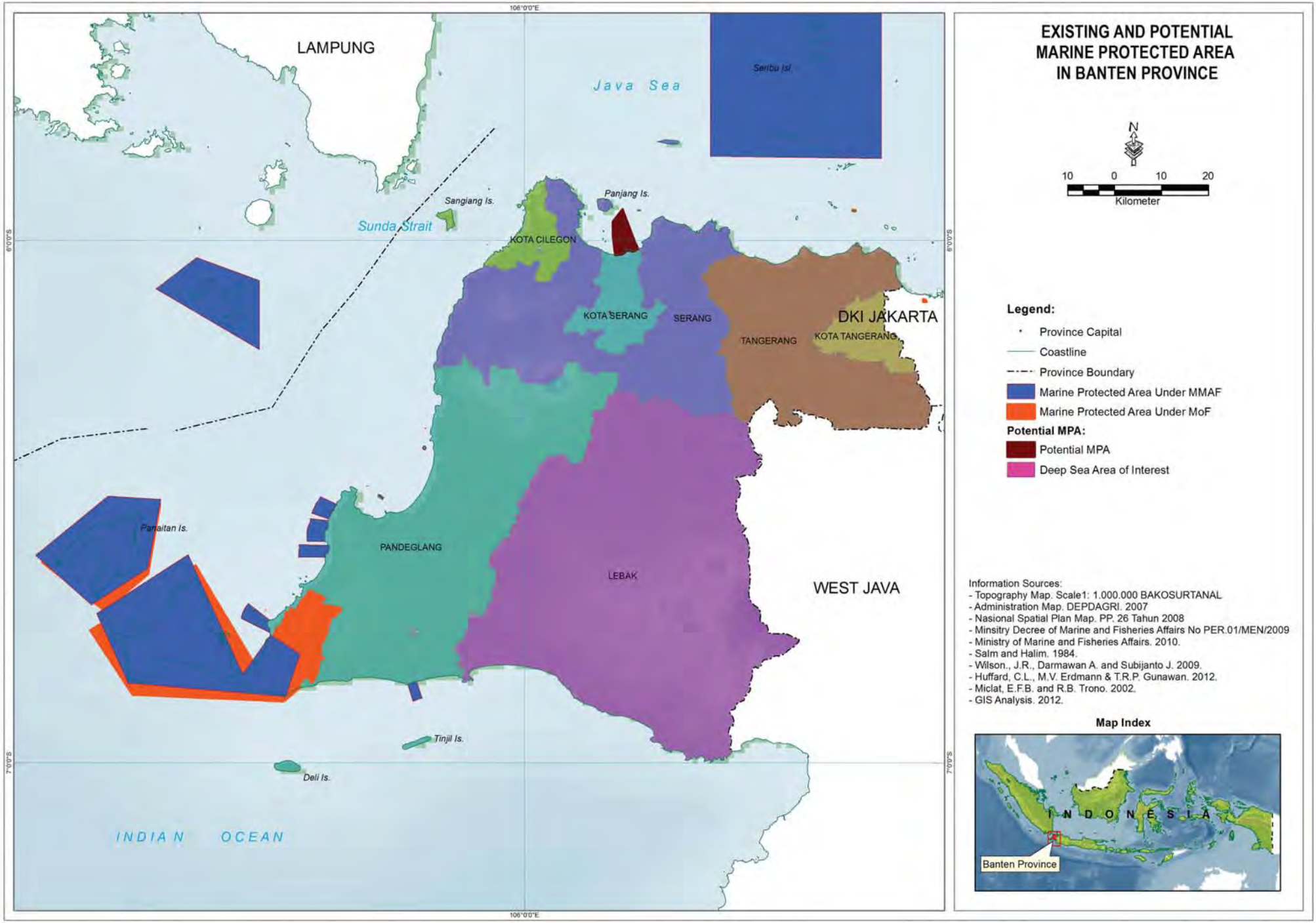

EXISTING AND POTENTIAL
MARINE PROTECTED AREA
IN JAMBI PROVINCE
N
20 0 20 40
Kilometer
Legend:
Province Capital
Coastline
Province Boundary
Marine Protected Area Under MMAF
Marine Protected Area Under MoF
Potential MPA:
Potential MPA
Deep Sea Area of Interest
RIAU
KEPULAUAN RIAU
Singkep Is.
Berhala Strait
WEST
SUMATERA
TANJUNGJABUNG BARAT
TANJUNGJABUNG TIMUR
TEBO
BUNGO
KOTA JAMBI
MUAROJAMBI
BATANGHARI
KERINCI
MERANGIN
SAROLANGUN
SOUTH SUMATERA
BENGKULU
Palembang
102°0'0"E
103°0'0"E
104°0'0"E
Information Sources:
- Topography Map. Scale1: 1.000.000 BAKOSURTANAL
- Administration Map. DEPDAGRI. 2007
- Nasional Spatial Plan Map. PP. 26 Tahun 2008
- Minsitry Decree of Marine and Fisheries Affairs No PER.01/MEN/2009
- Ministry of Marine and Fisheries Affairs. 2010.
- Salm and Halim. 1984.
- Wilson., J.R., Darmawan A. and Subijanto J. 2009.
- Huffard, C.L., M.V. Erdmann & T.R.P. Gunawan. 2012.
- Miclat, E.F.B. and R.B. Trono. 2002.
- GIS Analysis. 2012.
Map Index
I N D O N E S I A
Jambi

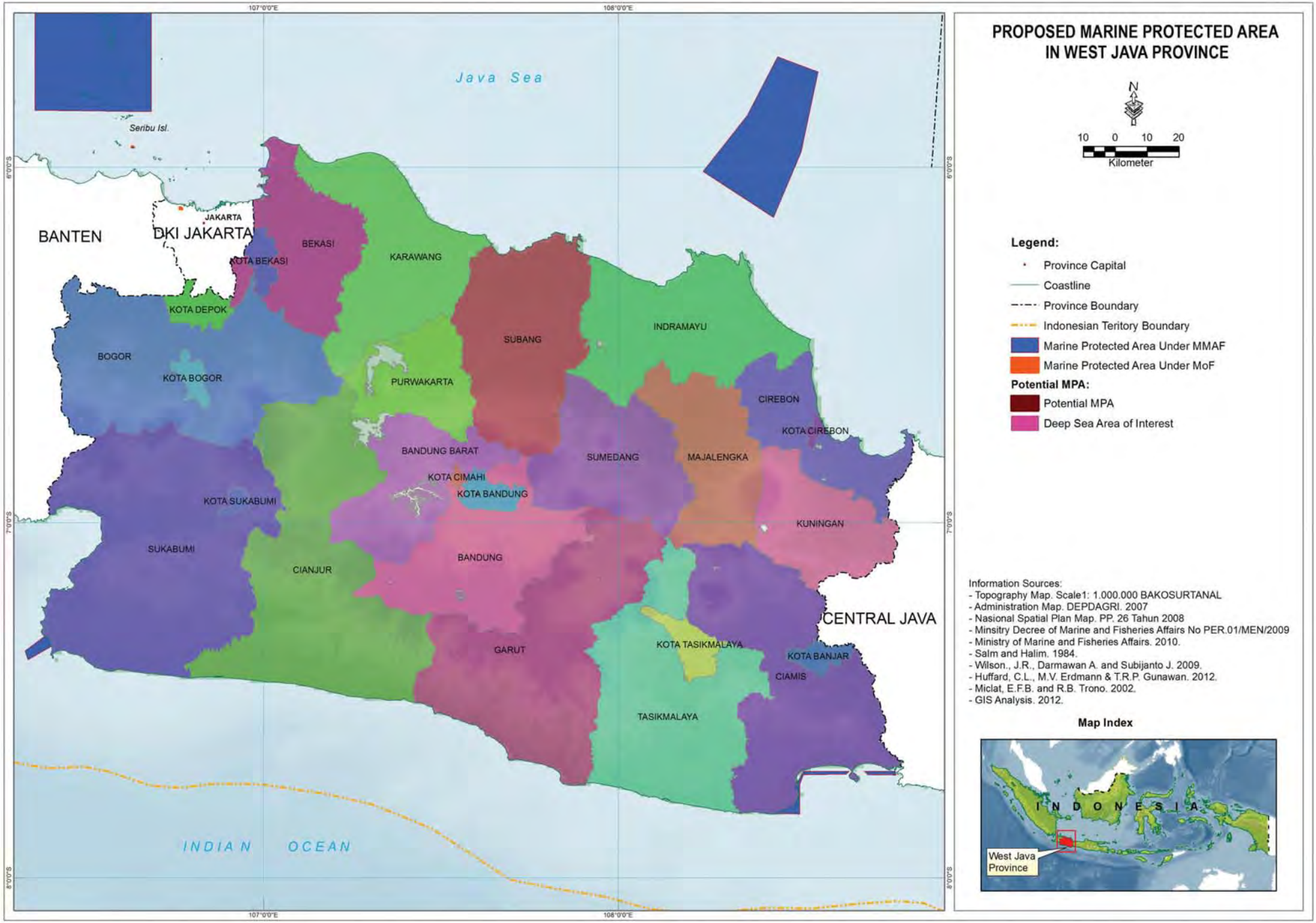

EXISTING AND POTENTIAL
MARINE PROTECTED AREA
IN BENGKULU PROVINCE
N
20 0 20 40
Kilometer
WEST SUMATERA
JAMBI
SOUTH SUMATERA
LAMPUNG
MUKO-MUKO
LEBONG
BENGKULU UTARA
REJANGLEBONG
KEPAHIANG
Bengkulu
KOTA BENGKULU
SELUMA
BENGKULU SELATAN
KAUR
Enggano Is.
101°0'0"E
102°0'0"E
103°0'0"E
3°0'0"S
4°0'0"S
5°0'0"S
Legend:
Province Capital
Coastline
Province Boundary
Indonesian Teritory Boundary
Marine Protected Area Under MMAF
Marine Protected Area Under MoF
Potential MPA:
Potential MPA
Deep Sea Area of Interest
Information Sources:
- Topography Map. Scale1: 1.000.000 BAKOSURTANAL
- Administration Map. DEPDAGRI. 2007
- Nasional Spatial Plan Map. PP. 26 Tahun 2008
- Minsitry Decree of Marine and Fisheries Affairs No PER.01/MEN/2009
- Ministry of Marine and Fisheries Affairs. 2010.
- Salm and Halim. 1984.
- Wilson., J.R., Darmawan A. and Subijanto J. 2009.
- Huffard, C.L., M.V. Erdmann & T.R.P. Gunawan. 2012.
- Miclat, E.F.B. and R.B. Trono. 2002.
- GIS Analysis. 2012.
Map Index
I N D O N E S I A
Bengkulu

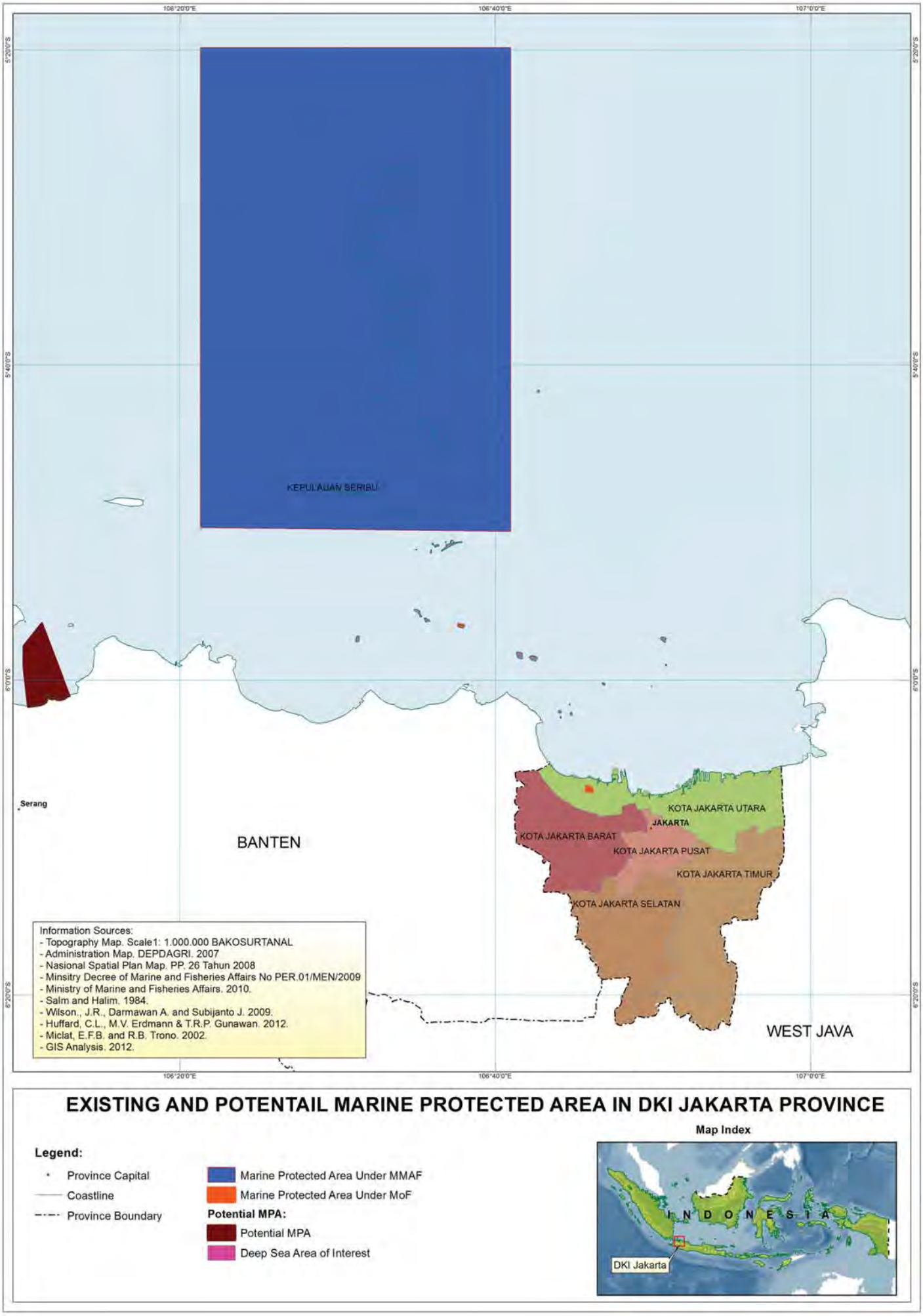

EXISTING AND POTENTIAL
MARINE PROTECTED AREA
IN SOUTH SUMATERA PROVINCE
N
25 0 25 50
Kilometer
Legend:
Province Capital
Coastline
Province Boundary
Marine Protected Area Under MMAF
Marine Protected Area Under MoF
Potential MPA:
Potential MPA
Deep Sea Area of Interest
Information Sources:
- Topography Map. Scale1: 1.000.000 BAKOSURTANAL
- Administration Map. DEPDAGRI. 2007
- Nasional Spatial Plan Map. PP. 26 Tahun 2008
- Minsitry Decree of Marine and Fisheries Affairs No PER.01/MEN/2009
- Ministry of Marine and Fisheries Affairs. 2010.
- Salm and Halim. 1984.
- Wilson., J.R., Darmawan A. and Subijanto J. 2009.
- Huffard, C.L., M.V. Erdmann & T.R.P. Gunawan. 2012.
- Miclat, E.F.B. and R.B. Trono. 2002.
- GIS Analysis. 2012.
Map Index
I N D O N E S I A
South Sumatera
JAMBI
BANGKA BELITUNG
BENGKULU
LAMPUNG
Jambi
Pangkal Pinang
Palembang
Bengkulu
MUSIBANYUASIN
BANYUASIN
MUSIRAWAS
KOTA PALEMBANG
KOTA LUBUKLINGGAU
MUARAENIM
KOTA PRABUMULIH
OGAN ILIR
OGAN KOMERING ILIR
EMPAT LAWANG
LAHAT
KOTA PAGARALAM
OGAN KOMERING ULU
OGAN KOMERING ULU TIMUR
OGAN KOMERING ULU SELATAN
103°0'0"E
104°0'0"E
105°0'0"E
106°0'0"E
2°0'0"S
3°0'0"S
4°0'0"S
5°0'0"S


EXISTING AND POTENTIAL
MARINE PROTECTED AREA
IN JAMBI PROVINCE
N
20 0 20 40
Kilometer
Karimata Strait
WEST KALIMANTAN
BANGKA BARAT
BANGKA
Pangkal Pinang
KOTA PANGKALPINANG
Bangka Is.
BANGKA TENGAH
Bangka Strait
BANGKA SELATAN
Pongok Is.
Mendanau Is.
BELITUNG
BELITUNG TIMUR
Belitung Is.
Lepar Is.
SOUTH SUMATERA
LAMPUNG
Java Sea
Legend:
Province Capital
Coastline
Province Boundary
Marine Protected Area Under MMAF
Marine Protected Area Under MoF
Potential MPA:
Potential MPA
Deep Sea Area of Interest
Information Sources:
- Topography Map. Scale1: 1.000.000 BAKOSURTANAL
- Administration Map. DEPDAGRI. 2007
- Nasional Spatial Plan Map. PP. 26 Tahun 2008
- Minsitry Decree of Marine and Fisheries Affairs No PER.01/MEN/2009
- Ministry of Marine and Fisheries Affairs. 2010.
- Salm and Halim. 1984.
- Wilson., J.R., Darmawan A. and Subijanto J. 2009.
- Huffard, C.L., M.V. Erdmann & T.R.P. Gunawan. 2012.
- Miclat, E.F.B. and R.B. Trono. 2002.
- GIS Analysis. 2012.
Map Index
I N D O N E S I A
Bangka Belitung
Province


EXISTING AND POTENTIAL
MARINE PROTECTED AREA
IN LAMPUNG PROVINCE
N
10 0 10 20
Kilometer
Legend:
Province Capital
Coastline
Province Boundary
Marine Protected Area Under MMAF
Marine Protected Area Under MoF
Potential MPA:
Potential MPA
Deep Sea Area of Interest
SOUTH SUMATERA
BENGKULU
TULANGBAWANG
WAYKANAN
LAMPUNG UTARA
LAMPUNG TENGAH
KOTA METRO
LAMPUNG TIMUR
LAMPUNG BARAT
TANGGAMUS
KOTA BANDARLAMPUNG
LAMPUNG SELATAN
BANTEN
INDIAN OCEAN
Java Sea
Semangka Bay
Lampung Bay
Tabuan Is.
Legundi Is.
Sebuku Is.
Sebesi Is.
Sunda Strait
104°0'0"E
105°0'0"E
106°0'0"E
4°0'0"S
5°0'0"S
6°0'0"S
Information Sources:
- Topography Map. Scale1: 1.000.000 BAKOSURTANAL
- Administration Map. DEPDAGRI. 2007
- Nasional Spatial Plan Map. PP. 26 Tahun 2008
- Minsitry Decree of Marine and Fisheries Affairs No PER.01/MEN/2009
- Ministry of Marine and Fisheries Affairs. 2010.
- Salm and Halim. 1984.
- Wilson., J.R., Darmawan A. and Subijanto J. 2009.
- Huffard, C.L., M.V. Erdmann & T.R.P. Gunawan. 2012.
- Miclat, E.F.B. and R.B. Trono. 2002.
- GIS Analysis. 2012.
Map Index
INDONESIA
Lampung Province


106°0'0"E
LAMPUNG
Java Sea
Seribu Isl
Sangiang Is.
Panjang Is.
Sunda Strait
KOTA CILEGON
KOTA SERANG
SERANG
DKI JAKARTA
TANGERANG
KOTA TANGERANG
Panaitan Is.
PANDEGLANG
LEBAK
WEST JAVA
Tinjil Is.
Deli Is.
INDIAN OCEAN
6°0'0"S
7°0'0"S
106°0'0"E
EXISTING AND POTENTIAL MARINE PROTECTED AREA IN BANTEN PROVINCE
N
10 0 10 20
Kilometer
Legend:
Province Capital
Coastline
Province Boundary
Marine Protected Area Under MMAF
Marine Protected Area Under MoF
Potential MPA:
Potential MPA
Deep Sea Area of Interest
Information Sources:
- Topography Map. Scale1: 1.000.000 BAKOSURTANAL
- Administration Map. DEPDAGRI. 2007
- Nasional Spatial Plan Map. PP. 26 Tahun 2008
- Minsitry Decree of Marine and Fisheries Affairs No PER.01/MEN/2009
- Ministry of Marine and Fisheries Affairs. 2010.
- Salm and Halim. 1984.
- Wilson., J.R., Darmawan A. and Subijanto J. 2009.
- Huffard, C.L., M.V. Erdmann & T.R.P. Gunawan. 2012.
- Miclat, E.F.B. and R.B. Trono. 2002.
- GIS Analysis. 2012.
Map Index
INDONESIA
Banten Province


PROPOSED MARINE PROTECTED AREA
IN WEST JAVA PROVINCE
N
10 0 10 20
Kilometer
Legend:
Province Capital
Coastline
Province Boundary
Indonesian Teritory Boundary
Marine Protected Area Under MMAF
Marine Protected Area Under MoF
Potential MPA:
Potential MPA
Deep Sea Area of Interest
Java Sea
Seribu Isl.
BANTEN
DKI JAKARTA
JAKARTA
BEKASI
KOTA BEKASI
KARAWANG
KOTA DEPOK
BOGOR
KOTA BOGOR
SUBANG
INDRAMAYU
PURWAKARTA
CIREBON
KOTA CIREBON
BANDUNG BARAT
SUMEDANG
MAJALENGKA
KOTA CIMAHI
KOTA BANDUNG
KOTA SUKABUMI
KUNINGAN
SUKABUMI
BANDUNG
CIANJUR
CENTRAL JAVA
GARUT
KOTA TASIKMALAYA
KOTA BANJAR
CIAMIS
TASIKMALAYA
INDIAN OCEAN
Information Sources:
- Topography Map. Scale1: 1.000.000 BAKOSURTANAL
- Administration Map. DEPDAGRI. 2007
- Nasional Spatial Plan Map. PP. 26 Tahun 2008
- Minsitry Decree of Marine and Fisheries Affairs No PER.01/MEN/2009
- Ministry of Marine and Fisheries Affairs. 2010.
- Salm and Halim. 1984.
- Wilson., J.R., Darmawan A. and Subijanto J. 2009.
- Huffard, C.L., M.V. Erdmann & T.R.P. Gunawan. 2012.
- Miclat, E.F.B. and R.B. Trono. 2002.
- GIS Analysis. 2012.
Map Index
INDONESIA
West Java Province



EXISTING AND POTENTAIL MARINE PROTECTED AREA IN DKI JAKARTA PROVINCE

Legend:

- Province Capital
- Coastline
- Province Boundary
- Marine Protected Area Under MMAF
- Marine Protected Area Under MoF

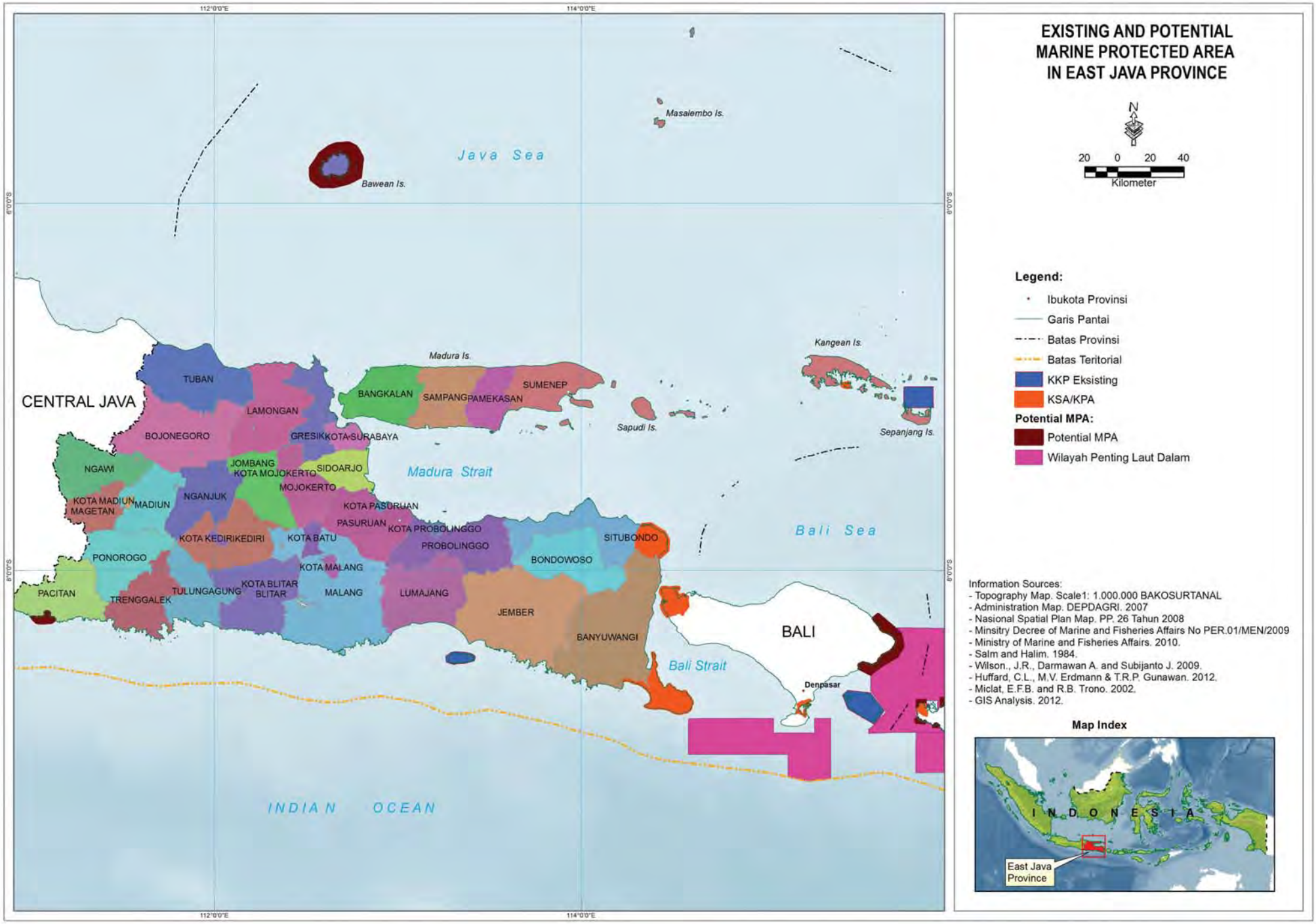
Potential MPA:

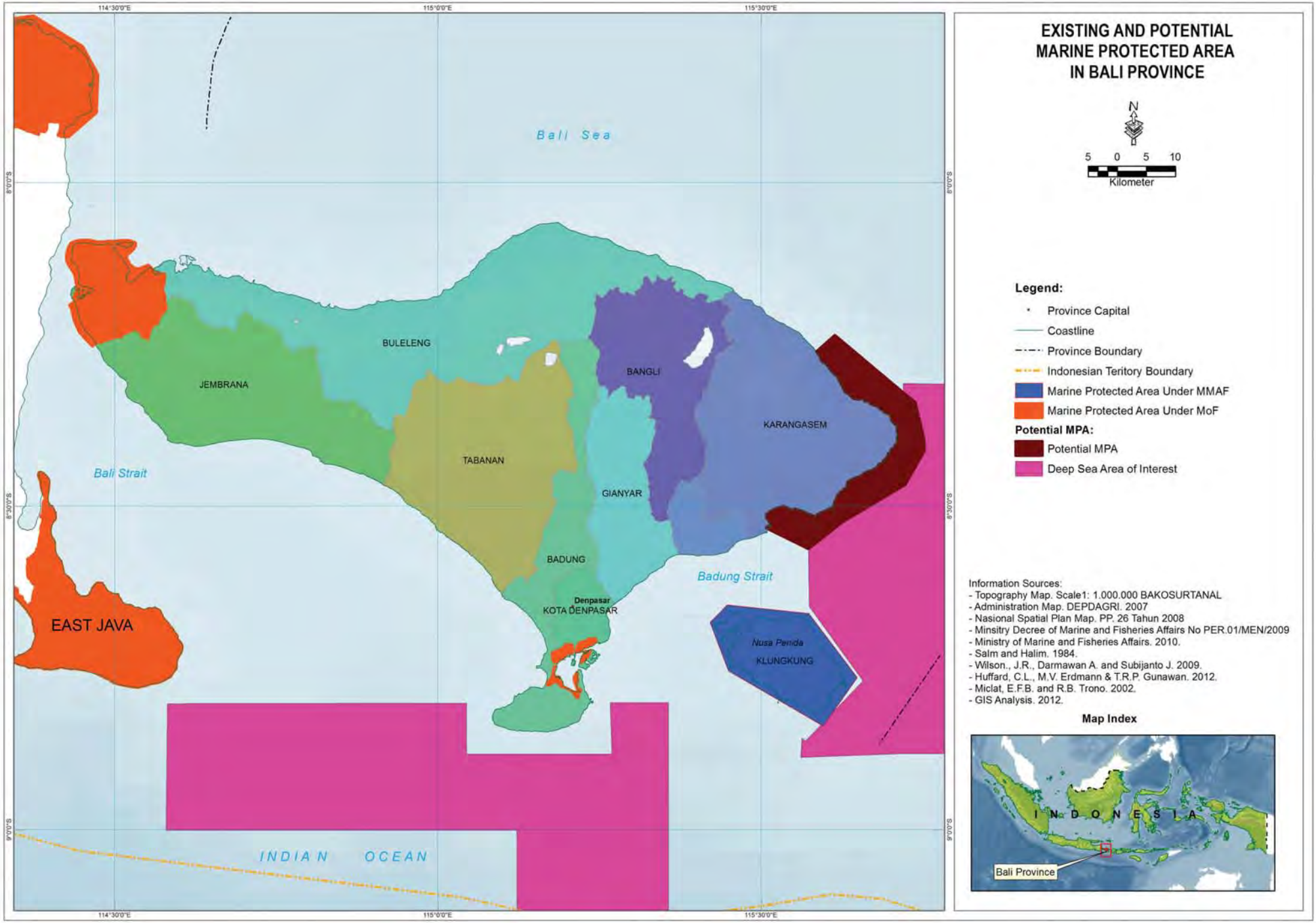
- Potential MPA
- Deep Sea Area of Interest

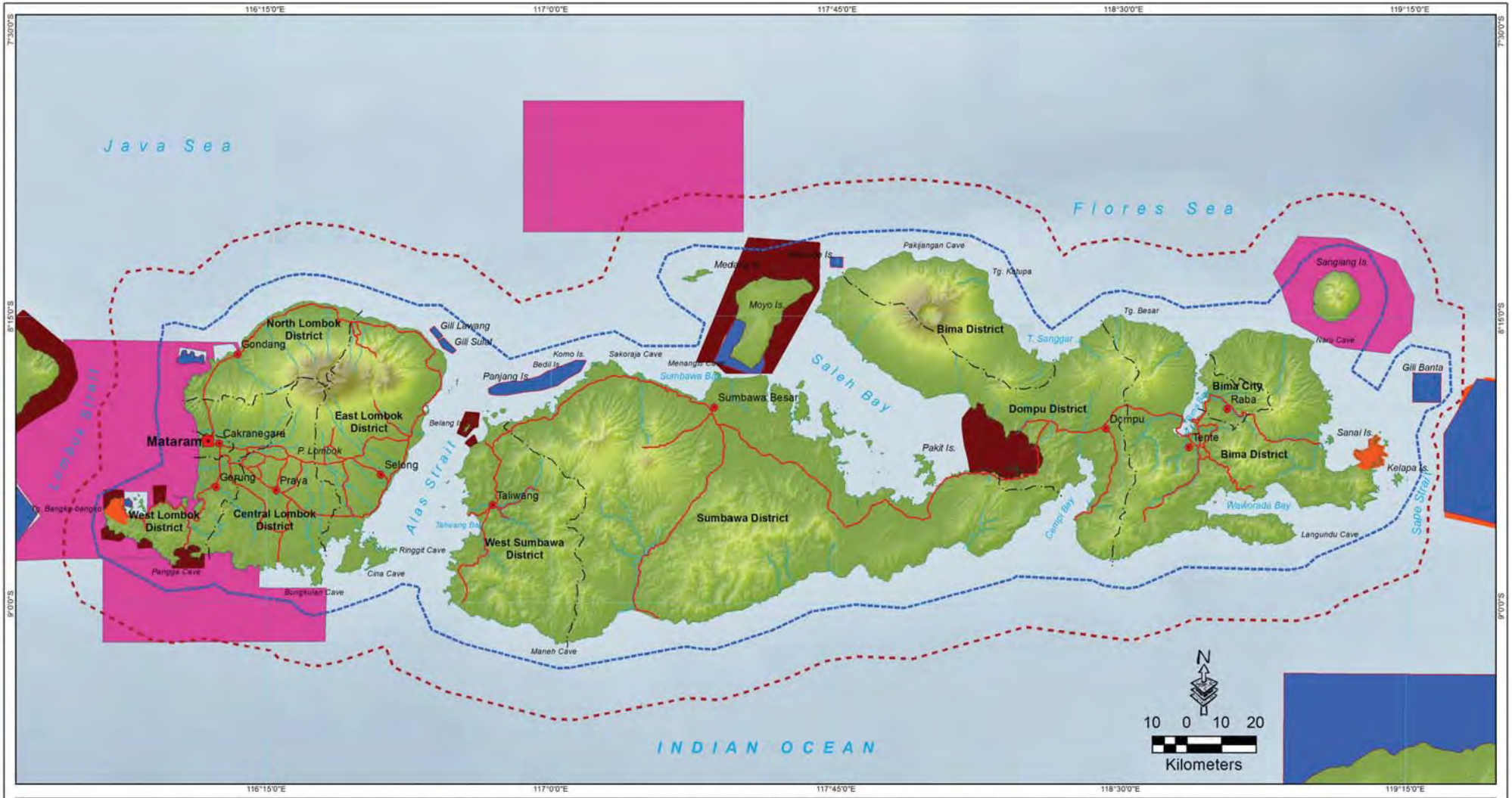
Map Index


EXISTING AND POTENTIAL
MARINE PROTECTED AREA
IN CENTRAL JAVA PROVINCE
N
10 0 10 20
Kilometer
Karimunjawa Islands
Java Sea
WEST
JAVA
JAWA BARAT
KOTA TEGAL
KOTA PEKALONGAN
BREBES
TEGAL
PEMALANG
PEKALONGAN
BATANG
KENDAL
KOTA SEMARANG
Semarang
DEMAK
JEPARA
KUDUS
PATI
REMBANG
BLORA
GROBOGAN
SEMARANG
TEMANGGUNG
BANJARNEGARA
PURBALINGGA
WONOSOBO
KOTA SALATIGA
SRAGEN
BANYUMAS
CILACAP
JAWA TENGAH
KOTA MAGELANGMAGELANG
BOYOLALI
KOTA SURAKARTA
KARANGANYAR
KEBUMEN
PURWOREJO
KLATEN
SUKOHARJO
EAST JAVA
Yogyakarta
DI. JOGYAKARTA
WONOGIRI
DAERAH ISTIMEWA YOGYAKARTA
JAWA TIMUR
INDIAN OCEAN
Legend:
Province Capital
Coastline
Province Boundary
Indonesian Teritory Boundary
Marine Protected Area Under MMAF
Marine Protected Area Under MoF
Potential MPA:
Potential MPA
Deep Sea Area of Interest
Information Sources:
- Topography Map. Scale1: 1.000.000 BAKOSURTANAL
- Administration Map. DEPDAGRI. 2007
- Nasional Spatial Plan Map. PP. 26 Tahun 2008
- Minsitry Decree of Marine and Fisheries Affairs No PER.01/MEN/2009
- Ministry of Marine and Fisheries Affairs. 2010.
- Salm and Halim. 1984.
- Wilson., J.R., Darmawan A. and Subijanto J. 2009.
- Huffard, C.L., M.V. Erdmann & T.R.P. Gunawan. 2012.
- Miclat, E.F.B. and R.B. Trono. 2002.
- GIS Analysis. 2012.
Map Index
I N D O N E S I A
Central Java


96°0'0"E
97°30'0"E
6°0'0"N
4°30'0"N
3°0'0"N
Weh Is.
KOTA SABANG
Malacca Strait
KOTA BANDAACEH
ACEH BESAR
PIDIE JAYA
BIREUEN
KOTA LHOKSEUMAWE
ACEH UTARA
PIDIE
ACEH JAYA
BENER MERIAH
ACEH TIMUR
ACEH TENGAH
ACEH BARAT
KOTA LANGSA
ACEH TAMIANG
NAGANRAYA
GAYOLUES
ACEH BARAT DAYA
NORTH SUMATERA
INDIAN OCEAN
ACEH TENGGARA
ACEH SELATAN
Simeuleu Is.
SIMEULUE
KOTA SUBULUSSALAM
ACEH SINGKIL
20 0 20 40
Kilometers
Banyak Isl.
Information Sources:
- Topography Map. Scale1: 1.000.000 BAKOSURTANAL
- Administration Map. DEPDAGRI. 2007
- Nasional Spatial Plan Map. PP. 26 Tahun 2008
- Minsitry Decree of Marine and Fisheries Affairs No PER.01/MEN/2009
- Ministry of Marine and Fisheries Affairs. 2010.
- Salm and Halim. 1984.
- Wilson., J.R., Darmawan A. and Subijanto J. 2009.
- Huffard, C.L., M.V. Erdmann & T.R.P. Gunawan. 2012.
- Miclat, E.F.B. and R.B. Trono. 2002.
- GIS Analysis. 2012.
EXISTING AND POTENTIAL MARINE PROTECTED AREA IN ACEH PROVINCE
Legend:
Province Capital
Distrik Capital
Coastline
Province Boundary
Indonesian Teritory Boundary
Economy Exclusive Zone
Marine Protected Area Under MMAF
Marine Protected Area Under MoF
Potential MPA:
Potential MPA
Deep Sea Area of Interest
Map Index
I N D O N E S I A
Aceh Province


EXISTING AND POTENTIAL
MARINE PROTECTED AREA
IN EAST JAVA PROVINCE
N
20 0 20 40
Kilometer
Legend:
Ibukota Provinsi
Garis Pantai
Batas Provinsi
Batas Teritorial
KKP Eksisting
KSA/KPA
Potential MPA:
Potential MPA
Wilayah Penting Laut Dalam
Information Sources:
- Topography Map. Scale1: 1.000.000 BAKOSURTANAL
- Administration Map. DEPDAGRI. 2007
- Nasional Spatial Plan Map. PP. 26 Tahun 2008
- Minsitry Decree of Marine and Fisheries Affairs No PER.01/MEN/2009
- Ministry of Marine and Fisheries Affairs. 2010.
- Salm and Halim. 1984.
- Wilson., J.R., Darmawan A. and Subijanto J. 2009.
- Huffard, C.L., M.V. Erdmann & T.R.P. Gunawan. 2012.
- Miclat, E.F.B. and R.B. Trono. 2002.
- GIS Analysis. 2012.
Map Index
I N D O N E S I A
East Java Province
Java Sea
Masalembo Is.
Bawean Is.
Madura Is.
Kangean Is.
Sapudi Is.
Sepanjang Is.
Madura Strait
Bali Sea
Bali Strait
INDIAN OCEAN
CENTRAL JAVA
BALI
Denpasar
TUBAN
LAMONGAN
BOJONEGORO
GRESIK
KOTA SURABAYA
BANGKALAN
SAMPANG
PAMEKASAN
SUMENEP
NGAWI
JOMBANG
KOTA MOJOKERTO
SIDOARJO
MOJOKERTO
NGANJUK
KOTA MADIUN
MAGETAN
MADIUN
KOTA PASURUAN
PASURUAN
KOTA PROBOLINGGO
PROBOLINGGO
SITUBONDO
BONDOWOSO
KOTA KEDIRI
KEDIRI
KOTA BATU
PONOROGO
KOTA MALANG
PACITAN
TULUNGAGUNG
TRENGGALEK
KOTA BLITAR
BLITAR
MALANG
LUMAJANG
JEMBER
BANYUWANGI
112°0'0"E
114°0'0"E
8°0'0"S


EXISTING AND POTENTIAL
MARINE PROTECTED AREA
IN BALI PROVINCE
N
5 0 5 10
Kilometer
Legend:
Province Capital
Coastline
Province Boundary
Indonesian Teritory Boundary
Marine Protected Area Under MMAF
Marine Protected Area Under MoF
Potential MPA:
Potential MPA
Deep Sea Area of Interest
Bali Sea
BULELENG
JEMBRANA
TABANAN
BANGLI
KARANGASEM
GIANYAR
BADUNG
Denpasar
KOTA DENPASAR
Bali Strait
Badung Strait
EAST JAVA
Nusa Penida
KLUNGKUNG
INDIAN OCEAN
114°30'0"E
115°0'0"E
115°30'0"E
8°0'0"S
8°30'0"S
9°0'0"S
Information Sources:
- Topography Map. Scale1: 1.000.000 BAKOSURTANAL
- Administration Map. DEPDAGRI. 2007
- Nasional Spatial Plan Map. PP. 26 Tahun 2008
- Minsitry Decree of Marine and Fisheries Affairs No PER.01/MEN/2009
- Ministry of Marine and Fisheries Affairs. 2010.
- Salm and Halim. 1984.
- Wilson., J.R., Darmawan A. and Subijanto J. 2009.
- Huffard, C.L., M.V. Erdmann & T.R.P. Gunawan. 2012.
- Miclat, E.F.B. and R.B. Trono. 2002.
- GIS Analysis. 2012.
Map Index
INDONESIA
Bali Province



EXISTING AND POTENTIAL MARINE PROTECTED AREA IN WEST NUSA TENGGARA PROVINCE

Legend:

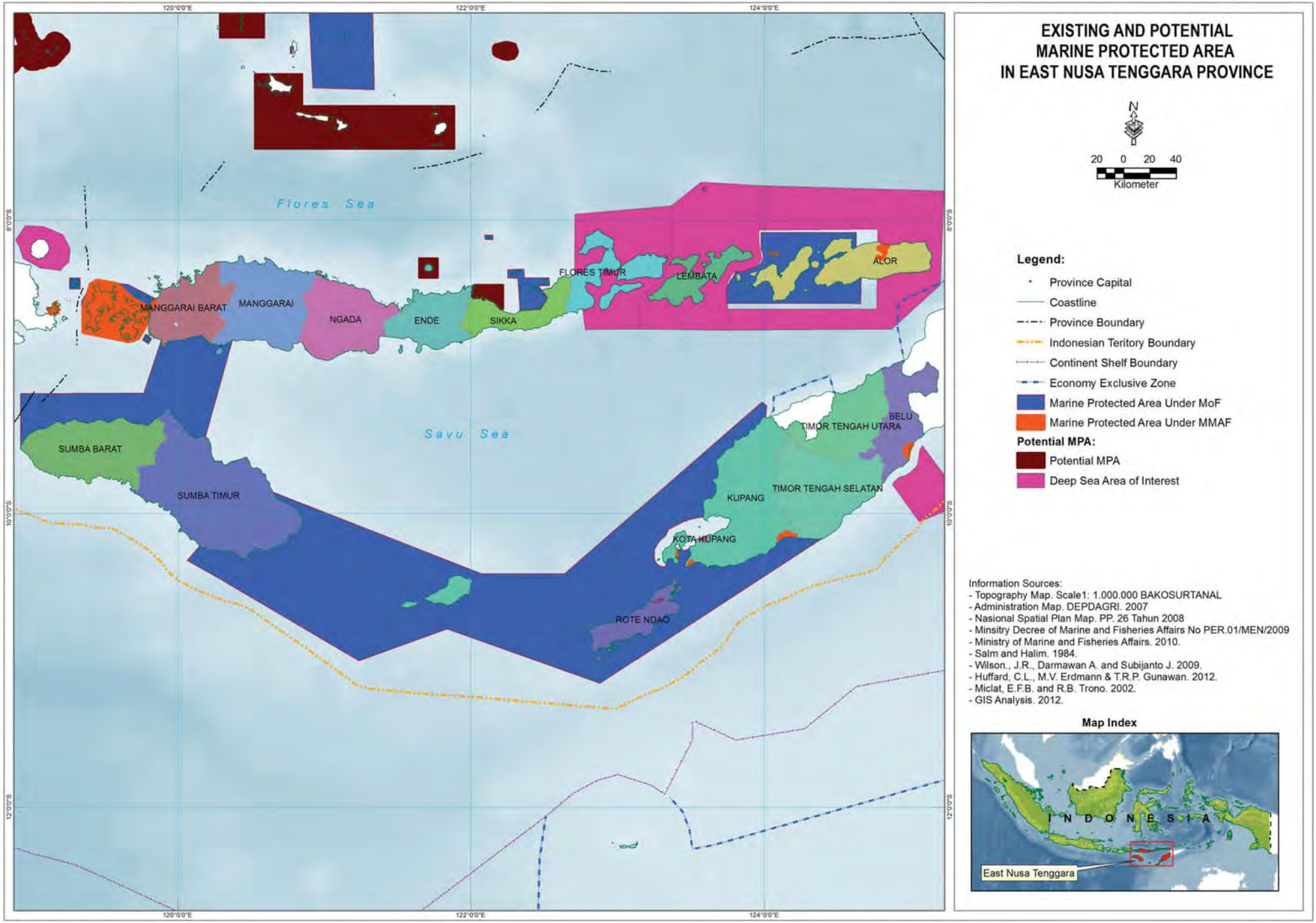
- Province Capital
- Distrik Capital
- District Boundary
- 4 NM Boundary
- 12 NM Boundary
- Road
- Coastline
- River
- Marine Protected Area Under MMAF
- Marine Protected Area Under MoF

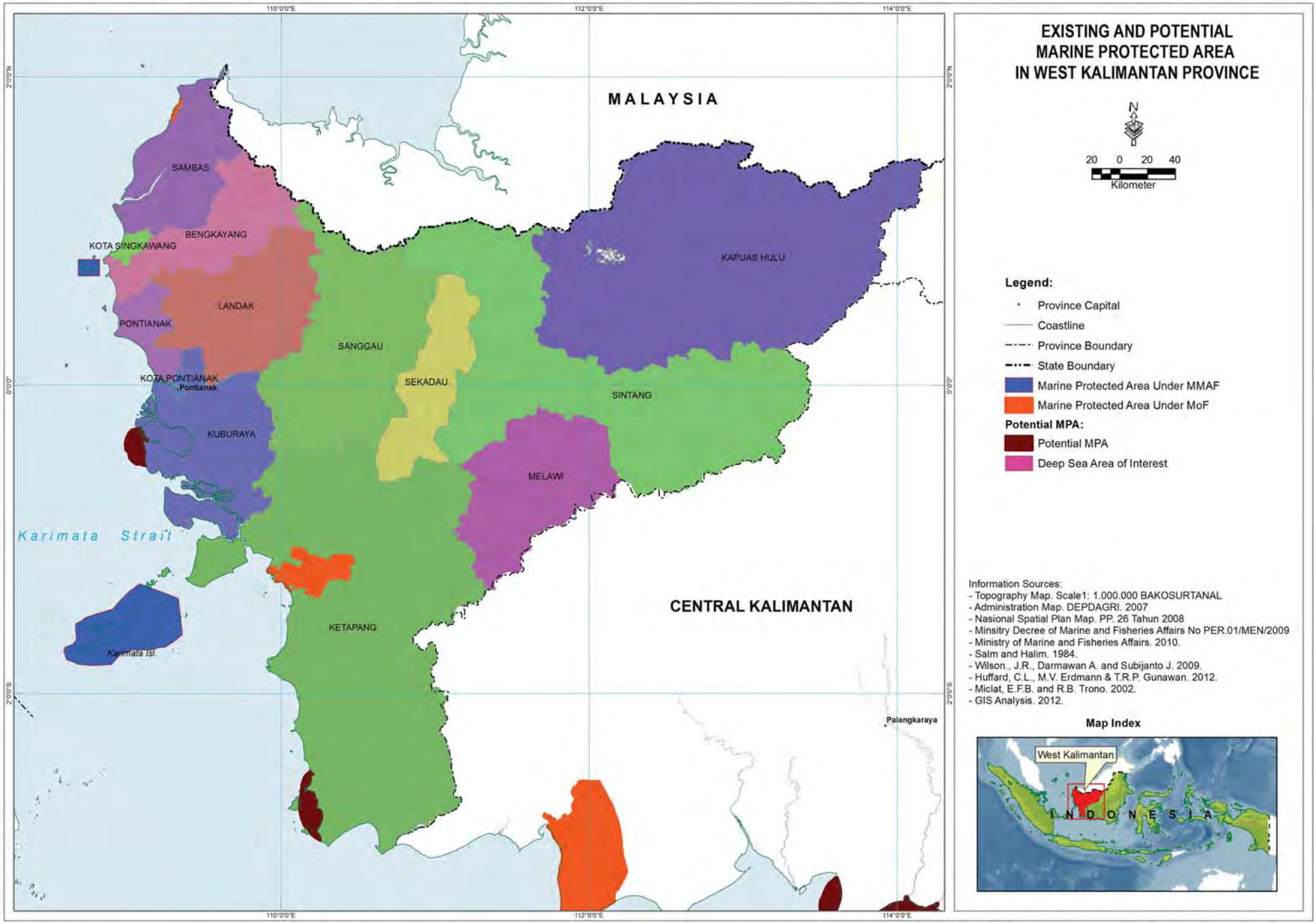
Potential MPA:

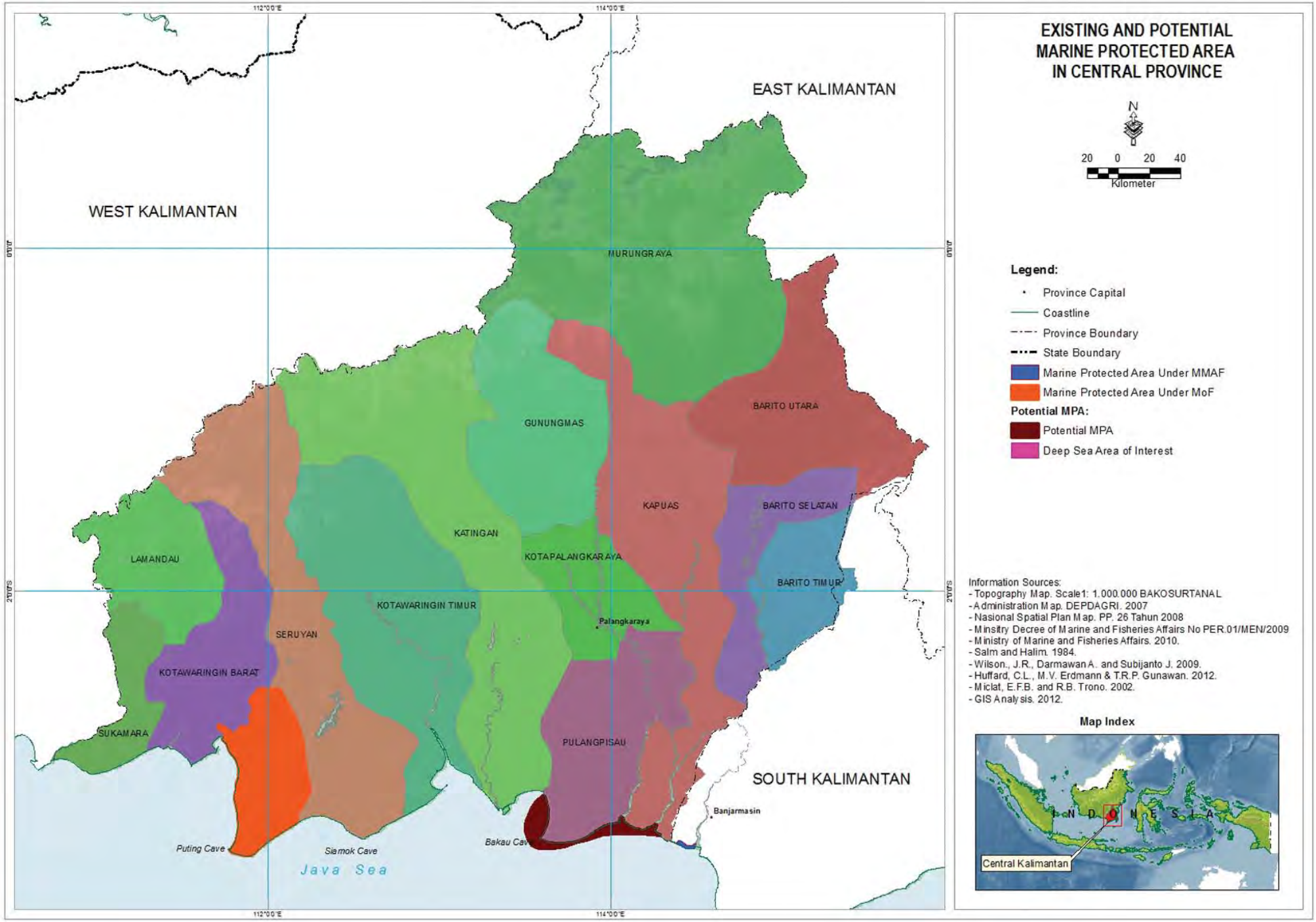
- Potential MPA
- Deep Sea Area of Interest

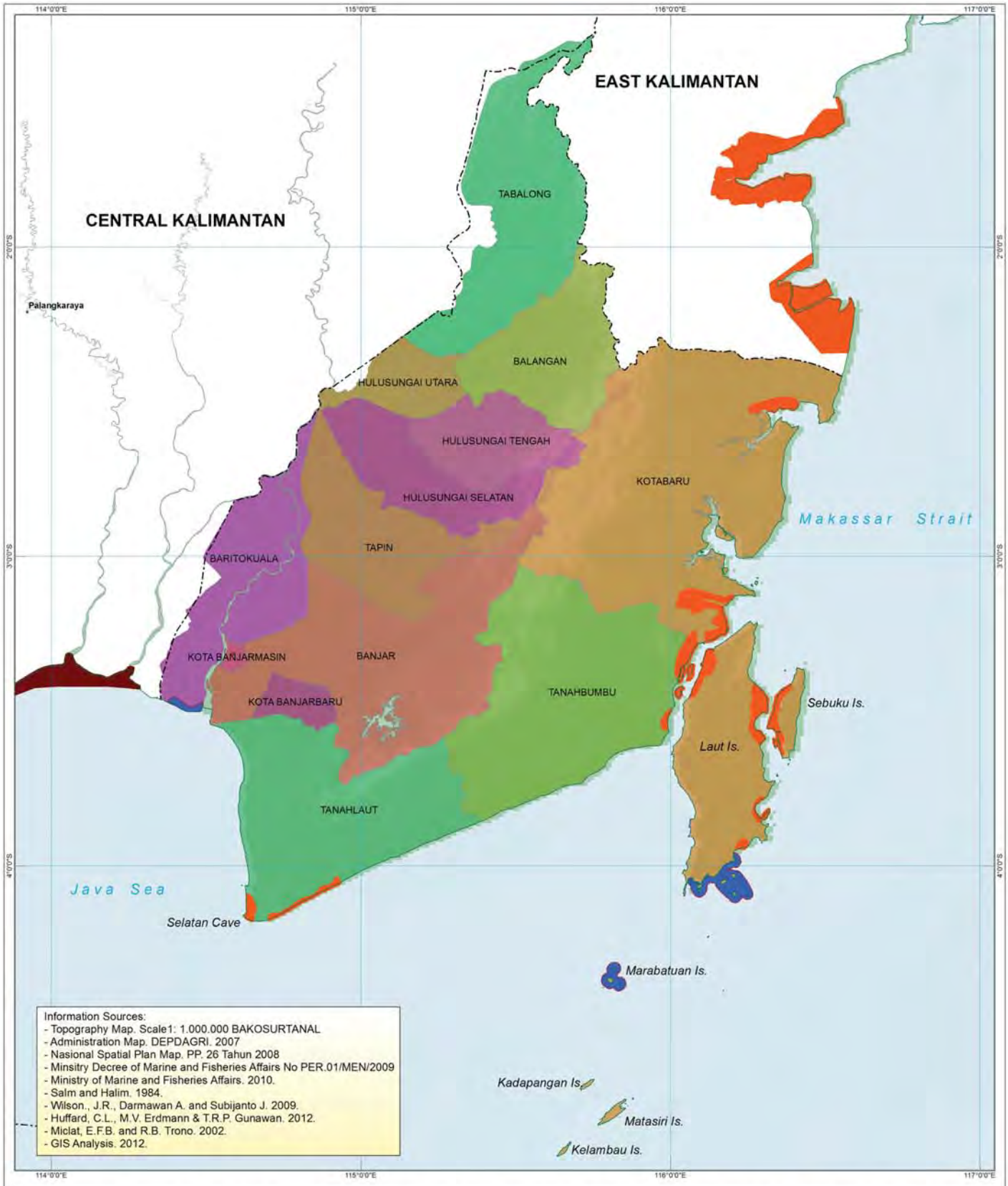
Information Sources:
- Topography Map. Scale1: 1,000,000 BAKOSURTANAL
- Administration Map. DEPDAGRI. 2007
- Nasional Spatial Plan Map. PP. 26 Tahun 2008
- Minsitry Decree of Marine and Fisheries Affairs No PER.01/MEN/2009
- Ministry of Marine and Fisheries Affairs. 2010.
- Salm and Halim. 1984.
- Wilson., J.R., Darmawan A. and Subijanto J. 2009.
- Huffard, C.L., M.V. Erdmann & T.R.P. Gunawan. 2012.
- Miclat, E.F.B. and R.B. Trono. 2002.
- GIS Analysis. 2012.

Map Index


EXISTING AND POTENTIAL
MARINE PROTECTED AREA
IN EAST NUSA TENGGARA PROVINCE
N
20 0 20 40
Kilometer
Legend:
Province Capital
Coastline
Province Boundary
Indonesian Teritory Boundary
Continent Shelf Boundary
Economy Exclusive Zone
Marine Protected Area Under MoF
Marine Protected Area Under MMAF
Potential MPA:
Potential MPA
Deep Sea Area of Interest
Flores Sea
Savu Sea
MANGGARAI BARAT
MANGGARAI
NGADA
ENDE
SIKKA
FLORES TIMUR
LEMBATA
ALOR
SUMBA BARAT
SUMBA TIMUR
BELU
TIMOR TENGAH UTARA
TIMOR TENGAH SELATAN
KUPANG
KOTA KUPANG
ROTE NDAO
120°0'0"E
122°0'0"E
124°0'0"E
8°0'0"S
10°0'0"S
12°0'0"S
Information Sources:
- Topography Map. Scale1: 1.000.000 BAKOSURTANAL
- Administration Map. DEPDAGRI. 2007
- Nasional Spatial Plan Map. PP. 26 Tahun 2008
- Minsitry Decree of Marine and Fisheries Affairs No PER.01/MEN/2009
- Ministry of Marine and Fisheries Affairs. 2010.
- Salm and Halim. 1984.
- Wilson., J.R., Darmawan A. and Subijanto J. 2009.
- Huffard, C.L., M.V. Erdmann & T.R.P. Gunawan. 2012.
- Miclat, E.F.B. and R.B. Trono. 2002.
- GIS Analysis. 2012.
Map Index
I N D O N E S I A
East Nusa Tenggara


EXISTING AND POTENTIAL
MARINE PROTECTED AREA
IN WEST KALIMANTAN PROVINCE
N
20 0 20 40
Kilometer
MALAYSIA
CENTRAL KALIMANTAN
SAMBAS
BENGKAYANG
KOTA SINGKAWANG
LANDAK
PONTIANAK
KOTA PONTIANAK
Pontianak
KUBURAYA
SANGGAU
SEKADAU
KAPUAS HULU
SINTANG
MELAWI
KETAPANG
Karimata Strait
Karimata Isl.
Palangkaraya
Legend:
Province Capital
Coastline
Province Boundary
State Boundary
Marine Protected Area Under MMAF
Marine Protected Area Under MoF
Potential MPA:
Potential MPA
Deep Sea Area of Interest
Information Sources:
- Topography Map. Scale1: 1.000.000 BAKOSURTANAL
- Administration Map. DEPDAGRI. 2007
- Nasional Spatial Plan Map. PP. 26 Tahun 2008
- Minsitry Decree of Marine and Fisheries Affairs No PER.01/MEN/2009
- Ministry of Marine and Fisheries Affairs. 2010.
- Salm and Halim. 1984.
- Wilson., J.R., Darmawan A. and Subijanto J. 2009.
- Huffard, C.L., M.V. Erdmann & T.R.P. Gunawan. 2012.
- Miclat, E.F.B. and R.B. Trono. 2002.
- GIS Analysis. 2012.
Map Index
West Kalimantan
I N D O N E S I A


EXISTING AND POTENTIAL
MARINE PROTECTED AREA
IN CENTRAL PROVINCE
N
20 0 20 40
Kilometer
Legend:
Province Capital
Coastline
Province Boundary
State Boundary
Marine Protected Area Under MMAF
Marine Protected Area Under MoF
Potential MPA:
Potential MPA
Deep Sea Area of Interest
Information Sources:
- Topography Map. Scale1: 1.000.000 BAKOSURTANAL
- Administration Map. DEPDAGRI. 2007
- Nasional Spatial Plan Map. PP. 26 Tahun 2008
- Minsitry Decree of Marine and Fisheries Affairs No PER.01/MEN/2009
- Ministry of Marine and Fisheries Affairs. 2010.
- Salm and Halim. 1984.
- Wilson., J.R., Darmawan A. and Subijanto J. 2009.
- Huffard, C.L., M.V. Erdmann & T.R.P. Gunawan. 2012.
- Miclat, E.F.B. and R.B. Trono. 2002.
- GIS Analysis. 2012.
Map Index
I N D O N E S I A
Central Kalimantan
EAST KALIMANTAN
WEST KALIMANTAN
SOUTH KALIMANTAN
MURUNGRAYA
GUNUNGMAS
BARITO UTARA
KAPUAS
BARITO SELATAN
KATINGAN
KOTAPALANGKARAYA
BARITO TIMUR
LAMANDAU
KOTAWARINGIN TIMUR
Palangkaraya
SERUYAN
KOTAWARINGIN BARAT
SUKAMARA
PULANGPISAU
Banjarmasin
Puting Cave
Siamok Cave
Bakau Cave
Java Sea
112°00'E
114°00'E
01°0'S
2°0'S



EXISTING AND POTENTIAL MARINE PROTECTED AREA IN SOUTH KALIMANTAN PROVINCE

Legend:

- Province Capital
- Coastline
- Province Boundary
- Marine Protected Area Under MMAF
- Marine Protected Area Under MoF

Potential MPA:

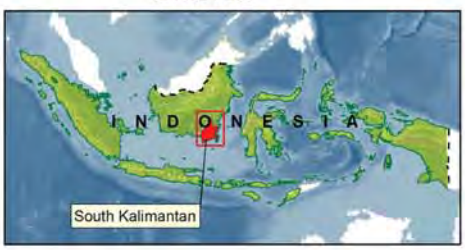
- Potential MPA
- Proposed MPA

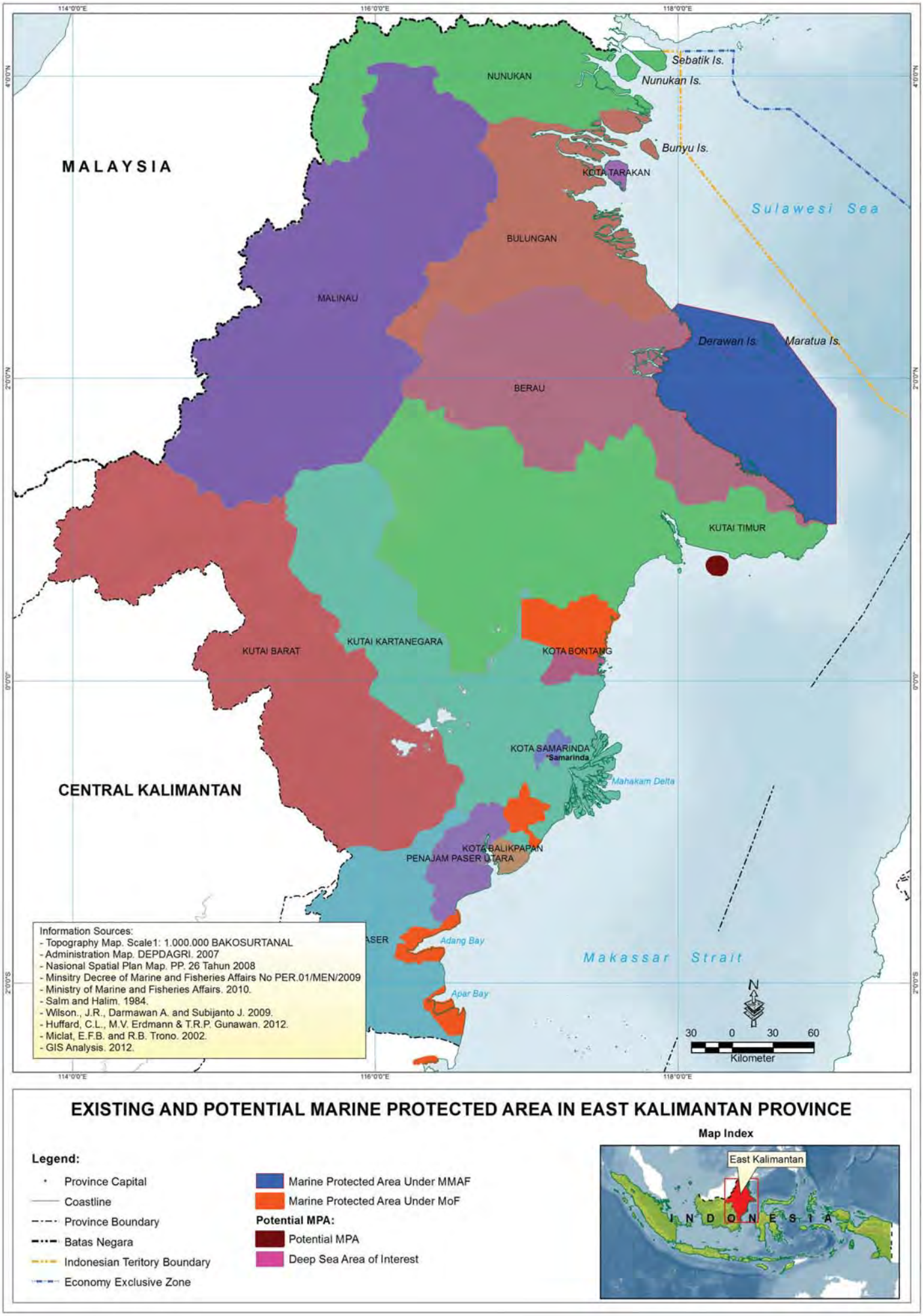
N

20 0 20 40

Kilometer

Indeks Peta





EXISTING AND POTENTIAL MARINE PROTECTED AREA IN EAST KALIMANTAN PROVINCE

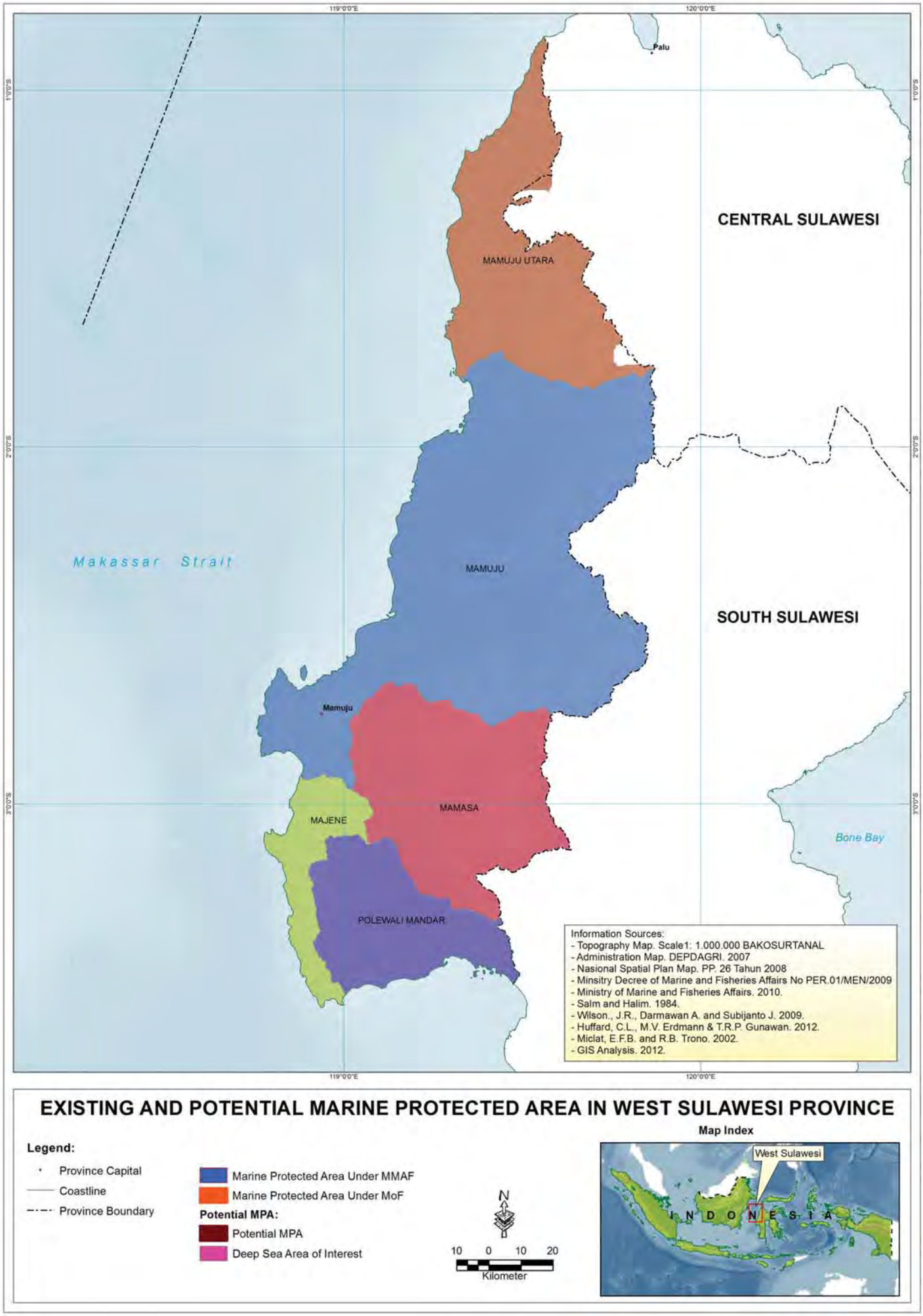
Legend:

- Province Capital
- Coastline
- Province Boundary
- Batas Negara
- Indonesian Teritory Boundary
- Economy Exclusive Zone
- Marine Protected Area Under MMAF
- Marine Protected Area Under MoF

Potential MPA:

- Potential MPA
- Deep Sea Area of Interest

Map Index



EXISTING AND POTENTIAL MARINE PROTECTED AREA IN WEST SULAWESI PROVINCE

Legend:

- Province Capital
- Coastline
- Province Boundary
- Marine Protected Area Under MMAF
- Marine Protected Area Under MoF

Potential MPA:

- Potential MPA
- Deep Sea Area of Interest

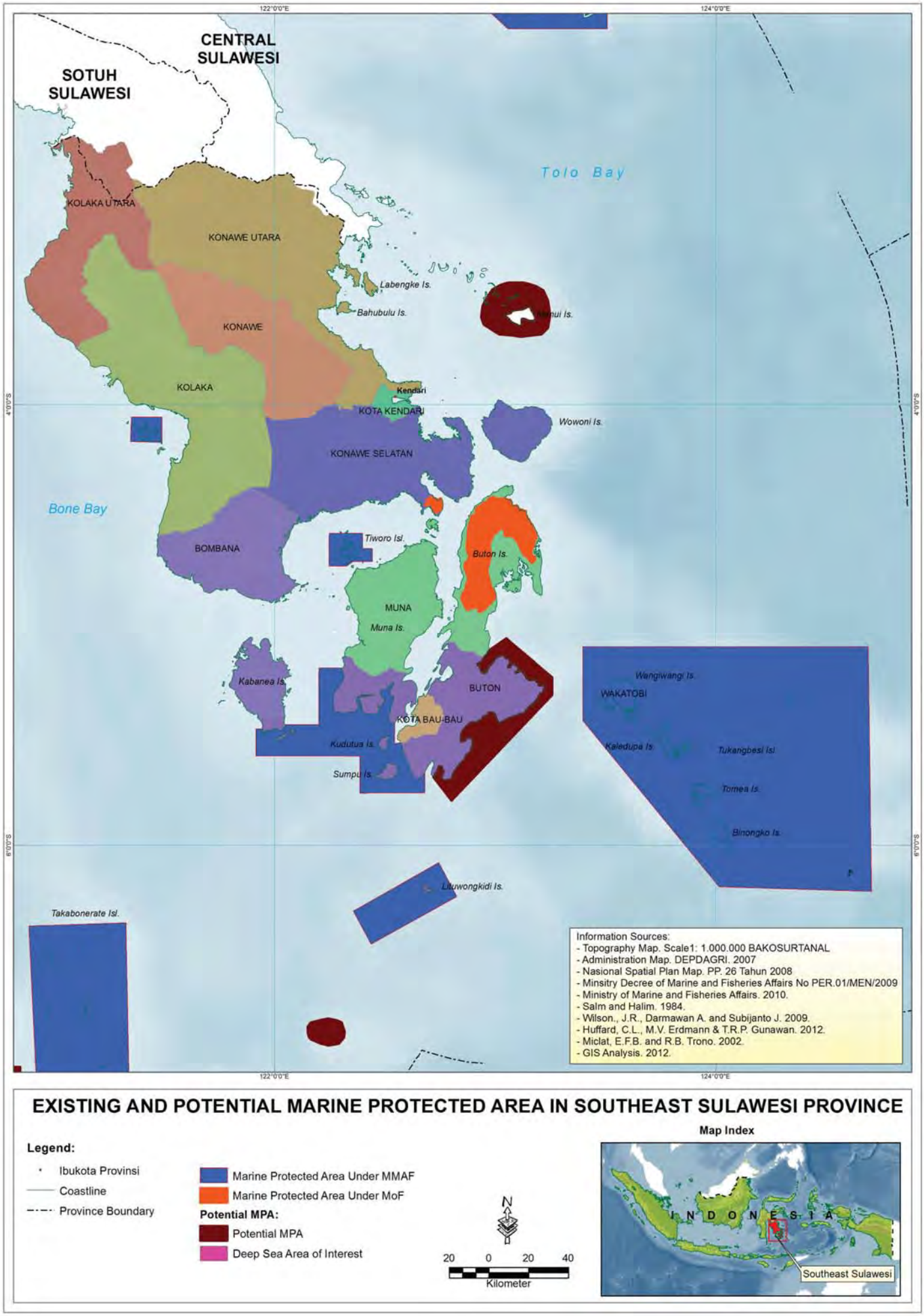
N

10 0 10 20

Kilometer

Map Index


96°0'0"E
97°30'0"E
6°0'0"N
4°30'0"N
3°0'0"N
Weh Is.
KOTA SABANG
Malacca Strait
KOTA BANDAACEH
ACEH BESAR
PIDIE JAYA
BIREUEN
KOTA LHOKSEUMAWE
ACEH UTARA
PIDIE
ACEH JAYA
BENER MERIAH
ACEH TIMUR
ACEH TENGAH
ACEH BARAT
KOTA LANGSA
ACEH TAMIANG
NAGANRAYA
GAYOLUES
ACEH BARAT DAYA
NORTH SUMATERA
INDIAN OCEAN
ACEH TENGGARA
ACEH SELATAN
Simeuleu Is.
SIMEULUE
KOTA SUBULUSSALAM
ACEH SINGKIL
20 0 20 40
Kilometers
Banyak Isl.
Information Sources:
- Topography Map. Scale1: 1.000.000 BAKOSURTANAL
- Administration Map. DEPDAGRI. 2007
- Nasional Spatial Plan Map. PP. 26 Tahun 2008
- Minsitry Decree of Marine and Fisheries Affairs No PER.01/MEN/2009
- Ministry of Marine and Fisheries Affairs. 2010.
- Salm and Halim. 1984.
- Wilson., J.R., Darmawan A. and Subijanto J. 2009.
- Huffard, C.L., M.V. Erdmann & T.R.P. Gunawan. 2012.
- Miclat, E.F.B. and R.B. Trono. 2002.
- GIS Analysis. 2012.
EXISTING AND POTENTIAL MARINE PROTECTED AREA IN ACEH PROVINCE
Legend:
Province Capital
Distrik Capital
Coastline
Province Boundary
Indonesian Teritory Boundary
Economy Exclusive Zone
Marine Protected Area Under MMAF
Marine Protected Area Under MoF
Potential MPA:
Potential MPA
Deep Sea Area of Interest
Map Index
I N D O N E S I A
Aceh Province



EXISTING AND POTENTIAL MARINE PROTECTED AREA IN SOUTHEAST SULAWESI PROVINCE

Legend:

- Ibukota Provinsi
- Coastline
- Province Boundary
- Marine Protected Area Under MMAF
- Marine Protected Area Under MoF

Potential MPA:

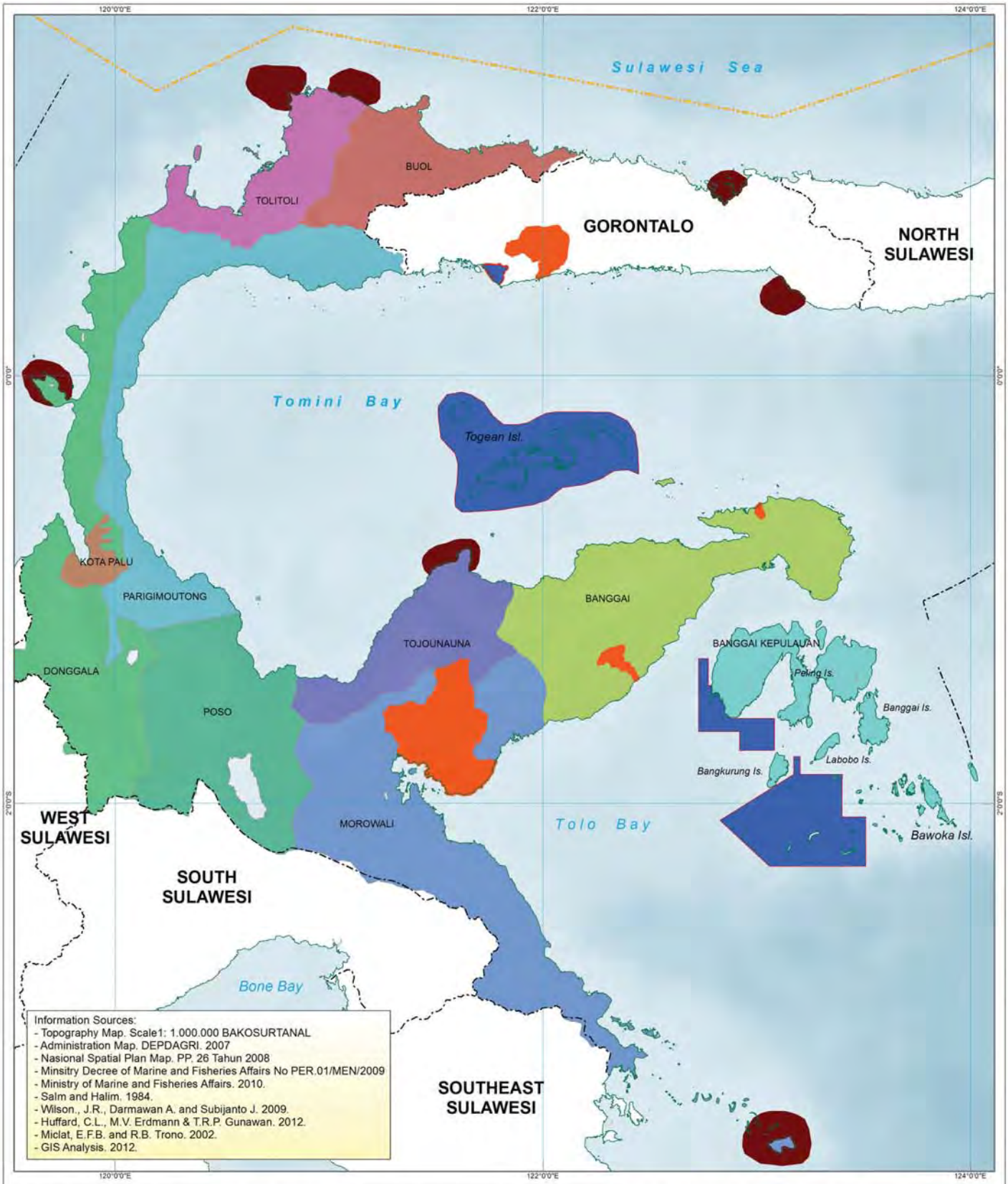
- Potential MPA
- Deep Sea Area of Interest

N

20 0 20 40

Kilometer

Map Index



EXISTING AND POTENTIAL MARINE PROTECTED AREA IN CENTRAL SULAWESI PROVINCE

Legend:

- Coastline
- Province Boundary
- Indonesia Teritory Boundary
- Marine Protected Area Under MMAF
- Marine Protected Area Under MoF

Potential MPA:

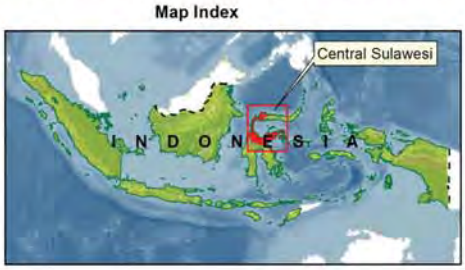
- Potential MPA
- Deep Sea Area of Interest

N

20 0 20 40

Kilometer

Map Index



EXISTING AND POTENTIAL MARINE PROTECTED AREA IN ACEH PROVINCE

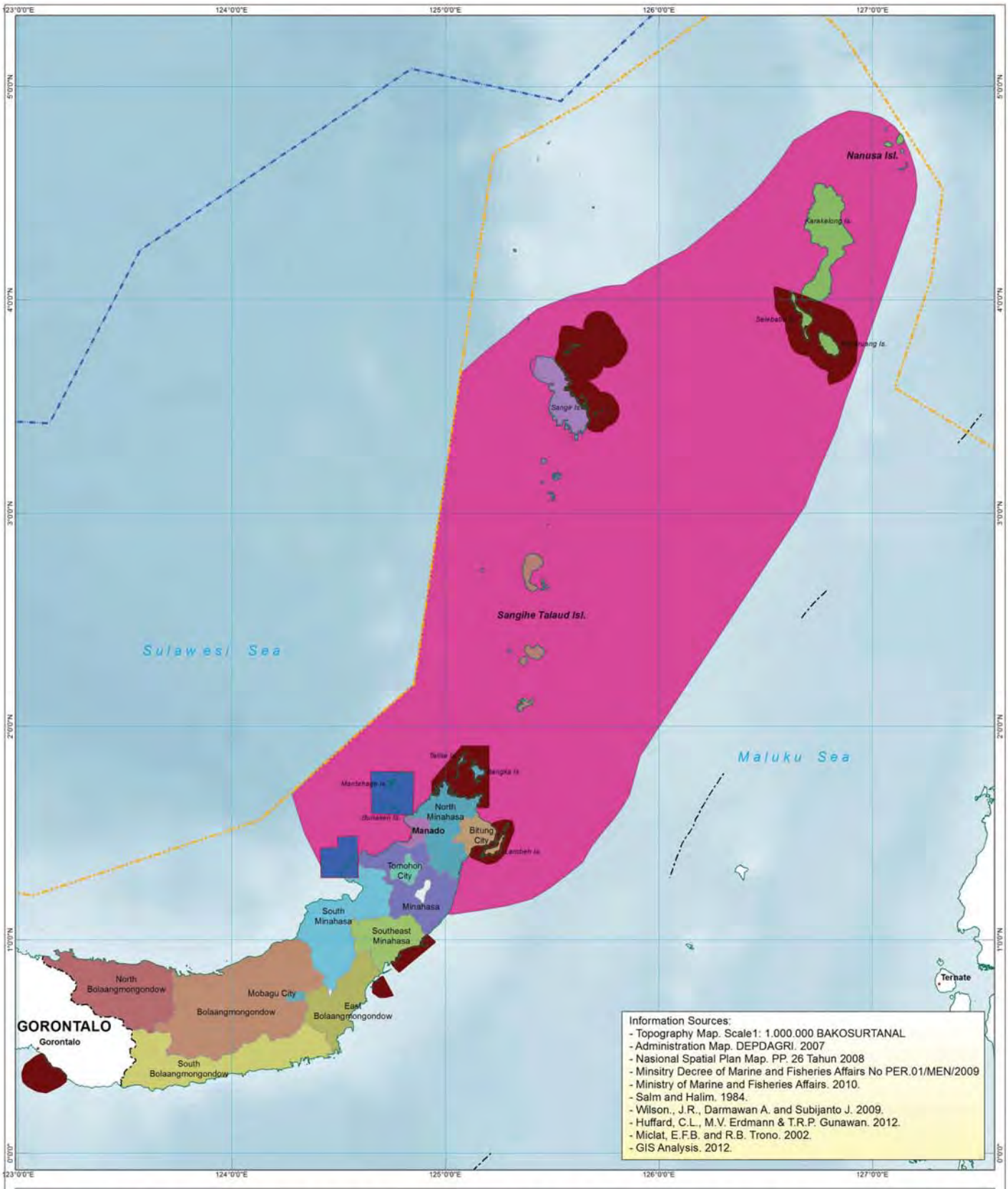
Legend:

- Province Capital
- Distrik Capital
- Coastline
- Province Boundary
- Indonesian Teritory Boundary
- Economy Exclusive Zone
- Marine Protected Area Under MMAF
- Marine Protected Area Under MoF

Potential MPA:

- Potential MPA
- Deep Sea Area of Interest

Map Index



EXISTING AND POTENTIAL MARINE PROTECTED AREA IN NORTH SULAWESI PROVINCE

Legend:

- Province Capital
- Coastline
- Province Boundary
- Indonesian Teritory Boundary
- Economy Exclusive Zone
- Marine Protected Area under MMAF
- Protected Area under MoF

Potential MPA:

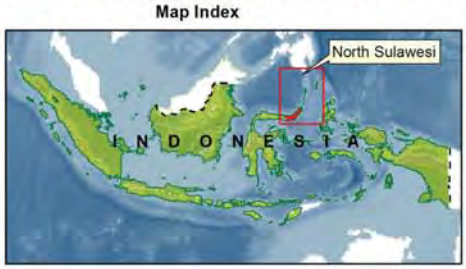
- Potential MPA
- Deep Sea Area of Interest

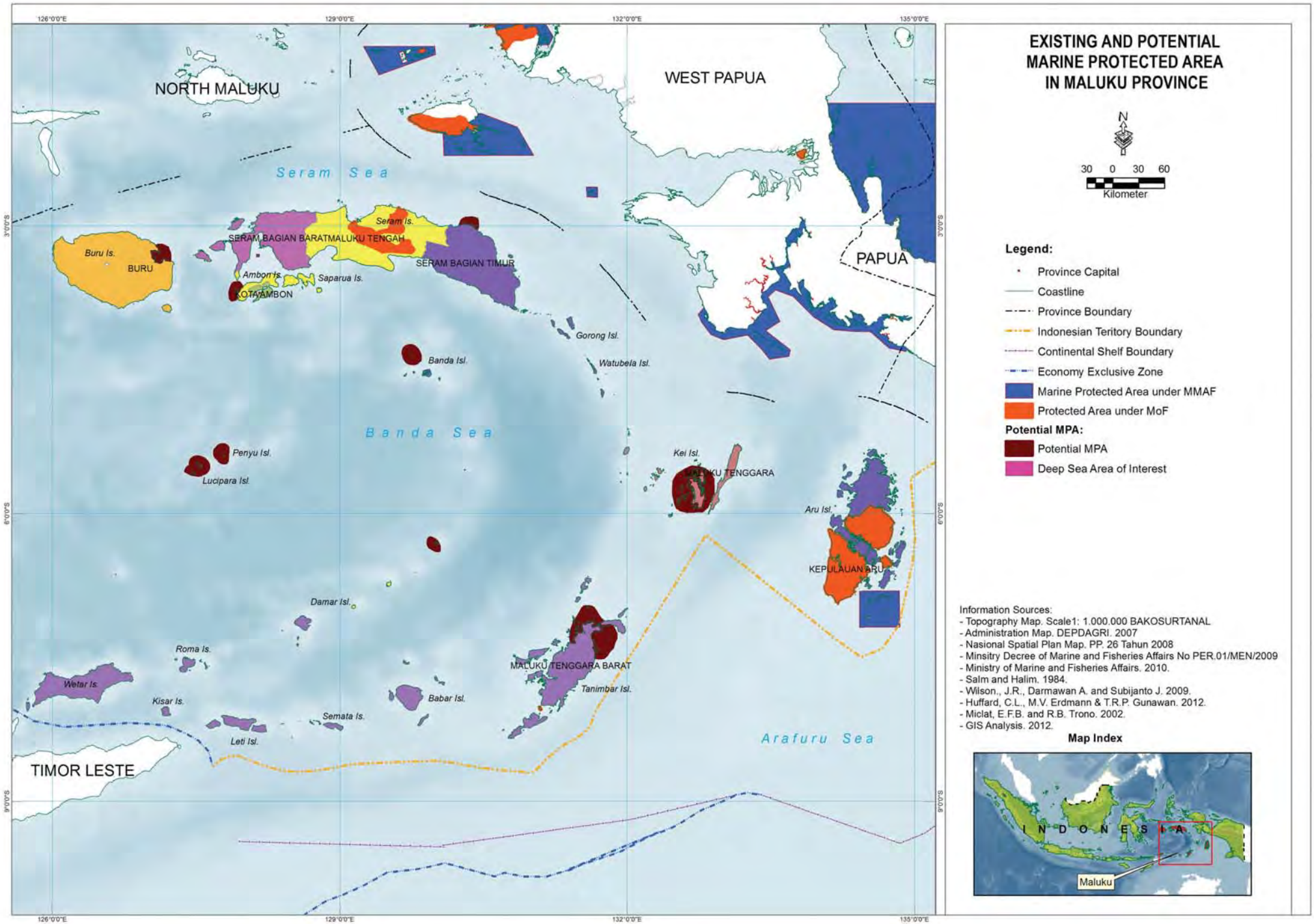
N

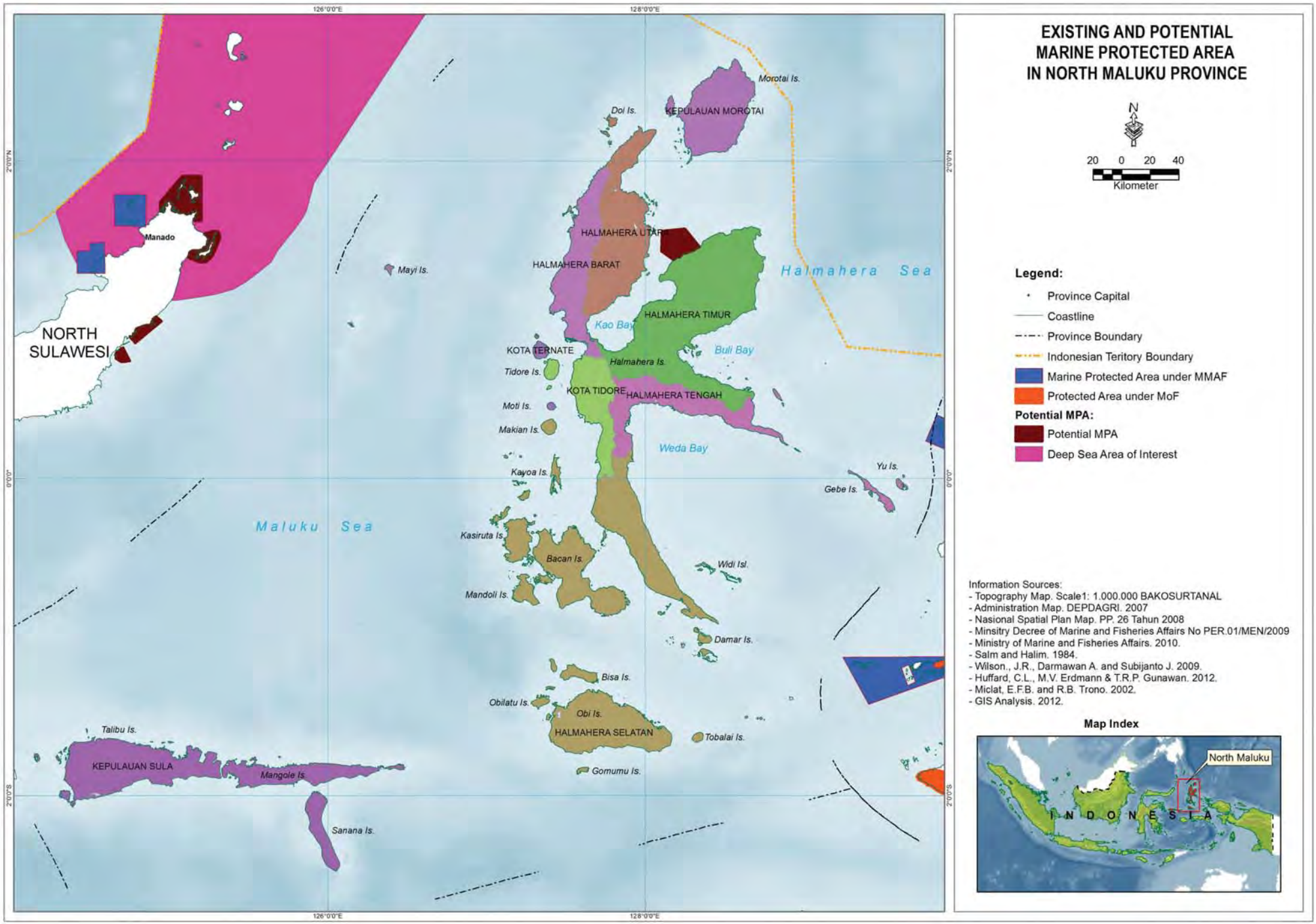
20 0 20 40

Kilometer

Map Index




EXISTING AND POTENTIAL MARINE PROTECTED AREA IN MALUKU PROVINCE
N
30 0 30 60
Kilometer
Legend:
Province Capital
Coastline
Province Boundary
Indonesian Teritory Boundary
Continental Shelf Boundary
Economy Exclusive Zone
Marine Protected Area under MMAF
Protected Area under MoF
Potential MPA:
Potential MPA
Deep Sea Area of Interest
Information Sources:
- Topography Map. Scale1: 1.000.000 BAKOSURTANAL
- Administration Map. DEPDAGRI. 2007
- Nasional Spatial Plan Map. PP. 26 Tahun 2008
- Minsitry Decree of Marine and Fisheries Affairs No PER.01/MEN/2009
- Ministry of Marine and Fisheries Affairs. 2010.
- Salm and Halim. 1984.
- Wilson., J.R., Darmawan A. and Subijanto J. 2009.
- Huffard, C.L., M.V. Erdmann & T.R.P. Gunawan. 2012.
- Miclat, E.F.B. and R.B. Trono. 2002.
- GIS Analysis. 2012.
Map Index
I N D O N E S I A
Maluku
NORTH MALUKU
WEST PAPUA
PAPUA
Seram Sea
Banda Sea
Arafuru Sea
TIMOR LESTE
SERAM BAGIAN BARAT
MALUKU TENGAH
SERAM BAGIAN TIMUR
BURU
KOTA AMBON
MALUKU TENGGARA
KEPULAUAN ARU
MALUKU TENGGARA BARAT
Buru Is.
Seram Is.
Ambon Is.
Saparua Is.
Gorong Isl.
Watubela Isl.
Banda Isl.
Penyu Isl.
Lucipara Isl.
Kei Isl.
Aru Isl.
Damar Isl.
Roma Is.
Wetar Is.
Kisar Is.
Semata Is.
Leti Isl.
Babar Isl.
Tanimbar Isl.
126°0'0"E
129°0'0"E
132°0'0"E
135°0'0"E
3°0'0"S
6°0'0"S
9°0'0"S



EXISTING AND POTENTIAL MARINE PROTECTED AREA IN NORTH MALUKU PROVINCE

N

20 0 20 40

Kilometer

Legend:

- Province Capital
- Coastline
- Province Boundary
- Indonesian Teritory Boundary
- Marine Protected Area under MMAF
- Protected Area under MoF

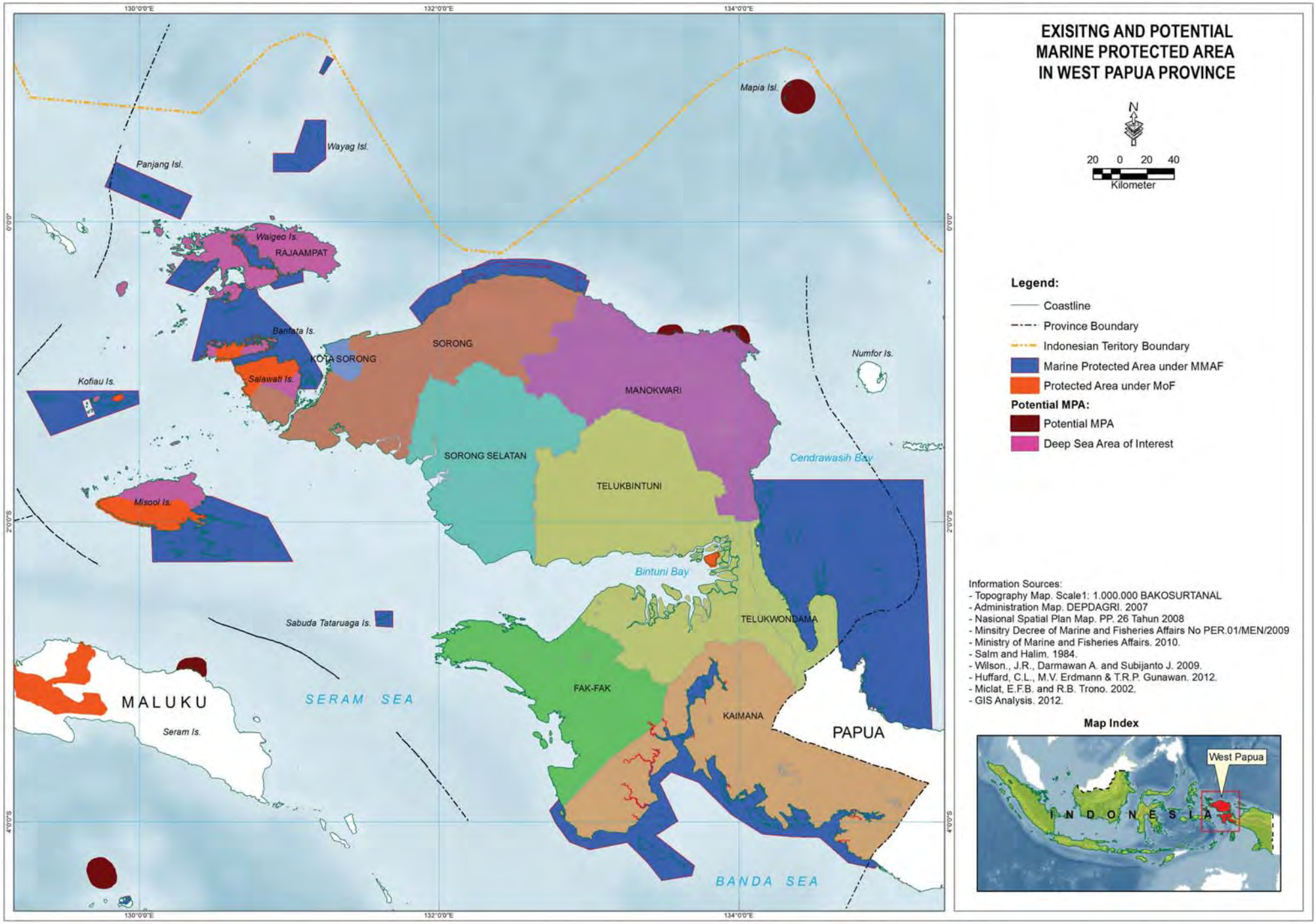
Potential MPA:

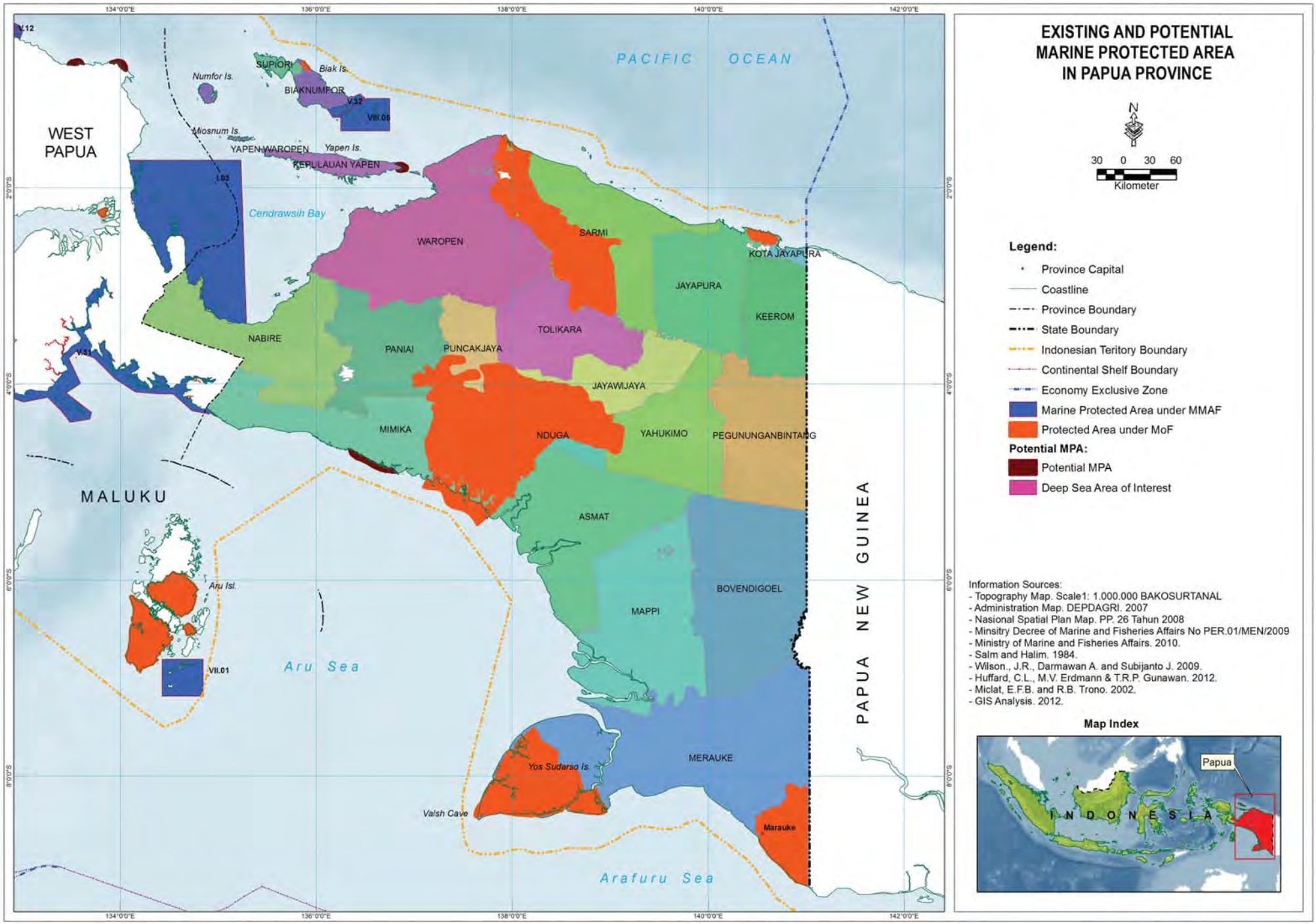
- Potential MPA
- Deep Sea Area of Interest

Information Sources:

- Topography Map. Scale1: 1.000.000 BAKOSURTANAL
- Administration Map. DEPDAGRI. 2007
- Nasional Spatial Plan Map. PP. 26 Tahun 2008
- Minsitry Decree of Marine and Fisheries Affairs No PER.01/MEN/2009
- Ministry of Marine and Fisheries Affairs. 2010.
- Salm and Halim. 1984.
- Wilson., J.R., Darmawan A. and Subijanto J. 2009.
- Huffard, C.L., M.V. Erdmann & T.R.P. Gunawan. 2012.
- Miclat, E.F.B. and R.B. Trono. 2002.
- GIS Analysis. 2012.

Map Index


EXISITNG AND POTENTIAL
MARINE PROTECTED AREA
IN WEST PAPUA PROVINCE
N
20 0 20 40
Kilometer
Legend:
Coastline
Province Boundary
Indonesian Teritory Boundary
Marine Protected Area under MMAF
Protected Area under MoF
Potential MPA:
Potential MPA
Deep Sea Area of Interest
Information Sources:
- Topography Map. Scale1: 1.000.000 BAKOSURTANAL
- Administration Map. DEPDAGRI. 2007
- Nasional Spatial Plan Map. PP. 26 Tahun 2008
- Minsitry Decree of Marine and Fisheries Affairs No PER.01/MEN/2009
- Ministry of Marine and Fisheries Affairs. 2010.
- Salm and Halim. 1984.
- Wilson., J.R., Darmawan A. and Subijanto J. 2009.
- Huffard, C.L., M.V. Erdmann & T.R.P. Gunawan. 2012.
- Miclat, E.F.B. and R.B. Trono. 2002.
- GIS Analysis. 2012.
Map Index
West Papua
I N D O N E S I A
Mapia Isl.
Wayag Isl.
Panjang Isl.
Waigeo Is.
RAJAAMPAT
Batanta Is.
Salawati Is.
KOTA SORONG
SORONG
MANOKWARI
Numfor Is.
Kofiau Is.
SORONG SELATAN
TELUKBINTUNI
Cendrawasih Bay
Misool Is.
Bintuni Bay
TELUKWONDAMA
Sabuda Tataruaga Is.
FAK-FAK
KAIMANA
PAPUA
MALUKU
Seram Is.
SERAM SEA
BANDA SEA
130°0'0"E
132°0'0"E
134°0'0"E
0°0'0"
2°0'0"S
4°0'0"S


EXISTING AND POTENTIAL MARINE PROTECTED AREA IN PAPUA PROVINCE
PACIFIC OCEAN
WEST PAPUA
MALUKU
PAPUA NEW GUINEA
Aru Sea
Arafuru Sea
Cendrawsih Bay
Numfor Is.
Biak Is.
Miosnum Is.
Yapen Is.
Yos Sudarso Is.
Valsh Cave
Aru Isl.
SUPIORI
BIAKNUMFOR
YAPEN-WAROPEN
KEPULAUAN YAPEN
WAROPEN
SARMI
KOTA JAYAPURA
JAYAPURA
KEEROM
TOLIKARA
NABIRE
PANIAI
PUNCAKJAYA
JAYAWIJAYA
MIMIKA
NDUGA
YAHUKIMO
PEGUNUNGANBINTANG
ASMAT
BOVENDIGOEL
MAPPI
MERAUKE
Marauke
V.12
V.32
VIII.06
I.03
V.31
VII.01
134°0'0"E
136°0'0"E
138°0'0"E
140°0'0"E
142°0'0"E
2°0'0"S
4°0'0"S
6°0'0"S
8°0'0"S
N
30 0 30 60
Kilometer
Legend:
Province Capital
Coastline
Province Boundary
State Boundary
Indonesian Teritory Boundary
Continental Shelf Boundary
Economy Exclusive Zone
Marine Protected Area under MMAF
Protected Area under MoF
Potential MPA:
Potential MPA
Deep Sea Area of Interest
Information Sources:
- Topography Map. Scale1: 1.000.000 BAKOSURTANAL
- Administration Map. DEPDAGRI. 2007
- Nasional Spatial Plan Map. PP. 26 Tahun 2008
- Minsitry Decree of Marine and Fisheries Affairs No PER.01/MEN/2009
- Ministry of Marine and Fisheries Affairs. 2010.
- Salm and Halim. 1984.
- Wilson., J.R., Darmawan A. and Subijanto J. 2009.
- Huffard, C.L., M.V. Erdmann & T.R.P. Gunawan. 2012.
- Miclat, E.F.B. and R.B. Trono. 2002.
- GIS Analysis. 2012.
Map Index
Papua
I N D O N E S I A

APPENDIX 5

EXISTING AND POTENTIAL MARINE PROTECTED AREA IN FISHERIES MANAGEMENT AREA RI 571 (WPP-RI 571)

Legend:

- Province Capital
- Coastline
- Province Boundary
- State Boundary
- Indonesian Teritory Boundary
- Continental Shelf Boundary
- Economy Exclusive Zone
- Marine Protected Area under MMAF
- Protected Area under MoF
- WPP-RI-571

Potential MPA

- Potential MPA
- Deep Sea Area of Interest

Information Sources:
- Topography Map. Scale1: 1.000.000 BAKOSURTANAL
- Administration Map. DEPDAGRI. 2007
- Nasional Spatial Plan Map. PP. 26 Tahun 2008
- Minsitry Decree of Marine and Fisheries Affairs No PER.01/MEN/2009
- Ministry of Marine and Fisheries Affairs. 2010.
- Salm and Halim. 1984.
- Wilson., J.R., Darmawan A. and Subijanto J. 2009.
- Huffard, C.L., M.V. Erdmann & T.R.P. Gunawan. 2012.
- Miclat, E.F.B. and R.B. Trono. 2002.
- GIS Analysis. 2012.

EXISTING AND POTENTIAL MARINE PROTECTED AREA IN FISHERIES MANAGEMENT AREA RI 572 (WPP-RI 572)

Legend:

- Province Capital
- Coastline
- Province Boundary
- Batas Negara
- Indonesian Teritory Boundary
- Continental Shelf Boundary
- Economy Exclusive Zone
- Marine Protected Area under MMAF
- Protected Area under MoF
- WPP-RI-572

Potential MPA

- Potential MPA
- Deep Sea Area of Interest

Information Sources:
- Topography Map. Scale1: 1.000.000 BAKOSURTANAL
- Administration Map. DEPDAGRI. 2007
- Nasional Spatial Plan Map. PP. 26 Tahun 2008
- Minsitry Decree of Marine and Fisheries Affairs No PER.01/MEN/2009
- Ministry of Marine and Fisheries Affairs. 2010.
- Salm and Halim. 1984.
- Wilson., J.R., Darmawan A. and Subijanto J. 2009.
- Huffard, C.L., M.V. Erdmann & T.R.P. Gunawan. 2012.
- Miclat, E.F.B. and R.B. Trono. 2002.
- GIS Analysis. 2012.

EXISTING AND POTENTIAL MARINE PROTECTED AREA IN FISHERIES MANAGEMENT AREA RI 573 (WPP-RI 573)

Legend:

- Province Capital
- Coastline
- Province Boundary
- State Boundary
- Indonesian Teritory Boundary
- Continental Shelf Boundary
- Economy Exclusive Zone
- Marine Protected Area under MMAF
- Protected Area under MoF
- WPP-RI-573

Potential MPA

- Potential MPA
- Deep Sea Area of Interest

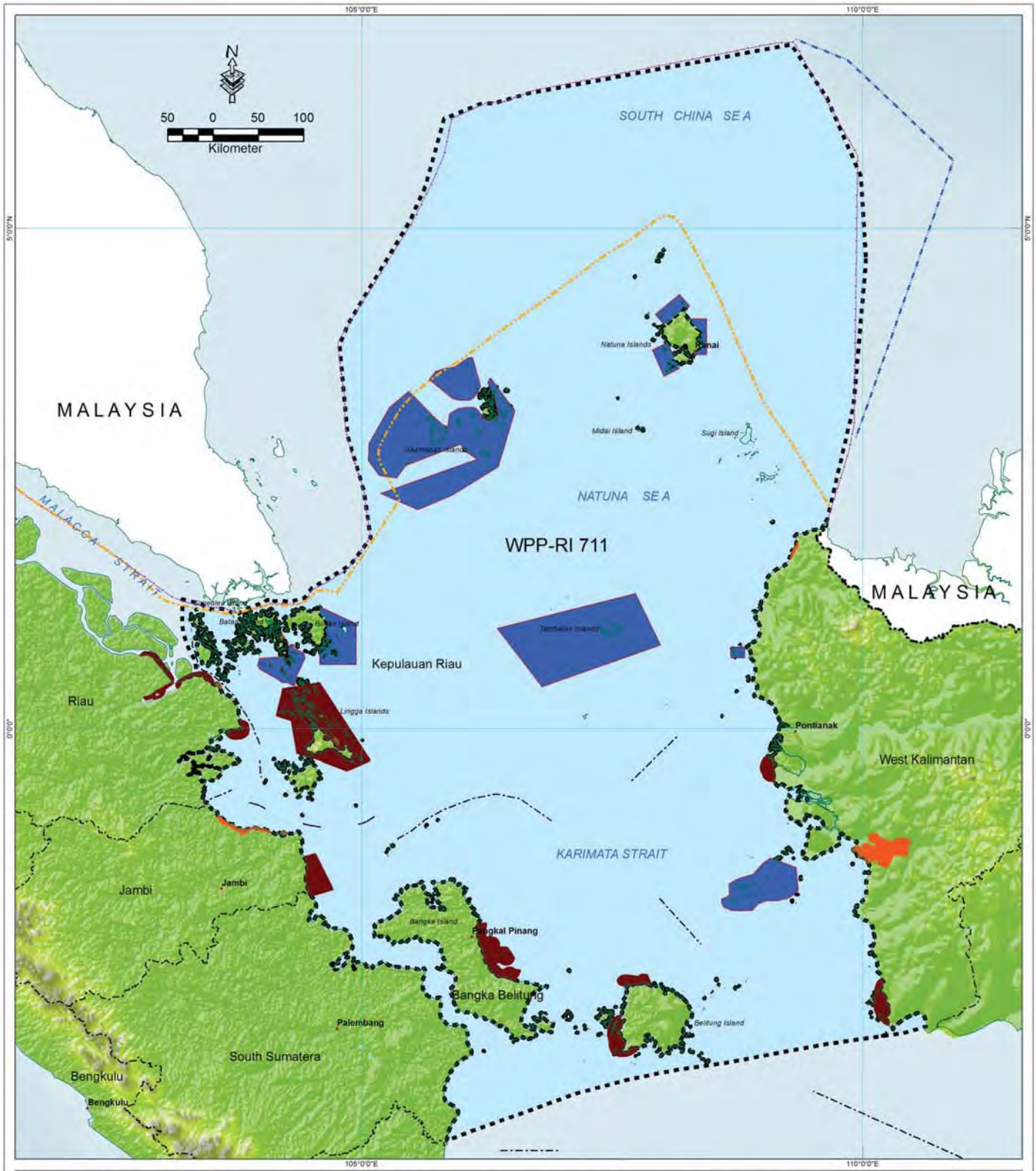
N

75 0 75 150

Kilometer

Information Sources:

- Topography Map. Scale1: 1.000.000 BAKOSURTANAL
- Administration Map. DEPDAGRI. 2007
- Nasional Spatial Plan Map. PP. 26 Tahun 2008
- Minsitry Decree of Marine and Fisheries Affairs No PER.01/MEN/2009
- Ministry of Marine and Fisheries Affairs. 2010.
- Salm and Halim. 1984.
- Wilson., J.R., Darmawan A. and Subijanto J. 2009.
- Huffard, C.L., M.V. Erdmann & T.R.P. Gunawan. 2012.
- Miclat, E.F.B. and R.B. Trono. 2002.
- GIS Analysis. 2012.



EXISTING AND POTENTIAL MARINE PROTECTED AREA IN FISHERIES MANAGEMENT AREA RI 711 (WPP-RI 711)

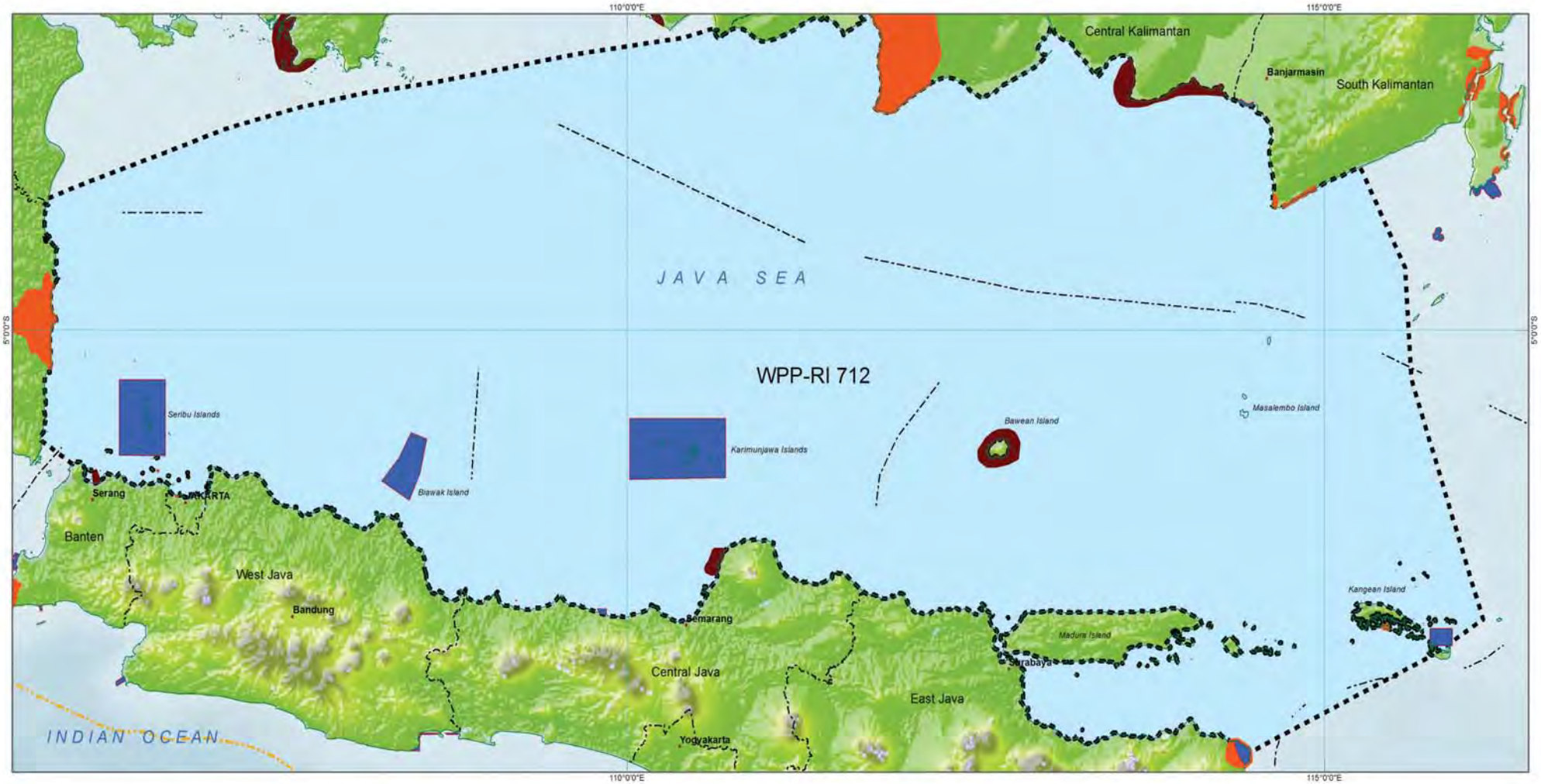
Legend:

- Province Capital
- Coastline
- Province Boundary
- State Boundary
- Indonesian Teritory Boundary
- Continental Shelf Boundary
- Economy Exclusive Zone
- Marine Protected Area under MMAF
- Protected Area under MoF
- WPP-RI-711

Potential for MPA

- Potential Area
- Deep Sea Area of Interest

Information Sources:
- Topography Map. Scale1: 1.000.000 BAKOSURTANAL
- Administration Map. DEPDAGRI. 2007
- Nasional Spatial Plan Map. PP. 26 Tahun 2008
- Minsitry Decree of Marine and Fisheries Affairs No PER.01/MEN/2009
- Ministry of Marine and Fisheries Affairs. 2010.
- Salm and Halim. 1984.
- Wilson., J.R., Darmawan A. and Subijanto J. 2009.
- Huffard, C.L., M.V. Erdmann & T.R.P. Gunawan. 2012.
- Miclat, E.F.B. and R.B. Trono. 2002.
- GIS Analysis. 2012.



EXISTING AND POTENTIAL MARINE PROTECTED AREA IN FISHERIES MANAGEMENT AREA RI 712 (WPP-RI 712)

Legend:

- Province Capital
- Coastline
- Province Boundary
- State Boundary
- Indonesian Teritory Boundary
- Continental Shelf Boundary
- Economy Exclusive Zone
- Marine Protected Area under MMAF
- Protected Area under MoF
- WPP-RI-712

Potential MPA

- Potential MPA
- Deep Sea Area of Interest

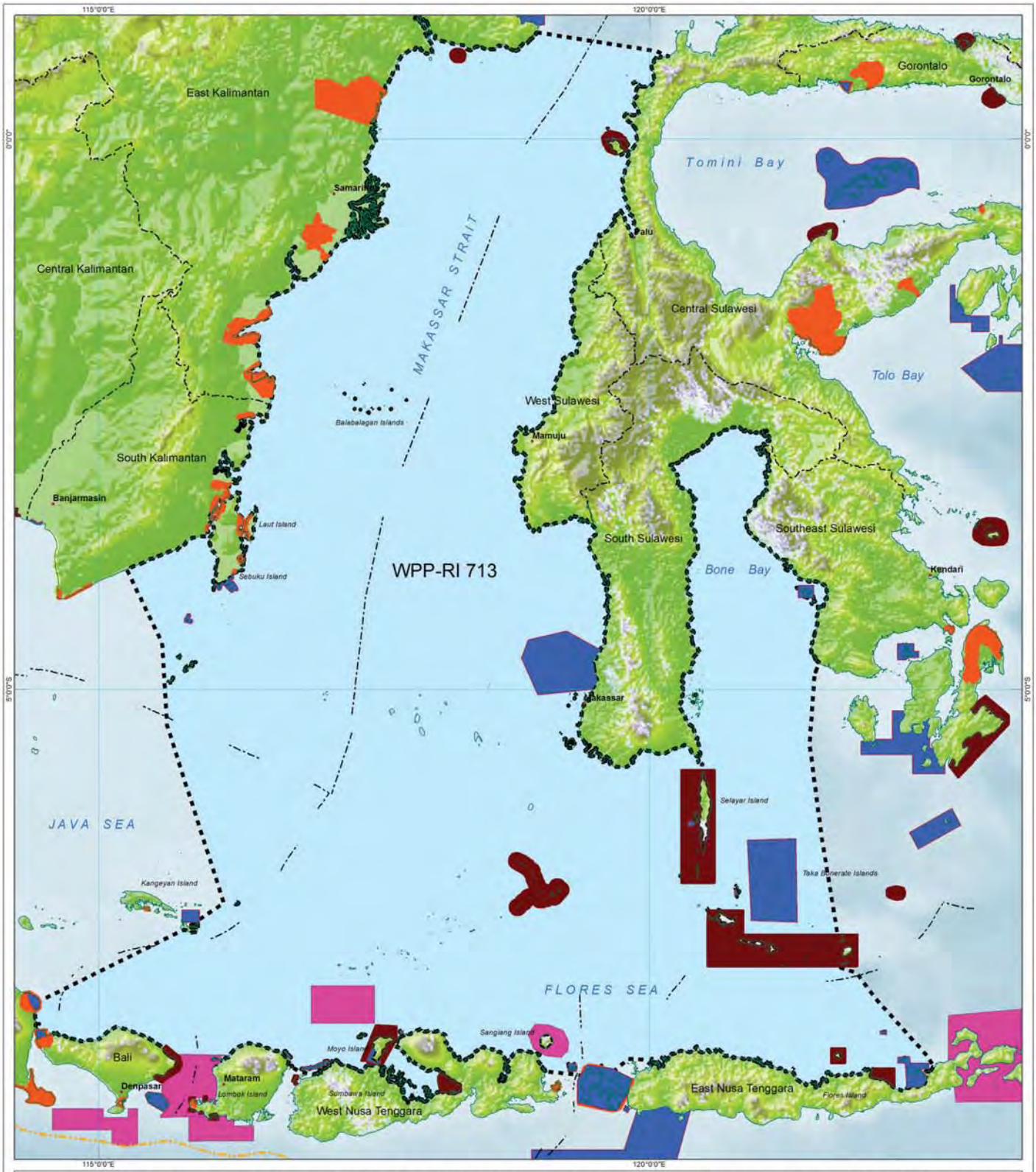
N

30 0 30 60

Kilometer

Information Sources:

- Topography Map. Scale1: 1.000.000 BAKOSURTANAL
- Administration Map. DEPDAGRI. 2007
- Nasional Spatial Plan Map. PP. 26 Tahun 2008
- Minsitry Decree of Marine and Fisheries Affairs No PER.01/MEN/2009
- Ministry of Marine and Fisheries Affairs. 2010.
- Salm and Halim. 1984.
- Wilson., J.R., Darmawan A. and Subijanto J. 2009.
- Huffard, C.L., M.V. Erdmann & T.R.P. Gunawan. 2012.
- Miclat, E.F.B. and R.B. Trono. 2002.
- GIS Analysis. 2012.



EXISTING AND POTENTIAL MARINE PROTECTED AREA IN FISHERIES MANAGEMENT AREA RI 713 (WPP-RI 713)

Legend:

- Province Capital
- Coastline
- Province Boundary
- State Boundary
- Indonesian Teritory Boundary
- Continental Shelf Boundary
- Economy Exclusive Zone

- Marine Protected Area under MMAF
- Protected Area under MoF
- WPP-RI-713

Potential MPA

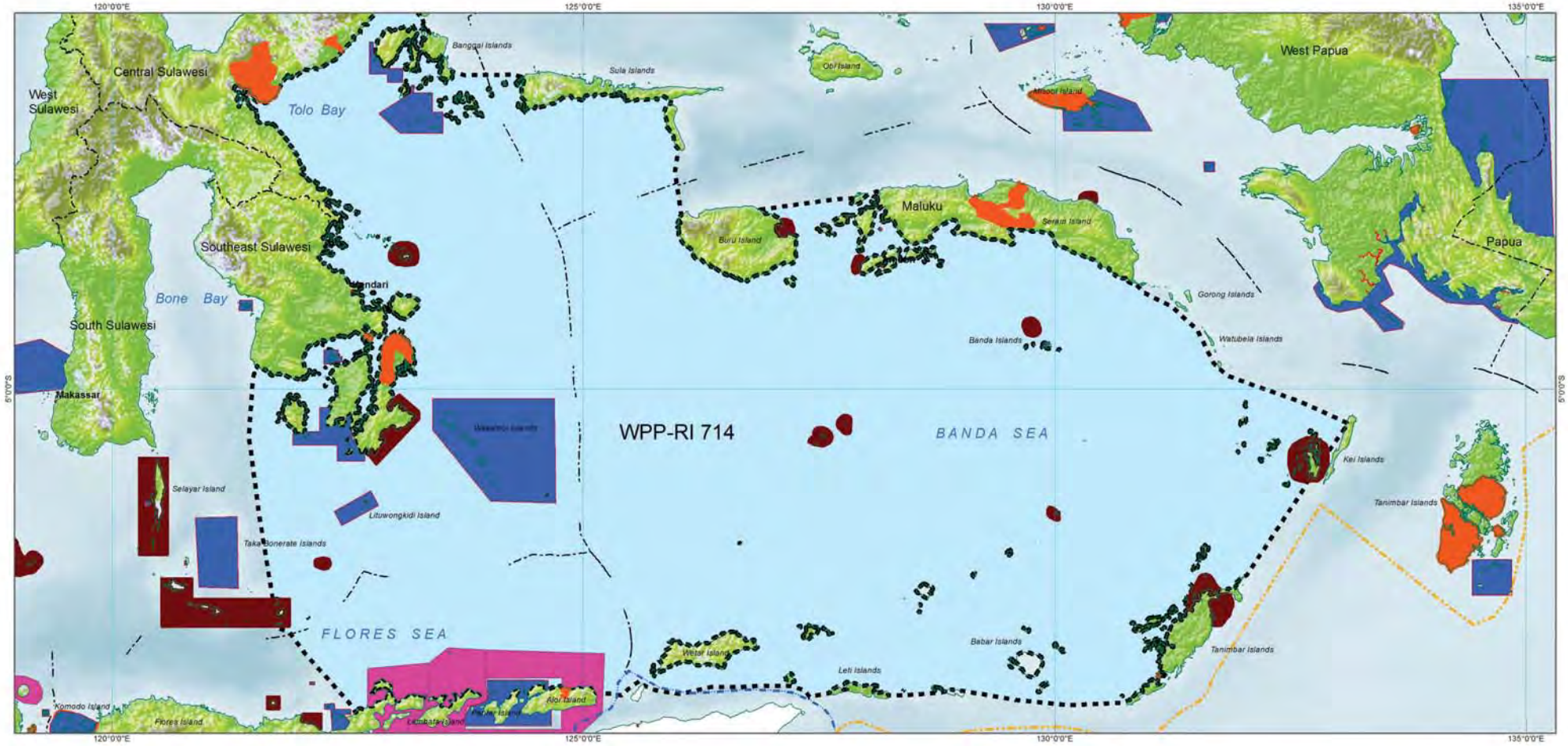
- Potential MPA
- Deep Sea Area of Interest

N

50 0 50 100

Kilometer

Information Sources:
- Topography Map. Scale1: 1.000.000 BAKOSURTANAL
- Administration Map. DEPDAGRI. 2007
- Nasional Spatial Plan Map. PP. 26 Tahun 2008
- Minsitry Decree of Marine and Fisheries Affairs No PER.01/MEN/2009
- Ministry of Marine and Fisheries Affairs. 2010.
- Salm and Halim. 1984.
- Wilson., J.R., Darmawan A. and Subijanto J. 2009.
- Huffard, C.L., M.V. Erdmann & T.R.P. Gunawan. 2012.
- Miclat, E.F.B. and R.B. Trono. 2002.
- GIS Analysis. 2012.



EXISTING AND POTENTIAL MARINE PROTECTED AREA IN FISHERIES MANAGEMENT AREA RI 714 (WPP-RI 714)

Legend:

- Province Capital
- Coastline
- Province Boundary
- State Boundary
- Indonesian Teritory Boundary
- Continental Shelf Boundary
- Economy Exclusive Zone
- Marine Protected Area under MMAF
- Protected Area under MoF
- WPP-RI-714

Potential MPA

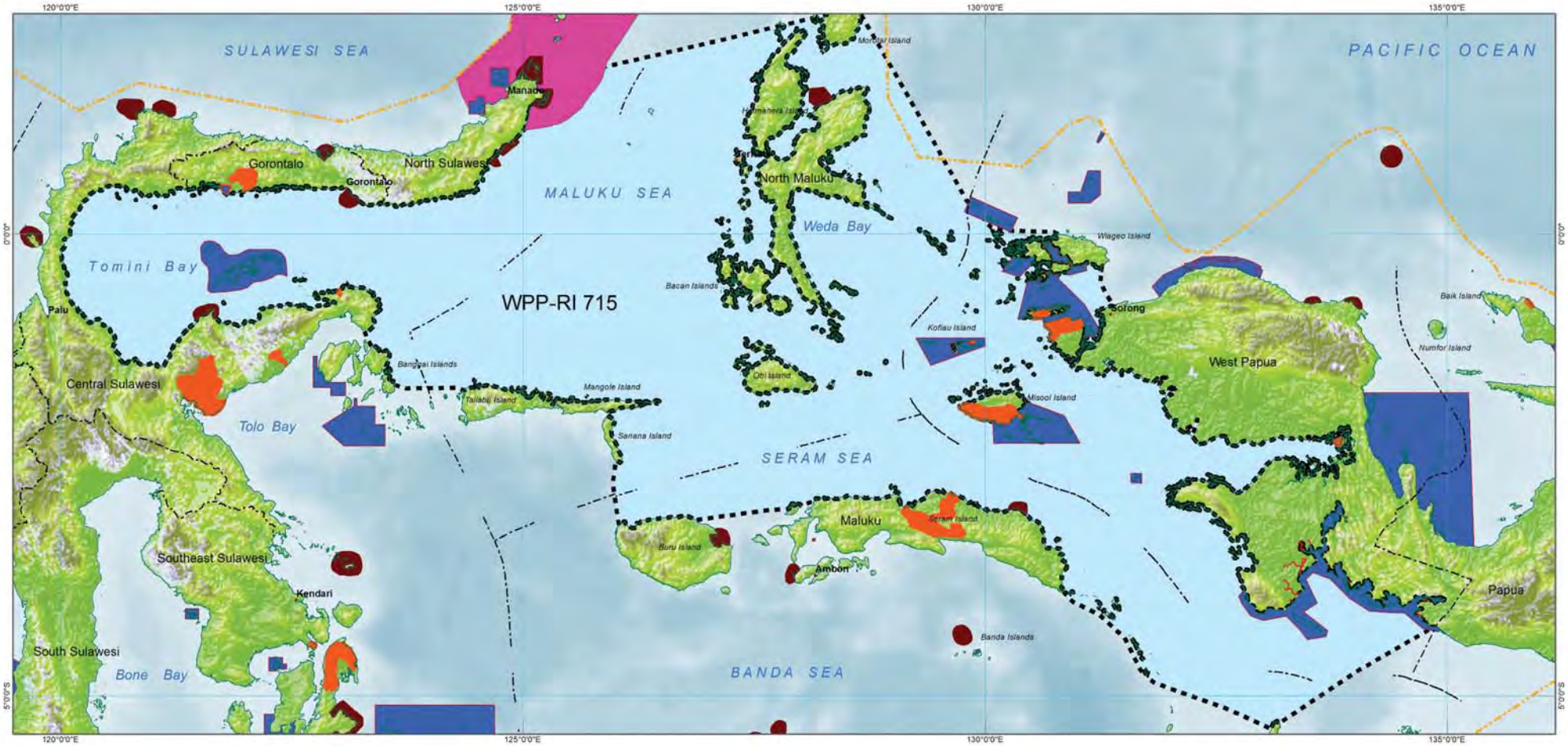
- Potential MPA
- Deep Sea Area of Interest

N

50 0 50 100

Kilometer

Information Sources:
- Topography Map. Scale1: 1.000.000 BAKOSURTANAL
- Administration Map. DEPDAGRI. 2007
- Nasional Spatial Plan Map. PP. 26 Tahun 2008
- Minsitry Decree of Marine and Fisheries Affairs No PER.01/MEN/2009
- Ministry of Marine and Fisheries Affairs. 2010.
- Salm and Halim. 1984.
- Wilson., J.R., Darmawan A. and Subijanto J. 2009.
- Huffard, C.L., M.V. Erdmann & T.R.P. Gunawan. 2012.
- Miclat, E.F.B. and R.B. Trono. 2002.
- GIS Analysis. 2012.



EXISTING AND POTENTIAL MARINE PROTECTED AREA IN FISHERIES MANAGEMENT AREA RI 715 (WPP-RI 715)

Legend:

- Province Capital
- Coastline
- Province Boundary
- State Boundary
- Indonesian Teritory Boundary
- Continental Shelf Boundary
- Economy Exclusive Zone
- Marine Protected Area under MMAF
- Protected Area under MoF
- WPP-RI-715

Potential MPA

- Potential MPA
- Deep Sea Area of Interest

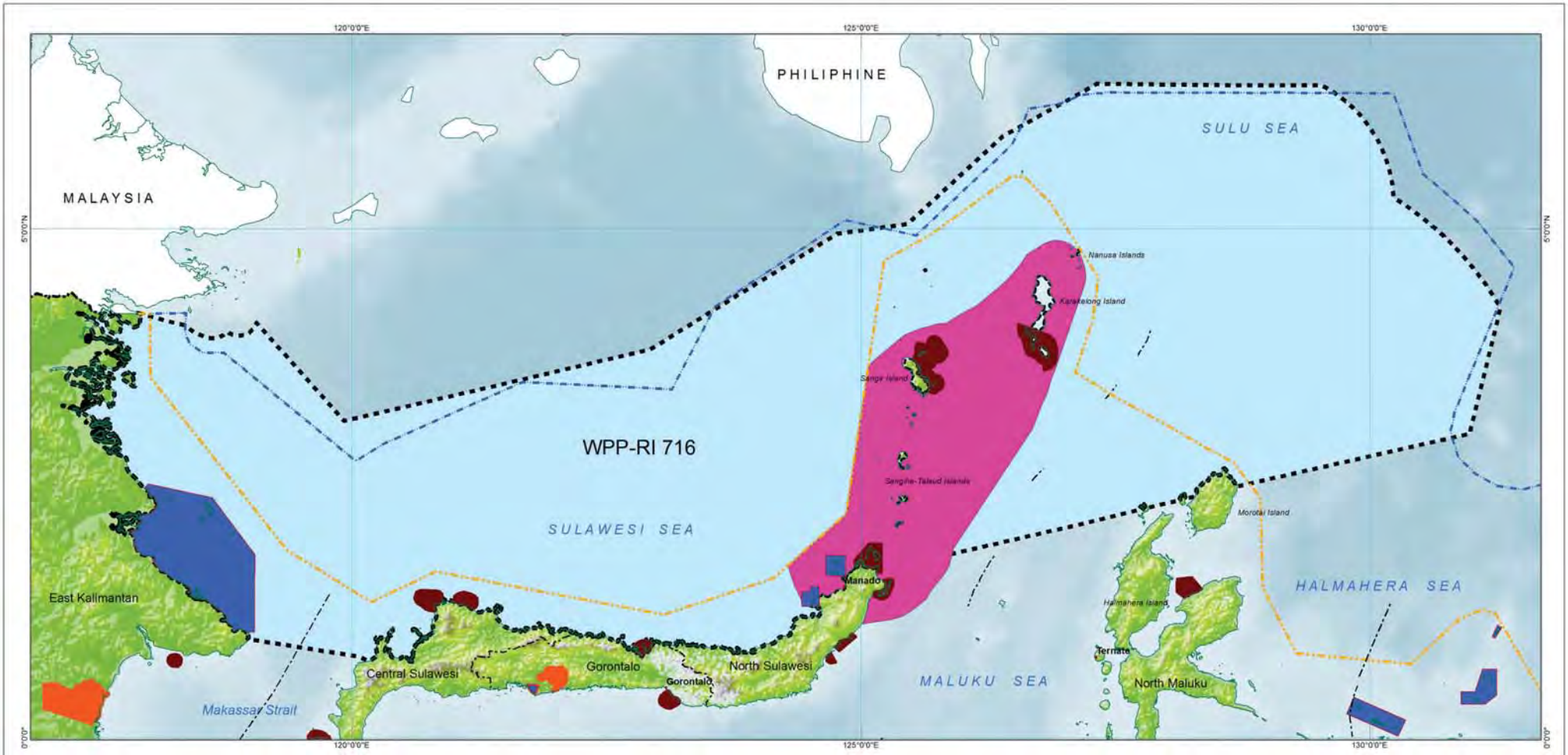
N

50 0 50 100

Kilometer

Information Sources:

- Topography Map. Scale1: 1.000.000 BAKOSURTANAL
- Administration Map. DEPDAGRI. 2007
- Nasional Spatial Plan Map. PP. 26 Tahun 2008
- Minsitry Decree of Marine and Fisheries Affairs No PER.01/MEN/2009
- Ministry of Marine and Fisheries Affairs. 2010.
- Salm and Halim. 1984.
- Wilson., J.R., Darmawan A. and Subijanto J. 2009.
- Huffard, C.L., M.V. Erdmann & T.R.P. Gunawan. 2012.
- Miclat, E.F.B. and R.B. Trono. 2002.
- GIS Analysis. 2012.



EXISTING AND POTENTIAL MARINE PROTECTED AREA IN FISHERIES MANAGEMENT AREA RI 716 (WPP-RI 716)

Legend:

- Province Capital
- Coastline
- Province Boundary
- State Boundary
- Indonesian Teritory Boundary
- Continental Shelf Boundary
- Economy Exclusive Zone
- Marine Protected Area under MMAF
- Protected Area under MoF
- WPP-RI-716

Potential MPA

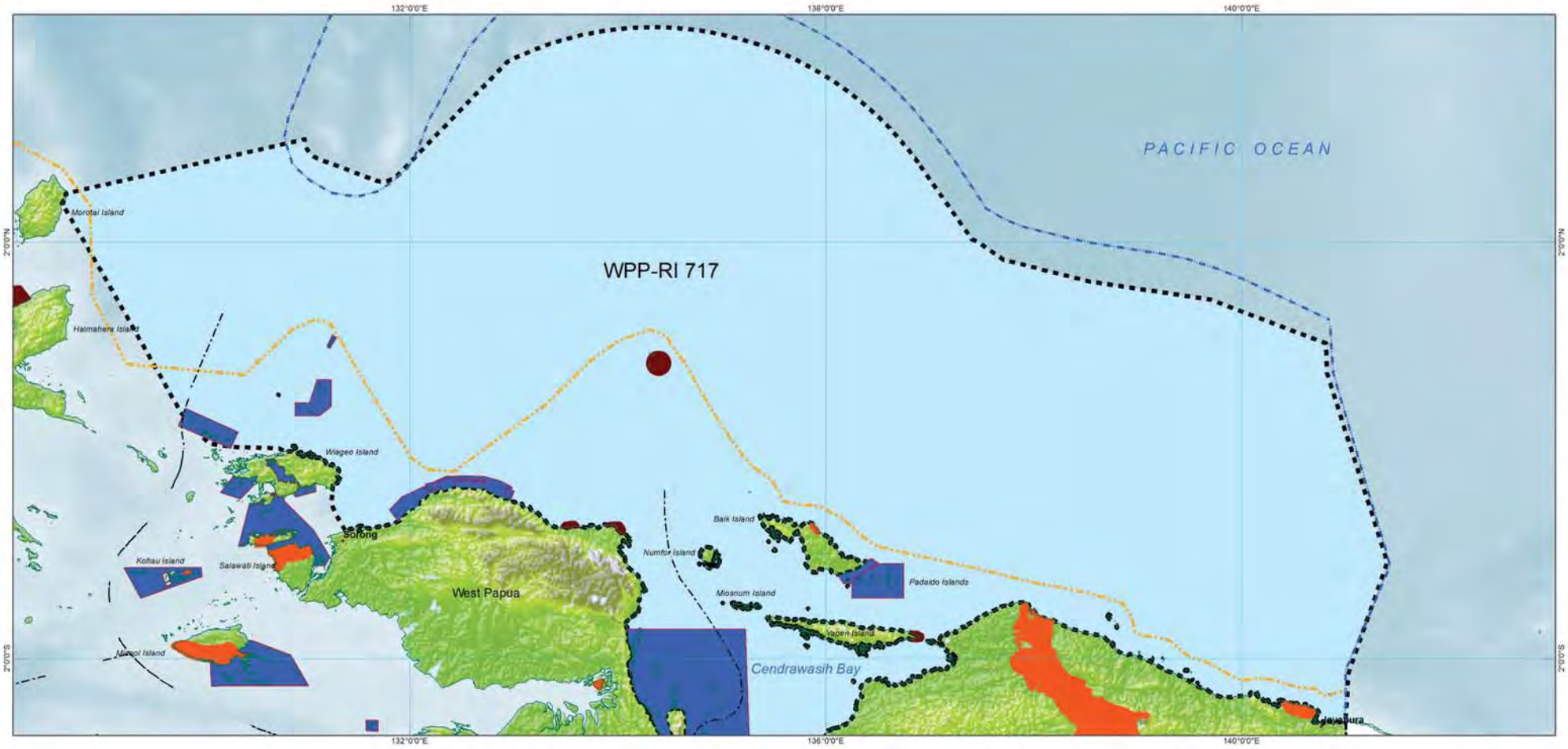
- Potential MPA
- Deep Sea Area of Interest

N

40 0 40 80

Kilometer

Information Sources:
- Topography Map. Scale1: 1.000.000 BAKOSURTANAL
- Administration Map. DEPDAGRI. 2007
- Nasional Spatial Plan Map. PP. 26 Tahun 2008
- Minsitry Decree of Marine and Fisheries Affairs No PER.01/MEN/2009
- Ministry of Marine and Fisheries Affairs. 2010.
- Salm and Halim. 1984.
- Wilson., J.R., Darmawan A. and Subijanto J. 2009.
- Huffard, C.L., M.V. Erdmann & T.R.P. Gunawan. 2012.
- Miclat, E.F.B. and R.B. Trono. 2002.
- GIS Analysis. 2012.



EXISTING AND POTENTIAL MARINE PROTECTED AREA IN FISHERIES MANAGEMENT AREA RI 717 (WPP-RI 717)

Legend:

- Province Capital
- Coastline
- Province Boundary
- State Boundary
- Indonesian Teritory Boundary
- Continental Shelf Boundary
- Economy Exclusive Zone
- Marine Protected Area under MMAF
- Protected Area under MoF
- WPP-RI-717

Potential MPA

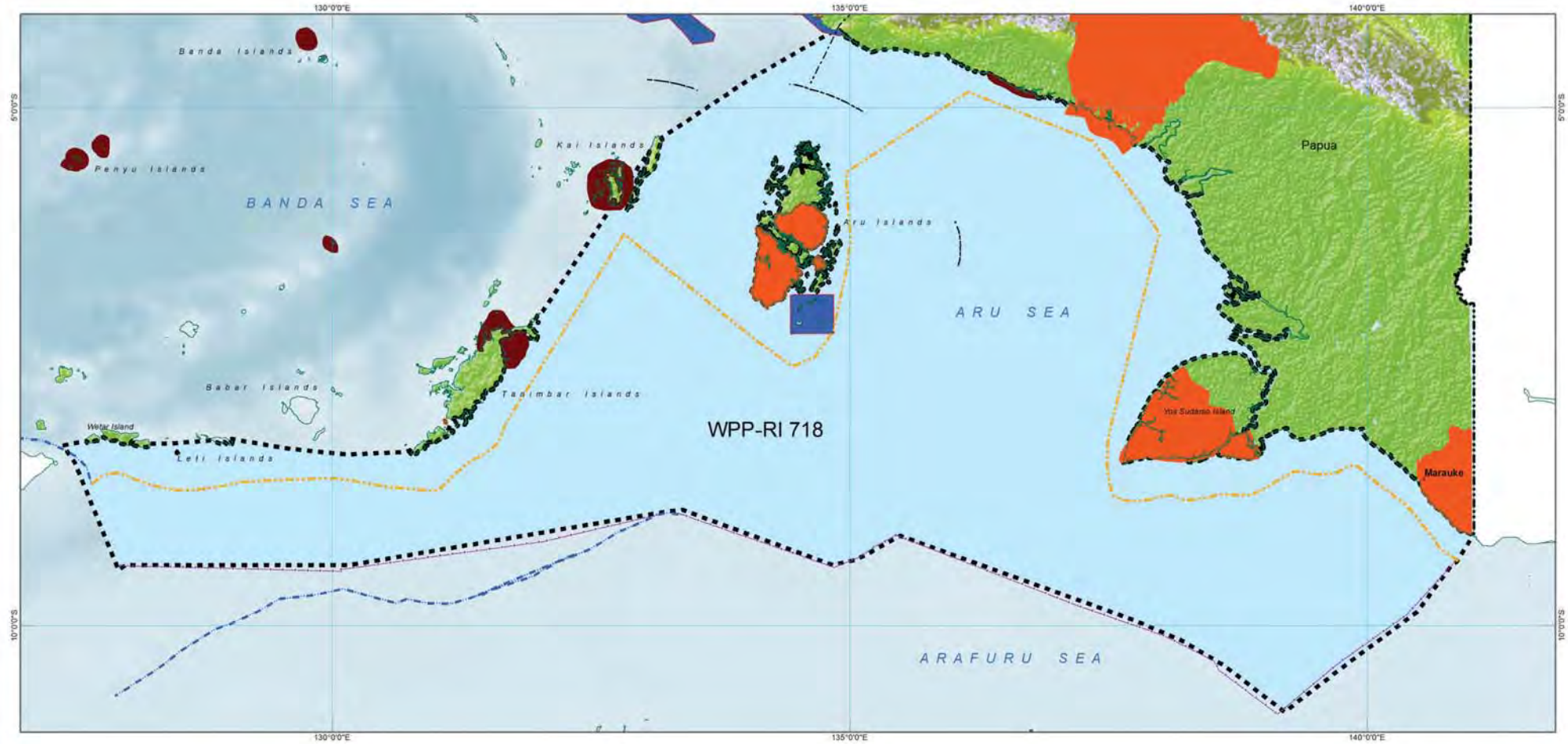
- Potential MPA
- Deep Sea Area of Interest

N

40 0 40 80

Kilometer

Information Sources:
- Topography Map. Scale1: 1.000.000 BAKOSURTANAL
- Administration Map. DEPDAGRI. 2007
- Nasional Spatial Plan Map. PP. 26 Tahun 2008
- Minsitry Decree of Marine and Fisheries Affairs No PER.01/MEN/2009
- Ministry of Marine and Fisheries Affairs. 2010.
- Salm and Halim. 1984.
- Wilson., J.R., Darmawan A. and Subijanto J. 2009.
- Huffard, C.L., M.V. Erdmann & T.R.P. Gunawan. 2012.
- Miclat, E.F.B. and R.B. Trono. 2002.
- GIS Analysis. 2012.



EXISTING AND POTENTIAL MARINE PROTECTED AREA IN FISHERIES MANAGEMENT AREA RI 718 (WPP-RI 718)

Keterangan:

- Province Capital
- Coastline
- Province Boundary
- State Boundary
- Indonesian Teritory Boundary
- Continental Shelf Boundary
- Economy Exclusive Zone
- Marine Protected Area under MMAF
- Protected Area under MoF
- WPP-RI-718

Potential MPA

- Potential MPA
- Deep Sea Area of Interest

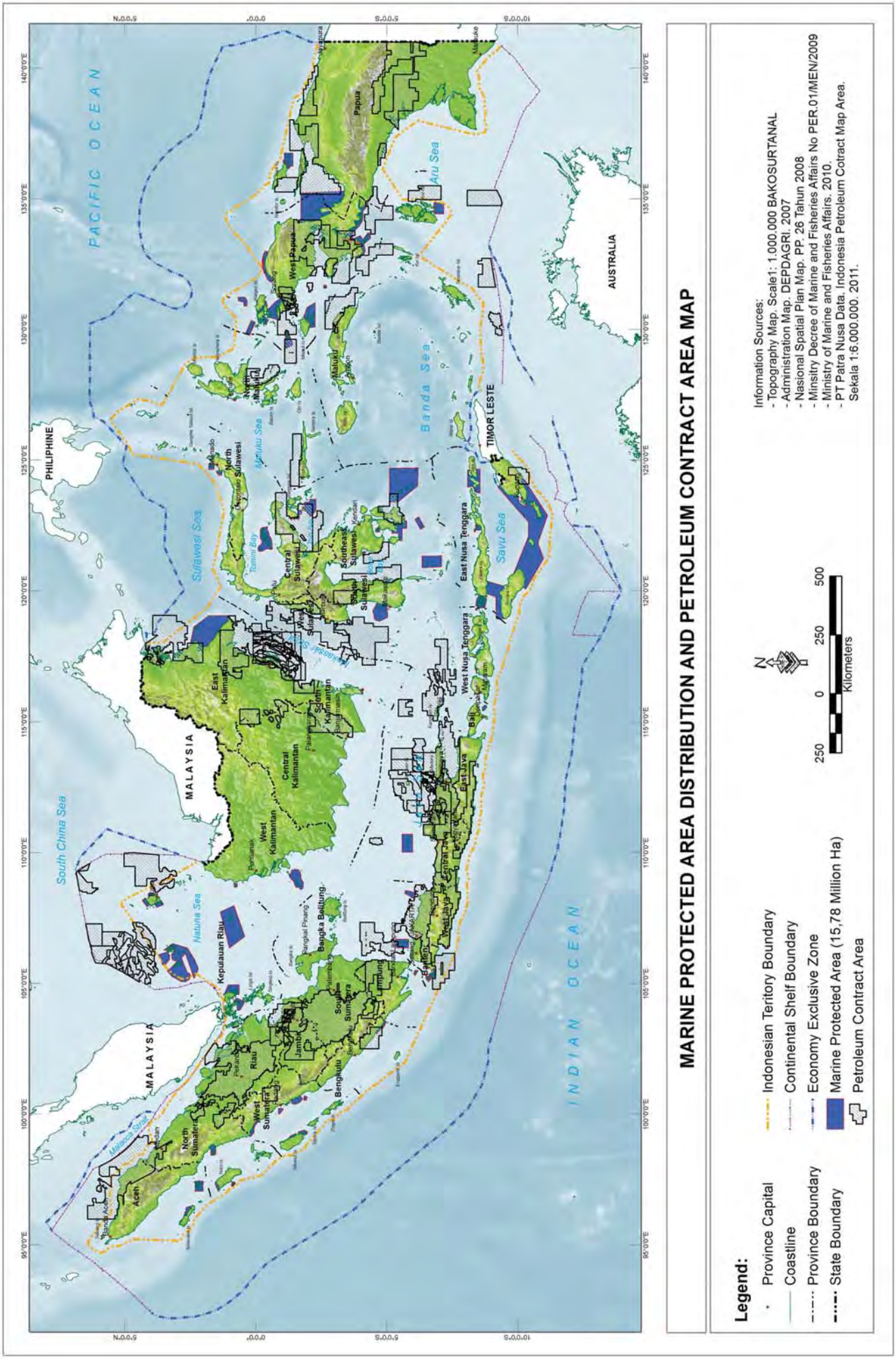
N

40 0 40 80

Kilometer

Information Sources:
- Topography Map. Scale1: 1.000.000 BAKOSURTANAL
- Administration Map. DEPDAGRI. 2007
- Nasional Spatial Plan Map. PP. 26 Tahun 2008
- Minsitry Decree of Marine and Fisheries Affairs No PER.01/MEN/2009
- Ministry of Marine and Fisheries Affairs. 2010.
- Salm and Halim. 1984.
- Wilson., J.R., Darmawan A. and Subijanto J. 2009.
- Huffard, C.L., M.V. Erdmann & T.R.P. Gunawan. 2012.
- Miclat, E.F.B. and R.B. Trono. 2002.
- GIS Analysis. 2012.

APPENDIX 6


MARINE PROTECTED AREA DISTRIBUTION AND PETROLEUM CONTRACT AREA MAP
Legend:
Province Capital
Coastline
Province Boundary
State Boundary
Indonesian Teritory Boundary
Continental Shelf Boundary
Economy Exclusive Zone
Marine Protected Area (15,78 Million Ha)
Petroleum Contract Area
Information Sources:
- Topography Map. Scale1: 1.000.000 BAKOSURTANAL
- Administration Map. DEPDAGRI. 2007
- Nasional Spatial Plan Map. PP. 26 Tahun 2008
- Minsitry Decree of Marine and Fisheries Affairs No PER.01/MEN/2009
- Ministry of Marine and Fisheries Affairs. 2010.
- PT Patra Nusa Data. Indonesia Petroleum Cotract Map Area. Sekala 1:6.000.000. 2011.
250 0 250 500
Kilometers
PACIFIC OCEAN
INDIAN OCEAN
AUSTRALIA
PHILIPHINE
MALAYSIA
TIMOR LESTE
South China Sea
Sulawesi Sea
Banda Sea
Aru Sea
Arafuru Sea
Maluku Sea
Natuna Sea
Savu Sea
Papua
West Papua
Aceh
North Sumatera
West Sumatera
Riau
Kepulauan Riau
Jambi
Bengkulu
South Sumatera
Bangka Belitung
West Kalimantan
Central Kalimantan
South Kalimantan
East Kalimantan
North Sulawesi
Central Sulawesi
Southeast Sulawesi
South Sulawesi
West Sulawesi
Gorontalo
Maluku
North Maluku
West Nusa Tenggara
East Nusa Tenggara
Bali
East Java
Central Java
West Java
Banten
Jakarta