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REGIONAL WORKSHOP TO FACILITATE THE DESCRIPTION OF ECOLOGICALLY OR BIOLOGICALLY SIGNIFICANT MARINE AREAS EBSAs IN THE SEAS OF EAST ASIA, AND TRAINING SESSION ON EBSAs
Xiamen, China, 13 to 18 December 2015

REPORT OF THE REGIONAL WORKSHOP TO FACILITATE THE DESCRIPTION OF ECOLOGICALLY OR BIOLOGICALLY SIGNIFICANT MARINE AREAS IN THE SEAS OF EAST ASIA[1]

INTRODUCTION

1. At its tenth meeting, the Conference of the Parties to the Convention on Biological Diversity requested the Executive Secretary to work with Parties and other Governments as well as competent organizations and regional initiatives, such as the Food and Agriculture Organization of the United Nations (FAO), regional seas conventions and action plans, and, where appropriate, regional fisheries management organizations (RFMOs) to organize, including the setting of terms of reference, a series of regional workshops, with a primary objective to facilitate the description of ecologically or biologically significant marine areas through the application of scientific criteria in annex I of decision IX/20 as well as other relevant compatible and complementary nationally and intergovernmentally agreed scientific criteria, as well as the scientific guidance on the identification of marine areas beyond national jurisdiction, which meet the scientific criteria in annex I to decision IX/20 (paragraph 36 of decision X/29).

2. In the same decision, the Conference of the Parties requested that the Executive Secretary make available the scientific and technical data, and information and results collated through the workshops referred to above to participating Parties, other Governments, intergovernmental agencies and the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) for their use according to their competencies.

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[1] The designations employed and the presentation of material in this note do not imply the expression of any opinion whatsoever on the part of the Secretariat concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

3. Subsequently, at its eleventh and twelfth meetings, the Conference of the Parties reviewed the outcomes, respectively, of the first and second set of regional workshops conducted and requested the Executive Secretary to further collaborate with Parties, other Governments, competent organizations, and global and regional initiatives, such as the United Nations General Assembly Ad Hoc Working Group of the Whole on the Regular Process for Global Reporting and Assessment of the State of the Marine Environment, including Socio-economic Aspects, the International Maritime Organization, the Food and Agriculture Organization of the United Nations, regional seas conventions and action plans, and, where appropriate, regional fisheries management organizations, with regard to fisheries management, and also including the participation of indigenous and local communities, to facilitate the description of areas that meet the criteria for EBSAs through the organization of additional regional or subregional workshops for the remaining regions or subregions where Parties wish workshops to be held, and for the further description of the areas already described where new information becomes available (decisions XI/17 and XII/22).

4. Pursuant to the above requests and with financial support from the Government of Japan, through the Japan Biodiversity Fund, the Secretariat of the Convention on Biological Diversity convened the CBD Regional Workshop to Facilitate the Description of Ecologically or Biologically Significant Marine Areas (EBSAs) in the Seas of East Asia. The workshop was organized in collaboration with the Action Plan for the Protection, Management and Development of the Marine and Coastal Environment of the Northwest Pacific Region (NOWPAP). This workshop was hosted by the Government of China (Ministry of Environmental Protection) in Xiamen, China, from 14 to 18 December 2015. It was held immediately following a training session on the description of EBSAs as well as other relevant areas of the CBD's work on marine and coastal biodiversity, convened by the Secretariat of the Convention on Biological Diversity, in collaboration with the Commonwealth Scientific and Industrial Research Organization (CSIRO) of Australia and the Global Ocean Biodiversity Initiative (GOBI), on 13 December at the same venue.

5. Scientific and technical support for this workshop was provided by CSIRO, with financial support from the European Commission. The results of technical preparation for the workshop were made available in a document entitled "Data to Inform the CBD Regional Workshop to Facilitate the Description of Ecologically or Biologically Significant Marine Areas in the Seas of the East Asia" (UNEP/CBD/EBSA/WS/2015/3/3).

6. The meeting was attended by experts from Cambodia, China, Indonesia, Japan, Malaysia, Myanmar, Philippines, Republic of Korea, Singapore, Thailand, Timor-Leste, Viet Nam, East Asian - Australasian Flyway (EAAF) Partnership, Global Ocean Biodiversity Initiative (GOBI), NOWPAP, Sustainability Initiative in the Marginal Seas of South and East Asia (SIMSEA), World Wide Fund for Nature (WWF) - Malaysia, WWF - Hong Kong, and CSIRO (Technical Support Team). Some Parties in the region did not nominate experts, although invited to do so by the Secretariat. The full list of participants is attached as annex I.

ITEM 1. OPENING OF THE MEETING

7. On behalf of the Ministry of Environmental Protection of China, Mr. Bai Chengshou, Deputy Director-General of the Nature and Ecology Conservation Department, delivered an opening statement. He welcomed the participants, pointing out that the workshop is very important for sharing experiences and implementing decision X/29 of the Convention on Biological Diversity (CBD). He said that China, as one of the mega-diverse countries, had put biodiversity conservation high on the national agenda. He stressed that life arose from the oceans and that the future of human beings depended on marine biodiversity. China was very rich in marine biodiversity and had always attached great importance to protection of the marine environment. By the end of 2014, China had established 68 marine protected areas, covering a total area of 7115 km^2. Seventeen of them were national-level, covering an area of 5089 km^2; 58 special national

marine protected areas had also been established. He also noted that marine biodiversity conservation and healthy marine ecosystems are the common responsibility of the international community, but stressed that further cooperation and actions were needed. He indicated that China would continue to fulfil its obligations and work hard to conserve marine biodiversity. He indicated that China valued and supported the work of the Convention, having previously hosted three regional workshops. He then highlighted that the workshop aimed to provide an interaction and communication platform for marine experts. He expressed his hope that experts gathered for the meeting should take full advantage of the opportunity for in-depth discussion and pool their collective wisdom to promote marine biodiversity conservation and a harmonious relationship between humans and nature towards the realization of the Aichi Biodiversity Targets. In concluding, he wished the participants a successful workshop and thanked the CBD Secretariat and Foreign Economic Cooperation Office of the Ministry of Environmental Protection of China for making this workshop possible. He also thanked the Environmental Protection Department of Fujian Province and the Xiamen Environmental Protection Bureau for their help and support.

8. On behalf of the Fujian Provincial Environmental Protection Department and its Director-General, Mr. Zhu Hua, Mr. Chen Ning extended a warm welcome to all the participants. He then introduced Fujian Province, which covered a total land area of 124,000 km^2 and a maritime area of 136,000 km^2. It was inhabited by 38 million people, and its GDP totalled 2.4 trillion Yuan in 2014. He noted Fujian’s abundant natural resources, ranking first in terms of forest coverage rate and second in terms of coastline length. Air quality and water quality were among the best of any Chinese city. It was also very rich in biodiversity. He stressed that Fujian Province paid great attention to biodiversity conservation, having carried out a basic survey on natural protected areas, assessed biodiversity and developed a provincial-level biodiversity conservation strategy and action plan for the period of 2014-2030. A total number of 92 protected areas were set up to protect endangered species and ecosystems. Mr. Chen noted that the workshop aimed to strengthen communication and cooperation and that it provided a great opportunity for Fujian Province to learn and to improve its future work in marine and terrestrial biodiversity and ecosystem conservation. Finally, he wished participants a successful workshop, and expressed his hope that Fujian Province left everyone with wonderful memories.

9. On behalf of Mr. Braulio de Souza Dias, Executive Secretary of the Convention on Biological Diversity, Ms. Jihyun Lee, Environmental Affairs Officer, delivered opening remarks. Mr. Dias welcomed the participants to the 12th regional EBSA workshop convened by the CBD Secretariat. In his statement, Mr. Dias thanked the Government of China, in particular the Ministry of Environmental Protection, for hosting this workshop, and the Government of Japan and the European Commission for providing financial support. Mr. Dias noted that the seas of East Asia were known as global hotspots for marine and coastal biodiversity. Over the past four decades, however, rising populations, extensive industrialization and socioeconomic development in this region had resulted in unprecedented biodiversity loss, in particular due to overfishing, pollution and habitat destruction. Global-scale climate change and ocean acidification pose further challenges. The functional integrity of marine and coastal ecosystems had thus been undermined, affecting the natural resources that have supported the economies and livelihoods of coastal communities, compromising the crucial services provided by marine ecosystems and undermining the functioning of the Earth’s life support system. He noted that global leaders have recognized the urgency of confronting these challenges and of taking action to improve the conservation and sustainable use of marine biodiversity, including through the implementation of the 2030 Agenda for Sustainable Development and the Sustainable Development Goals, particularly Goal 14. Mr. Dias emphasized that in order to conserve and sustainably use marine biodiversity, we must first know where to take action. It is in this respect that the CBD’s work on EBSAs plays a key role. The 11 regional EBSA workshops convened by the Secretariat since 2011 have sought to describe the “special places” of the oceans that are crucial to the healthy functioning of the global marine ecosystem. These workshops have covered more than 70 per cent of world’s oceans and involved 141 countries and 137 organizations, with some attending more than one workshop. So far, a total of 204 areas have been

described as meeting the EBSA criteria and considered by COP 11 and COP 12. Pursuant to requests by COP11 and COP 12, the summary reports on the outputs of these workshops have been submitted to the UN General Assembly and its relevant Working Groups. Mr. Dias concluded by noting that the EBSA process has facilitated information-sharing, regional networking and enhanced collaboration, and that these efforts will provide a sound basis furthering our efforts toward achieving the Aichi Biodiversity Targets in marine and coastal areas of this region. He wished participants a successful workshop.

ITEM 2. ELECTION OF THE CHAIR, ADOPTION OF THE AGENDA AND ORGANIZATION OF WORK

10. After a brief explanation by the CBD Secretariat on procedures for electing the workshop chair, Mr. Zhengguang Huang (China), as offered by the host Government, and Mr. Loke Ming Chou (Singapore), as proposed by an expert from China, were elected as the workshop co-chairs, with unanimous support from the floor.

11. Participants were then invited to consider the provisional agenda (UNEP/CBD/EBSA/WS/2015/3/1) and the proposed organization of work, as contained in annex II to the annotations to the provisional agenda (UNEP/CBD/EBSA/WS/2015/3/1/Add.1) and adopted them without any amendments.

12. The workshop was organized in plenary sessions and break-out group sessions. The co-chairs nominated the following rapporteurs to assist the CBD Secretariat in preparing the draft workshop reports on the discussions to be undertaken at the plenary sessions, taking into consideration the expertise and experience of the workshop participants and in consultation with the CBD Secretariat:

- Agenda item 3 (Workshop background, scope and output): Mr. Nguyen Chu Hoi (Vietnam)
- Agenda item 4 (Review of relevant scientific information): Mr. Nic Bax / Mr. Piers Dunstan (CSIRO)
- Agenda item 5 (Description of EBSAs): Break-out session group facilitators/rapporteurs
- Agenda item 6 (Identification of gaps): Mr. Spike Millington (EAAF) / Mr. David Johnson (GOBI) / Mr. Kuixuan Lin (NOWPAP)/ Ms. Annadel Cabanban (SIMSEA)

ITEM 3. WORKSHOP BACKGROUND, SCOPE AND OUTPUT

13. Under this agenda item, participants were provided with a series of presentations, as below, during the training day, including presentations on the scientific aspects of the EBSA criteria, the application of the EBSA criteria, and potential use of the EBSA information to support implementation of the ecosystem approach:

a. Mr. Shirayama Yoshihisa, (Japan) delivered a presentation on the values of deep-sea habitats in the Seas of East Asia;

b. Mr. Chou Loke Ming (Singapore) gave a presentation on the range of marine ecosystems in the Seas of South-East Asia and the status and trends of these ecosystems;

c. Mr. David Johnson (GOBI) discussed the work of the Global Ocean Biodiversity Initiative in supporting the description of EBSAs and focused in particular on the values and scientific challenges posed in the description of different types of ecosystem features in open-ocean and deep-sea areas; and

d. Mr. Piers Dunstan (CSIRO) and Mr. Nicholas Bax (CISRO) gave a presentation on approaches and experiences in the description of EBSAs and the use of EBSA information for the application of the ecosystem approach and marine spatial planning.

14. Ms. Jihyun Lee (CBD) gave a presentation on the work of the CBD on EBSAs and other relevant work on marine and coastal biodiversity. She then briefed the meeting on the workshop objectives and expected outputs.

15. The workshop participants noted the following points regarding the COP guidance on the regional workshop process as well as the potential contribution of the scientific information produced by the workshop:

a. The Conference of the Parties to the Convention, at its tenth meeting, noted that the application of the scientific criteria for the identification of ecologically or biologically significant areas (annex I of decision IX/20) presents a tool which Parties and competent intergovernmental organizations may choose to use to progress towards the implementation of ecosystem approaches in relation to areas both within and beyond national jurisdiction, through the identification of areas and features of the marine environment that are important for conservation and sustainable use of marine and coastal biodiversity (decision X/29, para. 25);

b. The application of the EBSA criteria is a scientific and technical exercise, and the identification of EBSAs and the selection of conservation and management measures is a matter for States and competent intergovernmental organizations, in accordance with international law, including the United Nations Convention on the Law of the Sea (decision X/29, para. 26);

c. The EBSA description process is open-ended, and additional regional or subregional workshops may be organized when there is sufficient advancement in the availability of scientific information (decision XI/17, paras. 9 and 12; decision XII/22, para. 6);

d. Each workshop is tasked to describe areas meeting the scientific criteria for EBSAs or other relevant criteria based on best available scientific information. As such, experts at the workshops are not expected to discuss any management issues, including threats to the areas;

e. The EBSA description process facilitates scientific collaboration and information-sharing at national, subregional and regional levels;

16. The workshop also noted the following points regarding the application of the criteria:

a. The EBSA criteria can be applied on all scales from global to local. Once a scale has been selected, however, the criteria are intended to be used to evaluate areas and ecosystem features in a context *relative to* other areas and features at the given scale;

b. Relative assessments are necessarily scale-dependent. Relative significance of areas has generally been viewed from regional or large subregional scales;

c. There are no thresholds that must be met and judgements are comparative to adjacent areas, and the current ranking system (e.g., high, medium, low, no information) for assessing the areas meeting each EBSA criteria is devised to facilitate better understanding of available scientific information in describing the areas with regard to the extent to which they meet different criteria. The current ranking system, however, does not intend to compare the importance of each criterion;

d. Areas may meet multiple criteria, and that is important, but meeting just one strongly is also important;

e. Areas described to meet the EBSA criteria have ranged from relatively small sites to very extensive oceanographic features; and

f. Areas described to meet the EBSA criteria can be overlapped or nested.

17. Mr. Piers Dunstan (CSIRO) provided a regional overview of biogeographic information on open-ocean water and deep-sea habitats and discussed potential options for the geographic scope of the workshop, also noting the boundaries of the previous workshops in the Southern Indian Ocean, North Pacific, Western South Pacific and North-East Indian Ocean regions.

18. The workshop agreed to overlap the geographic scope with that of the North-East Indian Ocean Workshop with regards to the waters of Myanmar, because this area was not fully considered by the previous workshop for the North-East Indian Ocean region (held in Colombo, Sri Lanka, from 23 to 27 March 2015) due to the absence of an expert from Myanmar. The geographic scope of the workshop is described in annex III.

19. Summaries of the above presentations are provided in annex II.

ITEM 4. REVIEW OF RELEVANT SCIENTIFIC DATA/INFORMATION/MAPS COMPILED AND SUBMITTED FOR THE WORKSHOP

20. For the consideration of this item, the workshop had before it two information notes by the Executive Secretary: document UNEP/CBD/EBSA/WS/2015/3/2, containing a compilation of scientific information to support the description of EBSAs in the Seas of East Asia, drawing on scientific information submitted by Parties, other Governments and relevant organizations in response to the Secretariat's notification (2015-093, dated 17 August 2015), and document UNEP/CBD/EBSA/WS/2015/3/3, *Data to Inform the CBD Regional Workshop to Facilitate the Description of Ecologically or Biologically Significant Marine Areas in the Seas of East Asia*, which was prepared in support of the workshop deliberation. These documents were made available on the meeting website (https://www.cbd.int/doc/?meeting=EBSAWS-2015-03) for the information of workshop participants.

21. Mr. Piers Dunstan (CSIRO) provided a presentation, "Review of relevant scientific data/information/maps compiled to facilitate the description of EBSAs in the Seas of East Asia," based on document UNEP/CBD/EBSA/WS/2015/3/3. He described the types of information that can be used to describe areas meeting the EBSA criteria, noting in particular the data available for this workshop both from large-scale-data holders (e.g., Ocean Biogeographic Information System) and data provided by Parties, as well as the potential to use traditional and local knowledge in the description of EBSAs. He emphasized that there was comparatively less data available on certain types of biological factors and also a lack of fine-scale data for this region. In this regard, he encouraged participants to identify information that could be used to complement the information contained in document UNEP/CBD/EBSA/WS/2015/3/3. The information provided in this presentation was considered in the description of areas meeting the EBSA criteria by the break-out groups. A summary of this presentation is provided in annex II.

22. Mr. Spike Millington (EAAF Partnership) discussed the available scientific information regarding the flyway migratory water-birds flyway in the region. A summary of this presentation is provided in annex II.

23. Ms. Jihyun Lee (CBD Secretariat) gave an overview of the "compilation of the relevant scientific information submitted by Parties, other Governments and relevant organizations in support of the workshop objectives", based on document UNEP/CBD/EBSA/WS/2015/3/2, noting in particular the initial list of potential areas to be considered as meeting the EBSA criteria, drawing on scientific information submitted by Parties and relevant organizations, using the template for EBSA description.

24. GIS data compiled for this workshop was available to workshop participants, in hard-copy maps as well as in GIS database with open-source GIS software, for their use and analysis.

ITEM 5. DESCRIPTION OF AREAS MEETING THE EBSA CRITERIA THROUGH APPLICATION OF THE SCIENTIFIC CRITERIA AND OTHER RELEVANT COMPATIBLE AND COMPLEMENTARY NATIONALLY AND INTERGOVERNMENTALLY AGREED SCIENTIFIC CRITERIA

25. Building upon the theme presentations provided in the previous agenda items, the workshop participants exchanged their views on possible ways of organizing their work on assessing the scientific information compiled and submitted for the consideration of the workshop. In this regard, participants noted the following points with regard to the description of areas meeting the EBSA criteria:

- The description of EBSAs is based on the scientific information and expert knowledge available at the time of the workshop, and, as the EBSA process is iterative and ongoing, there may be additional areas described as meeting the EBSA criteria in future regional or sub-regional workshops;
- In describing multiple ecological and/or biological components of a given area, participants should consider how these components may be interconnected as part of a system, and that, if separate components cannot be described as part of a coherent system approach, these components should be described separately;
- In addition to ecological or biological significance, connectivity is one of the five required network properties and components outlined in the "Scientific guidance for selecting areas to establish a representative network of marine protected areas, including in open ocean waters and deep-sea habitats" (annex II to decision IX/20), which is especially relevant with regards to the various types of ecological connectivity among different parts of the Seas of East Asia, including with regards to the East-Asian Australasian Flyway.

26. This workshop was mandated to evaluate areas at a regional scale within the Seas of East Asia. However, the workshop considered that the entire region has important features and a high level of biodiversity that needs to be viewed on a global scale. This perspective is presented in annex IV of this report.

27. For effective review of available scientific information and assessment of potential areas meeting the EBSA criteria, the workshop participants were then split into break-out groups. Participants were encouraged to share relevant information across break-out groups, as necessary to support the description of areas meeting the EBSA criteria. The break-out groups were organized as follows:

- Sub-group on intertidal areas;
- Sub-group on nearshore areas; and
- Sub-group on open-ocean and deep-sea areas.

28. Participants were assisted by the technical support team, including GIS operators, who made hard/electronic copies of the maps available for the deliberation of the break-out group discussion, provided data in a GIS database, and supported data analysis and interpretation as well as mapping of potential areas meeting the EBSA criteria.

29. During the break-out group discussions, participants worked on the description of areas meeting EBSA criteria, drew approximate polygons of areas meeting the EBSA criteria on a map provided by the technical support team as they were completed to keep track of opportunities to extend or merge areas and to identify areas that had yet to be considered.

30. The results of the break-out groups were reported at the plenary for consideration. At the plenary session, workshop participants reviewed the description of areas meeting the EBSA criteria proposed by

the break-out group sessions, including the draft descriptions, using templates provided by the CBD Secretariat, and considered them for inclusion in the final list of areas meeting EBSA criteria.

31. The workshop participants agreed on descriptions of 36 areas meeting the EBSA criteria. They are listed in annex V and described in its appendix. The map of described areas is contained in annex IV.

ITEM 6. IDENTIFICATION OF GAPS AND NEEDS FOR FURTHER ELABORATION IN DESCRIBING AREAS MEETING EBSA CRITERIA, INCLUDING THE NEED FOR THE DEVELOPMENT OF SCIENTIFIC CAPACITY AND FUTURE SCIENTIFIC COLLABORATION

32. Building on the workshop deliberation, the workshop participants were invited to identify, through break-out group sessions and plenary discussion, gaps and needs for further elaboration in describing areas meeting the EBSA criteria, including the need to develop scientific capacity and future scientific collaboration. The results of the plenary and subgroup discussions are compiled in annex VII.

ITEM 7. OTHER MATTERS

33. The workshop participants noted that the description of areas meeting the EBSA criteria by this workshop reflects the differing levels of scientific information available from different countries/sub-regions. This is often the case for the EBSA regional workshops, as they rely on the availability and accessibility of scientific information.

ITEM 8. ADOPTION OF THE REPORT

35. The participants considered and adopted the workshop report on the basis of a draft report prepared and presented by the Co-Chairs with some changes.

36. The participants agreed that any additional scientific information and scientific references would be provided to the CBD Secretariat by workshop participants within two weeks of the closing of the workshop in order to further refine the description of areas meeting EBSA criteria contained in annex V and its appendix.

ITEM 9. CLOSURE OF THE MEETING

37. In closing the workshop, the workshop co-chairs congratulated the workshop participants for their hard work and the results achieved through their collaboration throughout the week. They highly commended the technical support team for their scientific and technical support, and the efficient and effective servicing by the staff of the CBD Secretariat as well as the contributions of all the rapporteurs to the preparation of the report. The workshop co-chairs and participants expressed their sincere thanks to the Government of China for its hospitality and logistical support, which had enabled the workshop discussions to be very fruitful.

38. The workshop was closed at 6pm on Friday, 18 December 2015.

Annex I

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Annex II

SUMMARY OF THEME PRESENTATIONS

Agenda Item 3.

Marine Biodiversity: Characteristics and Scientific Exploration Using Modern Technology (by Mr. Yoshihisa Shirayama, Japan Agency for Marine-Earth Science and Technology (JAMSTEC))

Mr. Shirayama introduced JAMSTEC's cutting-edge technologies for unveiling deep-sea biodiversity. As an example, he reported the change that occurred in the benthic ecosystem of the Japan Trench, which was observed using a manned submersible "Shinkai 6500" at depths up to 5400 m. He emphasized that even though such modern technologies are available, science knows very little about the extremely high biodiversity in the marine environment, in particular deep-sea habitats. In the case of microscopic animals, i.e., meiobenthos (animals smaller than 1 mm), sometimes it is more difficult to find known species than unknown ones. He also emphasized the importance of international collaboration at the global scale highlighting the achievements of the Census of Marine Life project. Based on the results of the project, he pointed out that South East Asia is a hotspot of marine biodiversity at the global scale and expressed his anticipation of high quality descriptions of areas meeting the EBSA criteria in this workshop. Finally, he briefly introduced the EBSA description process carried out by the Government of Japan as well as the collection of ecological information in the South Asia region that could be useful for the description of areas meeting the EBSA criteria at this workshop. The information was compiled in a scientific research programme led by Mr. Shirayama and financially supported by the Ministry of Environment of Japan. Mr. Shirayama offered to make the information collected available for use in this EBSA workshop.

Southeast Asia – Global Hotspot of Marine Biodiversity (by Mr. Loke Ming Chou, National University of Singapore)

Mr. Chou began by pointing out that Southeast Asia is acknowledged as the global hotspot of marine biodiversity. Its sea area accounts for 2.5 per cent of the world's ocean surface but supports 30 per cent each of the world's coral reef and mangrove habitat. The region has extremely high species diversity, with 75 per cent of the world's coral species, 40 per cent of reef fish species, 72 per cent of mangrove species and 46 per cent of seagrass species. Many species are endemic, and global extinction risk is high. He noted that the diversity concentration of many taxa exhibits a declining gradient away from the region. Development and population pressures have resulted in widespread marine habitat degradation and the erosion of important ecosystem services. Conservation measures range from local community-based initiatives to national-level marine protected areas (MPAs) and a trans-boundary protected area for marine turtles (Turtle Islands Heritage Protected Area), managed jointly by Malaysia and the Philippines. The five designated World Heritage Sites, together with ASEAN heritage sites and biosphere reserves, do not adequately represent the area's rich biodiversity. Many other areas are worthy of consideration based on their biological and/or ecological significance. Mr. Chou noted that regional initiatives for marine environment management include those of intergovernmental bodies such as PEMSEA (Partnerships in Environmental Management for the Seas of East Asia), COBSEA (Coordinating Body on the Seas of East Asia), ASEAN (Association of Southeast Asian Nations), plus many other programmes like the Coral Triangle Initiative and the UNEP South China Sea Project. Research capacity has increased, and more is known of nearshore biodiversity than open-ocean and deep sea biodiversity. Many new species have been described from remote and less explored areas, from more exhaustive studies on explored areas or from greater vigilance. The discovery of the Manado coelacanth (*Latimeria menadoensis*) in 1998 demonstrated the need for continued biodiversity research. Joint biodiversity explorations to the Anambas & Natuna Islands in 2002 and Panglao in 2004 revealed many new species. The region's rich marine biodiversity provides valuable ecosystem services, but faces widespread habitat degradation that may be further impacted by climate change. Effective protection of a larger representation of the region's marine biodiversity is needed to maintain habitat resiliency.

Scientific assessment of ecologically or biologically significant marine areas (EBSAs): Workshop objectives and expected outputs/outcome (by Jihyun Lee, CBD Secretariat)

Ms. Lee introduced the process for describing EBSAs, beginning with the adoption of the EBSA criteria at the ninth meeting of the Conference of the Parties to the Convention (COP 9) and the call by the tenth meeting of the Conference of the Parties (COP 10) to organize a series of regional EBSA workshops. Since 2011, the CBD Secretariat has convened 11 regional workshops to facilitate the description of areas meeting the EBSA criteria, pursuant to COP decisions X/29, XI/17 and XII/22. These workshops have covered more than 70 per cent of the world's oceans and involved 141 countries and 137 organizations, with some attending more than one workshop. So far, a total of 204 areas have been described as meeting the EBSA criteria, and these areas have been considered by COP 11 and COP 12, which then requested that the summary reports on the outputs of these regional EBSA workshops be submitted to the United Nations General Assembly and its relevant working groups. She informed the participants that the results of subsequent workshops, including the present one, would be submitted to the forthcoming twentieth meeting of the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA 20) in April 2016 and the thirteenth meeting of the Conference of the Parties, in December 2016. Ms. Lee went on to emphasize that the application of the EBSA criteria is a scientific and technical exercise and that areas found to meet the EBSA criteria may require enhanced conservation and management measures, which can be achieved through a variety of means, including marine protected areas and impact assessments. She also emphasized that the identification of EBSAs and the selection of conservation and management measures is a matter for States and competent intergovernmental organizations. She then pointed out that the EBSA process may lead to further strengthening of the region's existing efforts to meet its goals for marine biodiversity conservation, by facilitating scientific collaboration and increasing awareness.

The Role of the Global Ocean Biodiversity Initiative (GOBI) (by Mr. David Johnson, GOBI)

Mr. Johnson explained the role of the Global Ocean Biodiversity Initiative (GOBI), an international partnership set up to advance the scientific basis for conserving biological diversity in the deep-sea and open oceans. GOBI is funded by the Government of Germany to support international collaboration and to provide scientific and technical support on how the EBSA criteria can be interpreted and applied. A number of key challenges to marine science must be overcome, such as data gaps, compiling regional biogeographies, understanding connectivity between key sites, and identifying those areas most resilient to the impacts of climate change and ocean acidification. Since 2009, GOBI has helped CBD Parties as well as regional and global organizations to develop and use data, tools and methodologies to describe EBSAs. Key issues concerning the strengths, challenges and limitations of data availability and scientific understanding can influence the EBSA process and interpretation of the seven EBSA criteria. GOBI is also active within the United Nations, explaining the value of EBSAs for benthic and pelagic systems, as well as promoting the EBSA repository (available at www.cbd.int/ebsa) as a resource providing baseline ecological information for broader ecosystem-based marine spatial planning.

Regional Overview of Biogeographic Information on Open-ocean Water and Deep-sea Habitats and Geographic Scope of the Workshop (by Mr. Piers Dunstan, Commonwealth Scientific, Industrial and Research Organization – CSIRO)

Mr. Dunstan presented a summary of the broad bioregions of the Seas of East Asia. Mr Dunstan showed the bioregions described by the Marine Ecoregions of the World and discussed the areas of high biodiversity through the Coral Triangle and extending northward. He discussed how the area was a large archipelagic region with extensive chains of islands connected with deep sea ridges and large shelf areas. He explained how the broader oceanic circulation separated the region from the broader Pacific and

Indian oceans. He then proposed the potential geographic scope of the workshop, considering the geographic scopes covered by the previous workshops.

Agenda Item 4.

Review of Scientific Information Compiled for the Workshop (by Mr. Piers Dunstan, Commonwealth Scientific, Industrial and Research Organization – CSIRO)

Mr. Dunstan presented the data collated for the workshop and described how the collated scientific information can be analysed and used in applying the EBSA criteria. He presented a brief summary of the data collated, as contained in document UNEP/CBD/EBSA/WS/2015/3/3. The data sets cover biological and ecological data, including habitat maps, coral reefs and important bird areas. He also showed physical data sets, including maps of benthic geomorphology, oceanic climatologies and derived data sets like SST frontal zones. Regarding the issue of how open ocean areas characterized by boundaries that vary seasonally, interannually and decadally could be portrayed, he suggested focusing on a typical area, perhaps one where the phenomenon occurred 70 per cent of the time.

International Cooperation for a Shared Biodiversity Resource: Migratory Waterbirds in the East Asian – Australasian Flyway (by Mr. Spike Millington, East Asian – Australasian Flyway Partnership, EAAFP)

Mr. Millington introduced the EAAFP, which brings together 34 national governmental, inter- and non-governmental organizations to protect migratory waterbirds and their habitats in the Flyway. He explained that the EAAFP supports 50 million migratory waterbirds of more than 250 populations that depend on a network of coastal and inland wetland sites, from Arctic Alaska and Russia through East Asia to Australia and New Zealand, to undertake their annual migrations. The EAAFP is the most threatened of the nine global flyways, including the highest number of threatened and endangered species, such as the critically endangered spoon-billed sandpiper. He explained that the principal reason for the continuing decline of most waterbird species in the Flyway is the loss and degradation of intertidal habitat, particularly due to reclamation in East Asia. The continued survival of these intertidal-dependent species relies upon the conservation and sustainable management of a network of intertidal sites, particularly in the critical bottleneck areas, such as the Yellow Sea. Different species depend on different networks due to their particular migration strategies and feeding preferences. Recent monitoring has indicated that as habitat disappears, more and more species are becoming dependent on an ever-shrinking number of sites, such that any further loss of critical intertidal habitat in key areas would have significant impact on global population numbers for some species. In light of this, and in accordance with the EBSA criteria and particularly the connectivity aspect, Mr. Millington proposed that a network of intertidal sites could constitute a single area meeting the EBSA criteria.

Annex III

ECOLOGICAL AND BIOLOGICAL SIGNIFICANCE OF THE SEAS OF EAST ASIA ON A GLOBAL SCALE

The workshop participants recognized the ecological and biological significance of the Seas of East Asia on a global scale on the following basis:

1. The East Asian Seas region abuts the C-shaped contour of the Asian continent's eastern shore, covering an area between latitudes 45ºN and 13ºS, and longitudes 98º and 147ºE. The bathymetry extends from the shallow shores of the continental shelf to deep ocean trenches (Japan Trench, Philippine Trench, and Marianas) reaching 9000m depth. The region's lower section is highly archipelagic with over 25000 islands of Indonesia and the Philippines stretching across seas that separate Asia from Australia and where the Pacific and Indian Oceans connect. The numerous islands of varying size, mostly volcanic or coral, compartmentalize but do not isolate the water body, resulting in connected seas of different sizes, with varying degrees of embayment.
2. The geological development of the region resulted in a large diversity of features that include enclosed seas and open water with deep basins, seamounts, hydrothermal vents and cold seep areas. There are a number of large marine ecosystems and regional seas, including the East China Sea, South China Sea, Gulf of Thailand, Sulu-Celebes-Sulawesi Seas and the Indonesian Seas (UNEP/COBSEA, 2010). The latitudinal range subjects the region's south–to-tropical and north-to-temperate climate conditions.
3. Surface current patterns indicate the Pacific as a main source of water mass. Warm westbound equatorial currents from the Pacific Ocean deflect north at the Philippines towards Japan as the Kurioshio current, or south into the Celebes Sea as the Mindanao current flowing between the islands of eastern and central Indonesia into the Indian Ocean. The region is influenced by monsoons, which reverse surface currents seasonally, resulting in highly dynamic circulation processes. These conditions make it conducive for migratory species such as cetaceans, large pelagic fish, and turtles to move throughout the seas and use different areas to support their life cycle.
4. Tectonic activity between the Eurasia-Australia and Pacific plates makes the region vulnerable to serious geological hazards but at the same time has contributed to coastal geomorphology variation ranging from narrow continental shelves dropping to deep water close to shore with poor beach development to wide, gently sloping beaches and deltas (UNEP/COBSEA, 2010). Large deltas formed by major rivers draining Asia's east coast and some of the large island masses of Indonesia and Philippines support expansive stands of mangrove associated with seagrass and large mud flats.
5. The extensive coastlines have been influenced by localized geomorphological conditions through time to provide the region with the greatest variety of coastal and marine ecosystems throughout the entire Indo-Pacific (IUCN/UNEP, 1985). The coastal environment is represented by a wide range of ecosystems that include cliffs, coves, beaches (sandy, muddy, rocky), mudflats, spits, dunes, lagoons, estuaries, marshes, mangroves, seagrass and coral reefs (Bleakley & Wells, 1995).
6. The region's coastal and marine ecosystems, particularly in the tropics, are among the richest and most productive in the world, with 30 per cent each of the world's coral reefs (Burke et al, 2011) and mangroves present (FAO, 2007). Seagrass areas are also more extensive and diverse in the region than anywhere in the world (Green & Short, 2003). These ecosystems support species richness at levels greater than elsewhere, e.g., nearshore fish, molluscs and crustaceans (Briggs, 1974). Described as the epicentre of global marine biodiversity, the region has 80 per cent of the world's hard coral species (about 800) (Spalding et al., 2001), 60 per cent of mangrove species (FAO, 2007) and 50 per cent of seagrass species (Green & Short, 2003).
7. Fringing reefs are common, but barrier reefs, atolls, platform reefs and the more recently discovered mesophotic reefs add to the diversity of reef systems throughout the region. The Coral Triangle is an area with the highest species diversity of corals, fish and other reef invertebrates in the world (Burke

et al., 2012). It has 798 species of coral (Veron et al., 2010) and 52 per cent of the reef fish species of the Indo-Pacific biogeographic region (Allen, 2007). The western half of the Coral Triangle includes the Philippines, east coast of Borneo and Papua, and there are further biodiversity hotspots with extraordinary concentrations of species.

8. At the apex of the Coral Triangle is the Sulu-Celebes-Sulawesi Sea, bounded by Indonesia, Malaysia and Philippines, and the pattern of declining species richness away from this large marine ecosystem applies to many taxa (e.g., Veron 2000, Allen, 2007). However, within the Coral Triangle there are localized areas with incredibly high species diversity. Eastern Indonesia's Bird's Head Peninsula itself holds 574 species of hard coral (Veron et al., 2010) and within this seascape, the Raja Ampat Islands ecoregion has the highest concentration of 553 coral species (Veron, 2000; Turak and Souhoka, 2003).

9. When defining the coral triangle (and its ecoregions and so-called "functional seascapes") Green and Mous (2008) used coral biodiversity (>500 coral species) as a critical threshold. The same authors also noted exceptional foraminifera species diversity in marine waters further north of the Coral Triangle boundaries and exceptional mangrove diversity further west and south. The deep-sea ecosystems are similarly diverse, including major trenches, ridges, seamount chains, hydrothermal vents and seeps. The deep-sea pelagic environment supports important spawning areas (e.g., bluefin tuna, yellow fin tuna, frigate tuna, skipjack and billfishes) and migratory species of seabirds, mammals and turtles.

10. Many species are endemic to the region or found in localized sites, and their loss translates to global extinction. Their global uniqueness should be guarded against loss. The Indonesian coelacanth, *Latimeria menadoensis*, discovered in 1998, is globally distinct. Population genetics of corals (Knittweis et al., 2009), fish (Lourie & Vincent, 2004; Timm & Kochzius, 2008), crustaceans (Barber et al., 2006), molluscs (Kochzius & Nuryanto., 2008) and echinoderms (Kochzius et al., 2009) indicate high levels of genetic structuring with distinct signatures from the region.

11. The region's fisheries production has increased steadily due mainly to contribution from increased aquaculture production as capture fisheries levelled off in the mid-1990s. Fishing efforts continue to rise, and some stocks are already depleted by overfishing (FAO, 2005). Marine capture fisheries make up almost 90 per cent of regional production, with the remainder from freshwater. Almost all marine capture fisheries are from the region's seas (UNEP/COBSEA, 2010).

12. The East Asian – Australasian Flyway supports 50 million migratory waterbirds of more than 250 populations that depend on a network of coastal and inland wetland sites from Arctic Alaska and Russia through East Asia to Australia and New Zealand to undertake their annual migrations. The Flyway is the most threatened of the nine global flyways, including the highest number (33) of threatened and endangered species, such as the critically endangered spoon-billed sandpiper and Chinese crested tern, which are endemic to the Flyway. Many additional species are declining at an alarming rate, some at 4-8 per cent per year, particularly shorebird populations dependent on intertidal habitats.

13. The principal reason for the continuing decline of most waterbird species in the Flyway is the loss and degradation of intertidal habitat, particularly to reclamation, in East Asia. The continued survival of these intertidal-dependent species relies upon the conservation and sustainable management of a network of intertidal sites, particularly in the critical bottleneck areas, such as the Yellow Sea.

14. Different species depend on different networks due to their different migration strategies and feeding preferences. Recent monitoring has indicated that as habitat disappears, more and more species are becoming dependent on an ever-shrinking number of sites, such that any further loss of critical intertidal habitat in key areas would have significant impacts on the numbers of global population for some species.

15. Despite habitat and environment degradation from intense anthropogenic pressure, the region still holds a rich array of marine life. Its diverse coastal and marine habitats continue to support the most

diverse marine flora and fauna in the world with biological and ecological significance at the global level. For these reasons the whole region can be considered to be of global ecological or biological significance relative to other regions.

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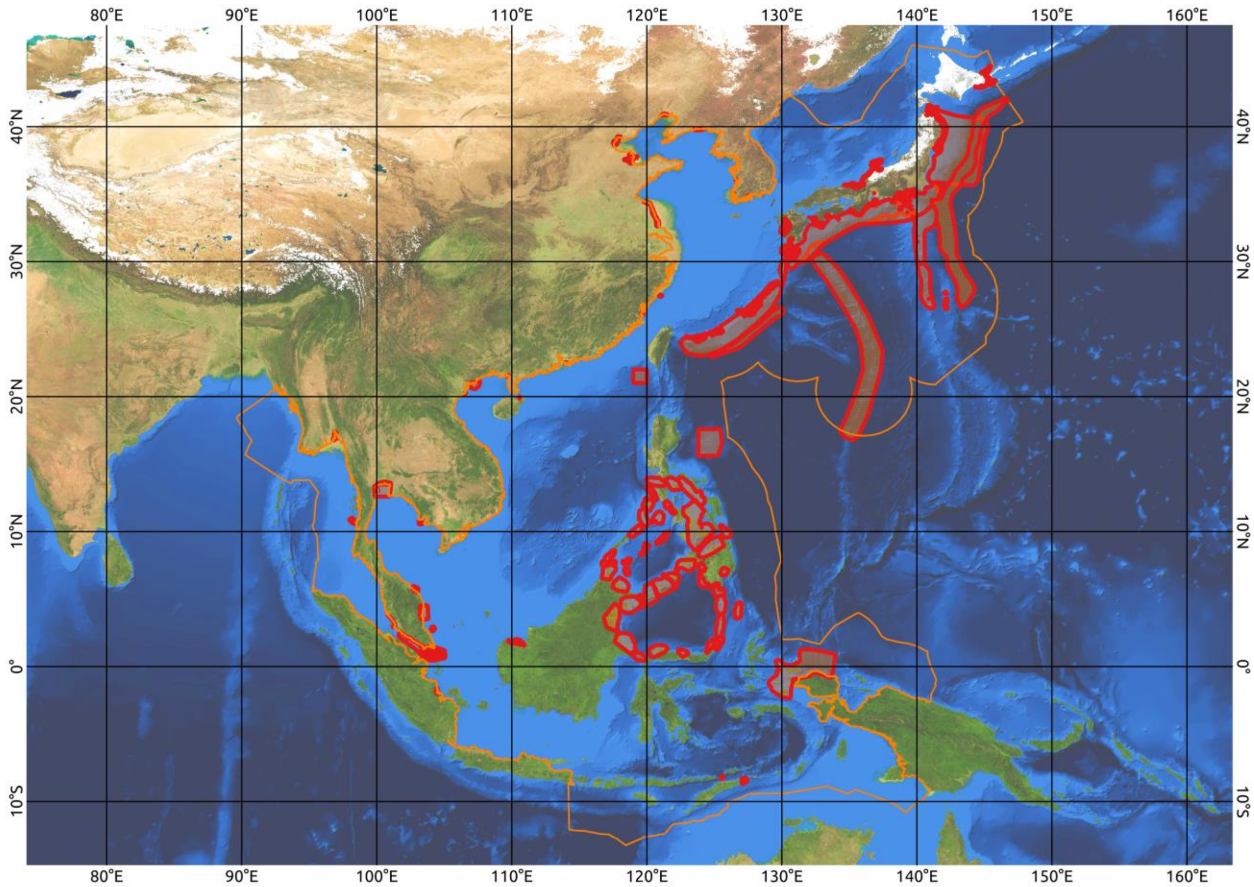
Annex IV

MAP OF THE WORKSHOP'S GEOGRAPHIC SCOPE AND AREAS MEETING EBSA CRITERIA IN THE SEAS OF EAST ASIA AS AGREED BY THE WORKSHOP PLENARY



Note : The thick red line depicts the areas meeting the EBSA criteria, and the thin orange line depicts the geographic scope of the workshop.

Annex V

DESCRIPTION OF AREAS MEETING THE EBSA CRITERIA IN THE SEAS OF EAST ASIA AS AGREED BY THE WORKSHOP PLENARY

No	**Areas meeting the EBSA criteria** **(See the detailed description of compiled areas in appendix to annex IV)**[4]	
1	Hainan Dongzhaigang Mangrove National Natural Reserve	
2	Shankou Mangrove National Nature Reserve	
3	Nanji Islands Marine Reserve	
4	Cold Seeps	
5	Muan Tidal Flat	
6	Intertidal Areas of East Asian Shallow Seas	
7	Lembeh Strait and Adjacent Waters	
8	Redang Island Archipelago and Adjacent Area	
9	Southern Straits of Malacca	
10	Nino Konis Santana National Park	
11	The Upper Gulf of Thailand	
12	Halong Bay-Catba Limestone Island Cluster	
13	Tioman Marine Park	
14	Koh Rong Marine National Park	
15	Lampi Marine National Park	
16	Raja Ampat and Northern Bird’s Head	
17	Atauro Island	
18	Sulu-Sulawesi Marine Ecoregion	
19	Benham Rise	
20	Eastern Hokkaido	
21	Southwest Islands	
22	Inland Sea Areas of Western Kyushu	
23	Southern Coastal Areas of Shikoku and Honshu Islands	
24	South Kyushu including Yakushima and Tanegashima Islands	
25	Ogasawara Islands	
26	Northern Coast of Hyogo, Kyoto, Fukui, Ishikawa and Toyama Prefectures	
27	Ryukyu Trench	
28	West Kuril Trench, Japan Trench, Izu-Ogasawara Trench and North of Mariana Trench	
29	Nankai Trough	
30	Sagami Trough and Island and Seamount Chain of Izu-Ogasawara	
31	Convection Zone East of Honshu	
32	Bluefin Tuna Spawning Area	
33	Kyushu Palau Ridge	
34	Kuroshio Current South of Honshu	
35	Northeastern Honshu	
36	Hydrothermal Vent Community on the Slope of Southwest Islands	

Appendix to Annex V

DESCRIPTION OF AREAS MEETING THE EBSA CRITERIA IN THE SEAS OF EAST ASIA AS AGREED BY THE WORKSHOP PLENARY

Area no. 1: Hainan Dongzhaigang Mangrove National Nature Reserve

Abstract

Hainan Dongzhaigang mangrove National Nature Reserve is an important coastal mangrove ecosystem and has most of the typical original natural mangroves of China. The area also has very rich biodiversity, especially various marine and coastal resources, for example, mangrove forests, waterfowl, phytoplankton and zooplankton. This estuary and coastal mudflat ecosystem is on the edge of boreal tropics, and is also an important habitat for wintering birds.

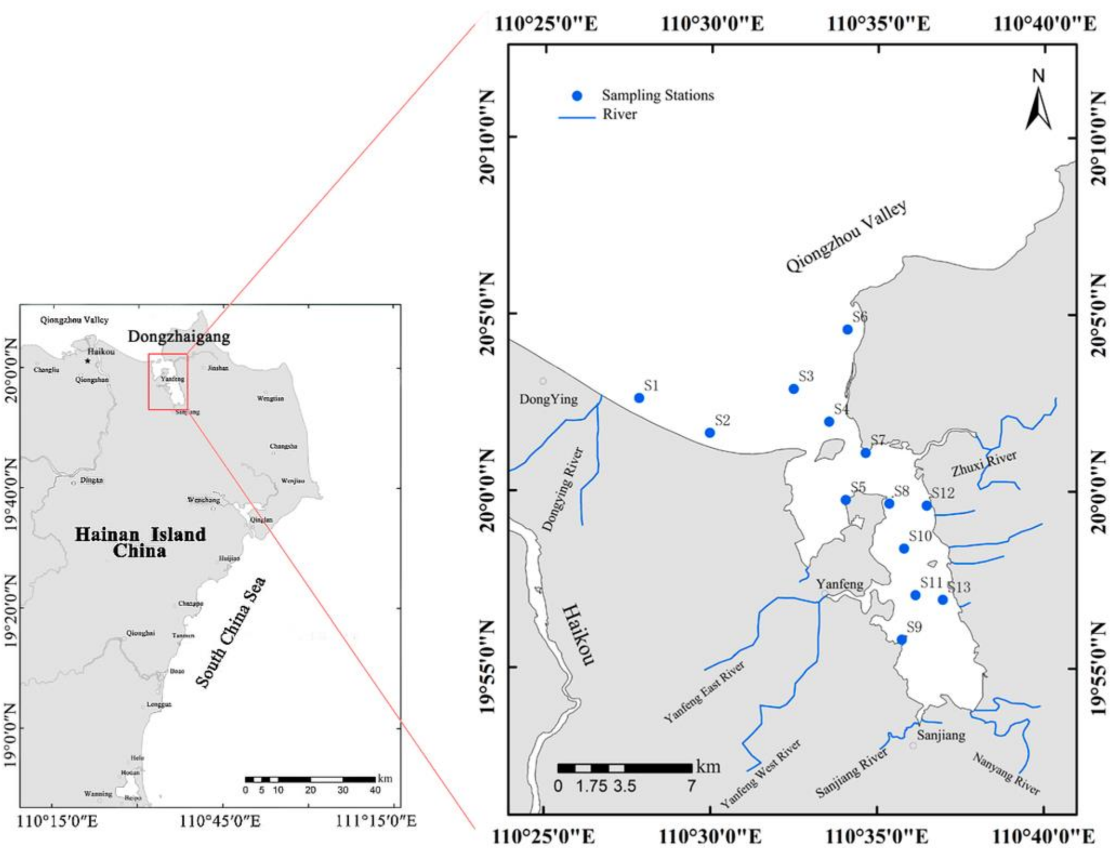
Introduction

Dongzhaigang is a shoal-water bay formed by continental sink during the Great Qiongzhou Earthquake of 1605. The total everglade area is 5400 ha, with 2065 ha of mangrove forest, and 3335 ha of mudflat and shoal-water area. Dongzhaigang has a typical subtropical monsoon marine climate, with mean rainfall of 1676 mm. Annual average air temperature ranges from 23.3 °C to 23.8 °C, and average annual sunlight is 2200 h.

It is a semi-enclosed, muddy bottom estuary, fed by four small rivers. The reserve is subjected to semidiurnal tides with mean tidal amplitude of 1.6–1.8 m. The vegetated area is approximately 1734 ha, dominated by *Bruguiera sexangula*, *Ceriops tagal*, *Avicennia marina*, *Rhizophora stylosa*, and *Aegiceras corniculatum*. Deforestation has ceased since 1986, when the bay was declared a national nature reserve (Dongzhaigang National Nature Reserve). It was one of the first seven wetlands in China listed in the Ramsar List of Wetlands of International Importance.

Location

The Hainan Dongzhaigang National Mangrove Nature Reserve is located in the northeast of the Meilan district, Haikou City (110°30'–110°37' E, 19°51'–20°01' N). The entire area covers 5400 ha.



Feature description of the proposed area

The reserve has very rich biodiversity. In the region there are 19 families and 35 species of mangrove plants, which account for 95 per cent of the national mangrove plant species, including *Nypa Steck*, *Lumnitzera littorea (Jack) Voigt*, *Sonneratia hainanensis* and *Acrostichum speciosum.* Among them, *Sonneratia hainanensis* and *Acrostichum speciosum* are the unique species in Hainan.

There are 40 families and 194 species of birds that been observed in the reserve. This area serves as an important stopover for migrating waterfowl, including *Platalea minor*, *Centropus sinensis* and *Larus sauner.*

In the reserve, there are 115 species of fish and 92 species of benthic animals, most of which have high economic value, such as grouper, bass and bream.

Feature condition and future outlook of the proposed area

The mangrove ecosystem has long been protected. Deforestation ceased in 1986, when the bay was declared a national nature reserve. A comprehensive health assessment has been carried out on the water quality in Dongzhaigang. Floods, wind damage, biological disasters (Sphaeromadae) and chilling are all the major ecological risk natural disturbance of the reserve (Liu et al., 2015).

Assessment of the area against the CBD EBSA Criteria

<table>
<tr><td rowspan="2">CBD EBSA Criteria
(Annex I to decision IX/20)</td><td rowspan="2">Description
(Annex I to decision IX/20)</td><td colspan="4">Ranking of criterion relevance
(please mark one column with an X)</td></tr>
<tr><td>No information</td><td>Low</td><td>Medium</td><td>High</td></tr>
<tr><td>Uniqueness or rarity</td><td>Area contains either (i) unique (“the only one of its kind”), rare (occurs only in few locations) or endemic species, populations or communities, and/or (ii) unique, rare or distinct, habitats or ecosystems; and/or (iii) unique or unusual geomorphological or oceanographic features.</td><td></td><td></td><td>X</td><td></td></tr>
<tr><td colspan="6">Explanation for ranking (must be accompanied by relevant sources of scientific articles, reports or documents)

Sonneratia hainanensis and Acrostichum speciosum in the reserve are species unique to Hainan (Mai, 2014).</td></tr>
<tr><td>Special importance for life-history stages of species</td><td>Areas that are required for a population to survive and thrive.</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">Explanation for ranking (must be accompanied by relevant sources of scientific articles, reports or documents)

This area serves as an important stopover for migrating waterfowl, including Platalea minor, Centropus sinensis and Larus sauner, and is a feeding place for Ardeidae (Wu & Wang, 2013; Mai, 2014).</td></tr>
<tr><td>Importance for threatened, endangered</td><td>Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species.</td><td></td><td></td><td></td><td>X</td></tr>
</table>

or declining species and/or habitats					
Explanation for ranking (must be accompanied by relevant sources of scientific articles, reports or documents) There are 16 species observed in the reserve that are rare and endangered and are under state protection (category ii) (Wu & Wang, 2013).					
Vulnerability, fragility, sensitivity, or slow recovery	Areas that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery.				X
Explanation for ranking (must be accompanied by relevant sources of scientific articles, reports or documents) The altitude of the tidal flat is the one of the main factors affecting mangrove distribution. The reserve's low altitude makes it particularly vulnerable to flooding, which causes significant natural disturbance (Liu et.al.,2015). Prolonged flooding not only exceeds the tolerance of the mangrove, but also promotes the growth of Sphaeromadae (biological disease), which negatively impacts mangroves in this reserve.					
	Area containing species, populations or communities with comparatively higher natural biological productivity.	X			
Explanation for ranking (must be accompanied by relevant sources of scientific articles, reports or documents) Needs further research.					
Biological diversity	Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity.				X
Explanation for ranking (must be accompanied by relevant sources of scientific articles, reports or documents) In the region there are 35 species of mangrove plants, which account for 95 per cent of the national mangrove plant species. There are also 115 species of fish and 194 species of bird in the reserve (Wu & Wang, 2013).					
Naturalness	Area with a comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or degradation.			X	
Explanation for ranking (must be accompanied by relevant sources of scientific articles, reports or documents) Most parts of the reserve are now protected very well, but some parts of the reserve are impacted by sewage from the surrounding village (Wu & Wang, 2013).					

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Maps and Figures

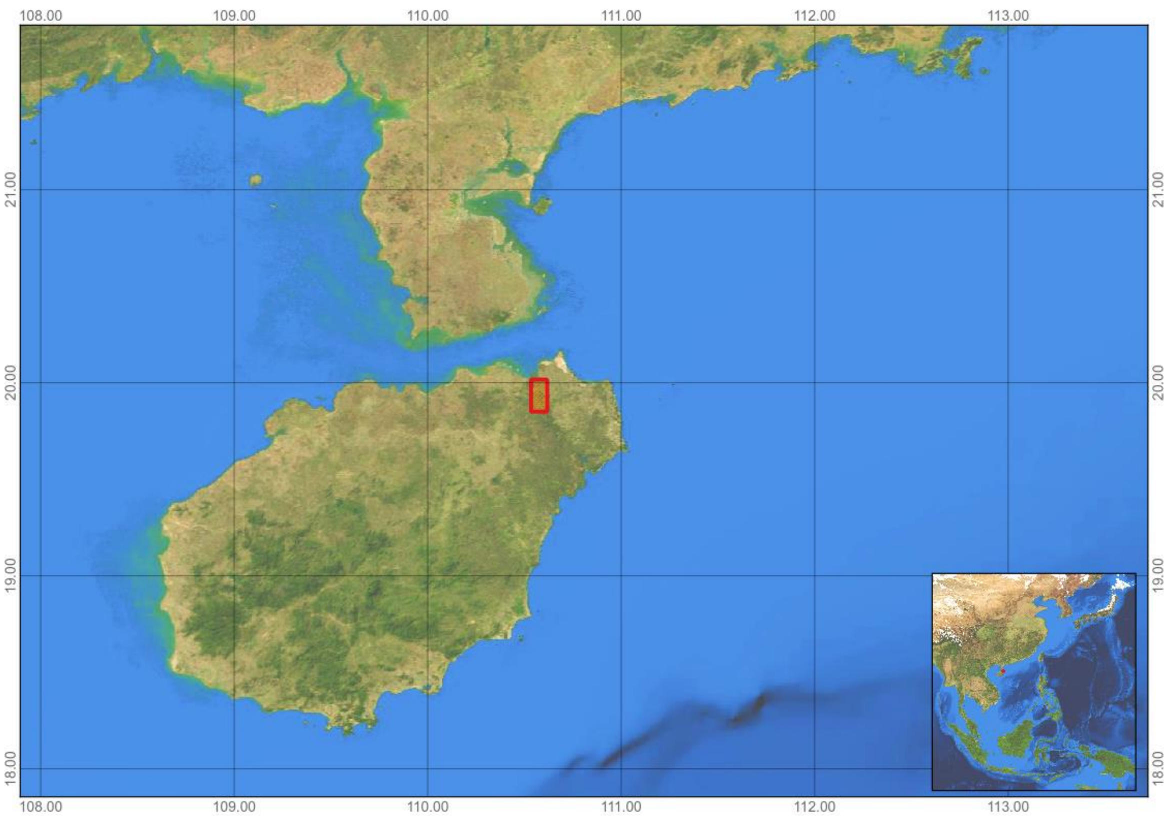

Figure 1. Area meeting the EBSA criteria

Area no. 2: Shankou Mangrove National Nature Reserve

Abstract

Shankou Mangrove National Nature Reserve covers a total area of almost 8,000 hectares and stretches along the coast for some 50 km. There are 14 species of mangrove and large populations of benthic diatoms, fish, shellfish, birds and insects in the Reserve, and it is one of the most typical coastal mangrove areas in China.

Introduction

Shankou Mangrove National Nature Reserve consists of two areas on either side of the Shatian Peninsula, southeast of Hepu County, Guangxi Zhuang Autonomous Region. It is the first of five reserves of its kind with the approval of the State Council in 1990s. Covering a total area of 8,000 hectares and containing a core area of 824 hectares, the Reserve stretches along the coast for some 50 km. Meanwhile, the Reserve's mangrove forest covers a total area of 765 hectares (Guangxi Mangrove Research Center, 1999) and includes 21 species of mangroves such as *Rhizophora stylosa, Kandelia candel, Aegiceras corniculatum, Avicennia marina, Bruguiera gymnorrhiza* and *Excoecaria agallocha*. All of them are of great value. Besides the mangroves, there are abundant marine creatures, such as seaweed, *Spartina anglica* and pearl oyster. The site also supports a number of vulnerable and endangered species, including dugong, which is under state protection. The climate is subtropical, with high temperatures and plenty of rain. Its thick silt and salinized soil make the region the most representative and best preserved natural mangrove preservation zone in China.

Location

The Shankou Mangrove National Nature Reserve is located on either side of the Shatian Peninsula, southeast of Hepu County, Guangxi Zhuang Autonomous Region of China. The Reserve is centred at 21°28'N, 109°43'E.

Feature description of the proposed area

Physical description

Located on the east coast of Guangxi Zhuang Autonomous Region of China, Shankou Mangrove National Nature Reserve is in the subtropical climate, with about 1796-1800 hours of sunshine annually and annual mean temperature of 23.4 ℃, while the annual variation of temperature is only about 13.8℃. The annual average precipitation is 1500-1700 mm, half of which falls in the summer. The evaporation capacity is about 1000-1400 mm, while the average relative humility is 80 per cent. The climate in the Reserve is warm, with sufficient sunshine and heat, and is divided into wet and dry seasons, conducive to the growth of mangroves. Severe weather comes in the form of Typhoons (2 to 3 per year, mainly in July and August) and rainstorms.

Shankou Mangrove National Nature Reserve experiences irregular diurnal tides. There is one tide per day 60 per cent of the year, with two tides per day during the rest of the year. Average tidal range is between 2.31 and 2.59 metres— bigger in summer while smaller in spring. In recent years, the average tidal range has been 2.52 metres, and the largest 6.25 metres. The mean sea level of the Reserve is 0.37 metres higher than the Yellow Sea. The average salinity of sea water is 28.9‰.

The Wuliu River, Ximi River and Daba River disgorge in the east of Shankou Mangrove National Nature Reserve and in the west, Dandou River disgorges, though the average fresh water runoff injection rate is very low.

Biological communities

Fourteen species of native mangrove and semi-mangrove species, 158 species (including variation) of benthic diatom, 96 species of phytoplankton, 26 species of zooplankton, 95 species (fish) of nekton, 273 species of insect, 139 kinds of birds and some un-researched microorganisms have recently been recorded in the Reserve (Guangxi Mangrove Research Center,1999).

Mangrove

There are 11 families, 14 genera and 14 species of mangroves in the Shankou Mangrove National Nature Reserve: *Acrostichum Aureum, Bruguiera Gymnorrhiza，Kandelia Candel, Rhizophora Stylosa, Acanthus Ilicifolius，Lumnitzera Racemosa，Excoecaria Agallocha， Aegiceras Corniculatum, Avicennia Marina, Cerbera Manghas，Pongamia Pinnata, Hibiscus Tiliaceus, Thespesia Populnea, Premna Obtusifolia*， and *Sonneratia Apetala.*

These mangroves can be divided into six basic communities: *Avicennia Marina, Aegiceras corniculatum, Kandelia candel, Rhizophora stylosa, Bruguiera gymnorrhiza* and *Excoecaria agallocha;* the rest are transitional communities, such as *Avicennia Marina+Aegiceras corniculatum, Aegiceras corniculatum+ Rhizophora stylosa,* among others.

The total area of Shankou Mangrove National Nature Reserve is 775.8 hectares. The national mangrove sources investigation conducted by the state forestry administration in 2001 showed that the total areas of all kinds of mangrove covered 1085.9 ha including 806.2 ha of land areas. The investigation totally counted eight community areas and the largest area of Rhizophora stylosa is 271.3 ha which occupies 33.7%, and the area of *Bruguiera gymnorrhiza+ Kandelia candel-Aegiceras corniculatum community is 222.6* ha, the area *of Kandelia candel- Avicennia Marina community* is 102.6 ha *, and the area of Kandelia candel* community is 4.4 ha.

Phytoplankton

There are 32 genera and 96 species of phytoplankton (including variation and deformation), 158 kinds of benthic diatom, two genera and three species of dinoflagellate, and one genera and one species of cyonophyta in the Reserve. The species and number of phytoplankton in winter (80 species, 3419×10^{3}cells/m^{3}) is even higher than in spring and summer (53 species, 100.5×10^{3}cells/m^{3}), and the seasonal change of species composition and quantitative distribution are very high.

Zooplankton

In the Reserve, there are 22 genera and 26 species of zooplankton. The largest number of species is medusa, followed by copepod.

Zoobenthos

There are 170 kinds of zoobenthos in the Reserve. Mollusca is the most common, accounting for 81 species, which accounts for 47.6 per cent of the total species. And the total number of mollusks and crustacean, which accounts for 87.65% and they are the dominant species in zoobenthos.

Fish

There are 36 families, 59 genera and 76 species of fish on record in Shankou Mangrove National Nature Reserve.

Birds

There are 139 species of birds in the Reserve, 13 of which are rare and endangered species under state protection (category ii), such as Eurasian spoonbill and black-faced spoonbill.

Feature condition and future outlook of the proposed area

The Reserve was established in 1993 and increased in size each year, until 2008, when the area of mangroves reached 818.8 hectares, which is 12 per cent bigger than the previous area of 730 hectares. The mangrove ecosystem is getting healthier, especially due to improved local awareness of sustainable development based on local economic development.

Assessment of the area against the CBD EBSA Criteria

CBD EBSA Criteria (Annex I to decision IX/20)	**Description** (Annex I to decision IX/20)	**Ranking of criterion relevance** (please mark one column with an X)			
		No information	**Low**	**Medium**	**High**
Uniqueness or rarity	Area contains either (i) unique ("the only one of its kind"), rare (occurs only in few locations) or endemic species, populations or communities, and/or (ii) unique, rare or distinct, habitats or ecosystems; and/or (iii) unique or unusual geomorphological or oceanographic features.			X	
Explanation for ranking At the national level, this mangrove ecosystem is highly unique, but in the Seas of East Asia region, such mangrove ecosystems are less unique.					
Special importance for life-history stages of species	Areas that are required for a population to survive and thrive.	X			
Explanation for ranking The special importance for life-history stages of species in the area needs to be further explored.					
Importance for threatened, endangered or declining species and/or habitats	Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species.				X
Explanation for ranking There are 13 species observed in the reserve that are considered rare and endangered species under state protection (category ii), such as Eurasian spoonbill and black-faced spoonbill. (Guangxi Mangrove Research Center, 1999).					
Vulnerability, fragility, sensitivity, or slow recovery	Areas that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery.			X	

<table>
<tr><td colspan="6">Explanation for ranking

Shankou Mangrove National Nature Reserve once conducted two activities to introduce Spartina alterniflora, and the species coverage has increased to about 251 ha, and its spread has seriously limited the surrounding ecological space available to mangroves, making them more vulnerable.</td></tr>
<tr><td>Biological productivity</td><td>Area containing species, populations or communities with comparatively higher natural biological productivity.</td><td></td><td></td><td>X</td><td></td></tr>
<tr><td colspan="6">Explanation for ranking

The total area of Shankou Mangrove National Nature Reserve is 775.8 hectares, and the net primary productivity per year of the mangrove community is between 11.49t-36.395t hm^{-2} (Wang B-S, 2002) and it is taken as the primary productivity of mangrove in protected areas which is higher, and between 8913.94t-28235.24t. The biomass of zoobenthos reaches 101.5～533.0 g/m^2 (Wang Xianpu 2011) .</td></tr>
<tr><td>Biological diversity</td><td>Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity.</td><td></td><td></td><td>X</td><td></td></tr>
<tr><td colspan="6">Explanation for ranking

The biodiversity in the Reserve is very high, and there are 14 species of native mangrove and semi-mangrove species, 158 species (including variations) of benthic diatom, 96 species of phytoplankton, 26 species of zooplankton, 95 species (fish) of nekton, 273 species of insect, 139 kinds of birds and some un-researched microorganisms (Guangxi Mangrove Research Center, 1999).</td></tr>
<tr><td>Naturalness</td><td>Area with a comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or degradation.</td><td></td><td></td><td>X</td><td></td></tr>
<tr><td colspan="6">Explanation for ranking

Established as a 730-ha reserve in 1993, the area increased in size every year, reaching 818.8 hectares in 2008, which is 12 per cent larger than its original size. The spread of Spartina alterniflora has seriously limited the surrounding ecological space available to mangroves.</td></tr>
</table>


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Maps and Figures

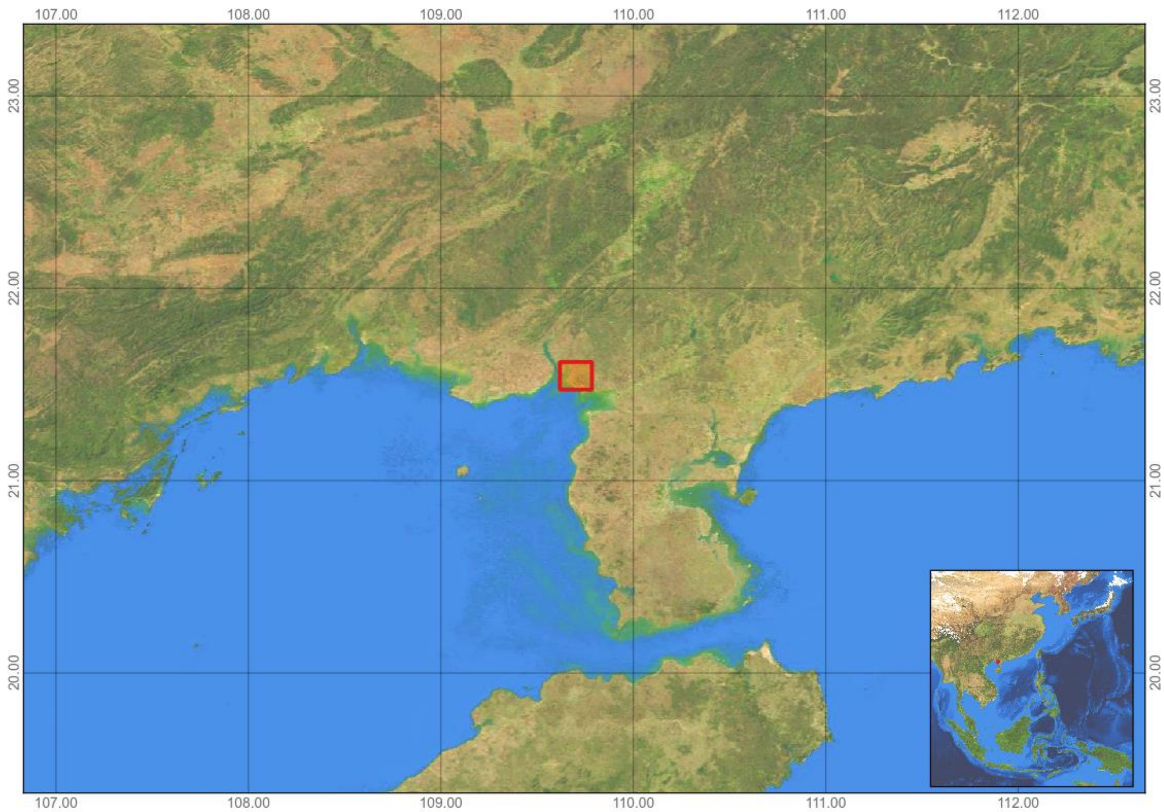

Figure 1. Area meeting the EBSA criteria

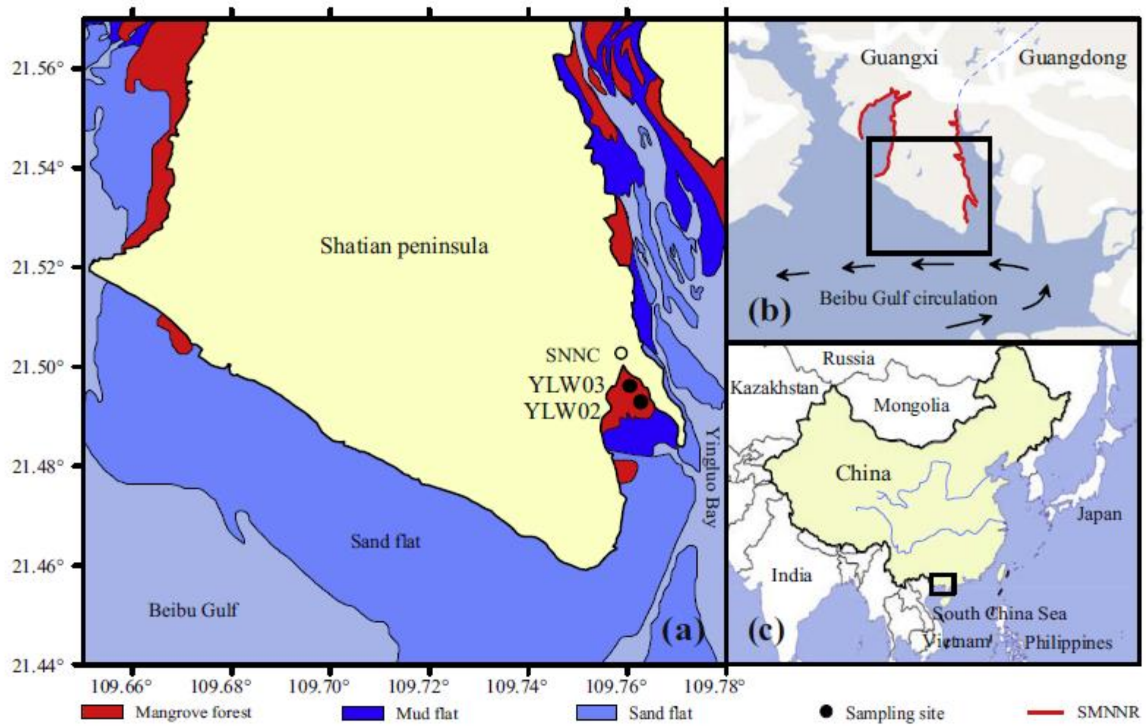

Figure 2: Location Diagram of Shankou Mangrove National Nature Reserve (Peng Xia, 2015)

Area no. 3: Nanji Islands Marine Reserve

Abstract
The area contains a high level of biodiversity, including 427 species of shellfish and 178 species of macro-benthic algae. It is referred to by scientists as “a kingdom of shells and algae”. There are also 459 species of micro-algae, 397 species of fish, 257 species of crustaceans and 158 species of other marine creatures. Nine of these species are listed as endangered or vulnerable by IUCN.

Introduction
The area consists of 52 islands, with the main one being Nanji Island, which has an area of 7.64 km^2. Due to the high biodiversity of molluscs and macroalgae, scientists often refer to the area as “a kingdom of shells and algae”.

Location
The area has a total coverage of 201.06km^2, of which11.13 km^2 is covered by land area. The geographical coordinates of the centre of Nanji Island are 121°05′E and 27°27′N.

Feature description of the area
<u>Physical description</u>
Climate
The area is in the subtropical monsoon region. In summer, southwesterly winds prevail, and northerly winds prevail in winter. The annual average temperature is 16.5°C. The hottest month is August, with an average temperature of 26.2°C. The coldest month is Feberary, with an average temperature of 6.6°C. Annual precipitation is 1063.4 mm. There are two rainy seasons: the first is from March to June, and the second is from August to September (EPBZJ, 1995).

Geomorphologic features
About 95 per cent of the coastline in the area is rocky shore. Sand beaches and mud flats are rare. The largest sand beach is Dashaao Bay, with a length of 600 m. Most of the subtidal zone is soft bottum. The main component of the subtidal sediment in Nanji waters is silt clay. It accounts for more than 90 per cent of the sediment (EPBZJ, 1995).

Hydrologic features
In the reserve, the water depth ranges from 15 to 50m. It has regular semidiurnal tide. The average tidal range is 3.74m, and themaximum tidal range is 6.76m. The maximum flood tide velocity is 84 cm/s, while that of the ebb tide is 78 cm/s (EPBZJ, 1995).

The area lies in the frontal region of the Jiangzhe coastal current, which is characterized by hypohaline and relatively low temperature. It is affected by monsoon and land streams, and its flow direction changes in different seasons. The upwelling in the reserve is crucial to maintain biodiversity and productivity in this region (EPBZJ, 1995).

The average annual temperature of surface water in this reserve is 18.7 ℃. The highest water temperature occurs in August, when the average temperature is 27.8℃. The coldest month is Feberary, with an average surface water temperature of 9.6℃. Annnual average salinity in this region is 30.10‰. Salinity shows seasonal variation in the reserve. The highest salinity occurs in July, with an average salinity of 32.09‰. And in October, the monthly average salinity is lowest, with a value of 28.01‰(EPBZJ, 1995).

<u>Biological community</u>
The area is characterized by a highly diversified ecological environment. Lying at the convergence area of the Jiangzhe coastal current, the area has a variety of currents and frontal surfaces. Such a complicated physical environment provides ideal habitats for marine fauna and flora. The reserve has 1,876 marine species, including 427 species of shells, 178 species of benthic macro algae, 459 species of

nano- and micro-algae, 397 species of fish, 257 species of crustaceans and 158 species of other marine lives. Among them, there are abundant shells and algae in particular (Xu et al., 1994; Gao et al., 1994; EPBZJ, 1995; Gao et al., 2007; Fu et al., 2011). Nowadays, 36 species of molluscs are found only in Nanji sea areas, and the algae *Sargassum nigrifoloides* (Zeng and Lu 1985), *Sargassum capitatum* (Zeng and Lu 1985), and *Giffordia zhejiangensis* (Wang, 1994) identified here were recognized as new species (Zeng and Lu, 1985; Wang, 1994; Zeng, 1999; Huang et al., 2013). Another 22 species of algae are listed as rare species (OABZP, 1998).

Algae
According to the investigation conducted in the intertidal zone in 1992 and 1993, 121 macroalgae species were identified (Gao et al., 1994). They belong to phylum Chlorophyta, Phaeophyta, Rhodophyta and Cyanophyta. Among them 81 species belong to phylum Rhodophyta, 24 species to phylum Phaeophyta, 12 species to phylum Chlorophyta, and only two species belong to Cyanophyta. There are four types of macroalgae biota. The largest component is warm temperate species, including *Porphyra haitanensis*, *Grateloupia ramosissima*, *Chondria crassicaulis* and *Sargassum fusiforme*. Subtropical species are also an important component, including *Hypnea cervicornis*, *Ishige okamurae* and *Pachydictyon coriaceum*. The third is cold temperate species, including *Porphyra yezoensis*, *Enteromopha intestinalis* and *Symphyocladia latiuscula*. The last component is tropical species, including *Scinain tsinglanensis* (Gao et al., 1994; EPBZJ, 1995).

The 459 species of nanoalgae and microalgae biota can be divided into three components. The first component is eurythermal species. It includes 223 species, accounting for 48.5 per cent of total species. In them 163 species are diatom, 30 species are blue-green algae, 20 species are dinoflagellate, seven species are green algae, and three species are golden algae (chrysophyceae). The warm-water species component includes 137 species, accounting for 29.85 per cent of total species. Among them, 83 species are diatom, 24 species are blue-green algae, and 30 species are dinoflagellate. The third component is temperate species, which includes 99 species, accounting for 21.57 per cent of total species, among which 81 species are diatom, 10 species are blue-green algae and species are dinoflagellate (Zhu et al., 1998b).

Molluscs
The biota of molluscs has four components. The lagest component is subtropical species, including *Thais bronni*, *Saccostrea echinata* and *Septifer virgatus*. Cosmopolitan species are another important component, including *Gomphina aequilater*a, *Thais clavigera* and *Littorina brevicula*. The third are tropical species, including *ostrea sinensis* and *Arcanavicu laris*. The last component is warm temperate species, including *Mytilus coruscus* and *Mopalia retifera* (EPBZJ, 1995).

Fishes
In surveys conducted in 2011 and 2012, a total of 69 species were caught. They belong to two classes, 12 orders, 34 families and 54 genuses. In spring, *Miichthys niiuy*, *Collichthys lucidus*, *Chaeturichthys hexanema* and *Muraenesox cinereus* are the dominant species, accounting for 77.17 per cent of the total catch. In summer, *Polydactylus Sextarius, Muraenesox cinereus, Argyrosomus Argentatus, Harpodon nehereu*, *Trichiurus lepturus*, *Thrissa kammakensis* are the dominant species, accounting for 80.51 per cent of the total catch. In autumn, the dominant species are *Harpodon nehereus, Thrissa kammakensis, Collichthys lucidus, Thrissa mystax, Polydactylus sextarius* and *Muraenesox cinereus*, which account for 83.64 per cent of the total catch. In winter, the dominant species are *Collichthys lucidus, Coilia ectene, Chaeturichthys hexanema, Dasyatis navarrae* and *Acanthopagrus latus*, which account for 79.43 per cent of the total catch (He et al., 2013).

Feature condition and future outlook of the area

Due to eutrophication, red-tide breakouts have increased in recent years in Nanji Islands Marine Reserve. Tourism has become the mainstay industry in the area, which exerts profound impact on land and intertidal ecosystem. Although the reserve administration makes an effort to protect the environment and biotope, the condition of the area is not optimistic.

Nanji Islands Marine Reserve was established in September 1990. The reserve focuses on the protection molluscs, macroalgae, seabirds and wild daffodil. Nanji Islands Marine Reserve plays a crucial role in protection of marine biodiversity in the warm temperate zone. Fourteen species of animals and plants in this reserve are officially protected by the central or local government.

An investigation, including hydrological, chemical and biological surveys, was carried out between 2013 and 2014 inthe intertidal and subtidal zones of Nanji Islands Marine Reserve. Data from this study has not yet been published, but will provide scientific support for future environmental and biodiversity protection.

Assessment of the area against the CBD EBSA Criteria

CBD EBSA Criteria (Annex I to decision IX/20)	**Description** (Annex I to decision IX/20)	**Ranking of criterion relevance** (please mark one column with an X)			
		No information	**Low**	**Medium**	**High**
Uniqueness or rarity	Area contains either (i) unique ("the only one of its kind"), rare (occurs only in few locations) or endemic species, populations or communities, and/or (ii) unique, rare or distinct, habitats or ecosystems; and/or (iii) unique or unusual geomorphological or oceanographic features.				X
The area has a high diversity of macroalgae. There are three endemic species in Phylum Phaeophyta, including *Sargassum nigrifoloides*, *Sargassum Capitatum* and *Giffordia Zhejiangensis* (Zeng & Lu, 1985; Wang, 1994; Zeng, 1999; Huang et al., 2013). The area is in the frontal region of the Jiangzhe Coastal Current. The hydrodynamics create a unique ecosystem. In Nanji waters, some species show the character of rupture distribution (Gao et al, 1994; Xu & Jiang, 1994). Some warm water species are found in Nanji waters, but not in the southern coastal waters, such as *Scinaia tsinglanensis* (Rhodophyta, Nemalionales, Galaxauraceae) (Shanghai Natural History Museum, 1983).					
Special importance for life-history stages of species	Areas that are required for a population to survive and thrive.			X	
The area is an important spawning and breeding place for migratory bird *Larus crassirostris* (Yu, 2011).					
Importance for threatened, endangered or declining species and/or habitats	Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species.			X	
In the area, there are 14 species of animals and plants officially protected by the central or local government. Some of them are listed as endangered or vulnerable species by IUCN (Table 1). There are also many species not on the list of officially protected species, but considering their rarity in the coastal					

<table>
<tr><td colspan="6">waters of eastern Asia, they should be regarded as threatened species. They include 36 species of molluscs: Rhyssoplax kurodai， Cellana grata， Collisella dorsuasa， Monodonta perplexa， Contharidus callichroa，Herpetopoma foyeolatum，Nererita vesicalis，Nererita reiniana，Mormula rissoina，Actaeopyramia eximia，Siphonaria acmaeoides，Pulsellum hige，Caleoastraea modesta，Paludinalla japonica，Nererita bicolo，Sinum japonica，Charonia sauliae，Enzinopsis menkeana，Terebra torguata，Hypselodoris festive，Yoldia glauca，Septifer keenae，Ostrea nippona，Ctena delicatula，Cycladicama cumingii，Kellia japonica，Oliva emicator，Barbatiella lateralis，Oxyperas bernardi，Terelo (Terelo) sp.，Corvemysella paula，Dosinia tumida，Lutraria sp.，Raetellops pulchella and Collisella heroldi (OABZP, 1998). The following five species of macroalgae, including Scinain tsinglanensis，Spatoglossum pacificum，Sargassum nigrifoloides，Sargassum capitatum and Giffordia zhejiangensis, are also rare species in the region (OABZP,1998).</td></tr>
<tr><td>Vulnerability, fragility, sensitivity, or slow recovery</td><td>Areas that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery.</td><td></td><td>X</td><td></td><td></td></tr>
<tr><td colspan="6">Most of the intertidal zone in the area is rocky shore, which is is relatively less sensitive to human activity. It’s the most important habitat for molluscs and macroalgae in this area (Zhou et al., 2011).</td></tr>
<tr><td>Biological productivity</td><td>Area containing species, populations or communities with comparatively higher natural biological productivity.</td><td></td><td></td><td>X</td><td></td></tr>
<tr><td colspan="6">There is no detailed information available on the primary productivity in the area, however, the abundance of nanoalgae and microalgae, to some extent, can reflect the primary productivity. In Nanji waters, the annual average abundance of microalgae was 1.2×10^6 inds/m^3 (Zhu et al., 1998a). It is comparable to other seas.

There is no study focusing on secondary productivity in this area. Biomass of zooplankton and catch rates of fishes, to some extent, can reflect secondary productivity. According to a survey conducted in 2004 and 2005, the annual average biomass of zooplankton in Nanji Islands Marine Reserve was 263.46 $mg.m^{-3}$. Biomass in spring, summer, autumn and winter were 403.64, 389.72, 218.34 and 42.15 $mg.m^{-3}$, respectively (Ji et al., 2007). These figures, except the biomass in winter, are high compared to other seas. The catch rates of fishes in Nanji waters in spring, summer, autumn and winter in 2011 were 2.48, 9.94, 5.83 and 2.17 kg/h, respectively (He et al., 2013). These figures are relatively low comared to other areas in the sub-region.</td></tr>
<tr><td>Biological diversity</td><td>Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity.</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">Nanji Islands Marine Reserve is known for its high marine biodiversity. In this area, there are 427 species of shellfish and 178 species of macro-benthic algae (Xu et al., 1994; Gao et al., 1994; EPBZJ, 1995; Gao et al., 2007; Fu et al., 2011). Inside the area, there are also 459 species of micro-algae, 397 species of fish, 257 species of crustaceans and 158 species of other marine creatures (EPBZJ, 1995; Zhu et al., 1998b; Zhou et al., 2002; Tang et al., 2014).</td></tr>
<tr><td>Naturalness</td><td>Area with a comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or degradation.</td><td></td><td></td><td>X</td><td></td></tr>
<tr><td colspan="6">Although the area has been protected for more than 20 years, and it is far away from the mainland, it cannot be considered highly natural. There are about 2200 residents the local community. According to</td></tr>
</table>

data collected in 2007, 1522 local residents were employed in the fishing industry, and 245 worked in mariculture (Zhejiang SIU, 2008). The reserve is also a tourism resort, with some 60,000 tourists visiting in 2007 (Zhejiang SIU, 2008).

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Maps and Figures

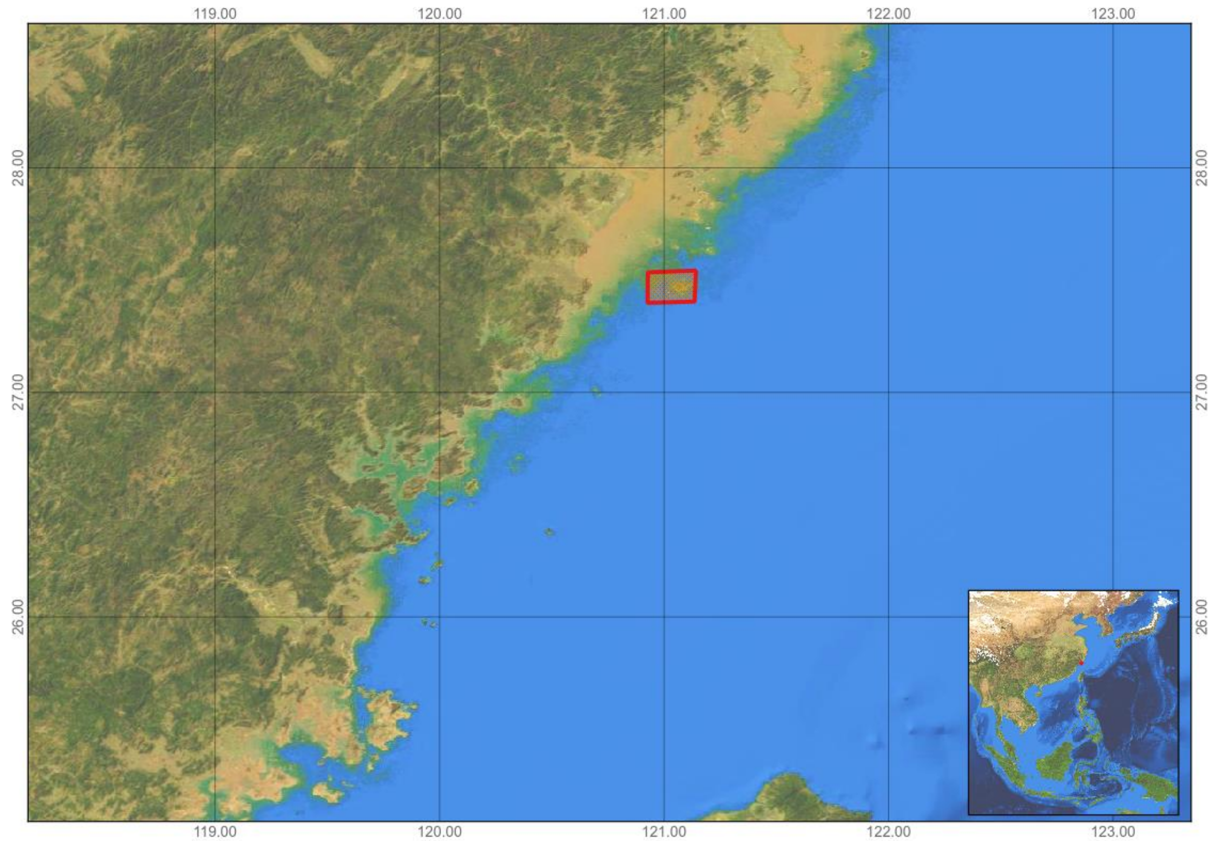

Figure 1. Area meeting the EBSA criteria

Table 1. Protected, endangered or vulnerable species in Nanji Islands Marine Reserve （OABZP，1998）

species	Government protection level	Endangered or vulnerable
Tachypleus tridentatus	II	EN
Caretta caretta olivacea	II	EN
Eretmochelys imbricata	II	EN
Chelonia mydas	II	EN
Dermochelys coriacea	II	EN
Neophocaena phocaenoides	II	
Dendrophyllia cribrosa	II	VN
Pinctada martensi	II	VN
Giycine soja	III	VN

Zanthoxylum nitidum	Protected species	VN
Maytenus diversifolius	Protected species	
Ardisia sieboldii	Protected species	
Psychotria serpens	Protected species	
Hippocampus japonicus	Local protected species	

II, Second class protection
III, Third class protection
EN, Endangered species
VN, Vulnerable species

Area no. 4: Cold Seeps

Abstract
The area is covers approximately 14,000 square kilometeres. The deep sea ecosystems of this area are unique not only for their communities composed of diverse bacteria, mussels, clams, hairy crabs and shrimps, but also for its habitats that support them, formed mainly by calcite, aragonite, dolomite, pyrite and authigenic minerals, including siderite, barite, gypsum and natural sulphur.

Introduction
This area includes the only active cold seeps with diverse ecological systems found in the deep seabed of China. The deep-sea cold seeps of this area, which contain autotrophic bacteria as the primary producers, support a community of bacteria, mussels, clams, hairy crabs and shrimp, as well as high biological productivity at the mouths of the cold seeps.

Location
The area is located in the southwest Taiwan Basin at 21°12'N, 118°30'E; 21°12'N, 120°17'E; 22°19', 118°30'E; and 22°19', 120°17'E, and at a depth of 2900m-3000m.

Feature description of the area
The cold-seep ecosystems in this area include a unique carbonate habitat formed mainly by calcite, aragonite, dolomite, pyrite and authigenic minerals, including siderite, barite, gypsum, and natural sulphur, as well as the communities the habitat supports, namely bacteria, mussels, clams, hairy crabs and shrimps. Carbon and energy are provided by autotrophic organisms to sustain cold-seep biota, with autotrophic bacteria being the bottom level of the food chain. Moreover, the ecosystem has high biomass at the mouth of cold seeps, where biomass generally reaches 1000-3000 g m^{-2} (Chen et al., 2007). Cold seeps at depth have unique biodiversity, high biomass density and tube worms with 170-250 years of life expectancy, generating metabolites diversity and rich genetic resources (Levin 2005). However, the deep-sea cold-seep ecosystem is very fragile and vulnerable to climate and sea level changes, sediment moving, and earthquakes.

Feature condition and future outlook of the area
Located on the sea floor, 3000 m deep, the cold seeps currently are not influenced by human activities other than scientific investigation. The unique biological habitat and cold seep ecosystems are intact. However, the distribution of seabed seeps is closely related to natural gas hydrate decomposition and/or the rise of natural gas and petroleum along weak geological belt. Therefore, it is necessary to establish an effective management mechanism to prevent the cold seeps and the habitats from impacts of the exploitation of fossil fuels in the area.

Assessment of the area against the CBD EBSA Criteria

CBD EBSA Criteria (Annex I to decision IX/20)	**Description** (Annex I to decision IX/20)	**Ranking of criterion relevance** (please mark one column with an X)			
		No information	**Low**	**Medium**	**High**
Uniqueness or rarity	Area contains either (i) unique ("the only one of its kind"), rare (occurs only in few locations) or endemic species, populations or communities, and/or (ii) unique, rare or distinct, habitats or ecosystems; and/or (iii) unique or unusual geomorphological or oceanographic features.				X
Cold seep habitats and the ecosystem it supports are rare based on:					

<table>
<tr><td colspan="6">The cold seeps of this area are active seeping sites on the seafloor of the northern South China Sea, where the water depth is around 3000 m (Zhang et al., 2012). Up to now, only a few cold seeps area (inactive or active) were discovered in the world, such as Gulf of Mexico (Paull et al., 1984), Northern Pacific (Kojima, 2002).

The ecosystem in this area includes a unique carbonate habitat formed mainly by calcite, aragonite, dolomite, pyrite and authigenic minerals, including siderite, barite, gypsum, and natural sulphur, as well as the communities the habitat supported, namely bacteria, mussels, clams, hairy crabs and shrimps (Zhang et al., 2012);

Carbon source and energy are provided by autotrophic organisms to sustain cold-seep biota, with autotrophic bacteria being the bottom level of the food chain. Moreover, the ecosystem has high biomass at the mouth of cold seeps, where biomass generally reacheds 1000-3000 g m^{-2} (Chen et al., 2007).</td></tr>
<tr><td>Special importance for life-history stages of species</td><td>Areas that are required for a population to survive and thrive.</td><td></td><td></td><td>X</td><td></td></tr>
<tr><td colspan="6">The highly localized seep sediments provide some of the most extreme marine conditions, and their high distinction from surrounding environments provide for all life history stages of specialized species and communities. Animal-microbe interactions at cold seeps are complex, and include sypmbioses, heterotrophic nutrition and geochemical feedbacks and habitat structure, providing a unique environment, especially at these depths (Levin 2005).</td></tr>
<tr><td>Importance for threatened, endangered or declining species and/or habitats</td><td>Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species.</td><td></td><td>X</td><td></td><td></td></tr>
<tr><td colspan="6">Cold seeps are proposed for inclusion under the International Finance Corporation’s Performance Standard 6 (IFC PS6) on Biodiversity Conservation and Sustainable Management of Living Natural Resources that businesses were encouraged to consider at COP 11 (decision XI/7, paragraph 2)</td></tr>
<tr><td>Vulnerability, fragility, sensitivity, or slow recovery</td><td>Areas that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery.</td><td></td><td></td><td>X</td><td></td></tr>
<tr><td colspan="6">Cold seeps and the ecosystems they support are likely vulnerable to pressures from climate change (Vanreusel A. et al., 2010) as well as and earthquakes. Restricted geographic location.</td></tr>
<tr><td>Biological productivity</td><td>Area containing species, populations or communities with comparatively higher natural biological productivity.</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">The ecosystem has a high level of biomass, especially at the mouth of cold seeps, where biomass generally reaches 1000-3000 g m^{-2} (Chen et al., 2007).</td></tr>
<tr><td>Biological</td><td>Area contains comparatively higher diversity</td><td></td><td>X</td><td></td><td></td></tr>
</table>

diversity	of ecosystems, habitats, communities, or species, or has higher genetic diversity.				
Cold seeps regularly exhibit high levels of metazoan biomass in association with a low local diversity (Vanreusel A. et al., 2010).					
Naturalness	Area with a comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or degradation.				X
Human activities are limited to scientific investigation so far. In 2004, “SONNE” 177 cruise found two cold seep areas with different water depth in the northern SCS, Haiyang 4 area, where the water depth is around 3000 m (Zhang, et al., 2010).					

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Maps and Figures

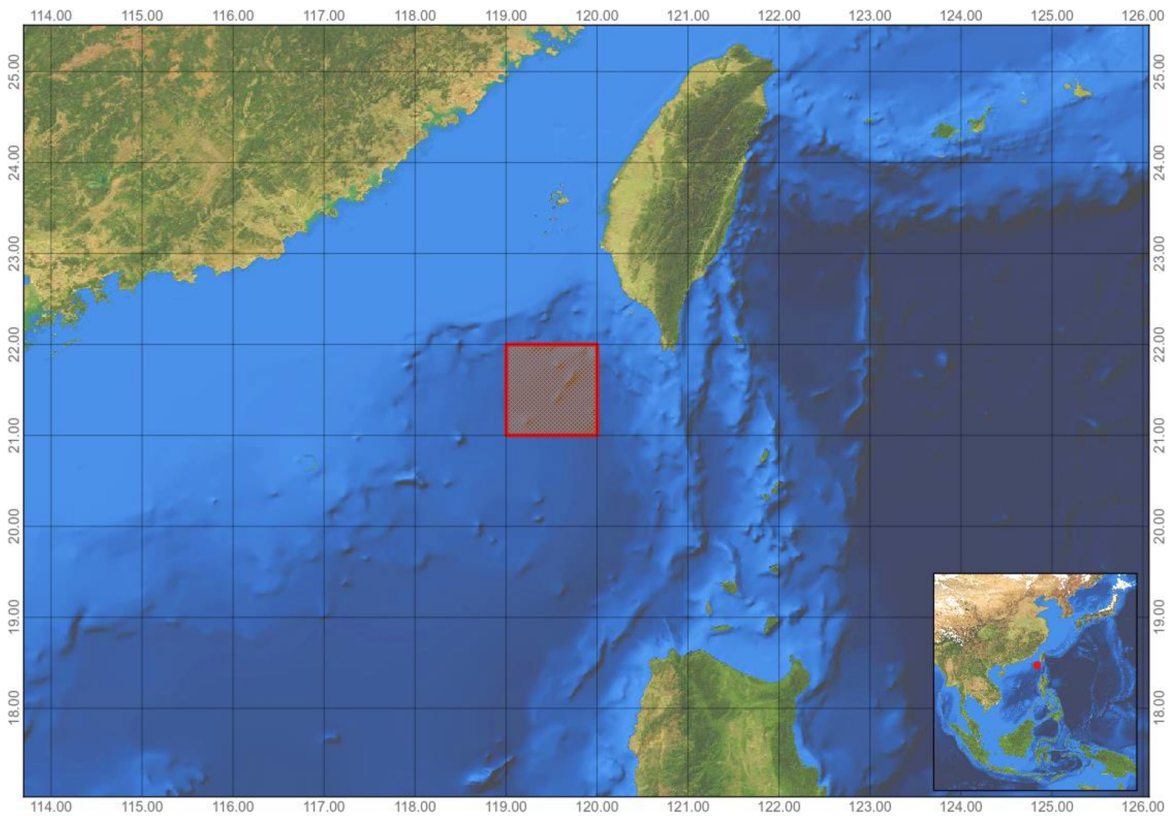

Figure 1. Area meeting the EBSA criteria

Area no. 5: Muan Tidal Flat

Abstract
Muan tidal flat maintains its pristine conditions with well-developed substrate for supporting numerous migratory waterbird species and fisheries resources. The sediments characteristically contain 30 to 40 per cent clay content. The area has high value for conservation as there are many globally endangered and protected species that hatch, nurse and feed in the area. This is a particularly rich feeding area for waterbirds. Some 29,000 winter waterbirds belonging to 48 species have been observed. In addition, 47 species of halophyte are distributed on Muan tidal flat. The diversity of benthic animals is also very high. The tidal flat has been a protected area since 2001 and was designated a Ramsar site in 2008.

Introduction
Most of the Muan tidal flat is in pristine condition. The area supports more than 1 per cent of extant species of common shelduck (*Tadorna tadorna*), mallard (*Anas platyrhynchos*), Eurasian curlew (*Numenius arquata*) visiting Republic of Korea. The area includes the first protected wetland area for a tidal flat, created in 2001, which was also registered as a Ramsar site in 2008.

Location
Muan tidal flat is located in the south-western coastal area of the Korean peninsula. The coordinates are between 35° 04′20″N and 35° 07′52″N, and between 126° 21′2″E and 126° 27′9″E. The entire area of Muan tidal flat covers about 42 km^2.

Feature description of the proposed area

Muan tidal flat is preserved in its natural habitat, free of human disturbance such as landfill and dyke construction on the shore. Due to the complicated coastline and sea current, different types of tidal flat, such as sand, mud or mixed tidal flats, characterize the area. In particular, winter waterbirds have been observed (48 species, in populations of 29,000 and more) since 2000 (simultaneous bird census by Ministry of Environment, Republic of Korea), and 47 species of halophyte are distributed on Muan tidal flat (MOF 2009, 2013).

The sea water surrounding Muan tidal flat is relatively shallow (less than 3 m deep). Sand and mud fractions are abundant in sediment. Muan tidal flat is a rias coast and spawning ground for marine living organisms. The tidal flat in Muan originated as a result of the naturally eroded soil from the land and floating sediment from the sea water. There are plenty of phytoplankton and zooplankton in the sea near Muan tidal flat. Marcobenthos are a plentiful, valuable food resource for migratory birds. A total of 367 species of marine living organisms have been observed, namely, 153 species of macrobenthos, such as mud mussel (Jong-mit, *Musculista senhousia*), crab (Kong-gae, *Ilyoplax deschampsi*) and Japanese ghost crab (Chil-gae, *Macrophthalmus japonicus*); 95 megabenthos such as opisthobranchia (Min-chaeng-yi, *Philine* sp.), bivalves (Som-teol-baek-hap, *Ventricoloidea foveolata*) and sea urchin (Bun-ji-sung-gae, *Temnopleurus toreumaticus*); 22 fishes such as gray mullet (Soong-eo, *Mugil cephalus*), croaker (Min-eo, *Miichthys miiuy*) and sea bass (Nong-eo, *Lateolabrax japonicus*); and, six molluscs such as small octopus (Nak-ji, Octopus monor), Manila clam (Ba-ji-rak, *Ruditapes philippinarum*); five crustaceans such as penaeid shrimp (Bo-ri-sae-woo, *Penaeus orientalis*) and blue crab (Minkot-gae, *Charybdis japonica*); 38 algae such as laver (Gim, *Porphyra tenera*); and 48 waterbirds, such as whooper swan (Keun-goni, *Cygnus Cygnus*) and red-necked stint (Jom-doyo, *Calidris ruficollis*) (MOF 2009, 2013).

Feature condition and future outlook of the proposed area
Muan tidal flat was designated as a marine protected area for its pristine wilderness and high biodiversity. Even though there were a lot of large reclamation projects completed along the tidal flats along this coast, some tidal flats, such as Muan tidal flat, remain intact due to the civic movement not to reclaim these areas. The government also built Muan visitor centre at this tidal flat in 2008 to provide more educational opportunities for visitors. The stakeholders in this area include local officials, and people are attempting to make this area known as an ecotourism destination.

Assessment of the area against the CBD EBSA Criteria

<table>
<tr><td rowspan="2">CBD EBSA Criteria
(Annex I to decision IX/20)</td><td rowspan="2">Description
(Annex I to decision IX/20)</td><td colspan="4">Ranking of criterion relevance
(please mark one column with an X)</td></tr>
<tr><td>No information</td><td>Low</td><td>Medium</td><td>High</td></tr>
<tr><td>Uniqueness or rarity</td><td>Area contains either (i) unique (“the only one of its kind”), rare (occurs only in few locations) or endemic species, populations or communities, and/or (ii) unique, rare or distinct, habitats or ecosystems; and/or (iii) unique or unusual geomorphological or oceanographic features.</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">As a typical epicontinental sea submerged after last glacial maximum, the Yellow Sea has diverse coastal zones, including estuaries, beaches and tidal flats, along the ria-type's complex coastline (Koh & Khim 2014, Jang 2008, Ryu et al., 2004). Surface sedimentary facies in the Hamhae-bay tidal flat are largely classified both into sand facies consisting dominantly of very coarse sand and gravel with poor roundness and sphericity, and mud facies consisting mainly of medium silt. The gravels and very coarse sands are interpreted as the deposits originating from coastal erosion. They seem to have been left as remnants on the upper tidal flat and transported along tidal channel and creeks (MOF 2013).</td></tr>
<tr><td>Special importance for life-history stages of species</td><td>Areas that are required for a population to survive and thrive.</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">The area supports more than 1% of extant species of common shelduck (Tadorna tadorna), mallard (Anas platyrhynchos) and Eurasian curlew (Numenius arquata) (Australasian Wader Studies Group 1999; Hua et al. 2015; Kang et al. 2008; MOF 2009, 2013).</td></tr>
<tr><td>Importance for threatened, endangered or declining species and/or habitats</td><td>Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species.</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">Two species of marine birds, Egrette eulophotes, Eurynorhynchus pigmeus, both category I endangered species, (Ministry of Environment, ROK) visit this area (MOF 2009, 2013).</td></tr>
<tr><td>Vulnerability, fragility, sensitivity, or slow recovery</td><td>Areas that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery.</td><td></td><td>X</td><td></td><td></td></tr>
<tr><td colspan="6">Muan mud flat is a national protected area, created in 2001. The condition of the sediment is stable (MOF 2009, 2013).</td></tr>
<tr><td>Biological productivity</td><td>Area containing species, populations or communities with comparatively higher natural biological productivity.</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">Explanation for ranking (must be accompanied by relevant sources of scientific articles, reports or</td></tr>
</table>

documents) High productivity of macro-benthic animals and marine species. Mean biomass is 468.96 g/m^2, which consists of 404.36 g/m^2 of molluscs (86%), 26.40 g/m^2 crustaceans (6%) and 21.42 g/m^2 echinoderms (5%)(MOF 2009, 2013). Fisheries products: *Marsupenaeus japonicus* (Bo-Ri-Sae-U), *Mugil cephalus* (Seung-Ea), *Clupanodon punctatus* (Jun-Ea), *Octopus minor* (Nak-Ji), *Porphyra tenera* (Kim), *Batillus cornutus* (So-Ra) and *Crassostrea gigas* (Cham-Gul).					
Biological diversity	Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity.				X
Explanation for ranking (must be accompanied by relevant sources of scientific articles, reports or documents) 318 species of macro-benthic animals are reported. Fifteen species occupy more than 0.5% of the total density, which are six species of polychaetes and molluscs, and three species of crustaceans. They occupy 90% of total macrobenthic density. The most dominant species is mud mussel (*Musculista senhousia*), with a mean density of 1,610 ind./m^2 (68%), recorded from 34 stations. Such high densities are observed in the stations of protected area, tidal-flat area of Hampyung-Gun and inner bay, whereas low densities or non-occurrence occur in those of bay mouth. Short-necked clam (*Ruditapes philippinarum*) is recorded 111 ind./m^2 (5%) of mean density, and shows high abundance in the inner-bay stations. Polychaetes *Chone* sp. (Sabellaridae) occur mainly in the bay-mouth stations, and lower tidal and subtidal areas. *Ilyoplax deschampsi* (brachyuran) is recorded high densities in the stations near to Haeje penninsula and mud flat of Hampyung-Gun. *Lumbrineris longifolia* (polychaete), *Heteromastus filiformis* (capitellid polychaete), *Ampithoe valida* (amphipod), *Grandidierella japonica* (amphipod), and *Laternula marilina* (bivalve) are observed as additional major dominant species in terms of density (MOF, 2009, 2013).					
Naturalness	Area with a comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or degradation.			X	
Coastlines are well preserved and mostly in their naturally state (MOF, 2009, 2013). In some places, moulluscs are being collected in accordance with traditional methods. There are no plans for construction or reclamation.					

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Maps and Figures

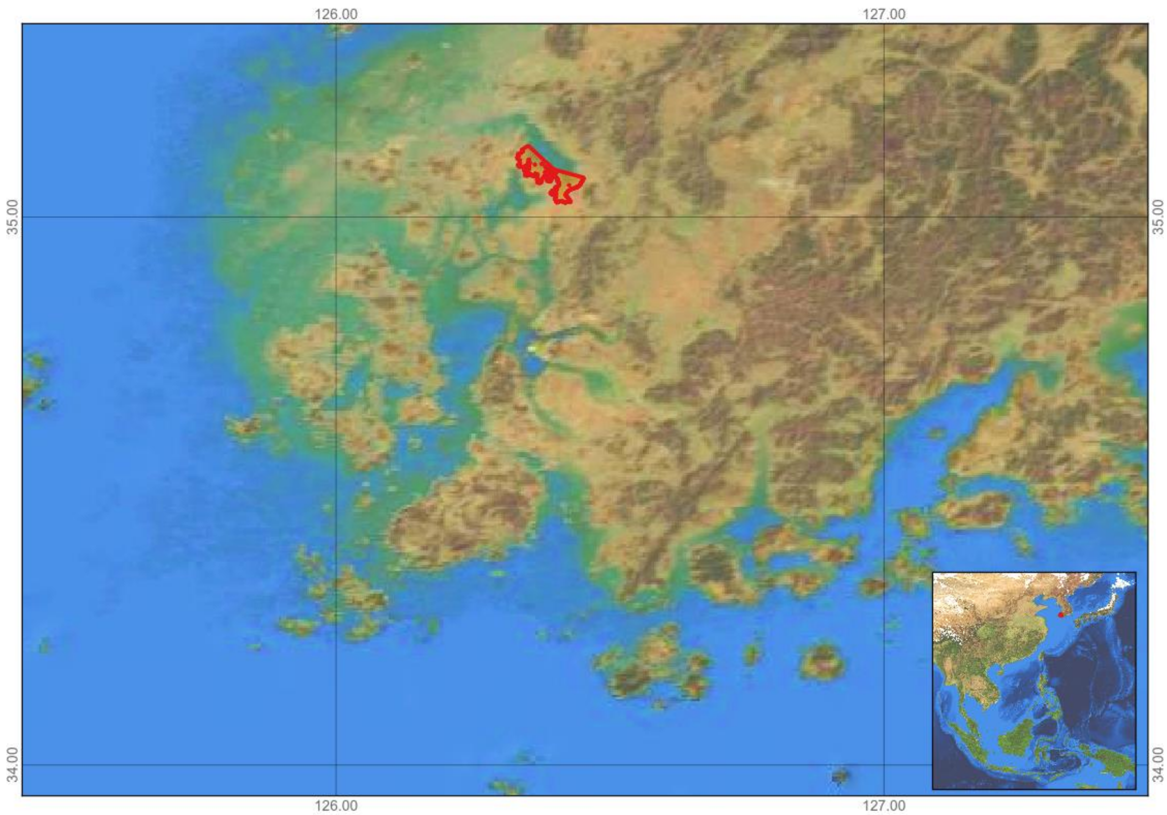


Figure 1. Area meeting the EBSA criteria.

	
무안갯벌 가을 조사에서 관찰된 노랑부리백로	무안갯벌 가을 조사에서 관찰된 황조롱이
< *Egretta eulophotes*>	**< *Falco tinnunculus*>**

	
< *Buteo buteo*>	**< *Calidris ruficollis*>**

Figure 1. Some marine birds reported in this area.

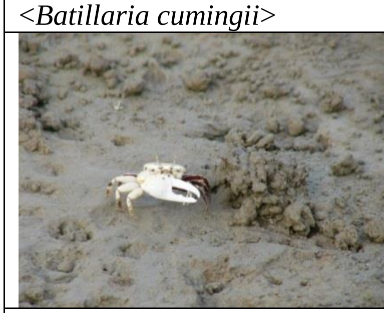
		
<Batillaria cumingii>	*<Macrophthalmus japonicus>*	*<Uca arcuata>*
		
<Uca lactea>	*<Boleophthalmus pectinirostris>*	*<Periophthalmus modestus>*

Figure 2. Benthic animals living on the Muan tidal flat.

Figure 3. Muan tidal flat around the visitor centre (Muan ecology tidal flat center)

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Area no. 6: Intertidal Areas of East Asian Shallow Seas

Abstract

The intertidal zones of shallow coastal seas in East Asia are critically important for the survival of many migratory waterbird species that are dependent on these areas for different stages of their life cycle. An obvious and very sensitive period is during migration, when some stopover sites serve as critical bottlenecks, particularly in the Yellow Sea ecoregion. Different species have different migratory strategies, so they require a specific network of sites throughout a flyway, or flight path, to be able to complete their migration. This area encompasses 20 sites that form the basis of a flyway-wide network within the East Asian Seas, but additional sites are also important for a number of species. Intertidal mudflats and sandflats have been disappearing at an alarming rate in recent decades (60% for the Yellow Sea in 50 years) leaving migratory waterbirds more dependent on fewer sites that continue to disappear. As a consequence, populations of migratory waterbirds have declined precipitously, with as many as 30 species globally threatened. The survival of these populations depends on maintaining a handful of remaining sites that are often not formally protected. It is no exaggeration to say that all remaining intertidal areas of the East Asian Seas are of vital importance to saving migratory waterbirds that depend on them.

Introduction

Intertidal zones are mudflats and sandflats exposed at low tides. They are highly productive and support a diverse community of benthic organisms that serve as the principal diet of more than 100 species of migratory waterbirds, particularly shorebirds. They also provide livelihoods for local people by supporting fisheries and shellfisheries, and providing a variety of other ecosystem services (MacKinnon et al. 2012). However, their level of protection is low compared to other wetland and terrestrial ecosystems (Murray and Fuller 2015). This is very important because of the connectivity of these areas in supporting the full life cycle of many dependent species.

The East Asian – Australasian Flyway extends from Alaska and Arctic Russia through East Asia to Australia and New Zealand. The intertidal areas along the coasts of the seas of East Asia serve as critical stopover areas, for feeding, resting and moulting, of many species that breed in the Arctic and subarctic. Most notable among these are shorebirds, including the critically endangered spoon-billed sandpiper, endangered Nordmann’s greenshank and near-threatened Asian dowitcher, all endemic to this Flyway. For scientific names and Red List status of species mentioned in the text see Table 2. Many other threatened and declining species share these habitats. Some mudflat-dependent species, such as black-faced spoonbill, Saunders’s gull and Chinese egret breed exclusively in the region and spend the non-breeding season here (BirdLife International 2015). The different migration strategies of different populations mean that they depend on a network of sites. For example, almost the entire global populations of spoon-billed sandpiper and Nordmann’s greenshank stage on the mudflats of the southern Jiangsu coast of China, before moving to non-breeding grounds in south-east Asia (Tong 2012, Tong et al. 2013, Murray 2015). The critically endangered Chinese crested tern breeds only on a few small islands off the Chinese coast, and the global population could be fewer than 100 individuals (Chan et al. 2010).

Location

Twenty of the most critical sites in the network are listed below. Additional sites are known to be important, and data are being collected for them. A 2012 IUCN Situation Analysis identified 16 key intertidal areas in east and south-east Asia for migratory waterbirds (MacKinnon et al. 2012). From China, the number of waterbird species reaching 1 per cent of the flyway population (that designates international importance according to Ramsar criteria) found at each site is taken from Bai et al. (2015). For 20 priority shorebird populations of 17 species throughout the Flyway, the number of species with concentrations of international importance is based on Conklin et al. (2014).

Table 1. The 20 most important sites for migratory shorebirds in the East Asian-Australian Flyway with their priority shorebird species (For scientific names see Table 2).

Site	Name	Description
1	Shunkunitai, Eastern Hokkaido, Japan	Most important site in East Asia for grey-tailed tattler, ruddy turnstone, lesser sandplover
2	Fujimae mudflat, Ise bay, Japan	1 priority shorebird species, dunlin
3	Ariake bay, Japan	9 priority shorebird species, grey plover, dunlin, Eurasian curlew
4	Suncheon Bay Tidal flat, ROK	5 priority shorebird species, hooded crane, Eastern curlew
5	Seocheon Tidal flat, ROK,	15 priority shorebird species, spoon-billed sandpiper, Eastern curlew. Most important site in the flyway for Eastern oystercatcher
6	Yalujiang Estuary NNR, China	24 species meeting 1% criteria, 16 priority shorebird spp, Nordmann's greenshank. Most important flyway site for bar-tailed godwit, Far Eastern curlew
7	Shuantaizi Estuary NNR, China	13 priority shorebird species, 22 species, most important site for great knot, Saunders's gull
8	Luannan mudflats (inc Nanpu), Hebei, China	20 species, 14 priority shorebird species. Supports up to 60+% of staging red knot, curlew sandpiper and 90% of staging relict gull (Rogers et al. 2010)
9	Yellow river delta NNR, China	42 species, 13 priority shorebird species, Dalmatian pelican. Most important site for grey plover
10	Yancheng NNR, China	Neighbouring areas also provide important habitat for migratory shorebirds, e.g. Lianyugang (26 spp, 12 priority shorebird spp,) Tiaozini/Dongtai/Rudong (19 spp, 13 priority shorebird species, spoon-billed sandpiper, Nordmann's greenshank, Asian dowitcher, Saunders's gull
11	Minjiang Estuary, inc Jiushan, Wuzhishan and Matsui islands, China	10 species, 5 priority shorebird species, spoon-billed sandpiper, Chinese crested tern nests on the islands and uses inshore areas for feeding and resting, including Minjiang estuary
12	Mai Po/Deep Bay NR mudflat, Hong Kong SAR	18 species, 13 priority shorebird species, black-faced spoonbill
13	Red River estuary, including Xuan Thuy NP, Vietnam	Black-faced spoonbill, spoon-billed sandpiper
14	Thailand inner gulf	9 priority shorebird species, spoon-billed sandpiper, Nordmann's greenshank, Asian dowitcher. See also Round (2006)
15	North Selangor coast, Malaysia	9 priority shorebird species, most important site for greater sandplover
16	Bako-Buntal Bay, Sarawak, Malaysia	5 priority shorebird spp, greater and lesser sandplover
17	Sembilang, Banyuasin delta, south Sumatra, Indonesia	9 priority shorebird species. Most important Flyway site for Asian dowitcher
18	Olango Island, Cebu, Philippines	Eastern curlew
19	Bago-Ilog, Negros Occ, Philippines	Asian dowitcher, Nordmann's greenshank
20	Gulf of Mottama, Myanmar	5 priority shorebird species, principal non-breeding area of spoon-billed sandpiper

Table 2. List of intertidal-dependent waterbird species in the East Asian shallow seas

Shorebirds		
Common name	**Scientific name**	**IUCN Status***
Ruddy turnstone	*Arenaria interpres*	LC
Lesser sandplover	*Charadrius mongolus*	LC
Greater sandplover	*Charadrius leschenaultii*	LC
Asian dowitcher	*Limnodromus semipalmatus*	NT
Bar-tailed godwit	*Limosa lapponica*	NT
Black-tailed godwit	*Limosa limosa*	NT
Grey plover	*Pluvialis squatarola*	LC
Eurasian curlew	*Numenius arquata*	NT
Far Eastern curlew	*Numenius madagascariensis*	EN
Whimbrel	*Numenius phaeopus*	LC
Little curlew	*Numenius minutus*	LC
Eurasian oystercatcher	*Haematopus ostralegus*	NT
Marsh sandpiper	*Tringa stagnatilis*	LC
Nordmann's greenshank	*Tringa guttifer*	EN
Grey-tailed tattler	*Tringa brevipes*	NT
Common greenshank	*Tringa nebularia*	LC
Wood sandpiper	*Tringa glareola*	LC
Wandering tattler	*Tringa incana*	LC
Terek sandpiper	*Xenus cinereus*	LC
Common sandpiper	*Actitis hypoleucos*	LC
Great knot	*Calidris tenuirostris*	EN
Red knot	*Calidris canutus*	NT
Curlew sandpiper	*Calidris ferruginea*	NT
Red-necked stint	*Calidris ruficollis*	NT
Dunlin	*Calidris alpine*	LC
Spoon-billed sandpiper	*Calidris pygmaea*	CR
Sanderling	*Calidris alba*	LC
Pectoral sandpiper	*Calidris melanotos*	LC
Sharp-tailed sandpiper	*Calidris acuminata*	LC
Broad-billed sandpiper	*Limicola falcinellus*	LC
Pacific golden plover	*Pluvialis fulva*	LC
Grey plover	*Pluvialis squatarola*	LC

Gulls and terns		
Common name	**Scientific name**	**IUCN Status**
Saunders's gull	*Saundersilarus saundersi*	VU
Relict gull	*Larus relictus*	VU
Armenian gull	*Larus armenicus*	NT
Chinese crested tern	*Thalasseus bernsteini*	CR

Cranes		
Common name	**Scientific name**	**IUCN Status**
Hooded crane	*Grus monacha*	VU

Red-crowned crane	*Grus japonensis*	EN

Others		
Common name	**Scientific name**	**IUCN Status**
Dalmatian pelican	*Pelecanus crispus*	VU
Oriental stork	*Ciconia boyciana*	EN
Black-faced spoonbill	*Platalea minor*	EN
Chinese egret	*Egretta eulophotes*	VU
Swan goose	*Anser cygnoid*	VU

*CR = critically endangered, EN= endangered, VU= vulnerable, NT= near threatened, LC = least concern

Feature description of the proposed area

Intertidal mudflats and sandflats are typically present in sheltered bays, coastlines and estuaries of shallow seas. They are covered at high tide but typically exposed at low tides. As tidal ranges in the region are very high, tidal flats can extend several kilometres out to sea. They support a very rich and abundant benthic fauna, which supports huge numbers and varieties of migratory waterbirds, particularly shorebirds. These birds depend on these food resources to replenish fat and energy stores during critical stages of their migration, and their migratory strategies are adapted to the availability of food resources (Lim and Posa 2014, Li et al. in press). If the quality of the site degrades, birds abandon it (Kraan et al. 2010). Different waterbird species exploit different food resources, which may be localized at certain sites, so the dependence and spatial distribution of different benthic faunas can determine the importance of individual sites for particular species (Choi et al. 2014). Biofilm has also been found to be a very important food source for many species (Jiménez et al. 2015). Coastal waterbirds also need high-tide roost sites. Saltpans and other human-modified habitats often serve as roosts or alternative feeding sites (Pandiyan et al. 2014).

<u>Description of the 20 most important sites (for location see Figure 2).</u>

1. Shunkunitai, Eastern Hokkaido, Japan

Shunkunitai is a long, narrow sandbank that lies between the Sea of Okhotsk and Lake Furen. On the accumulated three lined dunes, there are many kinds of ecosystems, such as seashores, grasslands, marshes, forests and mudflats. Ramsar site since 2005. Important species are: grey plover, Kentish plover, lesser sandplover, bar-tailed godwit, Far Eastern curlew, marsh sandpiper, wood sandpiper.

2. Fujimae mudflat, Ise Bay, Japan

Located at the head of Ise Bay, facing the Pacific Ocean is Nagoyta City, Japan’s third-largest city. Numerous rivers, such as the Kiso, Nagara, and Ibi, flow into this bay, creating a number of vast tidal flats along the shore. It is an Important Bird Area (IBA, designated by BirdLife International), and important bird species are: grey plover, dunlin, bar-tailed godwit, lesser sandplover, Far Eastern curlew, Asian dowitcher, Nordmann’s greenshank, red-necked stint, sharp-tailed sandpiper, curlew sandpiper and spotted redshank.

3. Ariake Bay, Japan

The Ariake Sea is a body of salt water surrounded by Fukuoka, Saga, Nagasaki and Kumamoto prefectures, all of which lie on the island of Kyūshū in Japan. It is the largest bay in Kyūshū. It is an IBA, as it is a very important stopover and non-breeding site for migratory shorebirds, such as grey plover, dunlin, greenshank, whimbrel, Kentish plover, lesser sandplover, grey plover, sharp-tailed sandpiper, dunlin, red knot, knot, spoon-billed sandpiper, curlew sandpiper, Asian dowitcher, spotted redshank, greenshank, tattler, Terek sandpiper, bar-tailed godwit, Eurasian curlew, Far Eastern curlew and whimbrel. Also important for Saunders's gull, black-faced spoonbill.

4. Suncheon Bay Tidal flat, ROK

Located between Yeosu and Goheung peninsulas, 8 km from the centre of Suncheon, this bay has 21.6 km^2 of mudflats and 5.4 km^2 of reed beds. Suncheon Bay is an IBA, as it is a very important wintering site for ducks, cranes (hooded crane) and gulls (Saunders's gull and relict gull). It is also a stopover site for shorebirds (grey-tailed tattler; bar-tailed godwit; Nordmann's greenshank, Terek sandpiper; and dunlin).

5. Seocheon tidal flat, ROK

This is the most important intertidal area in the country and includes Yubu Island, which supports tens of thousands of migratory shorebirds during migration, with more than 40 species recorded, including Terek sandpiper, Eastern oystercatcher, spoon-billed sandpiper and Nordmann's greenshank.

6. Yalu Jiang Estuary National Nature Reserve, China

Yalu Jiang Estuary National Nature Reserve, located in Liaoning Province of northeastern China, along the border between China and DPRK, is probably the most important remaining inter-tidal mudflat in the Yellow Sea supporting tens of thousands of staging shorebirds, particularly bar-tailed godwit and great knot in the spring and Far Eastern Curlew in autumn. It is an EAAFP Flyway Network Site and has a sister site relationship with Pukorokoro Miranda Naturalist Trust in New Zealand and a history of cooperation with the Trust in monitoring shorebird status and trends.

7. Shuantai Estuary National Nature Reserve, China

Shuangtai Estuary National Nature Reserve, a Ramsar site, plays a key role in regional biodiversity conservation in China as well as East Asia. It provides important habitats for endangered wetland-dependent species, such as Oriental stork, Siberian crane, red-crowned crane and Saunders's gull. It is at the northern edge of the eastern costal wetland in China and provides an important stopover to the migratory birds on the East Asian-Australasian Flyway. The wetland is the southernmost breeding site for red-crowned crane and the largest breeding site for Saunders's gull in the world.

8. Luannan mudflats (including Nanpu), Hebei, China

The Luannan mudflats (including Nanpu) is in the northern Bohai Bay, located between the expanding Binhai and Caofeidian newly reclaimed areas. It is of critical importance for migratory birds, especially red knots and curlew sandpipers, along their migrations from Australia to the Arctic. Twice a year, a large proportion (over 60%) of red knots in the East Asian-Australasian Flyway stop over during migration to refuel on the Luannan mudflats of Bohai Bay. The area is also important for spring staging relict gulls, with perhaps 90% of the global population gathering here before dispersing to its inland breeding grounds. Other important species include pied avocet, black-winged stilt, white-winged tern, great knot and Far Eastern curlew.

9. Yellow River Delta National Nature Reserve, China

Shandong Yellow River Delta National Nature Reserve is situated northeast of Dongying City, Shandong Province, facing the Bohai Sea to the North and bordering Laizhou Bay in the East. Yellow River Delta Nature Reserve has 152 bird species, 51 of which are included in the China-Australia Migratory Bird Agreement. The reserve is important for its breeding population of Oriental stork and Saunders's gull, as well as its and non-breeding population of Dalmation pelican. It also supports many shorebirds on passage including,

10. Yancheng National Nature Reserve, China

Yancheng National Nature Reserve is a conservation area for endangered bird species, including the red crowned crane, swan goose, , Oriental stork and relict gull. It supports an important colony of Saunders's gull

11. Minjiang Estuary, including Jiushan, Wuzhishan and Matsui islands, China

The Minjiang Estuary, in Fujian, is an important wintering site for spoon-billed sandpiper in China. Islands off the coast are the main breeding site for Chinese crested tern, which use the estuary for feeding and resting. Black-faced spoonbill also overwinters here. Other important species are: swan goose, Oriental stork , Chinese egret, Dalmatian pelican and Saunders's gull.

12 Mai Po/Deep Bay Nature Reserve mudflat, Hong Kong SAR

Every winter, around 90,000 migratory birds take refuge in the marshes and mudflats of the internationally acclaimed Mai Po Nature Reserve. Of the 380 species of birds that inhabit the reserve, 35 are of global conservation concern. Important species include spoon-billed sandpiper, Oriental Stork, black-faced spoonbill, Nordmann's greenshank, Dalmatian pelican, Chinese egret, great knot, Far Eastern curlew, relict gull and Saunders's gull.

13. Red River estuary, including Xuan Thuy NP, Vietnam

The Red River Delta is the flat low-lying plain formed by the Red River and its tributaries merging with the Thái Binh River in northern Vietnam. Xuan Thuy Nature Reserve is situated in the coastal zone of the Red River Delta, at the mouth of the main channel of the Red River, known as the Ba Lat River. The southern boundary is formed by the Vop River. The site comprises three islands and intervening areas of intertidal mudflats.

The site is an important staging and wintering area for migratory waterbirds. During surveys in 1988 and 1994, more than 20,000 waterbirds were observed. During the spring of 1996, it was estimated that 33,000 shorebirds passed through the nature reserve. Important species are: black-faced spoonbill (winter), Chinese egret, spoon-billed sandpiper, grey-tailed tattler , black-tailed godwit, Eurasian curlew, spotted redshank, Nordmann’s greenshank and Saunders's gull.

14. Thailand inner gulf

The Inner Gulf of Thailand has a 195 km-long section of the coastal zone from Laem Phak Bia in the west to Chonburi in the east and includes an estimated 23,500 ha of intertidal mudflats, extending over 2 km from the shoreline at low tide in places. Important speciesinclude lesser sandplover, greater sandplover, spoon-billed sandpiper, common redshank, Asian dowitcher, black-tailed godwit, spotted redshank, Nordmann’s greenshank and long-toed stint.

15. North Selangor coast, Malaysia

The mangrove belt of the north Selangor coast is highly productive and has significant social and economic importance. It is an Important Bird and Biodiversity Area, as thousands of shorebirds utilize the extensive mudflats during low tide for feeding. Some 39,000 birds were counted in a 1985/86 survey along the coast, including Asian dowitchers. Consequently, the habitat is an important staging and feeding site for shorebirds internationally and locally. Nordmann’s greenshanks have been recorded, and spoon-billed sandpipers have irregularly appeared along the coast.

16. Bako-Buntal Bay, Sarawak, Malaysia

Bako-Buntal Bay is a semi-circular bay bordered by Gunung Santubong to the west and Bako National park to the east. Roughly 15km wide between the promontories, narrowing to less than 5km between the Sg. Bako and Sg. Buntal at its base. Mangrove forest stretches between the two promontories. The bay is shallow, consisting of a sandy substrate overlaid with mud closer to the estuaries. The inter-tidal environment is dynamic, with constantly shifting sandbars. Important species include Chinese egret VU, lesser sandplover, greater sandplover, Far Eastern curlew, Nordmann’s greenshank and Chinese crested tern.

17. Sembilang, Banyuasin delta, south Sumatra, Indonesia

Sembilang National Park covers 2,051 km^2 along the east coast of Sumatra, Indonesia. The park is dominated by peat forests, like the neighbouring Berbak National Park, and both parks are Ramsar wetlands of international importance. The park is considered to have the most complex shorebird community in the world, with 213 species recorded

Tidal mudflats around Semenanjung Banyuasin are the main transit and wintering ground for migratory shorebirds—no fewer than 35,000-40,000 birds were recorded in 1984-1986, including up to 30,000 black-tailed godwits, around 13,000 Asian dowitchers and 21 Nordmann's greenshanks.

18. Olango Island, Cebu, Philippines

Olango is a low-lying island off the east coast of Mactan Island. It lies between Cebu and Bohol islands, 4 km east of Mactan and 15 km east of Cebu City. The main habitats include extensive intertidal coralline sand flats and mudflats, mangrove swamps, seagrass beds and coral reefs (note that the area given above includes about 2,900 ha of intertidal flats).

Olango Island is one of the most important staging areas for migratory shorebirds in the central Philippines. More than 10,000 shorebirds were recorded at one time in the 1980s, and the total number using the site may be as many as 50,000. These include significant numbers of Asian dowitcher, for which Olango is the most important site known in the Philippines, and the numbers of several other waterbird species, including Eurasian curlew and Far Eastern curlew, are probably of international importance. Olango is notable for its concentrations of Chinese egret.

19. Bago-Ilog, Negros Occidental, Philippines

About 73 species of migratory shorebirds pass through Bago-Ilog coastal wetlands every year, and these birds stay within these wetlands for about six months before they return to Siberia or China to breed. This is the most important site for Nordmann's greenshank, as well as other mudflat-dependent shorebird species, in Philippines.

20. Gulf of Mottama, Myanmar

The Gulf of Mottama flyway site covers more than 195,000 ha. This bell-shaped site is part of an estuary ecosystem and is one of the most important sites for migratory waterbirds in mainland South-east Asia, providing a nutrient-rich feeding ground for migratory waterbirds. About 200,000 migratory waterbirds stay here from October to mid-April. More than 70 waterbird species have been recorded at the site, including six species of duck, 31 species of wader and 16 species of tern or gull. Most important migratory species include the spoon-billed sandpiper, Nordmann's greenshank, great knot and lesser adjutant stork. This area is under the management of the State and Regional Government of Myanmar. The main threat to biodiversity at the site has been bird trapping. This illegal take is believed to be the most acute cause of the dramatic global decline of the spoon-billed sandpiper.

Feature condition and future outlook of the proposed area

The area and extent of intertidal flats has rapidly declined in recent decades and continues to decline, mainly due to reclamation for industrial and residential development (MacKinnon et al. 2012, Wang et al. 2014, Murray et al. 2015). The future outlook is bleak, with many areas currently proposed for reclamation and a very low proportion of protected areas, which are also at threat of degazettement. Lowering of productivity due to pollution from industrial (Choi et al. 2001) and aquaculture development is also a threat, as is invasion by the invasive alien cordgrass *Spartina* species (Neira et al. 2006, Lin et al. 2015).

Assessment of the area against the CBD EBSA Criteria

CBD EBSA Criteria (Annex I to decision IX/20)	Description (Annex I to decision IX/20)	Ranking of criterion relevance (please mark one column with an X)			
		No information	**Low**	**Medium**	**High**
Uniqueness or rarity	Area contains either (i) unique ("the only one of its kind"), rare (occurs only in few locations) or endemic species, populations or communities, and/or (ii) unique, rare or distinct, habitats or ecosystems; and/or (iii) unique or unusual geomorphological or oceanographic features.				X
Explanation for ranking Unique benthic community and endangered migratory bird species dependent on mudflats. Overall, intertidal flats are not restricted to this region, but the biodiversity of benthic and waterbird communities is specific to the region, with significant variation among intertidal areas.					
Special importance for life-history stages of species	Areas that are required for a population to survive and thrive.				X
Explanation for ranking Migratory waterbirds breed mostly in arctic and sub-arctic regions, and many spend the non-breeding season in Australasia. Most long-distance migratory shorebirds in the Flyway are entirely dependent on the intertidal coasts of the East Asia Seas to complete their migration. Different populations have different migration strategies and depend on a network of critical sites that varies among populations. For instance, the Alaskan-breeding subspecies of bar-tailed godwit *Limosa lapponica baueri* spends the non-breeding season in New Zealand, while *L. l. menzbieri* breeds in eastern Russia and migrates to northwest Australia. Individuals of both subspecies made long, usually non-stop, flights from non-breeding grounds to coastal staging grounds in the Yellow Sea region. Both subspecies essentially make single stops when moving between non-breeding and breeding sites in opposite hemispheres. This reinforces the critical importance of the intertidal habitats used by fuelling godwits in Australasia, the Yellow Sea, and Alaska (Battley et al. 2012). Other species undertake a more stepwise approach (Choi et al. 2015). There is evidence that loss of critical areas results in concomitant decline in population numbers (Rogers et al. 2010, Piersma et al. in press) for dependent species, indicating limited flexibility to move to different areas. For example, possibly 100% of the global population of endangered Nordmann's greenshank and critically endangered spoon-billed sandpiper use a single site (Rudong-Dongtai) in China as their staging area (Tong 2012, Tong et al. 2013, Murray 2015) and 60% of red knot use another area (Luannan), in China (Rogers et al. 2010). The majority of endangered black-faced spoonbill breeds off the western coast of northern Republic of Korea and southern Democratic People's Republic of Korea. During the breeding season, as well as the non-breeding season (principally at two sites, in Taiwan Province, China and Hong Kong SAR) they depend on mudflats for feeding. Sembilang in Sumatra, Indonesia is the major non-breeding site for the near threatened Asian dowitcher (Conklin et al. 2014, Bai et al. 2015).					
Importance for threatened, endangered or declining	Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species.				X

<table>
<tr><td>species and/or habitats</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="6">Explanation for ranking

Around 50 million individuals of waterbirds use the East Asian-Australasian Flyway each year. Among the over 200 species, 33 are globally threatened. These include the critically endangered spoon-billed sandpiper, endangered Nordmann’s greenshank and black-faced spoonbill and near-threatened Asian dowitcher. Many other waterbirds are endemic to the Flyway. Many populations continue to decline, some resulting in recent uplisting on the IUCN Red List (BirdLife International 2015). Nearly all populations of intertidal-dependent shorebirds are declining (Conklin et al. 2014). Since the number of intertidal areas has undergone a dramatic decline in recent decades, at peak migration times hundreds of thousands of waterbirds of many different species can congregate at some sites.</td></tr>
<tr><td>Vulnerability, fragility, sensitivity, or slow recovery</td><td>Areas that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activities or by natural events) or with slow recovery.</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">Explanation for ranking

Mudflats and sandflats are very vulnerable to degradation, and benthic fauna is very susceptible to the impacts of pollution (Lee et al. 2014) and changes in sedimentation (Lee et al. 2006) and salinity (Atkinson et al. 2001). Invasive alien species, notably exotic cordgrass Spartina spp, can also totally alter the nature of mudflats, resulting in completely changed ecosystems (Gan et al. 2009, Zou et al. in press). While restoration of degraded areas may be possible, the potential for re-creation of natural mudflats is so far very limited (Atkinson et al. 2001).</td></tr>
<tr><td>Biological productivity</td><td>Area containing species, populations or communities with comparatively higher natural biological productivity.</td><td></td><td></td><td>X</td><td></td></tr>
<tr><td colspan="6">Explanation for ranking

Exceptional benthic productivity characterizes mudflats. These organisms are utilized not only by tens of thousands of shorebirds but also provide food to humans via shellfish and local fisheries. Compared to other intertidal habitats, such as beaches and rocky shores, mudflats have high productivity.</td></tr>
<tr><td>Biological diversity</td><td>Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity.</td><td></td><td></td><td>X</td><td></td></tr>
<tr><td colspan="6">Explanation for ranking

Habitats are quite simply structured, with high benthic diversity and bird diversity, but low plant diversity.</td></tr>
<tr><td>Naturalness</td><td>Area with a comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or degradation.</td><td></td><td></td><td>X</td><td></td></tr>
<tr><td colspan="6">Explanation for ranking

This varies – very few areas remain in a natural state and most suffer from anthropogenic effects from impacts of reclamation (from total loss of naturalness to pollution and degradation of nearby areas and introduction of invasive alien species) (Lee and Miller-Rushing 2014).</td></tr>
</table>

Sharing experiences and information applying other criteria (Optional)

Other Criteria	**Description**	**Ranking of criterion relevance** (please mark one column with an X)			
		Don't Know	**Low**	**Medium**	**High**
Connectivity	The intertidal zones of the East Asia Seas form an interconnected and interdependent network, which will suffer disproportionately from the loss a key sites (like losing rungs of the ladder) (Iwamura et al. 2013)				X

Explanation for ranking

Runge et al. (2015) noted that for migratory species, only 7% are protected in stopover areas, much lower than in breeding and non-breeding areas. Nearly all intertidal areas in the Flyway that support internationally significant populations of migratory birds are identified as Important Bird and Biodiversity Areas (IBA) (19 of the 20 proposed here – the other is only recently recognized. IBAs recognize globally threatened bird species and the areas they need to survive. Single Species Action Plans have been developed under the Convention on Migratory Species for spoon-billed sandpiper, Chinese crested tern and black-faced spoonbill.

Maps and Figures

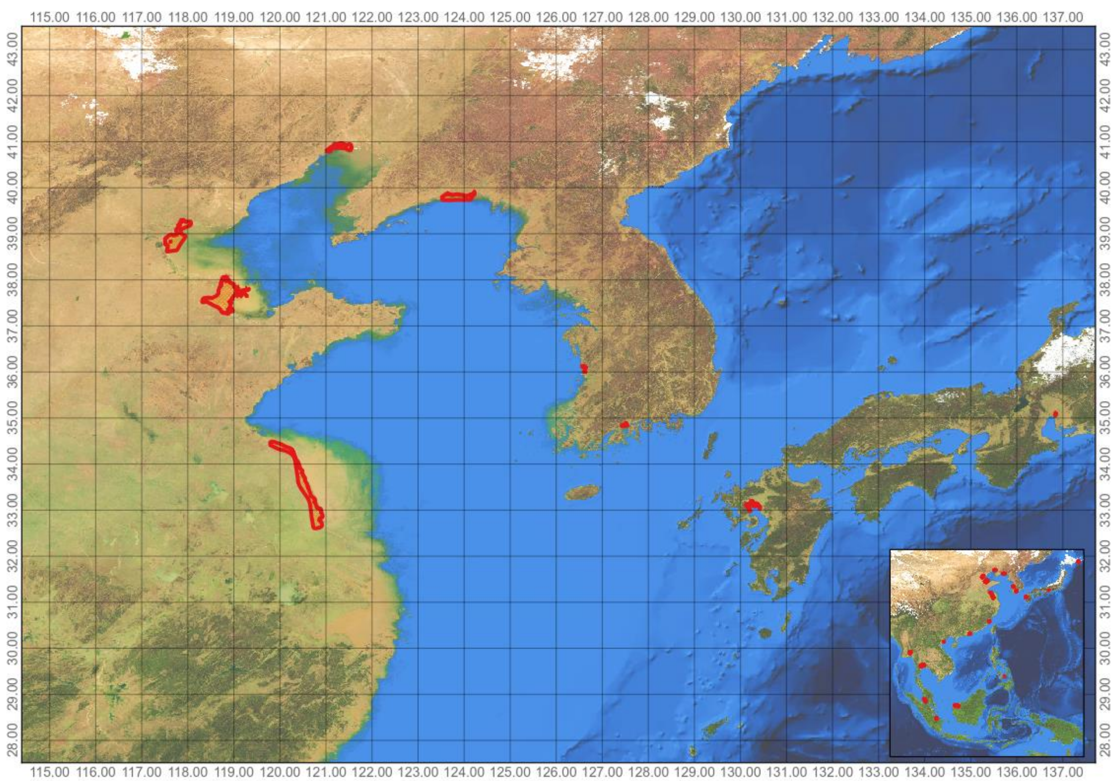

Figure 1. Areas meeting the EBSA criteria

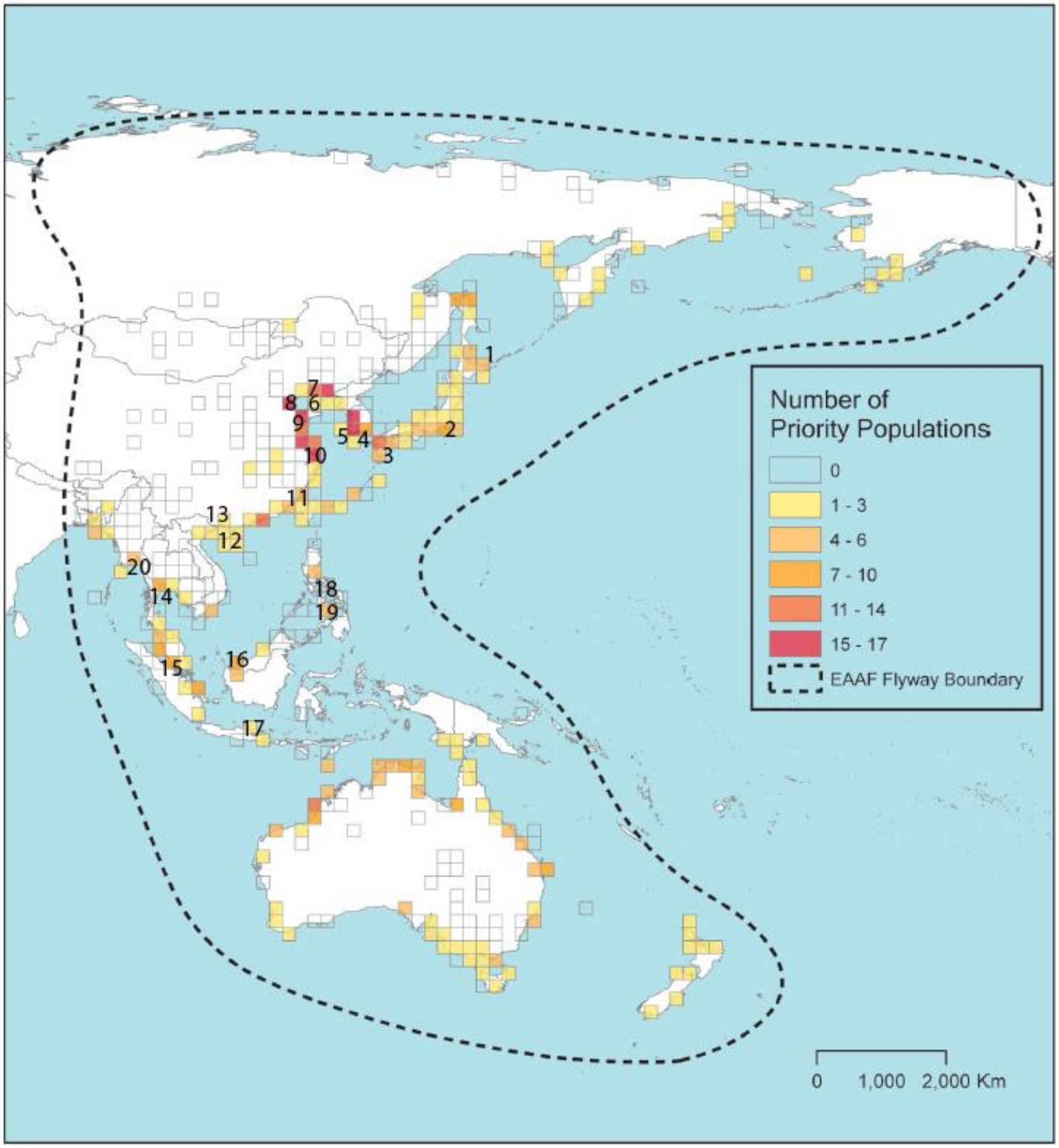

Figure 2. Location of the 20 most important shorebird sites and number of priority populations in each grid cell in the EAAF. Map based on Conklin et al. (2014).

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Area no. 7: Lembeh Strait and adjacent waters

Abstract

Lembeh reefs and its surrounding waters are among the richest and most diverse in marine biota in Indonesia. Lembeh Strait is bordered by an almost continuous fringing reef, while further offshore it is surrounded by deep, clear water. Lembeh Strait shows habitat heterogeneity and is rich in many different species, including endemic, rare and vulnerable species. Live coral cover ranging from 12.2 to 60.7 per cent, and a total of 193 corals species belonging to 68 genera have been recognized from this area. However, the habitat is completely open and featureless, consisting of volcanic sand and plains bordered in the shallows by a few small coral patches. Various new species from this area have been described, such as hermit crabs, shrimps, snails, octopuses, cuttlefishes, sea slugs, fishes, corals and zooplanktons. Indonesian Coelacanth (*Latimeria menadoensis) has recently been recorded here, as have various other species*. In addition, Lembeh Strait and adjacent waters have plentiful natural resources, including tuna fisheries, estimated to amount to 587,000 tonnes.

Introduction

Sulawesi Island and its surrounding waters are well known as the global centre of species diversity. Sulawesi is also known as the centre of the Coral Triangle. Lembeh Strait is located off the east coast of Bitung City, North Sulawesi Province (Figure 2), which has a fast growing international port. Lembeh Strait and adjacent waters are becoming popular among tourists for scuba diving. Several dive centres use the rare, endemic species and colourful biota for advertisements to attract tourists, leading the local government to protect the reefs. Lembeh Strait is one of the most interesting marine habitats, a macro paradise and a great place for scuba diving. Various new species have been described in this area, such as hermit crabs (*Clibanarius rubroviria* and *Clibanarius rutilus)* (Rahayu, 1999), mantis shrimps (*Lysiosquillina lisa)* (Ahyong & Randall, 2001), shrimps (*Hamodactylus macrophthalmus)* (Fransen & Rauch, 2013), ectoparasitic snails (*Epitonium)* (Gittenberger, 2003; Gittenberger & Gittenberger, 2011; Gittenberger *et al.*, 2000), endoparasitic snail (*Leptoconchus)* (Gittenberger & Gittenberger, 2006), sea slug (*Pontohedyle wenzli)* (Jörger & Schrödl, 2013), nudibranch (*Phyllodesmium lembehensis)* (Burghardt *et al.*, 2008), nudibranch *Tambja* (Pola *et al.*, 2005), catshark (*Atelomycterus erdmanni)* (Fahmi & White, 2015), mushroom corals (*Cycloseris boschmai)* (Hoeksema, 2014), sponges (*Xestospongia)* (Swierts *et al.*, 2014) and also zooplanktons (Mulyadi & Rumengan, 2012). New records of various species have also been recorded from this area, including Indonesian Coelacanth *(Latimeria menadoensis)* (Iwata *et al*., pers. com).

Tropical marine ecosystems are well known for their high biodiversity. Coastal ecosystems (mangroves, seagrass beds, coral reefs) in the tropics depend on each other for the interchange of organisms, food and nutrients. They play a role in the protection of shorelines during storms, and they are important sources of income for local economies through fisheries, ecotourism and mining. Unfortunately, the exploitation of these ecosystems appears destructive and unsustainable. One key to the species richness of coral reefs is formed by the complex of species interdependencies, like those of corals and their algal symbionts (zooxanthellae). Corals and many other sessile organisms use dead coral as substrate, serve as food and hiding place to other organisms. Host-symbiont relationships appear very specific. Therefore, in order to study the role of evolutionary history of species in biodiversity, a good knowledge of both host and symbiont species groups is required. Such studies usually require the application of molecular techniques in order to reveal sibling species (look-alikes) and to indicate evolutionary inter-relationships.

Many coral reef species show widespread ranges that are entirely or partly Indo-West Pacific. The ranges of these species and many others overlap in the Coral Triangle, the centre of maximum marine species diversity in the Indo-Pacific convergence. The centre’s boundaries are not exactly known because the range limits of many species have not been determined. Furthermore, disjunctive or fragmented distribution ranges may occur, which may be a result of incomplete sampling, particularly in species that are not well-known, or because some species depend on restricted habitat availability. Most marine species are also represented by a free-living phase (usually larvae) in the open water in between reefs. The dispersal of reef organisms is largely determined by the duration of this free-living phase and by the direction and speed of currents.

Location

The Lembeh Strait lies between Minahasa Peninsula in northern Sulawesi and Lembeh Island, North Sulawesi Province of Indonesia (Figure 3). Lembeh Strait is surounded by the Pacific Ocean in the north, mainland Sulawesi in the west, Lembeh Island in the east and Moluccas Sea in the south. The geographical coordinates of Lembeh Strait are 125^{o}09' – 125^{o}18' E and 27^{o}08' – 27^{o}25' N. Lembeh Strait is 22 km long and 2 km wide.

Feature description of the proposed area

The low sea level stand during the Last Glacial Maximum (LGM) and the direction of interoceanic currents from the Pacific to the Indian Ocean are considered limiting factors for the ranges of coral reef species. Most species that have ranges more or less congruent with the Coral Triangle are strictly West Pacific (Figure 4**.**). These are species are not found on reefs with terrigenous influence. During the LGM, 17,000-18,000 years ago, they most likely survived around Pacific islands where coral reef communities must have followed the slopes downward to the lowest sea level stand. From there they could re-colonize other areas by larval transport in currents after the sea level started to rise to its present stand. Hence, the species that determine the present Coral Triangle boundaries appear to be offshore species that survived in oceanic conditions and may not easily settle on shelf-based reefs nearshore. Considering the present ranges based on presence/absence data and the oceanic current directions, West Pacific islands most likely acted as species reservoirs during the LGM. Lembeh island is exposed to deep oceanic water and to currents on both sides.

The Lembeh Strait has characteristics as follows:

- *Environmental conditions*: Further south of Lembeh Strait there is a river flow bringing sediments and other degraded materials from land-based activities. Sediment reduces light, smothers coral tissue and in the long term it effects the structure and function of the coral reef ecosystem by altering both physical and biological processes. Destructive fishing, land-based pollutants and impact of international port and industry are most serious threat to coral reefs. Unsustainable fisheries using trawl, fish traps and explosive are still operated in this area. Diving and tourism can also become destructive.
- *Oceanography*: Surface current moves from north (Pacific Ocean) to south (Moluccas Sea) through the straits between the mainland Sulawesi and Lembeh Island. The major sea surface current flow to the south pass trought the Lembeh Strait and strongly influenced by Indonesian Throughflow (ITF) (Figure 5), which exports warm, water with lower salinity from the west Pacific into north-east Indian Ocean. Carbon dioxide concentration at Lembeh Strait ranges 394.54 to 568.32 µatm (Suratno, 2015, pers. com.).
- *Ecological characteristics:* The Lembeh Strait has extremely high habitat diversity, high species diversity and endemism, and tuna fishery.
- *Coastal ecosystems:* Seagrass beds and mangrove forests can be found in the southern Lembeh Strait.

Feature condition and future outlook of the proposed area

The condition of the area is relatively degraded and unstable at present. There are several industrial acitivities in the coastal area of Bitung City and Lembeh Island.

Species diversity on coral reefs strongly depends on habitat variability, including abiotic and biotic components. Areas with relatively low species numbers in the middle of species-rich areas usually represent relatively low habitat diversity. Outside the Coral Triangle, areas with low environmental variability may hinder its expansion. Among areas showing contrasting diversity patterns, species-poor areas usually lack clear environmental gradients, such as with distance from river outlets (onshore-offshore or alongshore). Oceanic island groups without large rivers may for lack low-salinity habitats, gently declining reef slopes, or variation in exposure to wave action along their coastlines. Cross-shelf reef systems present a large variety of environmental gradients, from inshore with terrigenous impact to oceanic conditions. They show much more variation in depth ranges and wave exposure (depending on increasing shelf depth), and temperature (cold-water upwelling near barrier reefs).

Assessment of the area against the CBD EBSA Criteria

<table>
<tr><td rowspan="2">CBD EBSA Criteria
(Annex I to decision IX/20)</td><td rowspan="2">Description
(Annex I to decision IX/20)</td><td colspan="4">Ranking of criterion relevance
(please mark one column with an X)</td></tr>
<tr><td>No information</td><td>Low</td><td>Medium</td><td>High</td></tr>
<tr><td>Uniqueness or rarity</td><td>Area contains either (i) unique (“the only one of its kind”), rare (occurs only in few locations) or endemic species, populations or communities, and/or (ii) unique, rare or distinct, habitats or ecosystems; and/or (iii) unique or unusual geomorphological or oceanographic features.</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">Rare, endemic species and colourful biota (Suharsono et al., 2012). Various new species have been described in this area, such as hermit crabs Clibanarius rubroviria and Clibanarius rutilus (Rahayu, 1999), mantis shrimps Lysiosquillina lisa (Ahyong & Randall, 2001), shrimps Hamodactylus macrophthalmus (Fransen & Rauch, 2013), ectoparasitic snails Epitonium (Gittenberger, 2003; Gittenberger & Gittenberger, 2011; Gittenberger et al., 2000), endoparasitic snail Leptoconchus (Gittenberger & Gittenberger, 2006), sea slug Pontohedyle wenzli (Jörger & Schrödl, 2013), nudibranch Phyllodesmium lembehensis (Burghardt et al., 2008), nudibranch Tambja (Pola et al., 2005), catshark Atelomycterus erdmanni (Fahmi & White, 2015), mushroom corals Cycloseris boschmai (Hoeksema, 2014), sponges Xestospongia (Swierts et al., 2014) and also zooplanktons (Mulyadi & Rumengan, 2012). New records of various species have recorded from this area, including Indonesian coelacanth, Latimeria menadoensis (Iwata et al., pers. com).</td></tr>
<tr><td>Special importance for life-history stages of species</td><td>Areas that are required for a population to survive and thrive.</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">Lembeh Strait contains a variety of habitats related to geological setting and exposure to prevailing currents, waves, as well as pollutants, including sediment from land-based activities, runoff from industrial and domestic sources,, siltation and turbidity. The complexity of habitat types in the Lembeh Strait and its surrounding waters has resulted in high species diversity (Suharsono et al., 2012). Lembeh Strait has additional importance as it is a base for significant foreign company and foreign vessel activity in connection with the tuna fishery, especially for skipjack tuna (Katsuwonus pelamis). Industrial fleet activity includes longline, pole and line, handline, and purse-seine (Proctor & Nugraha, 2002). Lembeh Strait is known as a location for the metamorphosing stage of juveniles, such as eels (Rhinomuraena quaesita) (Miller et al., 2013). The maturity level of cuttlefish (Sepia latimanus) samples collected from Lembeh Strait range from immature to post-spawning (Pratasik et al., 2015).</td></tr>
<tr><td>Importance for threatened, endangered or declining</td><td>Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species.</td><td></td><td></td><td></td><td>X</td></tr>
</table>

species and/or habitats					

The area is very important for several species groups of marine biota (hermit crabs, shrimps, snails, sea slugs, octopus, cuttlefish, fishes, corals, sponges and zooplanktons). Although most divers come to Lembeh Strait for the muck diving, Lembeh Strait has coral reef, large pelagics like mackerels and sharks, and occasionally whales. In 1997 in the Lembeh Strait region, 1,424 manta rays were caught in the large trap nets set in a migratory channel designed to catch pelagic fish and marine mammals entering the mouth of Lembeh Strait (Convention on Migratory Species, 2014). Manta ray (*Manta alfredi*) are among the marine species included in the CITES Appendix, as are catshark *Atelomycterus erdmanni* (Fahmi & White, 2015). Foreign poachers stretched a net across a major migratory route for marlins, sharks, dolphins, and whales, wiping them out in short order (Convention on Migratory Species, 2014).

The area is also increasingly recognized as important aggregator for pelagic species such as tuna (Asia *et a;.*, 2015) and mimicry species, such as sand-flat octopus (Hanlon *et al*., 2008). Recently, Lembeh Strait has also been recognized as a habitat of Indonesian coelacanth *(Latimeria menadoensis)*.

Traded as a marine ornamental, the IUCN Red List places Banggai Cardinalfish (BCF) *Pterapogon kauderni* in the endangered category, with overexploitation and habitat degradation as the major threats. After the (unsuccessful) proposal for listing under CITES Appendix II in 2007, a national action plan (BCFAP) was developed and BCF conservation included in the Indonesian Coral Triangle Initiative National Plan of Action (CTI-NPOA). Monitoring is widely accepted as an integral part of effective management (Moore *et al*., 2011).

Vulnerability, fragility, sensitivity, or slow recovery	Areas that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery.				X

Many coral reef organisms in Lembeh Strait, such as mantis shrimp (*Haptosquilla pulchella)*, have a planktonic or pelagic larval dispersal phase, thus it is critical to understand the patterns of ecological connectivity between reserve populations that result from larval dispersal to protect this threatened species (Barber *et al*., 2002)**.**

Biological productivity	Area containing species, populations or communities with comparatively higher natural biological productivity.		X		

Lembeh Strait is known as a location for the metamorphosing stage of *Rhinomuraena quaesita , which* enter the coastal area to find a hiding place where they can transform into juvenile eels (Miller *et al*., 2013).

Biological diversity	Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity.				X

Lembeh Strait is part of the Coral Triangle ecoregion, which consists of a warm water mass from the western Pacific Ocean (Hoeksema, 2007). The Strait's biodiversity is potentially very high, and further research is planned in 2017.

The substrate is the perfect habitat for unusual, exotic and juvenile organisms that make their homes in the sediment and trash at the bottom of the ocean. Creatures hiding in the substrate are so interesting and different from the usual tropical marine life. For example, Banggai cardinalfish (*Pterapogon kauderni*) have been reported in Lembeh Strait as an introduced population (Erdmann & Vagelli, 2001; Moore *et al*., 2011).

More than one thousand individual giant clams have been report here, consisting of seven species: *Tridacna crocea, T. squamosa, T. maxima, T. derasa, T. gigas, Hippopus hippopus and H. porcelanus*. The population density of giant clams is 4 individu/m^2. The highest density of individuals is *T. crocea* (2 individu/m^2), while the lowest are *T. gigas, T. derasa* and *H. porcelanus* (0.01 individu/m^2) (Arbi, 2010). The results from another survey found 92 species of Gastropoda and Bivalvia in the inner part of the strait (Arbi, 2010), 182 species of Gastropoda and Bivalvia in the northern part (Arbi, 2011), and 97 species of Gastropoda in the southern part (Arbi & Mudjiono, 2012) (Figure 6**.**).

Bitung is known for its skipjack tuna (*Katsuwonus pelamis*), some 6,132 tonnes of which are produced..
Genetic diversity within the population of *Linckia laevigata* in northern Sulawesi showed high levels of haplotype and nucleotide diversity, ranging from 0.84 in the population to 1.00 (Kochzius *et al*., 2009).

Naturalness	Area with a comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or degradation.		X		

The area is relatively degraded and has major industries. Lembeh Strait is relatively polluted because there are major industries, and the pollution may reduce native diversity and increase the numbers of invasive alien marine species (Piola & Johnston, 2008). South of Bitung there is a river bringing sediments and other degraded materials from land-based activities. Effects of heavy sedimentation on coral structure are associated with limited coral species, slow growth rates and limited coral recruitment (West & van Woesik, 2001; James *et al*., 2005). Shipping traffic and human activities in the mainland may have been linked to more turbid waters and higher nutrient values (Swierts *et al*., 2013).

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Maps and Figures

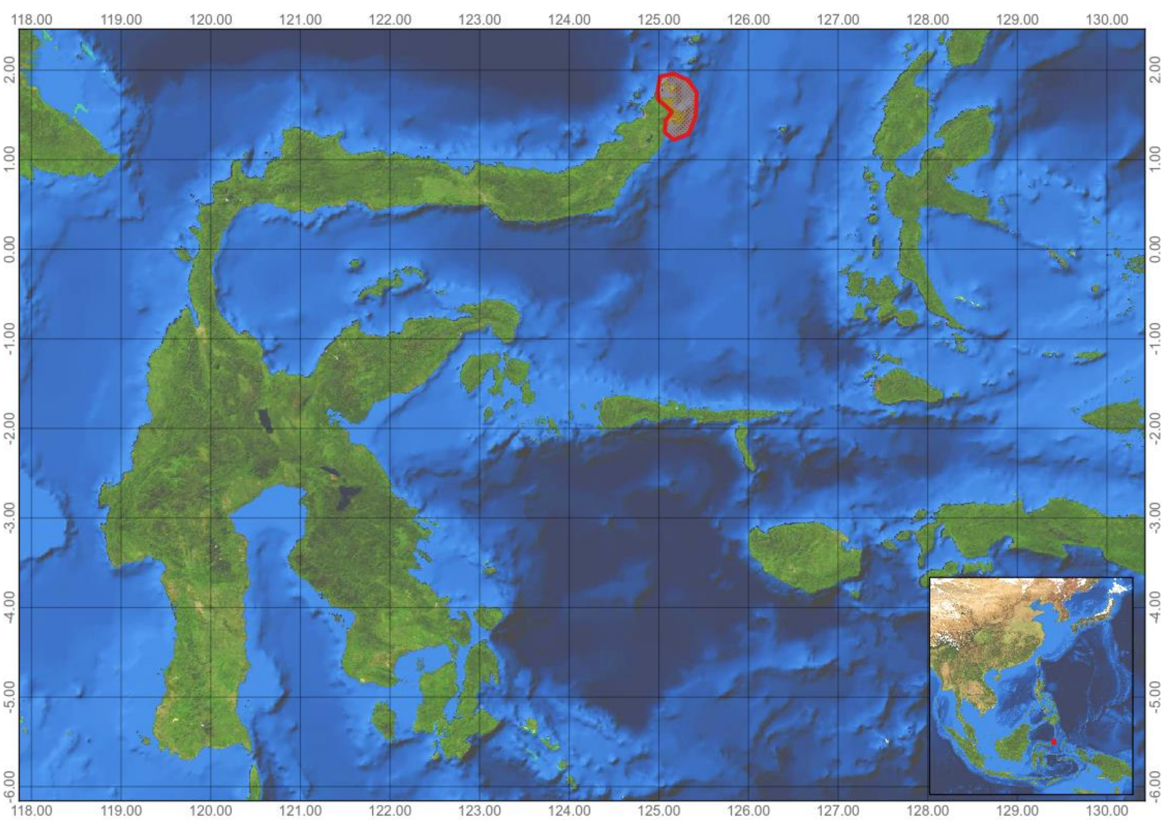

Figure 1. Area meeting the EBSA criteria

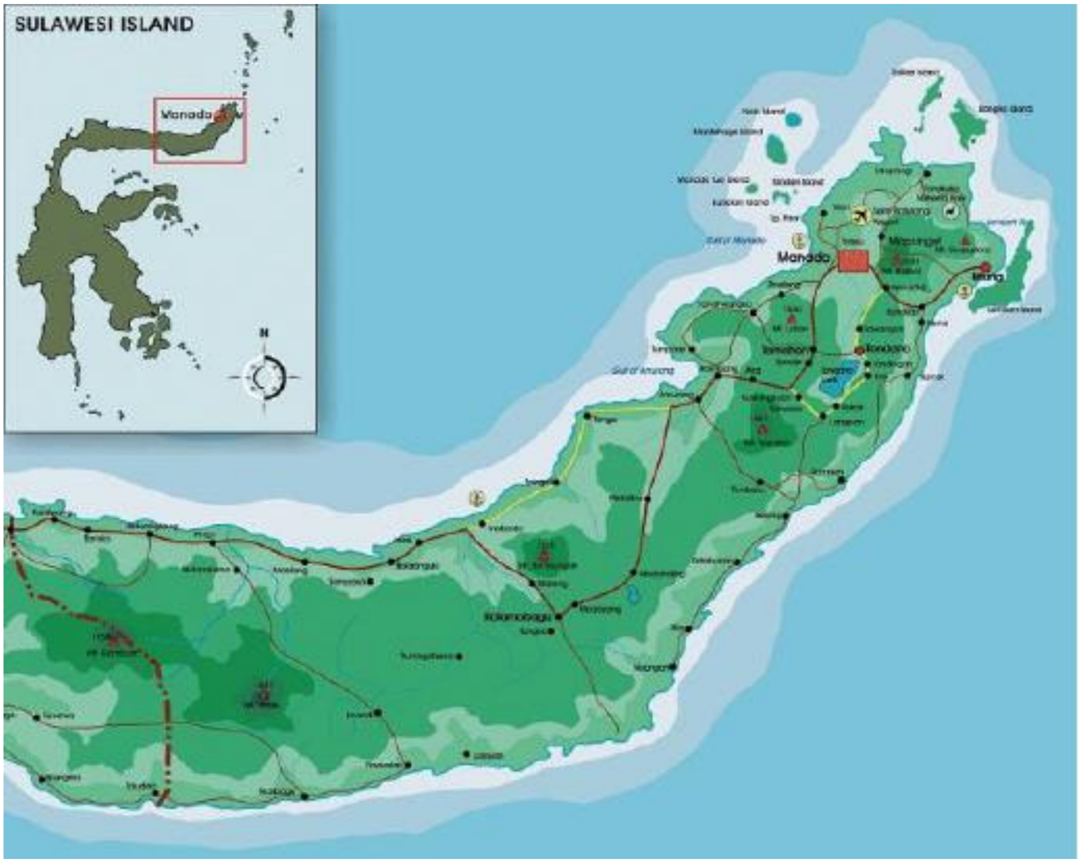

Figure 2. Lembeh Strait is located off east coast of Bitung City, North Sulawesi Province (Hoeksema, 2012).

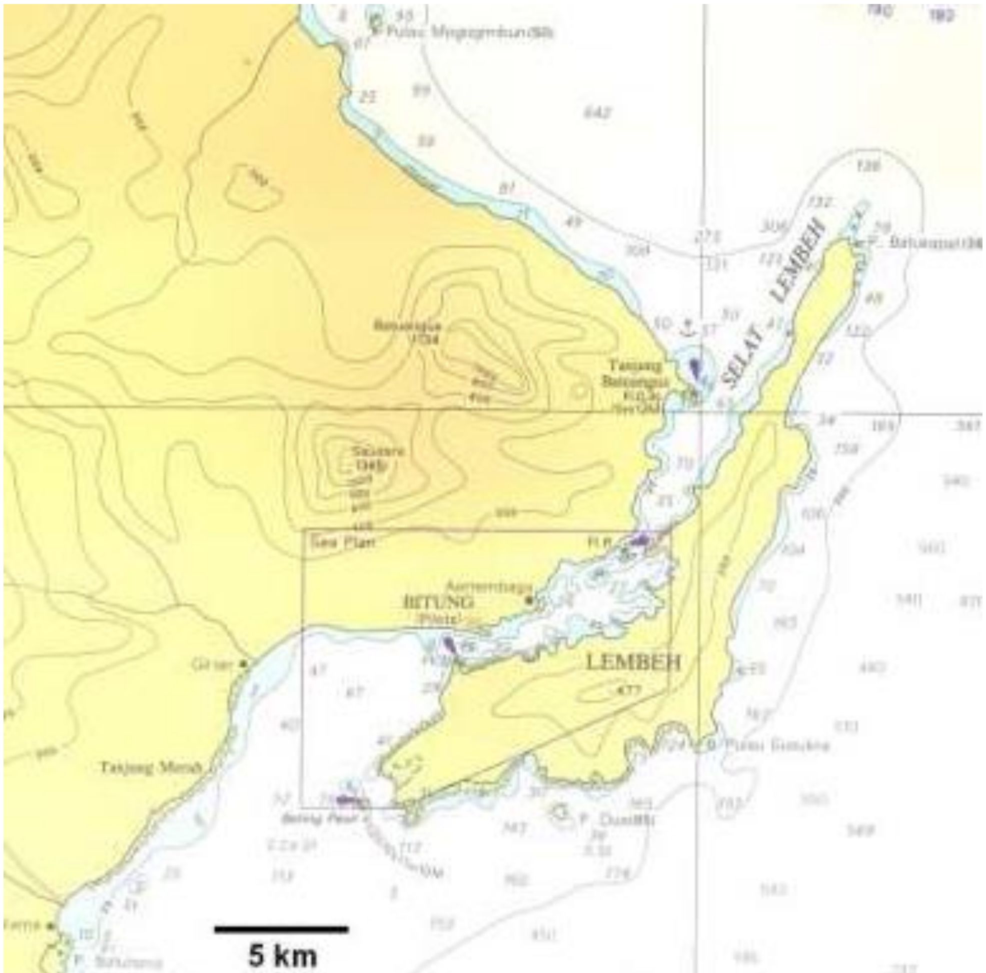

Figure 3. Nautical map of Lembeh Island showing its coastline and surrounding seafloor (Hoeksema, 2012).

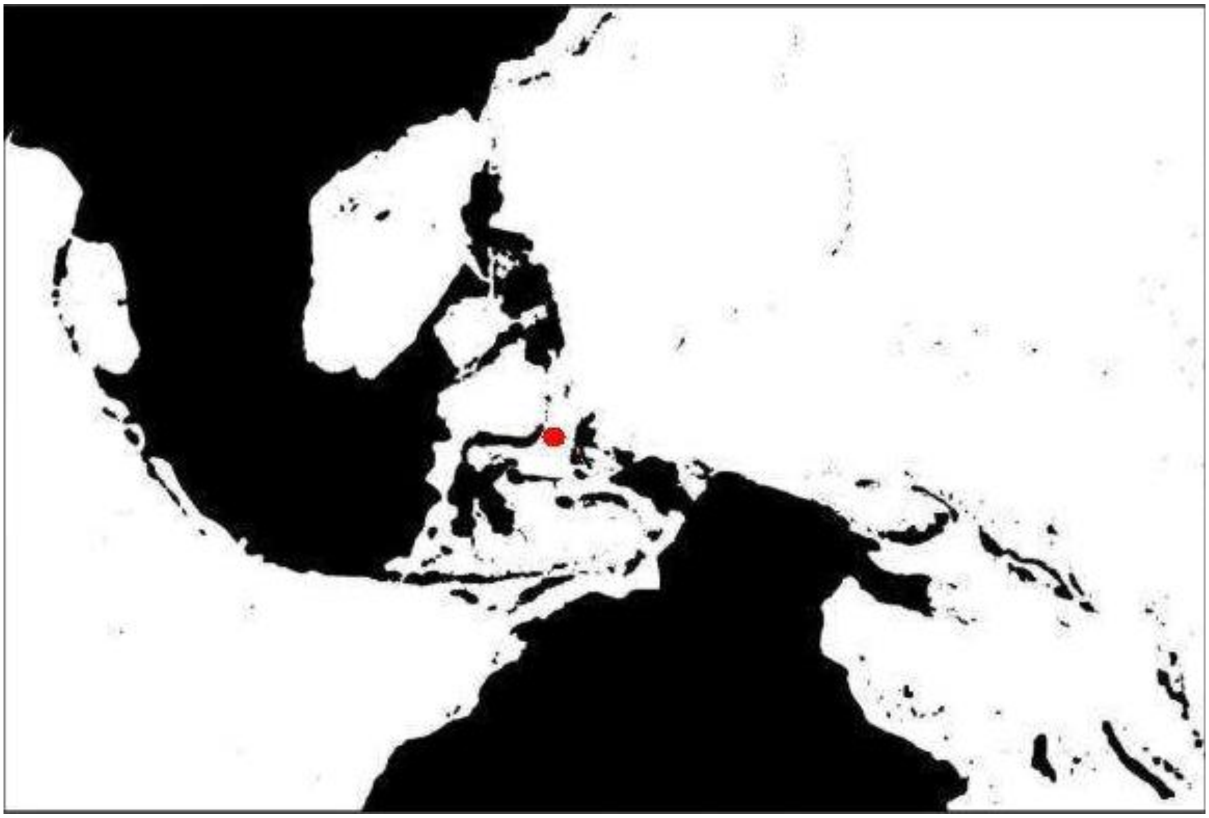

Figure 4. Central Indo-Pacific coastlines and shoals during the Last Glacial Maximum (18.000 yrs. BP)

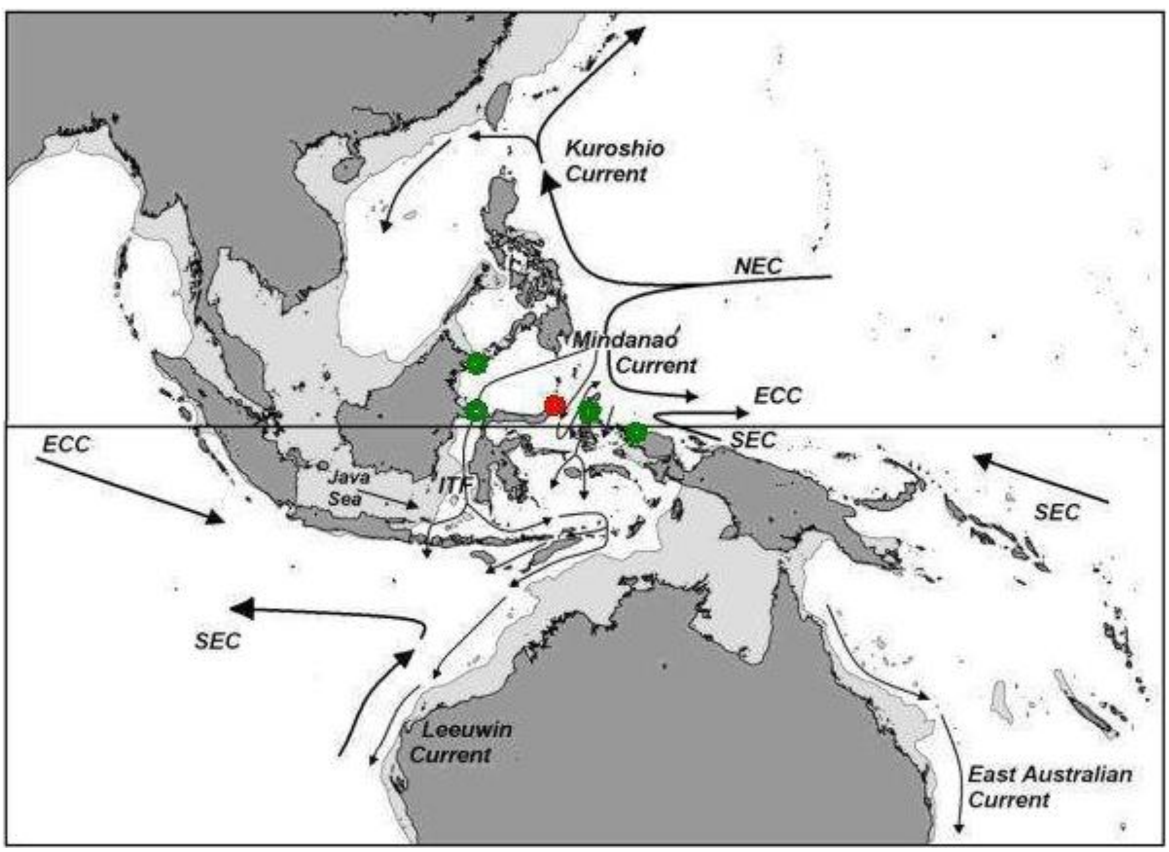

Figure 5. Oceanic currents in the Central Indo-Pacific convergence. ITF = Indonesian Through Flow. Red dot: Position of Lembeh (Hoeksema, 2012). at the lowest sea level stand (- 120-150m).

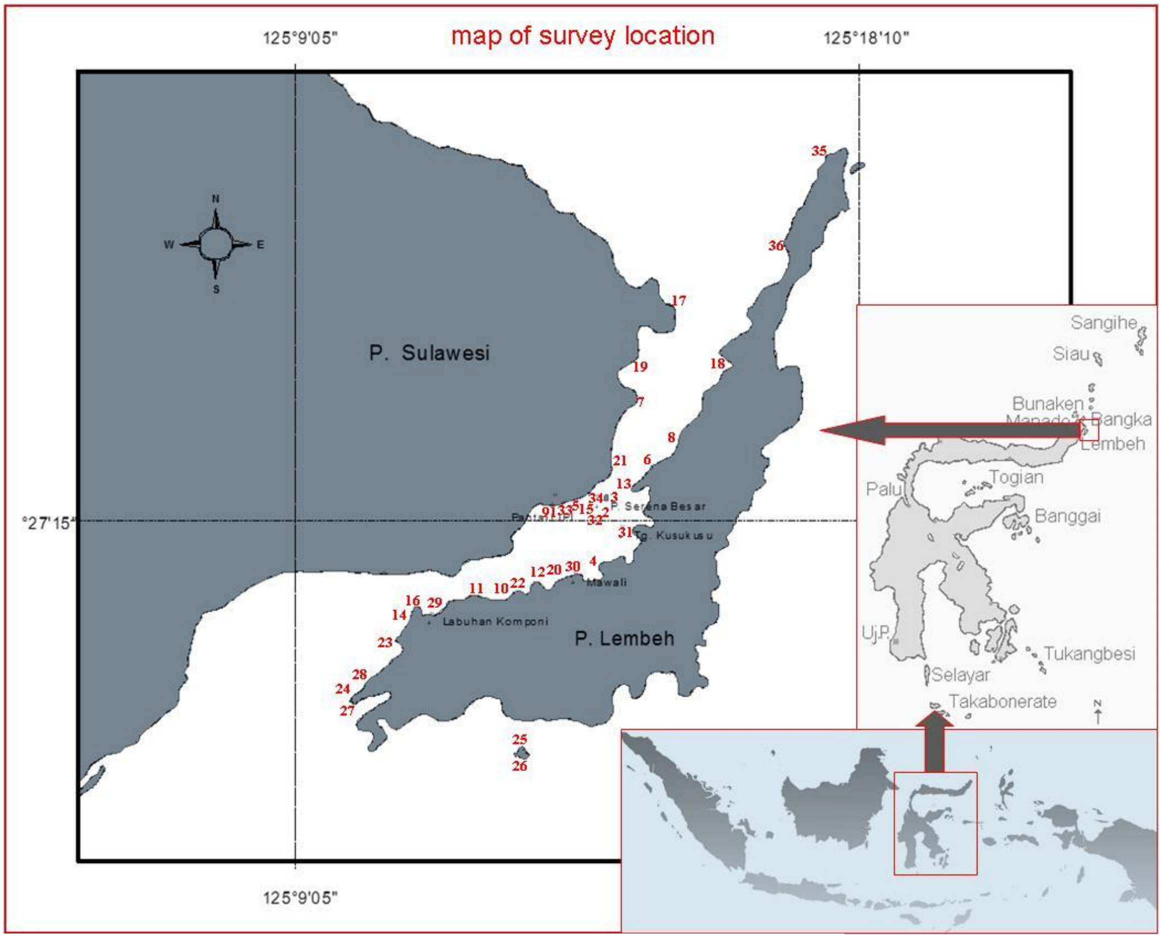

Figure 6. Map of mollusc survey location in the inner part of Lembeh Strait

Figure 7. Hairy frogfish, unique species of Lembeh Strait

Figure 8. Unique symbiosis between sea urchin and crab found in Lembeh Strait

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Area no. 8: Redang Island Archipelago and Adjacent Area

Abstract
The coral reefs in Pulau Redang are among the best on the East coast of Malaysia and are generally in good condition. A study by Reef Check Malaysia in 2014 shows that the reefs around Redang islands are considered to be in "Good" condition, with live coral cover of 58.13 per cent, which is slightly above the average (56.38 per cent) for reefs within the Sunda Shelf region. The diversity of fish and invertebrates is average. The main threats to the coral reefs in Redang Island appear to be the growth of the tourism industry and related development, such as resorts and infrastructure. Redang has an average of 100,000 of visitors annually. The island is a popular resort destination, with a more upmarket image than nearby Perhentian Island. Diving and snorkelling are the main tourist activities. There are 10 medium-large size resorts, located mainly on Pasir Panjang. Based on recent marine biological studies, Redang Island is believed to be the seed-source for most of the marine biodiversity of the eastern part of Peninsular Malaysia. The beaches in the State of Terengganu offer nesting sites for the hawksbill turtle (*Eretmochelys imbricata*), The leatherback turtle (*Dermochelys coriacea*) and the endangered green turtle (*Chelonia mydas*). There are 36 turtle nesting sites in Terengganu beaches, out of 78 nesting sites on the beaches of Malaysia. Turtle landings occur at virtually every beach in the State of Terengganu, but nesting is most concentrated at the following sites: Pulau Redang; Pulau Perhentian; Penarik; Rantau Abang; Paka; Geliga and Kijal.

Introduction
Redang Island is located about 45 kilometres or 24.28 nautical miles to the northeast of Kuala Terengganu. The island can be reached via Merang jetty, which is about 12 nautical miles (or 22.2 km) southwest of the island. Redang Island has a surface area of about 2,483.58 hectares (NRE & JPBD, 2006) — the largest of nine islands within the Redang Island archipelago. The other eight islands are:

i. Pinang Island
ii. Lima Island
iii. Paku Besar Island
iv. Paku Kecil Island
v. Kerengga Besar Island
vi. Kerengga Kecil Island
vii. Ekor Tebu Island
viii. Ling Island

The waters surrounding these islands were gazetted as Marine Parks under the Establishment of Marine Parks Malaysia Order 1994 under the Fisheries Act 1985 (Amended 1991). The Redang Island Marine Park waters cover an area of about 12,750 hectares.

The land and water is managed as an integrated ecosystem with co-operation between the Federal and State Governments, whereby the land is gazetted as a Forest Reserve. Development on the private lands is managed through proper planning using the environmental guidelines established by the state government to reduce the adverse environmental impact to the ecosystem of the island.

About two hundred families reside in the village on the main island of Redang. Agriculture is carried out mainly on the flat land of the Redang River Valley with fruit trees lining the hill slopes. The remnants of what were formerly coconut and pepper plantations still exist on Pulau Redang today. The islanders are mainly fishers. Some, however, supplement their income by collecting edible birds' nests from the swiftlet colonies located in the caves along the north-eastern coast.
The sandy beaches have been used by the various species of turtles for landing and nesting, laying their eggs in the thousands. The landings and nesting of the sea turtles is said to occur throughout the year at various localities of the Malaysian coastlines.The beaches in state of Terengganu offer nesting sites for the hawksbill turtle (*Eretmochelys imbricata*), The leatherback turtle (*Dermochelys coriacea*) and the

endangered green turtle (*Chelonia mydas*). There are four turtle nesting sites on the Redang Island Archipelago out of 36 nesting sites in beaches of Terengganu. There are two (2) predominant species of marine turtles in Malaysia; greens (*Chelonia mydas*) and hawksbills (*Eretmochelys imbricata*).
On the mainland, the most important green turtle beaches are those near Paka, at Geliga, and near Penarik. The most important olive ridley rookeries are near Penarik and at Kijal. The Rantau Abang Turtle Sanctuary has already been identified as the most important nesting area for leatherback turtles, although significant numbers of leatherbacks also nest near Paka and Kemaman (Aikanathan.S. & Mortimer J.A 1990).
Ma’ Daerah in Terengganu records one of the largest populations of nesting greens on mainland Peninsular Malaysia. A satellite tracking study was conducted by WWF-Malaysia from 2006-2013 for these sites to identify the migration route for the turtles and its interesting habitat. Post-nesting breeding movement of C. *mydas* males and females has identified important migration routes from the Ma' Daerah Turtle Sanctuary to foraging grounds in Southeast Asia (Lau et al 2009).

Location

Redang Island is located about 45 kilometres or 24.28 nautical miles to the northeast of Kuala Terengganu. Redang Island has a surface area of about 2,483.58 hectares (NRE & JPBD, 2006) — the largest of nine islands within the Redang Island archipelago. The archipelago area is approximately within the coordinates of 5° 43’ 28.92N, 102° 59’ 04.53”E and 5° 49’ 10.49”N, 103° 03’ 02.82E.

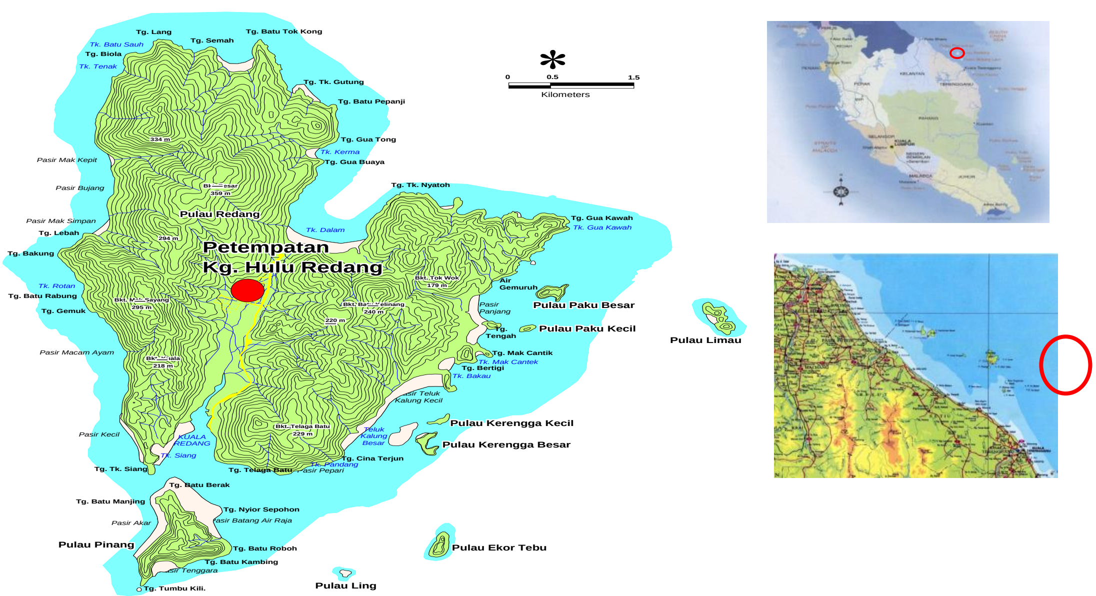

Figure 1: Pulau Redang Archipelago (Source: Department of Town & Country Planning, 2006)

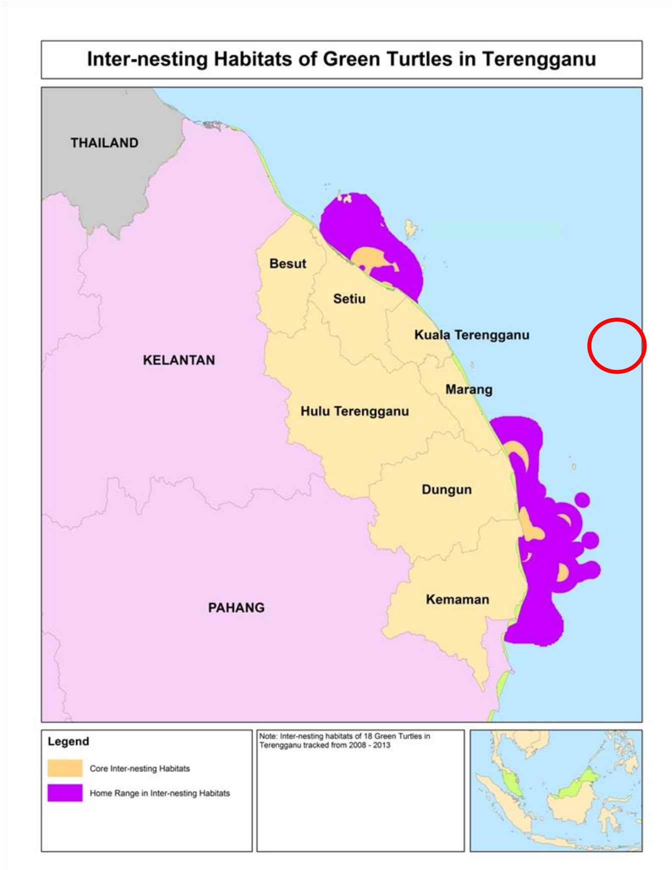

Figure 2. Inter-nesting habitat for green turtles in Terengganu (Source: Lau et al., 2009)

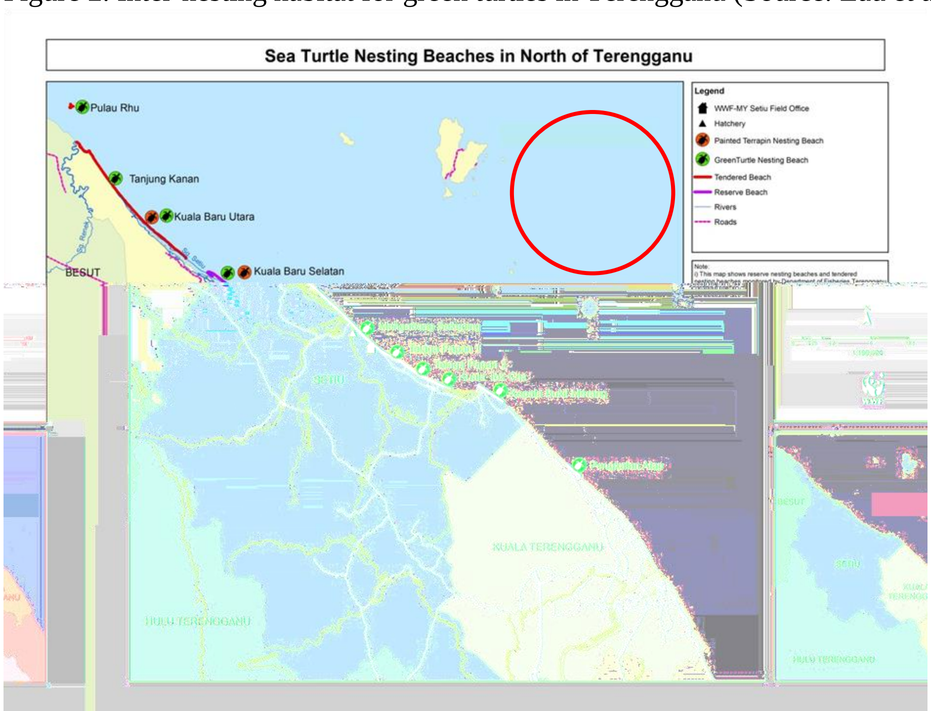

Figure 3. Sea turtle nesting beaches in the north of Terengganu (Source: Lau et al., 2009)

Figure 4. Sea turtle nesting beaches in the north of Terengganu (Source: Lau et al., 2009)

Feature description of the proposed area

Marine Biodiversity

Pulau Redang Marine Park has long been recognized for its natural value and outstanding marine biodiversity and a wide range of habitat types. The marine park also has cultural, social and economic importance to the community.

The waters of Redang Island lie within the Indo-Pacific Region. The diversity of marine fauna of the Indo-pacific region far exceeds that even of other tropical regions. It has many families that are not found elsewhere. It contains about 500 species of reef-building corals, more than 1000 species of bivalves and about 3000 species of fish. Redang Island and its associated islets have fringed coral reefs superior to any in Peninsular Malaysia and rank among the best in the world (Department of Marine Park Malaysia 2006).

Marine Turtle

The beaches of Terengganu offer nesting sites for the hawksbill turtle (*Eretmochelys imbricata*), leatherback turtle (*Dermochelys coriacea*) and endangered green turtle (*Chelonia mydas*). There are 36 turtle nesting site in Terengganu beaches out of a total of 78 nesting sites on the beaches of Malaysia.

Turtles land at virtually every beach in the State—but in greater density at some than others. The heaviest nesting can be found on the mainland and offshore islands of Terengganu. The most important of these are situated at: Pulau Redang; Pulau Perhentian; Penarik; Rantau Abang; Paka (which consists of Ma'Daerah, Cakar Hutan, and Tanjong Batu beaches); Geliga and Kijal. The most famous nesting beach is that at Rantau Abang, where most of Malaysia's leatherbacks nest along 15 km of coastline. Scattered leatherback nesting occurs elsewhere along the mainland coastline—especially at Paka, Geliga and Kijal. Most green turtle nestings occur on the offshore islands of Pulau Redang and Pulau Perhentian, and also at Paka, Geliga and Kijal. One of the best hawksbill rookeries of Peninsular Malaysia is at Pulau Redang (Aikanathan.S. & Mortimer J.A 1990).

The State of Terengganu once hosted the largest rookery of leatherbacks in the world but the leatherback is now considered functionally extinct in Terengganu. However, the state still holds the highest nesting densities of green turtles for Peninsular Malaysia with annual records of between 2,000 to 2,500 nests (WWF-Malaysia, 2009).
The annual number of leatherback turtle nestings has declined precipitously over the last 40 years, with current levels representing less than 2 per cent of the figures recorded in the 1950s. The declining trend is indicated in the number of nestings per year since 1956 (http://seatru.umt.edu.my/?page_id=1408).

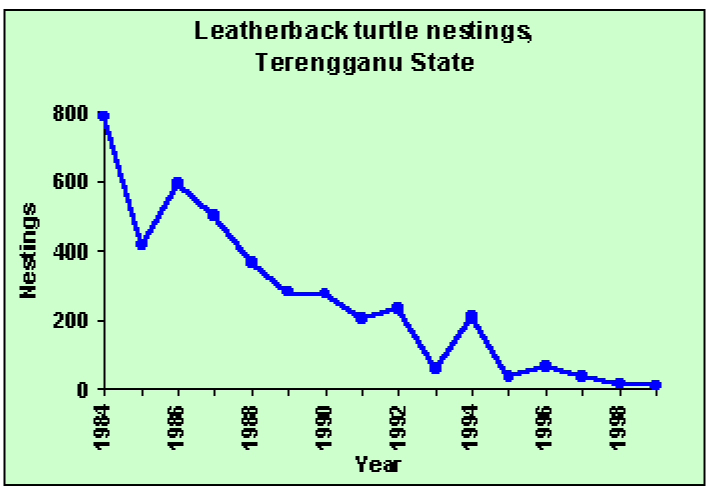

Figure 5: The Leatherback Turtle Population in Terengganu (source:http://seatru.umt.edu.my/?page_id=1408)

Nesting density for green turtles in Terengganu show wide year-to-year fluctuations. This characteristic is common among many green turtle populations. Average annual nestings estimated from the last ten years' data at 2,945 nestings per year is about 38 per cent of the 1956 figures, representing a 62 per cent decline. Nonetheless, the size of the green turtle population in Terengganu is the most significant, compared to the other species. However, there is growing concern that the population will decline further since egg harvesting was common in the past and is still being practiced today (http://seatru.umt.edu.my/?page_id=1408).

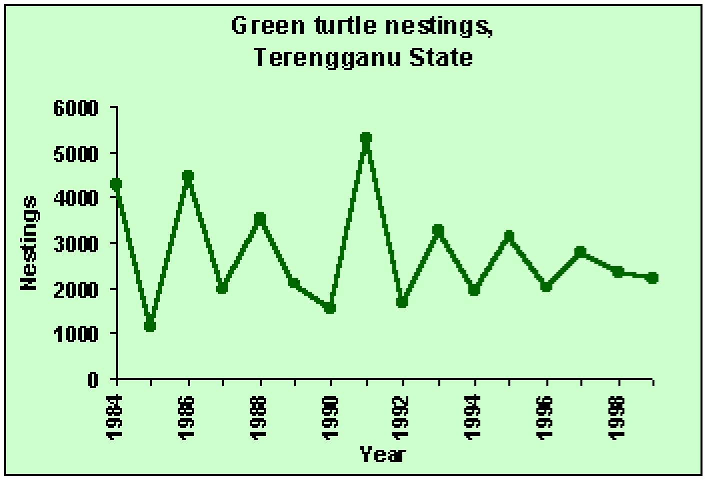

Figure 6. The green turtle population in Terengganu (source from http://seatru.umt.edu.my/?page_id=1408)

The remaining nesting population fof hawksbill turtle is very low, estimated at a ten-year average of only 41 nestings per year. The last five-year average has declined by 20 per cent, compared to the previous five year average, and by 49 per cent, compared to nestings in 1978. Comparision with earlier records is not possible because of lack of historical data (http://seatru.umt.edu.my/?page_id=1408).

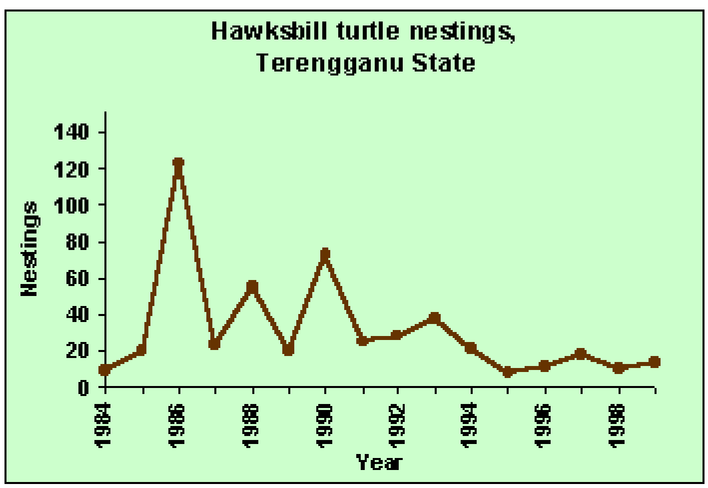

Figure 7: The hawksbill turtle population in Terengganu
(source: http://seatru.umt.edu.my/?page_id=1408)

Location	Numbers of Egg Clutches Laid Annually	Source
Turtle Islands Park, Sabah (especially Pulau Gulisan)	350—400	Sabah Parks, unpubl. data; Phillipps, 1988
Terengganu (especially Pulau Redang and Pulau Perhentian)	20—200	Fisheries Statistics, unpubl.; Mortimer, 1991c; Chan, 1991
Pahang (offshore islands)	100	Mortimer, 1991a
Johor (offshore islands)	100—200	Fisheries Statistics, unpubl.; Mortimer, 1991b; Chan, 1991
Kedah	< 25	Sukarno, 1991
Pulau Pinang	< 25	Mortimer, 1991d
Perak (Pasir Panjang and Sembilan Islands)	< 25	Mortimer, 1990; Fisheries Statistics, unpubl.
Melaka	> 350	This paper

Table 1: Current estimates of the numbers of hawksbill egg clutches laid annually in each Malaysian state where they are known to occur (Source: Mortimer , Zaid and Safee, 1993)

The Climate
The climate of the archipelago and adjacent area is dominated by the north-east monsoon, which blows from November to March, producing a wetter season in these months than during the rest of the year. Rain, however, is frequent throughout the year with short dry spells from April to September.

Water Quality
Redang Island is active in the tourism industry and receives more one hundred thousand tourists annually. However, the water nutrient parameters (e.g., PO_4^{-3}-P, NH_3-N, NO_2^--N and NO_3^-N) complied with class 1 water and are in compliance with Malaysia Marine Water Quality Criteria and Standard, regulated by the Department of Environment, Malaysia (Zainuddin et al., 2012).

Island	**PO_4 (μg/L)**	**NH_3 (μg/L)**	**NO_2 (μg/L)**	**NO_3 (μg/L)**
Redang	1.591 (0.000 - 5.303)	23.686 (0.000 - 47.372)	0.621 (0.041 - 4.436)	70.780 (21.904 - 114.151)
DOE Malaysia	Class I - 5 Class II- 75 Class III- 670	Class I – 35 Class II- 70 Class III- 320	Class I - 10 Class II- 55 Class III- 1000	Class I - 10 Class II- 60 Class III- 1000
Pulau Redang (Law *et Al.*, 2001)	2.849 - 9.911	0.938 - 3.263	0.098 - 9.254	2.871 - 18.237

Table 2: Status of nutrients in waters of Redang Island in Terengganu (Source: Zainuddin et al., 2012).

Note:
Malaysia Marine Water Quality Criteria and Standard: Class 1- Preservation, marine protected areas, marine parks; **Class 2** - Marine life, fisheries, coral reefs, recreational and mariculture; **Class 3** - Ports, oil & gas fields. (Source: Department of Environment Malaysia website, 2012 – refered by Zainuddin et al., 2012)

Substrates
The level of rubble has decreased compared to 2013 (11.35 per cent), however it was still found to be relatively high. The low level of the algae and silt indicates that sewage pollution and sedimentation are not a problem for now (Reef Check Malaysia, 2014).

Reef Health
In 2014, a total of 12 coral reef sites were surveyed by the Reef Check Malaysia team in Redang Island, and it was reported that 25 per cent of the sites were in excellent condition, while 33 per cent were in good condition. Forty-two per cent of the sites were in fair condition. No reefs were in poor condition (Reef Check Malaysia, 2014).

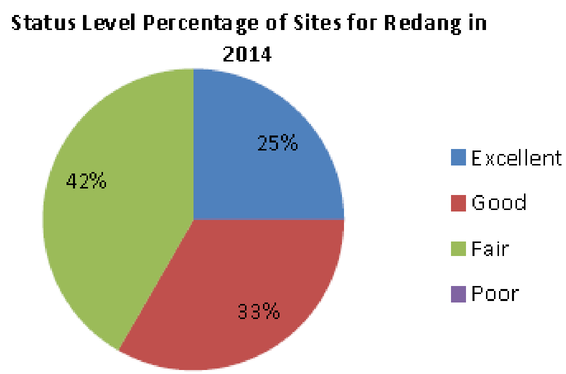

Figure 5: Status level percentage of sites for Redang in 2014 (Source: Reef Check Malaysia 2014).

According to the Coral Reef Health Criteria (Chou *et al.*, 1994), the reefs around Redang islands are considered to be in "Good" condition, with live coral coverage of 58.13 per cent (hard coral + soft coral) and slightly above the average (56.38 per cent) for reefs within the Sunda Shelf region.

Percentage of live coral cover	Rating
0-25	Poor
26-50	Fair
51-75	Good
76-100	Excellent

Table 3: Coral Reef Health Criteria developed by Chou *et al*, 1994.

TEV Value
Based on TEV study in 2012, the results indicate that the aesthetic value of coral reefs contributes nearly 75 per cent to the TEV, followed by contributions towards captured fisheries of 24 per cent. Other components only contribute the remaining 1 per cent of total economic value per year. This study found that the economic value is around RM 354 million (USD 113 million) per year. In the next 20 year period, TEV for Pulau Redang Marine Park is estimated to be nearly RM 3.4 billion (USD 1.1 billion) with 10 per cent discount rate (Kamarruddin et al., 2012).

COMPONENT OF TEV		Economic Value per Year (RM)	PV (20-year period, =10%) (RM)
Capture fisheries		85,682,000.00	815,141,166.64
Tourism		538,545.00	5,123,482.17
Research & education		(2,800,000.00)	(26,637,978.42)
Aesthetic (coral reef)		265,510,297.54	2,525,949,133.93
Biological Support			
Turtle		403,240.50	3,836,254.19
Bird (nest swift lets)		500,000.00	4,756,781.86
Coastal protection		1,032,018.82	9,818,176.85
Carbon sequestration		1,013,254.85	9,639,664.54
Bequest value	min WTP	2,077,090.00	19,760,528.07
	ave WTP	2,492,508.00	23,712,633.68
TOTAL	LOWER BOUND	353,956,446.71	3,367,387,209.83
	UPPER BOUND	354,371,864.71	3,371,339,315.45

Table 4: Economic Value of Pulau Redang Marine Park (Source: Kamarruddin et al., 2012).

Feature condition and future outlook of the proposed area

Malaysia's Department of Marine Parks prepared a zoning plan for Redang Island Marine Park to ensure the conservation of biodiversity and maintenance of ecological processes, with appropriate provision for ecologically sustainable use. The zones are classified into four zoning categories, based on intended or designated usage of the area. They are:

i. General use
ii. Habitat protection and preservation
iii. Conservation
iv. Tourism and recreation

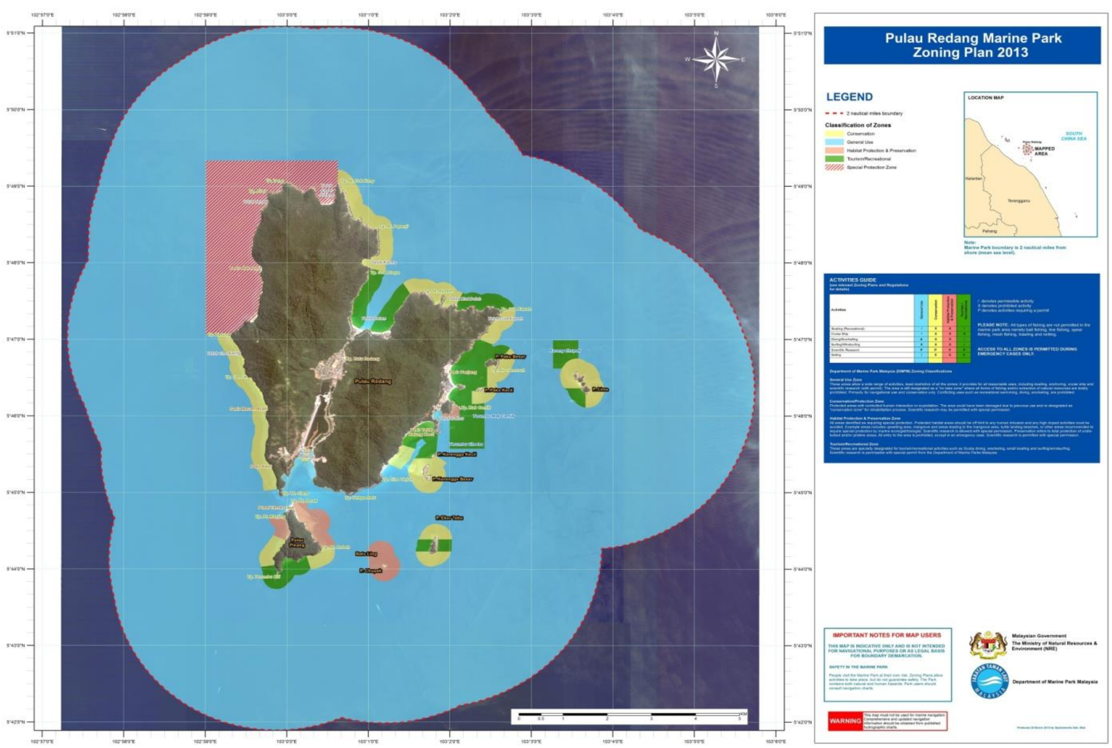

Figure 6: Zoning map for Pulau Redang (Source: Department of Marine Park Malaysia, Ministry of Natural Resources and Environment & United Nations Development Programme/ Global Environment Facility Funded project, 2013)

YEAR	Leatherback Turtle (*Dermochelys coriacea*)	Green Turtle (*Chelonia mydas*)	Hawksbill Turtle (*Eretmochelys imbricata*)
2010	8	4,583	36
2011	-	4,255	35
2012	-	3,711	40
2013	-	7,192	28
2014	-	4,306	37
TOTAL	**8**	**24,407**	**176**

Table 5: Numbers of leatherback, green and hawksbill turtle egg clutches laid in the State of Terengganu from 2010-2014 (Source: Department Of Fisheries, 2015)

Fisheries bycatch (both in Malaysian and International waters) and commercial egg collection have been the main threatening process operating over the last four decades (especially in the 1950s, 1960s, 1970s and 1980s) for marine turtle. Other listed threats are ineffective hatchery management, tourism related impacts and more recently coastal development by the petroleum industry (Aikanathan.S. & Mortimer J.A 1990).

The current management of the marine turtle population involves the use of hatcheries on the nesting beaches to protect the eggs from collection and a "no trawl zone", which extends 5.5 nautical miles (-10 km) offshore from the nesting sites *(Fisheries Act* 1985, Malaysia) to protect turtles in the marine environment (Hamann et al., 2006).

The Terengganu State Government also adopted the Turtles Enactment, 1951 (Amendment 1987) to provide for more protection of leatherback turtles in the state. In 1988 the Terengganu State Government banned the commercial sale and consumption of leatherback turtle eggs as long as 100 per cent of eggs could be saved for hatching. Two fishing regulations were adopted: the Fisheries Regulation (Prohibition of Fishing Methods) 1985 (Amendment 1989) bans large meshed gill nets throughout Malaysian coastal waters, and the Fisheries Regulation (Fisheries Areas) 1991 provides offshore protection to leatherback turtles during their internesting period. In 1988 the Terengganu State Government established the development of the Rantau Abang Turtle Sanctuary. The sanctuary covered 14km of nesting beaches, including the areas that received the highest density of nesting (Hamann et al., 2006).

Aside from the legislative changes, several organizations (e.g. WWF, SEATRU, SEAFDEC, Malaysian Society of Marine Sciences and Department of Fisheries Malaysia) have implemented a variety of educational and awareness raising activities such as the production of leaflets, school materials and turtle conservation posters (Hamann et al., 2006).

Assessment of the area against the CBD EBSA Criteria

CBD EBSA Criteria (Annex I to decision IX/20)	**Description** (Annex I to decision IX/20)	**Ranking of criterion relevance** (please mark one column with an X)			
		No information	**Low**	**Medium**	**High**
Uniqueness or rarity	Area contains either (i) unique ("the only one of its kind"), rare (occurs only in few locations) or endemic species, populations or communities, and/or (ii) unique, rare or distinct, habitats or ecosystems; and/or (iii) unique or unusual geomorphological or			X	

<table>
<tr><td></td><td>oceanographic features.</td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="6">Explanation for ranking
Off the north coast of the islet of P. Ling (southeast of Redang Island) two enormous coral heads of Porites sp. are major attractions to divers. The larger of the two is 40m in circumference and 10m in height and has a cave at the base over 2m in height. The formations are probably over 100 years old and represent the largest coral structures in the east coast of Peninsular Malaysia. The area offers a fairly diverse underwater environment and exciting seascapes with branching, tabulated, foliaceous, massive, sub massive and encrusting types of hard corals, soft corals, sponges, tunicates, sea anemones and gorgonians. Fish life is abundant (Department of Marine Park Malaysia 2006).</td></tr>
<tr><td>Special importance for life-history stages of species</td><td>Areas that is required for a population to survive and thrive.</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">Explanation for ranking

The beaches offer nesting sites for the hawksbill turtle (Eretmochelys imbricata), the leatherback turtle (Dermochelys coriacea) and the endangered green turtle (Chelonia mydas). There are four turtle nesting sites on the Redang Island Archipelago out of 36 nesting sites in beaches of Terengganu. Waters and beaches in the northwest of Redang Island have been zoned as “Special Protection” as they are the main turtle landing sites and are closed to the public (Department of Marine Park Malaysia, Ministry of Natural Resources and Environment & United Nations Development Programme/ Global Environment Facility Funded project 2013).

The leatherback turtle (Dermochelys coriacea) nests primarily on the mainland beaches of Terengganu, along a 15 km stretch of beach centred in Rantau Abang. The green turtle (Chelonia mydas) is more widely distributed. Nesting beaches can be found in Terengganu (mainly in Redang and Perhentian Islands, Kemaman and Kerteh) (Hamann et al., 2006).</td></tr>
<tr><td>Importance for threatened, endangered or declining species and/or habitats</td><td>Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species.</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">Explanation for ranking
A turtle landing beach / baby shark area has been declared a “Special Protection Zone”:
From Tanjung (Tg.) Bakung to Tg. Batu Tok Kong (including Teluk Cagar Hutang- High Coral Resilience Area, Tg. Lang, Teluk Batu Sauh, Teluk Tenak, Pasir Mak Kepit, Pasir Bujang, Pasir Mak Simpan and Tg. Lebah);
Teluk Mak Cantek to south of Tg. Bertigi (near Teluk Bakau);
Pasir Akar to Tg. Batu Manjing area, Tg. Batu Berak to Tg. Batu Roboh (including the areas of Pusat Taman Laut Pulau Redang, Tg. Nyior Sepohon and Pasir Batang Air Raja) in Pulau Pinang;
Entire Chupak Island and Batu Ling.
Note: Tanjung = Cape; Teluk = Bay
(Department of Marine Park Malaysia, Ministry of Natural Resources and Environment & United Nations Development Programme/ Global Environment Facility Funded project 2013).

The leatherback turtle (Dermochelys coriacea) nests primarily on the mainland beaches of Terengganu, along a 15 km stretch of beach centred in Rantau Abang. The green turtle (Chelonia mydas) is more widely distributed. There are 36 nesting beaches can be found in Terengganu (Hamann et al., 2006).</td></tr>
</table>

A total number of 24,047 green turtle egg clutches laid in the State of Terengganu from 2010-2014 was recorded by Department of Fisheries Malaysia (refer table 5 for details).					
Vulnerability, fragility, sensitivity, or slow recovery	Areas that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery.				X
Explanation for ranking (must be accompanied by relevant sources of scientific articles, reports or documents) A turtle landing beach / baby shark area has been declared a “Special Protection Zone” (please see above under “Importance for threatened, endangered or declining species and/or habitats”). The nesting ground and adjacent area in Terengganu is very crucial for green turtle population in the South East Asia Region. (Please see figures 3 and 4 for the location for the nesting ground in nothern Terrengganu and southern Terengganu - Lau et al., 2009) Another satellite tracking study also showed that the male and female green turtles remained within 30km of the nesting ground during the breeding and inter-nesting periods. After the breeding season, the turtles migrated at least 1900km to four different foraging grounds in Vietnam, Indonesia, Peninsular and Borneo Malaysia (Van der Merwe et al. 2009). A total number of 24,047 green turtle egg clutches laid in the State of Terengganu from 2010-2014 were recorded by Department of Fisheries Malaysia (refer to table 5 for details).					
Biological productivity	Area containing species, populations or communities with comparatively higher natural biological productivity.	X			
Explanation for ranking (must be accompanied by relevant sources of scientific articles, reports or documents)					
Biological diversity	Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity.			X	
Explanation for ranking (must be accompanied by relevant sources of scientific articles, reports or documents) Contains about 500 species of reef-building corals, more than 1000 species of bivalves and about 3000 species of fish (Department of Marine Park Malaysia 2006).					
Naturalness	Area with a comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or degradation.		X		
Explanation for ranking (must be accompanied by relevant sources of scientific articles, reports or documents) The main island of P. Redang is inhabited by about 200 families of islanders who fish the waters around the islands.The island is a popular resort destination, particularly for diving and snorkelling. There are 10 medium-large size resorts, mainly on Pasir Panjang. Most resorts have an in-house dive operator (Department of Marine Park Malaysia, Ministry of Natural Resources and Environment & United Nations Development Programme/ Global Environment Facility Funded project 2013)					

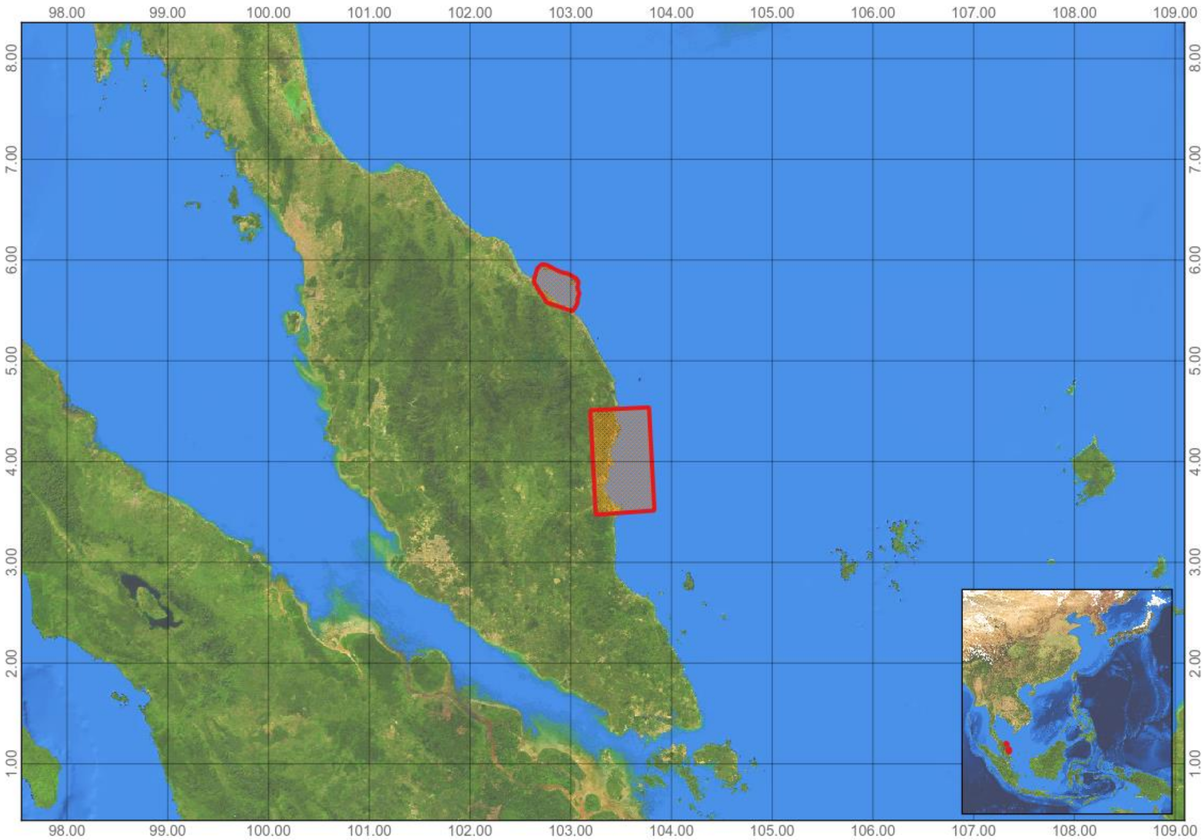

Figure 7. Area meeting the EBSA criteria

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Area no. 9: Southern Strait of Malacca

Abstract
The southern Strait of Malacca is particularly unique because it is a shallow, narrow water mass sandwiched between Sumatera Island and Peninsular Malaysia and linked with the Singapore Strait and Riau Archipelago. It is an important foraging and inter nesting habitat for one of the few viable populations of hawksbill turtles. The beaches of Negeri Sembilan and Melaka are home to the highest nesting population of hawksbill turtle and in an adjacent area. Sungai Linggi provides the crucial home ground for endangered painted terappins and river terappins. It harbours diverse marine resources within its seagrass bed, estuaries and mangroves.

Introduction

The Strait of Malacca is the longest strait (1,120 km) in the world. It is bordered by four littoral states, Thailand, Indonesia, Malaysia and Singapore, and situated between the west coast of Peninsular Malaysia and the east coast of Sumatra Island, Indonesia. The Strait of Malacca receives strong influences from two predominant monsoons, the Northeast monsoon (December – February) and the Southwest monsoon (June – August). In between the two predominant monsoon seasons, there are inter-monsoon seasons. The water of the Strait of Malacca is generally calm but there are occasional thunderstorms with squalls giving rise to wind gusting up to 50 knots during the Southwest monsoon and the two inter-monsoon seasons in the Southwestern region of the Peninsular Malaysia (Kamaruzaman, 1999). Rainfall in the area is abundant, and the duration of the precipitation is generally short but often torrential and high in intensity. There are two periods of maximum rainfall in the area, which occur primarily in October – November and April – May (MMS, 2002). The Strait of Malacca acts as the ultimate sink for the fresh water runoff from the west coast of Peninsular Malaysia.

The Strait of Malacca harbours one of the largest estuarine environments, soft-bottom habitats, fringing coral reefs, seagrass beds and mangroves (Tan and Yusoff, 2002). Rich marine resources in the strait support more than 50 per cent (636,000tonnes) of the capture fisheries landing in Peninsular Malaysia (Ibrahim, 2002; FAO, 2002). The sand on the beaches of Melaka has narrow platforms composed of relatively fine-textured pyrogenic sand, which ranges from igneus (*Pulau Upeh*) to calcium carbonate (*Pulau Besar*) (Mortimer, 1993).

The beaches of Melaka have the largest nesting population of hawksbill turtles in Peninsular Malaysia (annual records of between 400 to 600 nests) and an almost similar nesting population as Turtle Island Parks in Sabah (Table 1). The nesting beaches in Melaka, such as Tanjung Kling, Pulau Upeh and Pulau Besar, have been recognized as crucial for species protection since the 1970s (Kiew, 1975). The Department of Fisheries of Malaysia established the first turtle hatchery at Pulau Besar in 1987 (Mortimer, 1988), and in Padang Kamunting in 1990 (Mortimer, 1993). A satellite tracking study was conducted by WWF-Malaysia from 2006-2013 for these sites to identify the migration route for the turtles and their inter-nesting habitat.

Location
This area covers the waters and beaches from the Negeri Sembilan to the Riau Archipelago, Indonesia. The area encompasses the existing marine protected area, turtle-nesting area and inter-nesting area, and turtle feeding ground. The northern boundary of the area is 101.6ºE 2.42ºN, and the southern boundary is 104.98ºE 0.57ºN.

Feature description of the proposed area

<u>**Physical description**</u>

The Strait of Malacca is a shallow, narrow water body with an average depth of 53.38m. Malacca Strait becomes narrower and shallower at the southeastern tip. The narrowest section in the area is only about

24.9 km (Sumatra-Peninsular Malaysia). Average water depth in the southeastern part of the Strait is 39.5 m. The area receives significant freshwater run-off from the west coast of Peninsular Malaysia. It is estimated that the Strait of Malacca receives 9.35 x 1010 m^3 of freshwater every year. There is a converging and circulating current in the water off Lumut, Klang and the Port Dickson area. This complex current circulation is reducing the flushing rate in the waterway. Water quality in the Strait of Malacca is closely related to the anthropogenic activities of Peninsular Malaysia. The salinity, temperature, pH and dissolved oxygen (DO) in the area are rather consistent. There is no significant ($p>0.05$) difference in the hydrological parameters in the Strait of Malacca during the northeast and southwest monsoon (Hii et al., 2006).

Water Quality/hydrological parameter	**Value from 2006 studies**
Average biochemical oxygen demand (BOD)	0.604±0.077 (0.23 – 1.08) mg O^2 /L
Total suspended solid (TSS)	7.19±0.49 (3.93 – 13.57) mg/ L
Salinity	31.22±1.01 ppt
Temperature	29.60±0.68 ºC
pH	7.84±0.14
Dissolved oxygen	5.28±0.42 mg O^2/ L

Source: Hii et al. 2006

The sea-current in the Strait of Malacca ranges from 0.088 to 0.736 m/s. Water in the Strait of Malacca generally flows north-westerly, towards Indonesian waters and the Andaman Sea during the Northeast monsoon and vice versa during the Southwest monsoon. The southern part of the Strait of Malacca receives water input from the South China Sea, Johor Strait and Rupat Strait. Although there is no large river run-off from the southern region of Peninsular Malaysia, the current in the southern part of the Strait presents a complex and instable movement. The complicated current pattern in the area is due to the narrow, shallow water. The circulating type of current in the Strait of Malacca is believed to reduce the rate of seawater flushing and extends the residential time of the seawater parcel in the waterway (Hii et al. 2006).

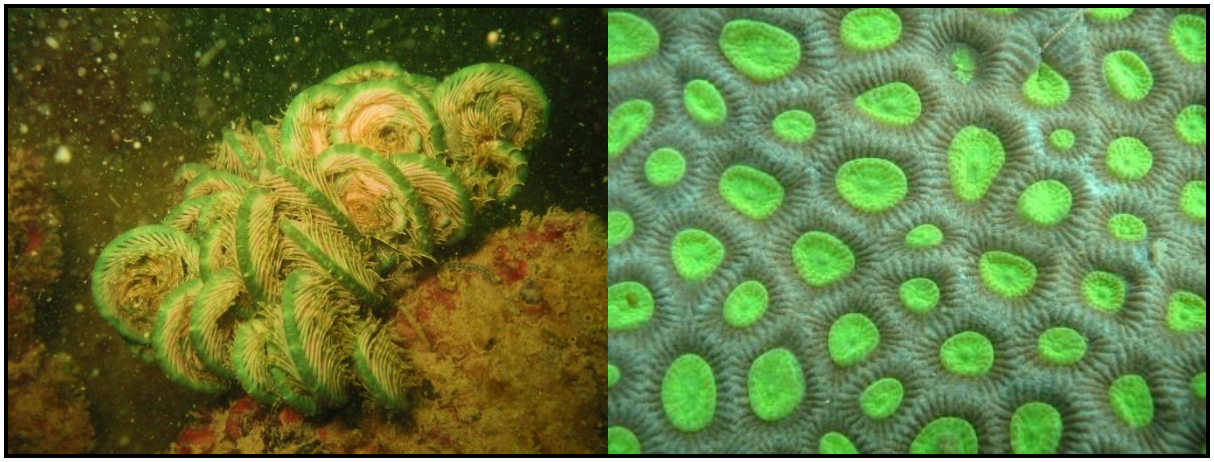
Although the hydrological parameters are rather stable, there are obvious water stratifications in the water of those stations situated in the northern part of the Straits of Malacca. The stratified water may be an indication of poor water mixing or a large freshwater run-off from Peninsular Malaysia. There is no obvious stratified water in the southern part of the Strait of Malacca. The water is well mixed, and there is no large river input from the southern states of Peninsular Malaysia (Hii et al. 2006).

In terms of topography, the west coast of Peninsular Malaysia is dominated by coastal plains and basins formed by alluvial deposits. Sandy beaches only found in limited areas. The eastern island of Sumatra, mainly Riau Archipelago, is generally made of granitic and old sedimentary materials that are rich sources of tin and bauxite (Chua et al., 2000).

Ecological Features

The waters off Tanjung Tuan Protected Area (figure 6) have been gazetted as a Fisheries Prohibited Area as provided for in Fisheries Regulations (Prohibited Area) (Amendment) 1994, Fisheries Act 1985. The Fisheries Prohibited Areas are Tanjung Tuan (off the promontory – in Melaka), Tanjung Tuan 1 and Tanjung Tuan 2 (off Negeri Sembilan waters), demarcated as one nautical mile from the beach with provisions for prohibition against fishing and collection of shells, molluscs and corals.

The coral communities and species composition in Tanjung Tuan are unique and differ from the coral communities of the eastern coast of Peninsular Malaysia. The coral communities are resilient and are able to survive under turbid and high stress conditions (WWF-Malaysia briefing paper, 2015 in prep). The constant growth rate of the corals makes them unique and resilient to climate change compared with other coral communities found in Malaysia. However, the corals are under threat for various reasons, such as eutrophication via untreated sewage discharged into the bay, intense collection of reef organisms, climate change (i.e., high sea surface temperatures and ocean acidification) as well as high sedimentation and turbidity (WWF-Malaysia briefing paper, 2015,in prep). This is evident from the decline in the percentage of coral cover in Tanjung Tuan and Port Dickson area from 32.9 per cent in 1976 to only 11.9 per cent in 2014 (The Star, 2015).



©Photos courtesy of Affendi Yang Amri

Green feather star — Close up of hard coral colony

Corals of Tanjung Tuan

a) Painted and river terrapins of Sungai Linggi
Sungai Linggi is home to the painted terrapin (*Batagur borneoensis*) and river terrapin (*Batagur affinis*), both of which are listed as critically endangered in the 2014 IUCN Red List of Threatened Species. The painted terrapin population in Sungai Linggi constitutes one of the only remaining known populations in the West Coast of Peninsular Malaysia. Globally, its distribution is restricted to the Sundaland region of Peninsular Malaysia, Borneo, Sumatra and southernmost Thailand (Moll, 1985). Populations are known to be declining rapidly, with Peninsular Malaysia believed to be the last stronghold for the species, with an estimated remaining total population of a few thousand animals (CITES, 2006).

Painted Terrapin (©WWF-Malaysia/Lau Min Min)

River Terrapin (©WWF-Malaysia/Balu

Painted and River Terrapins

b) Hawksbill turtles
Melaka has the highest nesting densities of hawksbill turtles in Peninsular Malaysia, with annual records of between 400 and 600 nests. Aside from nesting, Melaka's hawksbills travel the whole

southern part of the Strait of Malacca as their migratory corridor to the waters of Riau Archipelago (Indonesia) and neighbouring islands (Lau *et al.*, 2009).

The seagrass bed

The Teluk Kemang, Negeri Sembilan and the Tanjung Adang-Marambong in Johor are the major seagrass beds of Malaysia. Teluk Kemang's seagrass bed, associated with the coral reef flats, has been identified as an area of high biodiversity, with corals, gastropods, seaweeds, seagrasses, sea cucumbers and eels. The seagrass bed in Tanjung Adang-Marambong, associated with the sub-tidal shoals, is not only the feeding ground for dugong and birds, it is also has diserve gastropods, seaweeds, sea cucumbers, fish and echinoderms. The Teluk Kanang and Tanjung adang-Marambong shoals have 10 species of seagrass, including the dugong grass *Thallasia hemprichi*, and are recognized as areas with a high diversity of seagrass (Japar at. Al, 2011). Dugongs have also been found in this seagrass bed (Japar Sidik and Muta Harah, 2002).

Feature condition and future outlook of the proposed area

The sedimentation rates of Tanjung Tuan, which ranged from 0.95 to 54.3 mg cm-2 day -1 in 1979 (Liew and Hoare, 1979), increased drastically 24 years later, when they ranged from 27.31 ± 3.2 to 233.59 ± 52.04 mg cm-2 day -1 (Lee et al., 2004). This considerable increase in the amount of sediment in the coastal waters over the years may be attributed to various anthropogenic activities, such as road-building and infrastructure development as well as dredging and shipping activities.

Land-use changes around Tanjung Tuan can adversely impact the uniqueness of this area. As Tanjung Tuan fully borders Negeri Sembilan, the changes in land-use in Negeri Sembilan can impact this promontory. Negeri Sembilan also derives economic benefits from ecotourism activities in Tanjung Tuan, the main event being the raptor watch. Therefore the protection of this unique biodiversity requires joint collaboration between the authorities of Melaka and Negeri Sembilan.

Sedimentation is one of the main threats to the coral reefs in Tanjung Tuan. Corals are deemed to be stressed if the daily sedimentation rate exceeds 10mg/cm^2. Based on research conducted in 2006, the daily maximum sedimentation rate in Blue Lagoon, Port Dickson (76.83mg/cm^2 per day) was higher compared to other study sites, such as Langkawi (49.94mg/cm^2 per day) and Pulau Redang (0.54mg/cm2 per day) (Lee and Mohamad 2011).

Hard corals with sediments (Tanjung Tuan)

The coral reef as an ecosystem is likely to fail if strict measures are not taken to control sedimentation. If the sedimentation stress can be alleviated, the coral reef has a high chance to recover. While the 2013 Environmental Quality Report states that the marine water quality in Port Dickson ranges from excellent to moderate, it is still important to ensure that sedimentation is minimized.

Sungai Linggi used to be home to one of the largest nesting populations of painted terrapins in Malaysia prior to decimation of its population in the late 1990s, due to overharvesting for the pet trade and food consumption, with export to China (CITES, 2006). Major threats now include loss and degraded habitat due to clearing of riparian vegetation and riverbanks for oil palm and other activities, overharvesting of eggs for human consumption, accidental catch in fishing gear and pollution. Both species are categorised as critically endangered, due to rapidly diminishing numbers in the wild globally and imminent threats to their habitats and also wildlife trade (Horne et al., 2012).

Marine turtles like hawksbills in Malacca are being robbed of their nesting grounds due to coastal development and land reclamation, and they are put off from landing on beaches at night by light pollution. Whilst at sea, turtles are in peril at the hands of illegal poachers and of being caught by various fishing gears such as trawlers.

Padang Kemunting beach is one of the main habitats for hawksbill turtles, with an average annual landing of 100 nests, which is 20-25 per cent of the total number of turtles in Melaka. However, the bright lighting at night on the beaches from the recreational and tourism activities is preventing female turtles from finding a suitable place to lay eggs in the dark. Similarly, hatchlings emerging from nests can become confused by bright lights that can cause them to move inland towards the light sources, rather than towards the sea. Bright lighting due to rapid development of the beachfront chalets in Kuala Linggi, Tanjung Serai beach, Meriam Patah and Tanjung Dahan also disturb the landing of turtles.

Assessment of the area against the CBD EBSA Criteria

<table>
<tr><td rowspan="2">CBD EBSA Criteria
(Annex I to decision IX/20)</td><td rowspan="2">Description
(Annex I to decision IX/20)</td><td colspan="4">Ranking of criterion relevance
(please mark one column with an X)</td></tr>
<tr><td>No information</td><td>Low</td><td>Medium</td><td>High</td></tr>
<tr><td>Uniqueness or rarity</td><td>Area contains either (i) unique (“the only one of its kind”), rare (occurs only in few locations) or endemic species, populations or communities, and/or (ii) unique, rare or distinct, habitats or ecosystems; and/or (iii) unique or unusual geomorphological or oceanographic features.</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">Explanation for ranking (must be accompanied by relevant sources of scientific articles, reports or documents)

Status (IUCN): Critically endangered hawksbill turtles
Melaka is the only location in Peninsular Malaysia where large populations of hawksbill turtles remain. The nesting populations appear to be stabilizing. However, it should be noted that historical nesting data in Melaka extends to 1990, which is quite recent and too short-term to surmise population trends (Liew, 2002).

IUCN Status: Critically endangered – Painted and river terrapins
Sungai Linggi is home to the painted terrapin (Batagur borneoensis) and river terrapin (Batagur affinis),</td></tr>
</table>

both of which are categorized as critically endangered in the 2014 IUCN Red List of Threatened Species.					
Special importance for life-history stages of species	Areas that are required for a population to survive and thrive.				X
Explanation for ranking (must be accompanied by relevant sources of scientific articles, reports or documents) Various studies and observations indicate that both adult and juvenile turtles are regularly encountered, apparently while foraging, in Malaysian waters in the Strait of Melacca (Mortimer, 1993). According to the turtle satellite tracking study by Lau (2009), all the adult female hawksbill turtles appeared to have migrated to the specific geographical area south of the Strait of Malacca. Six out of the eight turtles were documented residing in the region, and the entire southern part of the Strait of Malacca was identified as a migratory corridor for the hawksbills. Lau (2009) mapped out the core nesting ground of the hawksbill to be in the Malaccan water while the Riau Archipelago appears to be the feeding area of the hawksbills.					
Importance for threatened, endangered or declining species and/or habitats	Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species.				X
Explanation for ranking (must be accompanied by relevant sources of scientific articles, reports or documents) Previous studies indicate 69% of the total 324 clutch of turtle eggs were deposited on mainland beaches between the northern border of Melaka and Kem Terendak, 26% on Pulau Upeh, and 5% near Tanjung Kling. Conservation efforts have suggested preservation of this critical nesting and foraging habitat, and Pulau Upeh was suggested as a turtle nesting sanctuary. These mainland beaches have been intensely developed, and the southern part of the beaches is mangrove. Almost 25% of the nesting occurs within 150 m of beach at Pulau Upeh (Mortimer et. al. 1993). Sungai Linggi is home to the painted terrapin (*Batagur borneoensis*) and river terrapin (*Batagur affinis*), both of which are categorized as critically endangered in the 2014 IUCN Red List of Threatened Species.					
Vulnerability, fragility, sensitivity, or slow recovery	Areas that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery.				X
Explanation for ranking (must be accompanied by relevant sources of scientific articles, reports or documents) The live coral cover declined from 32.9% in 1976 to only 11.9% in 2014 at the Tanjung Tuan and Port Dickson Area (The Star, 2015). The corals in the southern Malacca Strait are under for various reasons, such as eutrophication via sewage going straight into the bay, intense collection of reef organisms, climate change (high sea surface temperatures and ocean acidification) as well as high sedimentation and					

<table>
<tr><td colspan="6">turbidity (WWF-Malaysia briefing paper, 2015).

Sungai Linggi is home to the painted terrapin (Batagur borneoensis) and river terrapin (Batagur affinis), both of which are categorized as critically endangered based on the 2014 IUCN Red List of Threatened Species. The painted terrapin population in Sungai Linggi constitutes one of the only known remaining populations on the West Coast of Peninsular Malaysia. Globally, its distribution is restricted to the Sundaland region of Peninsular Malaysia, Borneo, Sumatra and southernmost Thailand (Moll, 1985). Populations are known to be declining rapidly, with Peninsular Malaysia believed to be the last stronghold for the species, with an estimated total remaining population of a few thousand animals (CITES, 2006).</td></tr>
<tr><td>Biological productivity</td><td>Area containing species, populations or communities with comparatively higher natural biological productivity.</td><td></td><td></td><td>X</td><td></td></tr>
<tr><td colspan="6">Explanation for ranking (must be accompanied by relevant sources of scientific articles, reports or documents)

The southern Malacca Strait appears to have higher levels of phytoplankton, where there is both vertical mixing and high nutrient input from rivers from Sumatra island. Average surface chlorophyll ranges from 0.51 to 0.95 mg/m3 for Melacca Strait, without any distinct seasonal variation, but this varies depending on location. The northern, deeper and more open areas have lower chlorophyll than the shallower and narrower southern areas. Zooplankton, on the other hand, varies with the monsoon seasons, with plankton counts of 0.38x103/m3 to 0.50x103/m3 in the north-east Monsoon, 0.67x 103/m^3 to 0.84 x103/m^3 in the Southwest Monsoon (Chua et al., 1997).

Merambung shore (the most southern part of the Melacca straits) has the highest cholophyll-a and nitrate concentration compared to Pulau Besar area (middle) and Pulau Sembilan area (northern) (Mujahid et al., 2012).</td></tr>
<tr><td>Biological diversity</td><td>Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity.</td><td></td><td></td><td>X</td><td></td></tr>
<tr><td colspan="6">Explanation for ranking (must be accompanied by relevant sources of scientific articles, reports or documents)

Within the Strait of Melacca, Tanjung Tuan was found to have low (32.9%) live coral cover but an abundance of soft corals and macroalgae (Goh & Sasekumar 1981). In 2001, amseagrass bed with dugong grass (Thallassia hemprichi) was also found at the nearby southern Strait of Melacca (Abu Hena et al. 2001). A total of 255 species of hard coral species were recorded in the Singapore region (Huang et al, 2009). In 2012, the south coast of Peninsular Malaysia recorded 245 species of scleractinian coral diversity (Affendi & Rosman, 2012).

Fish diversity has been assessed in Tanjung Adang-Merambong, where some 70–76 species of fish in 41 families have been observed in seagrass beds and the adjacent mangrove areas (Sasekumar et al., 1989). Seahorse species (e.g., Hippocampus kuda, status: vulnerable) and other crustaceans, including crabs (Dorippe sp., Hemigrap-sus sp., Parthenope longimanicus, Portunus pelagicus, Scylla serrata, Thalamita sp., Matuta sp. and horseshoe crab, Carcinoscorpius rotundicauda) have been observed (Arshad et al., 2001).</td></tr>
<tr><td>Naturalness</td><td>Area with a comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or degradation.</td><td></td><td>X</td><td></td><td></td></tr>
<tr><td colspan="6">Explanation for ranking (must be accompanied by relevant sources of scientific articles, reports or documents)</td></tr>
</table>

The Strait of Malacca, including its southern part, is the busiest shipping lane in the world; therefore, most of the area is exposed to human disturbance.

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Maps and Figures

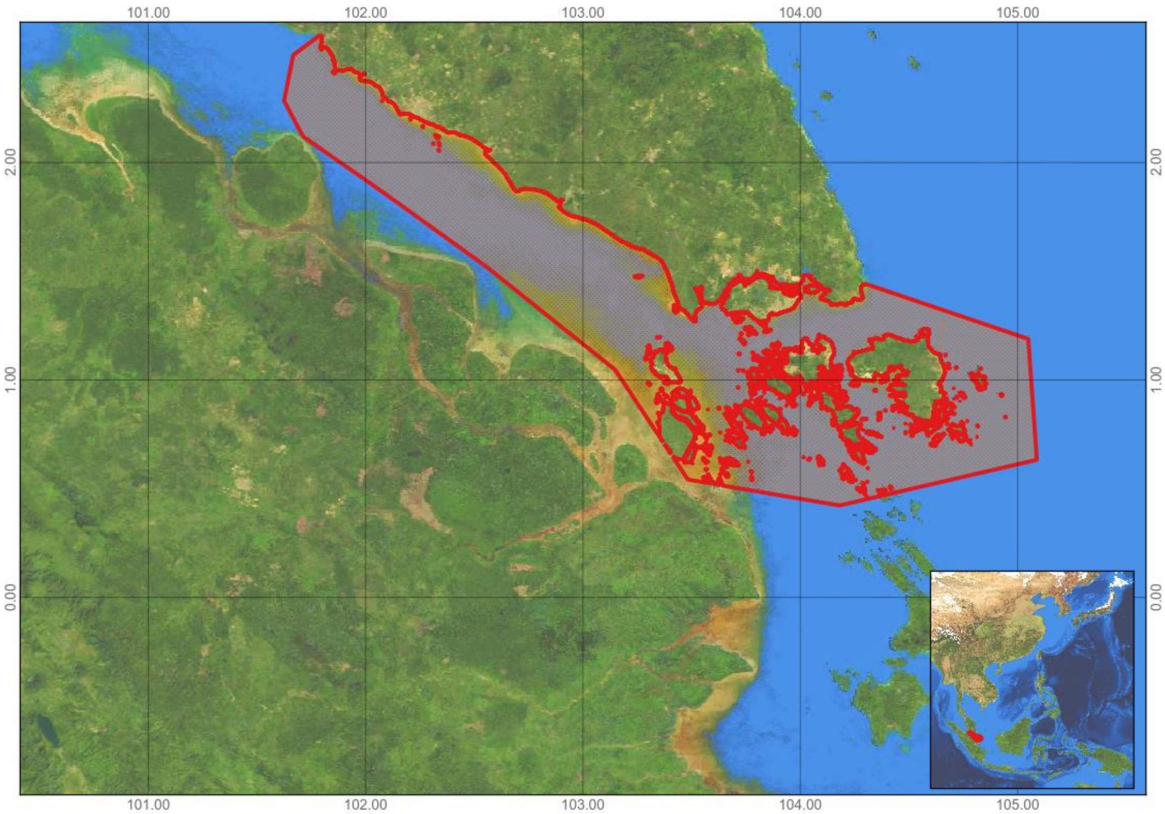

Figure 1. Area meeting the EBSA criteria

Location	Numbers of Egg Clutches Laid Annually	Source
Turtle Islands Park, Sabah (especially Pulau Gulisan)	350–400	Sabah Parks, unpubl. data; Phillipps, 1988
Terengganu (especially Pulau Redang and Pulau Perhentian)	20–200	Fisheries Statistics, unpubl.; Mortimer, 1991c; Chan, 1991
Pahang (offshore islands)	100	Mortimer, 1991a
Johor (offshore islands)	100–200	Fisheries Statistics, unpubl.; Mortimer, 1991b; Chan, 1991
Kedah	$<$ 25	Sukarno, 1991
Pulau Pinang	$<$ 25	Mortimer, 1991d
Perak (Pasir Panjang and Sembilan Islands)	$<$ 25	Mortimer, 1990; Fisheries Statistics, unpubl.
Melaka	$>$ 350	This paper

Table 1. Estimated numbers of hawksbill egg clutches laid annually (1990 and 1991) in each Malaysian state where they are known to occur. (Source: Mortimer et al. 1993).

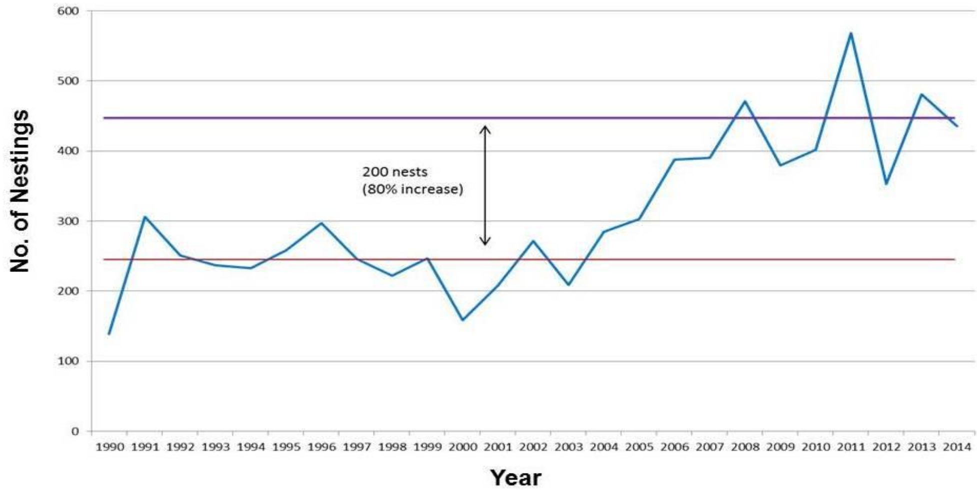

Figure 2. Hawksbill turtle nesting in Malacca from 1990 to 2014 (Source: Department of Fisheries Malacca).

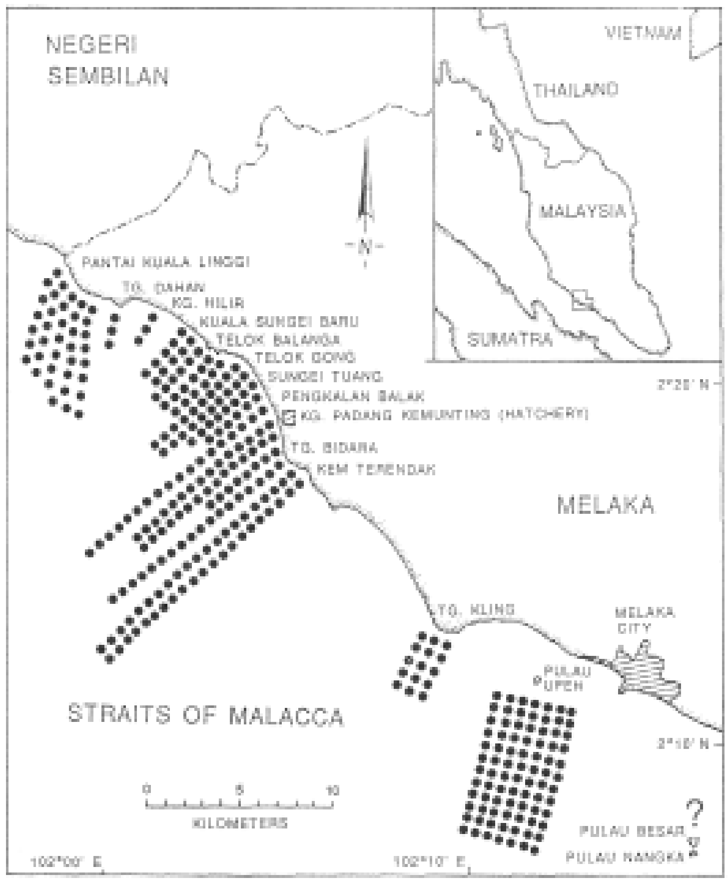

Figure 1. Map showing locations of the turtle hatchery and major nesting areas of Melaka. Closed circles indicate the localities from which hawksbill turtle egg clutches were reportedly collected during the 1991 nesting season. Each closed circle represents one egg clutch. Question mark (?) indicates areas in need of further surveys.

Figure 3. Major nesting areas of Malacca, where the number of clutches are represented by closed circles (Mortimer, 1993)

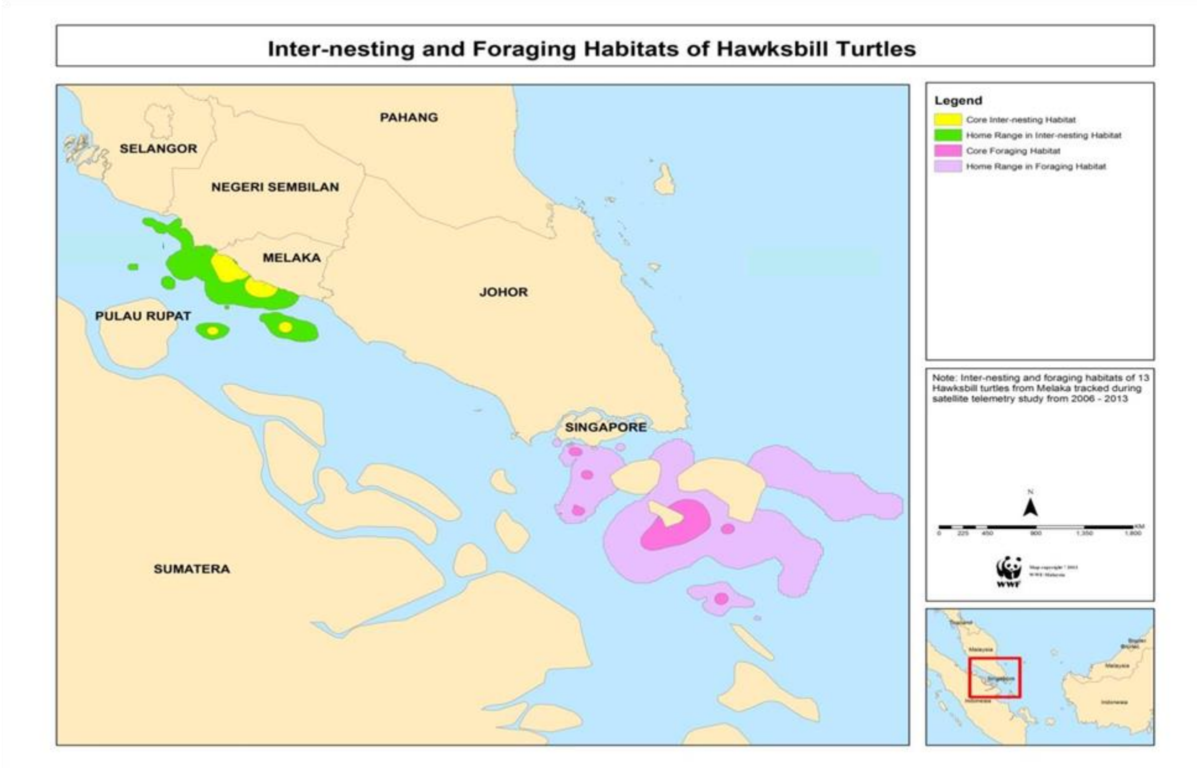

Figure 4. The regional importance of the two populations from Melaka, it showed that Melaka nesting population migrated to Riau Archipelago of Indonesia and considered as foraging site for Melaka's Hawksbills. Data sources from Satellite telemetry study of Melaka's hawksbill turtles (2006 – 2013)

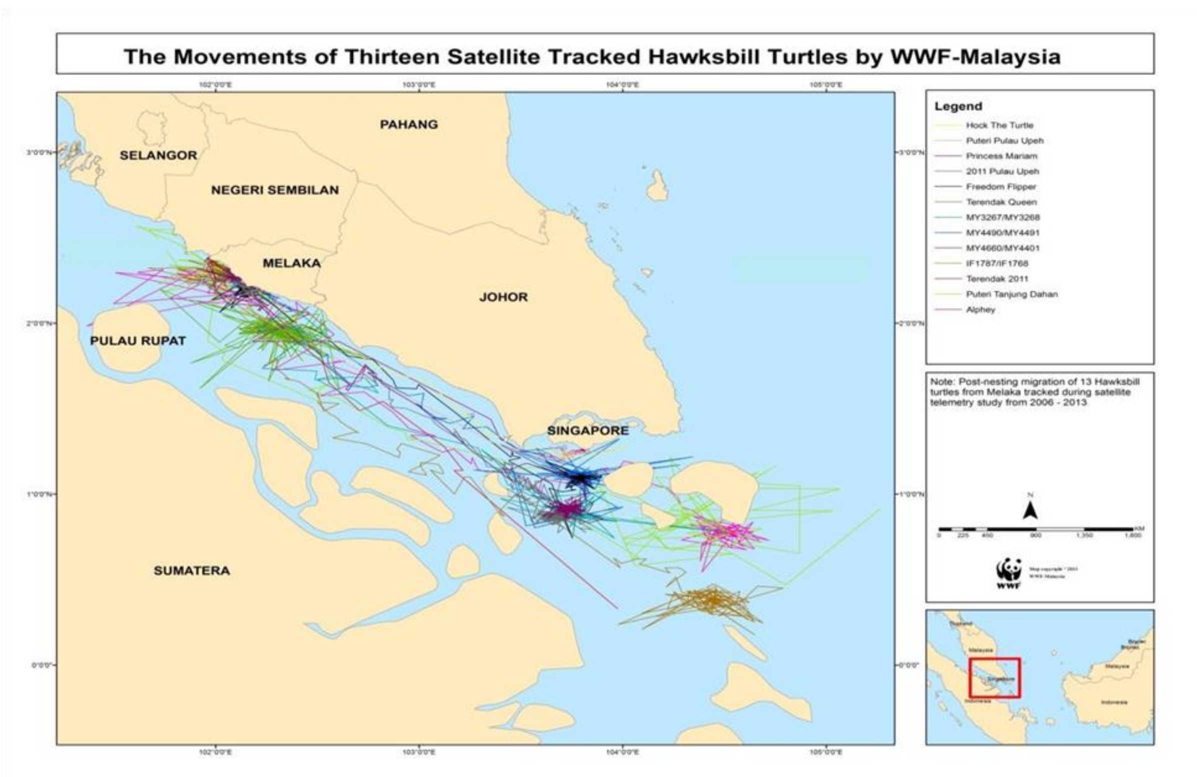

Figure 5. Actual satalite tracking data for Melaka nesting population migrated to Riau Archipelago of Indonesia and considered as foraging site for Melaka's Hawksbills. Data sources from Satellite telemetry study of Melaka's hawksbill turtles (2006 – 2013)

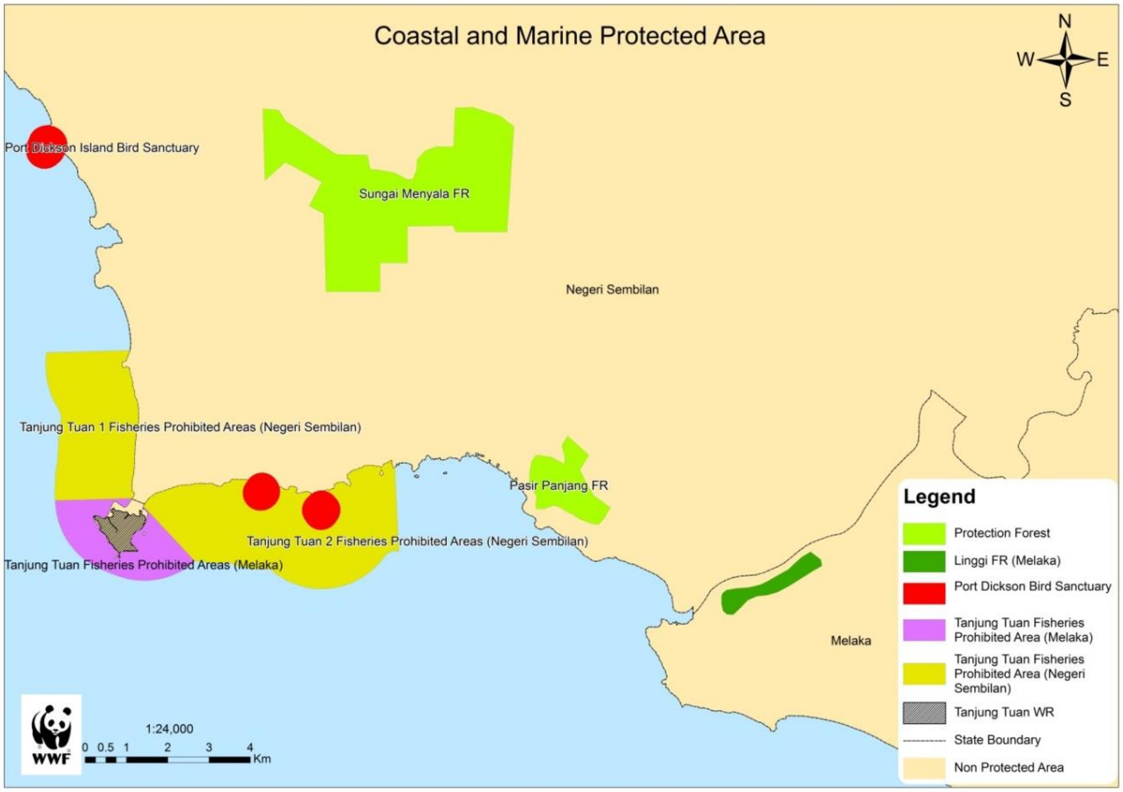

Figure 6. Coastal & Marine Protected Areas in Negeri Sembilan, north of Malacca.

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Area no. 10: Nino Konis Santana National Park

Abstract
The area is rich in marine biodiversity, including sharks, coral trout (*Plectropomus* species), and the highly threatened Napoleon wrasse (*Cheilinus undulatus*) as well as other types of marine species that are densely concentrated around coral reefs in the area. The area also has a high level of productivity due to strong ocean mixing, which raises both nutrient concentrations in the area and supports the area's biodiversity.

Introduction
The area is rich in biodiversity, including coral reefs and megafauna assemblages, including whales, dolphins, whale sharks, orcas and mantas (Erdmann and Mohan, 2013). It is home to a number of marine and terrestrial habitats that are listed at the national and global level and includes 55,600 ha of the Coral Triangle and 25 endemic bird species (Erdmann and Mohan, 2013).

Location
The area is located at 8°27′00″S 127°20′00″E and covers 1,236 square kilometres.

Feature description of the proposed area
The marine near shore zone in Nino is characterized by a narrow reef flat (often < 60 m wide, but up to almost 1 km) that is dominated by seagrass in shallower water (approximately 2,200 ha) and corals in deeper water and on the escarpment (approximately 2,000 ha) (Amaral A.L., 2010). The reef is shoreline fringing, gradually sloping seaward to the edge of the outer slope (Erdmann and Mohan, 2013). There are important habitats in the area for certain threatened fish species (Erdmann and Mohan, 2013).

The area contains a unique species of coral (*Montipora spp*.) that shows significant morphological differences from its closest congener, and is likely new to science, requiring additional taxonomic study (Erdmann and Mohan, 2013).

The area contains a wealth of marine species that are most densely concentrated on the coral reefs. For instance, the condition and conservation status/resilience of the hard corals and coral reef fishes of the approximately 20 sites represent the full range of oceanographic and ecological conditions found in the the area (Erdmann and Mohan, 2013). Sharks, coral trout (*Plectropomus* species), and the highly threatened Napoleon wrasse (*Cheilinus undulatus*) are believed to reside in this area, although they were not spotted in a recent survey (Erdmann and Mohan, 2013).

The area has high biological productivity due to strong ocean mixing, which influences both nutrient concentrations and sea surface temperature in the broader ecoregion (Erdmann and Mohan, 2013). The sea surface productivity in the area, as exemplified by chlorophyll-a concentration, is patchy both spatially and temporally. For instance, in September 2012, the chlorophyll-a concentration of 0.2-0.3 mg m-3 was slightly higher around the area than waters to the south, but higher again in parts of the Banda Sea, around 0.4-0.6 mg m-3, perhaps reflecting mixing of Indonesian Throughflow waters there (Erdmann and Mohan, 2013).

Feature condition and future outlook of the proposed area
Unsustainable fishing methods such as the use of fish traps, spear, hook and line, and gill nets, which also destroy the coral reefs, are quite common in this general area (Timor-Leste NBSAP, 2015). Also, some local communities use cyanide fishing as well as blast fishing (Amaral, 2010). Therefore the coral reefs in this area may be affected or degraded in the future.

Nino Konis Santana National Park was established as an IUCN Category V Protected Area, meaning that the local people can live in and have access to the resources in the park area. Yet, multiple-use zoning is required to establish rules within this space, to give the best protection for the natural environment without neglecting the needs of the people who live there. The zoning can then inform how the park is managed (Erdmann and Mohan, 2013).

In 2013, the Coral Triangle Initiative project, led by the Government of Timor-Leste (Ministry of Agriculture and Fisheries) and supported by USAID's Coral Triangle Support Partnership (CTSP), conducted research on cost-effective management solutions at Nino Konis Santana National Park to determine whether it was possible for the communities to participate in the project. In this regards, the CTSP has, in turn, co-facilitated a process through which fishing communities in the national park have completed multiple-use zoning of their local marine area. The zones were divided into no-take zones, buffer zones and special regulation zones with a mix of gear restrictions, temporal closures and species-specific take limits. This community-based zoning is accompanied by community-based management plans and covers 22,360 hectares of the 55,600 hectare marine park (Erdmann and Mohan, 2013).

Aside from that, a marine megafauna aerial survey was conducted by researchers from Charles Darwin University in the coastal area of Timor-Leste, including areas around NKSNP. This study identified several megafauna species that are found in the coastal area of Timor-Leste (Dethmers, 2012). However lack of follow-up studies is an obstacle for the country to provide more information on the status of marine megafauna species in the sea of Timor-Leste.

Assessment of the area against the CBD EBSA Criteria

<table>
<tr><td rowspan="2">CBD EBSA Criteria
(Annex I to decision IX/20)</td><td rowspan="2">Description
(Annex I to decision IX/20)</td><td colspan="4">Ranking of criterion relevance
(please mark one column with an X)</td></tr>
<tr><td>No information</td><td>Low</td><td>Medium</td><td>High</td></tr>
<tr><td>Uniqueness or rarity</td><td>Area contains either (i) unique ("the only one of its kind"), rare (occurs only in few locations) or endemic species, populations or communities, and/or (ii) unique, rare or distinct, habitats or ecosystems; and/or (iii) unique or unusual geomorphological or oceanographic features.</td><td></td><td></td><td>X</td><td></td></tr>
<tr><td colspan="6">The area contains a unique species of coral (Montipora spp.) that shows significant morphological differences from its closest congener and is likely new to science, requiring additional taxonomic study (Erdmann and Mohan, 2013). A recent survey found three undescribed species (a damsel fish in the genus Chromis, a goby in the genus Vanderhorstia, and a jawfish in the genus Stalix - noting that each of these have also been previously identified in Indonesia) and three species that are potentially new (a dottyback in the genus Labracinus, another damselfish in the genus Chromis, and a damsel fish in the genus Chrysiptera) but are currently being investigated with genetic techniques to determine if they do indeed represent distinct taxa. Moreover, the survey recorded at least 16 important range extensions of species previously not known or expected to occur in this area. Included in these extensions are the following species: Luzonichthys taeniatus, Pseudochromis pictus, Cirrhilabrus humanni, Cirrhilabrus tonozukai, Hoplolatilus chlupatyi, Chlorurus capistratoides, Pterapsaron longipinnis, Synchiropus tudorjonesi, Pseudanthias charlenae, Pomacentrus cheraphilus, Meiacanthus cyanopterus, Parapercis avolineatus, and Trimma papayum (Erdmann and Mohan, 2013).</td></tr>
<tr><td>Special importance for life-history stages of species</td><td>Areas that are required for a population to survive and thrive.</td><td></td><td></td><td>X</td><td></td></tr>
<tr><td colspan="6">The literature is not clear on the importance of the area for the life-history stages of species, but the assumption is that the coral reefs in the area are of definite importance to several reef fish species that live</td></tr>
</table>

<table>
<tr><td colspan="6">there as spawning and nursery grounds as well as important feeding grounds. Large schools of juvenile snappers as well as juvenile fish of the Chromis species were reported in a recent survey (Erdmann and Mohan, 2013).</td></tr>
<tr><td>Importance for threatened, endangered or declining species and/or habitats</td><td>Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species.</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">Sharks, coral trout (Plectropomus species), and the highly threatened Napoleon wrasse (Cheilinus undulatus) are believed to reside in this area, although they were not spotted in a recent survey (Erdmann and Mohan, 2013). The general area is also an important migratory corridor for whales, dolphin and six threatened turtle species (Esters and Erdmann, 2012)</td></tr>
<tr><td>Vulnerabilit, fragility, sensitivity, or slow recovery</td><td>Areas that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery.</td><td></td><td></td><td>X</td><td></td></tr>
<tr><td colspan="6">The area contains a wealth of marine species that are densely concentrated around the area’s coral reefs, which are known to be especially vulnerable to different types of anthropogenic pressures. However, a recent survey showed that many of the corals in the area exhibited relatively low levels of recent injury overall, with the exception of corals at the Lamsana Inlet, where an active crown-of-thorns seastar outbreak was occurring. There was no evidence of past or recent major coral bleaching-related mortality in the area, as typically triggered by elevated or depressed sea temperatures (Erdmann and Mohan, 2013).

The area is also quite resilient to other pressures such as climate change. There was no evidence or reports of past (1998) or recent (2010) large-scale high temperature bleaching-induced coral mortality around Timor-Leste due to presence of cool waters about three to four degrees cooler than many neighbouring locations (Erdmann and Mohan, 2013).</td></tr>
<tr><td>Biological productivity</td><td>Area containing species, populations or communities with comparatively higher natural biological productivity.</td><td></td><td></td><td>X</td><td></td></tr>
<tr><td colspan="6">The area has high biological productivity due to strong ocean mixing, which influences both nutrient concentrations and sea surface temperature in the broader ecoregion (Erdmann and Mohan, 2013). The sea surface productivity in the area, as exemplified by Chlorophyll-a concentration, is patchy both spatially and temporally. For instance, in September 2012, Chlorophyll-a concentration of 0.2-0.3 mg m-3 was slightly higher around the area than waters to the south, while Chlorophyll-a levels were higher again in parts of the Banda Sea, around 0.4-0.6 mg m-3, perhaps reflecting mixing of ITF (Indonesian Throughflow) waters there (Erdmann and Mohan, 2013).</td></tr>
<tr><td>Biological diversity</td><td>Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity.</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">Counts for fish species in the area yielded higher than average results, indicating higher genetic diversity. Fish species numbers in the area at visually sampled sites during a survey ranged from 66 to 294, with an average of 212 species per site. This is the second- highest average for any survey region to date anywhere on the globe. The top 6 sites recorded for reef fish diversity in the area included 270 species (at Loikere), 260 species (at Ete Asa Lepek), 249 species (at West Jako Island), 243 species (at Tenu), 238</td></tr>
</table>

<table>
<tr><td colspan="6">species (at Com Deep Cave), and 237 species (at Djonu Twin Rocks Tutuala). 200 or more species per site is considered the benchmark for an excellent fish count. (Erdmann and Mohan, 2013)

In terms of coral diversity, Nino Konis Santana National Park hosts diverse reef coral fauna as well: 214 species at Djonu East; 194 species at Tutuala 3 Terraces and 193 species at Loikere (Erdmann and Mohan, 2013).</td></tr>
<tr><td>Naturalness</td><td>Area with a comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or degradation.</td><td></td><td></td><td>X</td><td></td></tr>
<tr><td colspan="6">The marine environment, including the coral reefs, is relatively undisturbed and can even be characterized as pristine, notwithstanding fishing pressure. Because this is a protected area, it is expected that human-induced disturbances here will be less than in other marine areas in Timor-Leste.</td></tr>
</table>

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Maps and Figures

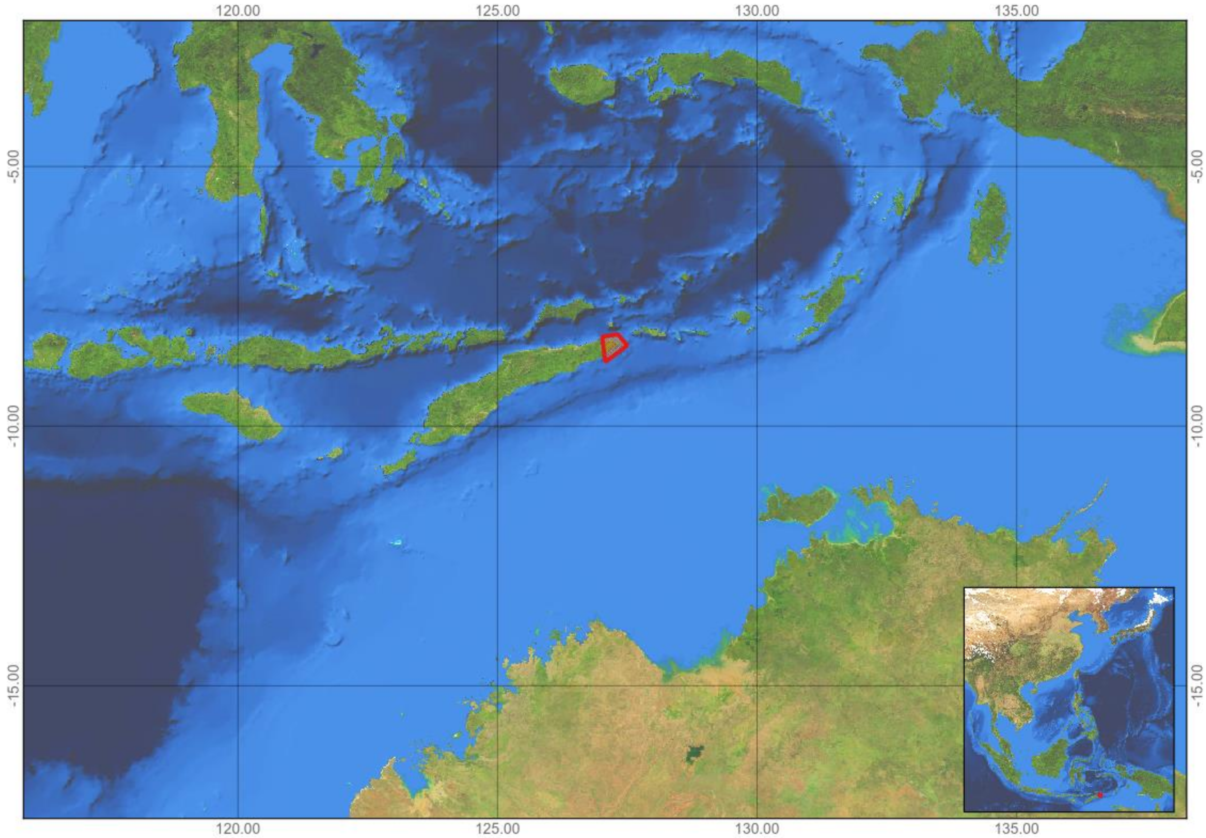

Figure 1. Area meeting the EBSA criteria

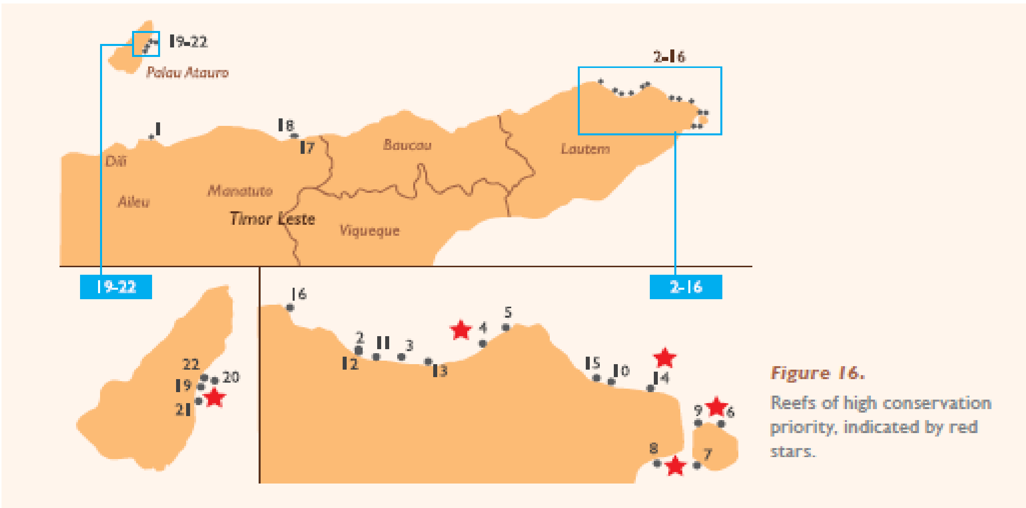

Figure 2. Reefs of high conservation priority; Nino Konis Santana National Park is shown on the right side of the figure (Erdmann and Mohan, 2013).

Area no. 11: The Upper Gulf of Thailand

Abstract
The area is characterized by a range of habitats and a high level of biodiversity. The area contains mangrove forests, macrobenthic fauna, phytoplankton and zooplankton and organisms such as fish, birds (mangrove birds and migratory birds) and endangered marine species such as hawksbill turtles (*Eretmochelys imbricate*), green turtles (**Chelonia mydas**), Irrawaddy dolphins **(***Orcaella brevirostris*), finless porpoises **(Neophocaena phocaenoides**), Indo-Pacific humpback dolphins **(Sousa chinensis**), Indo-Pacific bottlenose dolphin **(Tursiops aduncus**) and Bryde's whales **(Balaenoptera edeni**). The coastal area serves as feeding ground, mating ground and nursing ground for Bryde's whales.

Introduction
Occupying about 9,565 km^2 with a coastline of about 400 km, the area is influenced by several rivers, namely the Chao Phraya, Tha Chin, Bang Pakong, Mae Klong and Phetchaburi, which for thousands of years have carried sediments into the Gulf, creating one of the largest mudflats in the sub-region, with gravel and sandy beaches along the shores of Chon Buri and Phetchaburi province. The area is influenced by northeasterly monsoon winds from November to February, which bring dry and cool air to the northern part of the country. Passing through the Gulf, these monsoon winds gather moisture and bring heavy rains to the eastern coastlines of the peninsula. From May to September, southeasterly monsoon winds prevail, causing rain in most areas of the country. In between these periods, variable weather and storms prevail. The muddy coastlines are caused by an accumulation of clay around estuaries (Kanjana et al., 2013).

Location
The entire area covers 9,565 km^2, along 400 km of the coastline. The centroid of the area is N13^o 2' 39.994", E100^o 27' 50.783. The area covers the coasts of Chon Buri, Chacheangsao, Samut Prakarn, Bangkok, Samut Sakhon, Samut Songkram and Phetchaburi provinces of Thailand.

Feature description of the area
The area is home to a variety of species typical of mangroves, including angelwing clams (**Pholas orientalis**) in Samut Sakhon province, razor clams (*Solen* sp.) in Samut Songkram province and blood cockles (*Anadara granosa*) in Petchaburi province (Kanjana et al., 2013).

The area is important for endangered marine species such as hawksbill turtles, green turtles, Irrawaddy dolphins, finless porpoises, Indo-Pacific humpback dolphins, Indo-Pacific bottlenose dolphins and Bryde's whales. The area is an important habitat for Bryde's whales, especially from April to November, when the whales migrate into the area for feeding, mating and nursing calves. Bryde's whales are protected under Thailand's Wild Animal Reservation and Protection Act, BE 2535. According to the data from a photo identification study from the Department of Marine and Coastal Resources of Thailand, the population of Bryde's whales in Thailand is about 50, which is very small. The habitat and mating grounds of Bryde's whales are threatened. The whales use the area for feeding and nursing calves. Most of the Bryde's whales in the area can be found from April until the end of November every year. Bryde's whales in the area feed on shorthead anchovy (*Encrasicholina heteroloba*), Hardenberg's anchovy (*Stolephorus insularis*), Indian ilisha (*Ilisha melastoma*) and white sardine (*Escualosa thoracata*) (Department of Marine and Coastal Resources, 2012). Moreover, Kram Island, located in the area, serves as an egg-laying ground for green turtles and hawksbill turtles (average 300 nests/year: Chalatip Junchompoo, personal communication, 2015).

The coral reefs in the area cover an area of 6.5 km^2. They are found around islands of Chonburi province and Kram Islands and adjacent area. The largest area of coral reefs is 2.6 km^2. The dominant coral species are *Porites lutea*, *Echinopora lamellose* and *Acropora subulata*. Additionally, seagrasses in Chonburi province extend over an area of 1 km^2, with three species found including *Halophila decipiens*, *Halophila minor* and *Halodule uninervis* (Department of Marine and Coastal Resources, 2012).

With mangrove (intertidal) forests found in estuary areas and on coastlines covered with mud or sandy mud, the area contains some 25 plant species, in particular those belonging to the Avicenniaceae family, such as olive mangroves, *Avicennia alba* Blume and white mangroves. Other plant species found here include Asiatic mangroves, tall-stilt mangroves, sonneratia, white mangroves, atap, large-leafed orange mangroves, Tagal mangroves, shore trees, Portia trees, and herbaceous seepweeds. Preventing coastal erosion and trapping sediments, mangrove forests serve as habitats and feeding grounds for various organisms, ranging from microbes, plankton, polychaetes, crabs, shrimps, fish, birds, insects, to certain land animals (Kanjana et al., 2013). The area consists of mangrove beaches and mangrove forests with high a diversity of plant and macrobenthic fauna such as *Sigambra* sp., *Lumbrineris* sp., *Magelona* sp., *Nepthys* sp., Orbiniidae, Capitellidae, *Glycera* sp., *Sternaspis* sp., *Syllis* sp. and *Mediomastus* sp. (Department of Marine and Coastal Resources, 2012). Mangrove beaches and mangrove forests serve as habitat for birds, both residential species and migratory species. Various residential birds include little cormorants, great cormorants, terns, herons and little egrets. Migratory species migrate into the area during the winter. Rare species of migratory bird species include spoon-billed sandpipers, Nordmann's greenshanks, Asian dowitchers, black-faced spoonbills and pied avocets (Kanjana et al., 2013). Mangrove forests also provide egg-laying and nursing grounds for many marine organisms such as giant perch (*Lates calcarifer*), mullet (*Liza subviridis*), tiger prawn (*Penaeus monodon*), giant mud crab (*Scylla serrata*) and murder's mangrove crab (*Sesarna meredi*) (Department of Marine and Coastal Resources, n.d.).

Feature condition and future outlook of the area
The area is an important source of food, both from aquaculture and capture fisheries, such as short mackerel (*Rastrelliger brachysoma*), mullets, threadfins, sardines, anchovies, blood cockles (*Anadara granosa*) swimming crab (*Portunus pelagicus*) and krill (Kanjana et al., 2013). The use of seine, trawl and push net fishing gears is prohibited from June to July to protect and restore marine species.

Assessment of the area against the CBD EBSA Criteria

CBD EBSA Criteria (Annex I to decision IX/20)	**Description** (Annex I to decision IX/20)	**Ranking of criterion relevance** (please mark one column with an X)			
		No information	**Low**	**Medium**	**High**
Uniqueness or rarity	Area contains either (i) unique ("the only one of its kind"), rare (occurs only in few locations) or endemic species, populations or communities, and/or (ii) unique, rare or distinct, habitats or ecosystems; and/or (iii) unique or unusual geomorphological or oceanographic features.			X	
Each year, Bryde's whales migrate into the Gulf from April to November. Moreover, Kram Island is also a nesting ground of hawksbill turtles and green turtles. The population of Bryde's whales in the area is around 50 individuals. They can be encountered all year round. This population is relatively unique in that it is a closed population with little breeding with other populations. The Department of Marine and Coastal Resources is in the process of researching the genetics of the population of Bryde's whales in this area. This will enable a comparison of genetics information between the whales' population in the area and whales' population in other areas. Migratory species bird migrate into the area during winter season. Rare species of migratory bird species include critically endangered spoon-billed sandpipers, endangered Nordmann's greenshanks and near threatened					

Asian dowitchers (Kanjana et al., 2013).					
Special importance for life-history stages of species	Areas that are required for a population to survive and thrive.				X
The area is important for feeding, mating and nursing calf for Bryde's whales. Each year, Bryde's whales migrate into the Gulf from April to November. Moreover, Kram Island is also an egg-laying ground of hawksbill turtles and green turtles (Department of Marine and Coastal Resources, 2012). The area consists of high biodiversity of marine species, especially shoals of small fish that serve as the food of Bryde's whales. Additionally, mangrove forests extend along the coastline. The area is also home to internationally important populations (at 1% level) of 9 priority shorebird species of the East Asian – Australasian Flyway (WWF-Hong Kong, 2014).					
Importance for threatened, endangered or declining species and/or habitats	Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species.				X
Many endangered marine animals can be found in the area (e.g., hawksbill turtles, green turtles, Irrawaddy dolphins, finless porpoises, Indo-Pacific humpback dolphins, Indo-Pacific bottlenose dolphins and Bryde's whales). The area is particularly important as feeding ground, mating ground and nursing ground for Bryde's whales, which seem to be declining. This is due to various factors such as bycatch, habitat deterioration and natural illnesses (Department of Marine and Coastal Resources, 2012). Moreover, the area provides an important habitat for shorebirds that migrate into the area during winter. These birds are especially rare and of global importance, and listed on the IUCN Red List as: critically endangered: spoon-billed sandpipers; endangered: Nordmann's greenshanks; and near threatened: Asian dowitchers (Kanjana et al., 2013).					
Vulnerability, fragility, sensitivity, or slow recovery	Areas that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery.			X	
The mangrove, coral reefs and seagrass habitats, which are generally very fragile and take a long time to recover, are prone to pressures from local communities.					
Biological productivity	Area containing species, populations or communities with comparatively higher natural biological productivity.			X	
Mangrove forests in the area serve as egg-laying and nursing grounds for marine species. Therefore, this is an essential ecosystem in the food web. The area has a high level of productivity and is considered as an important fishery site for local fishery, commercial fishery and aquaculture.					

Biological diversity	Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity.			X	
There are diverse species (e.g., angelwing clams, razor clams, cockles), migratory birds (spoon-billed sandpipers, Nordmann's greenshanks and Asian dowitchers) and marine mammals (Irrawaddy dolphins, finless porpoises, humpback dolphins and Bryde's whales) in the area. The upper area has high biodiversity due to diverse ecosystems, including brackish water ecosystems, mangrove ecosystems, muddy beach ecosystems, coral reef ecosystems and seagrass ecosystems. These ecosystems support a high biodiversity (Kanjana et al., 2013).					
Naturalness	Area with a comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or degradation.		X		
The area is important for the local commercial fishery and for aquaculture. Other coastal developments also occur in the area. These human activities cause impacts on the ecosystem. The decline of biological productivity in the area has resulted from three major factors, overfishing, deteriorating coastal ecosystem and degraded environmental quality.					

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Maps and Figures

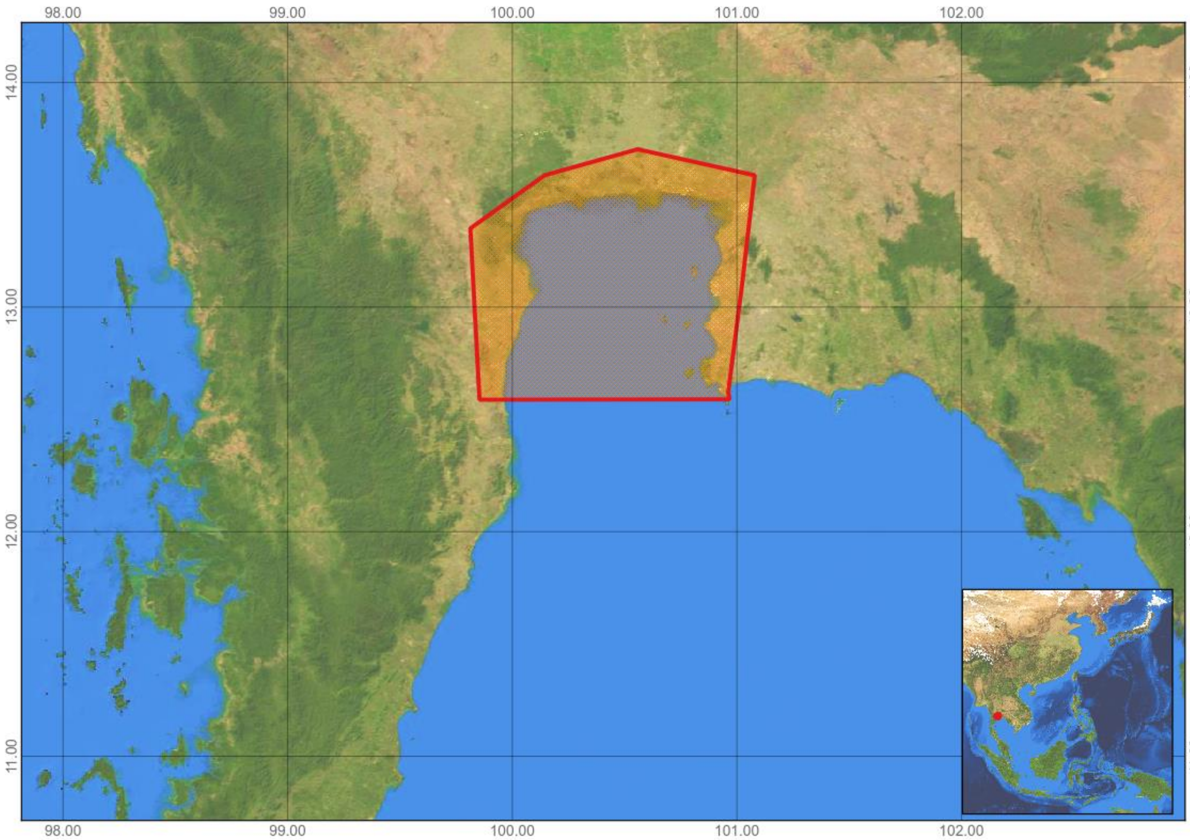

Figure 1. Area meeting the EBSA criteria

Area no. 12: Halong Bay-Catba Limestone Island Cluster

Abstract

The marine waters of Halong Bay-Catba Limestone Island Cluster comprise a highly unique set of 2400 limstone islands and islets, which are associated with special island fringing reefs and pseudo-atolls in karst saline lakes. The area contains a remarkable diversity of coastal and marine habitats and ecosystems, including coral reefs, seagrass beds, mangroves, sandy and coral beaches, hard and soft bottom and substrata, tidal marshes, karst saline lakes, embayments, coastal bays, karst caves, underwater karst valleys, karst funnels, karst wells, channelstones and shallow-water areas. It also has a high diversity of species, including phytoplankton, zooplankton, mollusca, crustacean, marine fish, reptiles, snakes, sea turtles and mammals.

Introduction

The marine waters of Halong Bay-Catba Limestone Island Cluster is situated in the nearshore area of the North-east Tonkin Gulf near Haiphong city. It includes Baitulong Bay National Park, Halong Bay World Natural Hetitage, Catba National Park, Catba Biosphere Reserve and Marine Park, as well as Longchau islands (ADB, 1999; Birdlife/ FIPI/ EU, 2001, N.C. Hoi, 2013).

Halong Bay-Catba Limestone Island Cluster is rich in natural resources and has a high diversity of marine ecosystems, including mangroves, seagrass beds, coral reefs, beaches, soft bottoms, hard bottoms, saline lakes, embayments and bays and shallow water ecosystems (Đ.C. Thung & Massimo Sarti, 2005; T.D.Thanh, 2012; N.C.Hoi, 2013).

Location

Halong Bay-Catba Limestone Island Cluster is situated in the nearshore area of the North-east Tonkin Gulf near Halong city and Haiphong city, Vietnam. It includes Baitulong Bay National Park, Halong Bay World Natural Hetitage, Catba National Park, Catba Biosphere Reserve and Marine Park, as well as Longchau islands. Its total area is about 204.753 ha, including island terrestrial and marine environments, with 185.140 ha in the marine area (T.D.Thanh, 2012; Haiphong PPC, 2014; Quangninh PPC, 2015).

Feature description of the area

The area contains 2400 limestone islands and islets, and a coastline of more than 150km cut across by coastal mountainous land, capes, estuaries and coastal bays (N.C.Hoi, 1998b, 1999). In Halong Bay, there are 1969 islands and islets with density of 1,3 island/1km^2 (L.H.Anh, 1999).

The largest island in this cluster is Catba Island, which has an area of 334km^2 and an altitude of about 100m-250m. Associated with Catba Island are 367 surrounding islets, including 22 limestone islands and islets (N.V.Tien et al., 1999; T.D.Thanh, 2012; Haiphong PPC, 2014). The other limestone islands are less 100m in altitude, and some islets range from 20m to 50m in altitude (L.H.Anh, 1999; Haiphong PPC, 2014). It is a tropical karst relief region that was submerged in the Holocene marine transgression (T.D.Thanh, 2012). Therefore, the karst landscape and seascape are highly unique and characterized by underwater karst valleys, karst funnels, karst wells, especially channelstone (Haiphong PPC, 2014). However, the different sizes of the limestone islands and small shallow-water embayments (2-5m in depth) in this area provides exceptional sites for “semi-cold coral” development (WWF&HIO, 1993; N.C.Hoi, 1998a; V.S.Tuan, 2005).

The area has a high tidal amplitude (3.5-4.2m) and a marine hydrodynamic regime dominated by tidal currents. The wave activity within the islands is weak, but seaward of the islands, the waves are strong (north-east wave level 5 in winter and stronger in summer with a south-easterly direction). The marine waters are affected by the monsoons in the winter season, as well as summer storms and floods. The yearly average temparature is about 20.2-26.6^{o}C, and the maximum air temperature is 40^{o}C, and minimum 5^{o}C, but in winter the seawater temperature is 18^{o}C. Annual rainfall is about 1.700-1.990mm, mainly in summer (May-October). The area receives about two to four storms per year, (July-September) with high winds ranging from 20 to 40m/s. Air humidity averages 86 per cent (V.S.Tuan, 2005; Haiphong PPC, 2014; Quangninh PPC, 2015).

These above conditions support coral life and growth, as well as other organisms in the marine environment (V.S.Tuan, 2005).

Feature condition and future outlook of the area

The marine organisms living inshore and the coral reefs distributed within the coastal bay and embayment (landward of islands) are impacted by land-based activities (V.S.Tuan, 2005; N.V.Tien, 2004; N.C.Hoi, 2012).

Economically, the marine waters and neighbouring areas are very important. A number of development projects from national and provincial funding sources as well as from international donors have been created for this area, especially in developing infrastructure for ports, transportation, coal mining, urbanization, economic processing, food processing and shipyards (N.C.Hoi, 1998b).

Besides development projects, the area has also received a number of scientific projects which focus on technical assistance in marine conservation and coastal management from government and from international and overseas partners of Vietnam such as: UNESCO (usually for Halong Bay WH), NOAA – integrated coastal management (2002-2013), IUCN-USAID – management alliance for Halong Bay (since 2014), IUCN and Danida – marine protected areas (2014-2018), World Wildlife Fund, Fauna & Flora International , Japan lnternational Cooperation Agency, World Bank, and Asian Development Bank (N.C.Hoi, 2012; Haiphong PPC, 2014; Quangninh PPC, 2015).

Coastal and marine development activities such as land-reclamation, land-based pollution, cage aquaculture impacts and destructive fishing are increasingly impacting this area.

Assessment of the area against the CBD EBSA Criteria

CBD EBSA Criteria (Annex I to decision IX/20)	**Description** (Annex I to decision IX/20)	**Ranking of criterion relevance** (please mark one column with an X)			
		No information	**Low**	**Medium**	**High**
Uniqueness or rarity	Area contains either (i) unique ("the only one of its kind"), rare (occurs only in few locations) or endemic species, populations or communities, and/or (ii) unique, rare or distinct, habitats or ecosystems; and/or (iii) unique or unusual geomorphological or oceanographic features.				X

The Halong Bay-Catba Limestone Island Cluster is a highly unique set of 2400 limestone islands and islets which are associated with special island fringing reefs and pseudo-atoll in karst saline lake (V.S.Tuan, 2005; T.D.Thanh, 2012).

There are 58 marine species have been put in the Vietnam Red Book.
The area includes marine species such as snout otter clam, abalone (*Haliotis divesicolor*), oyster (*Meretrix meretrix*), horseshoe crab (*Tachypleus tridentatus*) and three species of pearl clam and lobster. The area is also home to sea turtles (*Chelonia mydas, Caretta caretta, Lepidochelys olivacea, Eretmochelys imbricata)* (MoFi, 1995; N.V.Tien, 2004; V.S.Tuan, 2005).

<table>
<tr><td>Special importance for life-history stages of species</td><td>Areas that are required for a population to survive and thrive.</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">Average coral coverage is 48% (5-70%). There are also more than 50 limestone caves (both above and underwater), 57 embayments (0.7-28 ha) and 62 karst saline lakes, 50 sandy beaches (20-200m in width) with coral sand, about 1000 ha of mangrove and 120ha of tidal marsh. The stone and soft substrata are covered in a large area of the intertidal zone (V.S.Tuan, 2005; T.D.Thanh, 2012; Haiphong PPC, 2014; Quangninh PPC, 2015).

In the waters, there are some 3000 ha of coral reefs with high concentration of commercial seafood species such as snout otter clam, green clam and holothurian (N.C.Hoi, 1996; N.V.Tien, 2004; V.S.Tuan, 2005; Haiphong PPC, 2014; Quangninh PPC, 2015).

Scientists have shown that the special habitats and ecosystems in the marine waters become not only a “home” to marine and terrestrial species, but also cause a ‘spillover effect’ of nutrients and larval marine organisms out to around marine waters. The location is also important for rare seabird and shorebird species which have adapted to limestone and karst cave environments (Birdlife/FPI/EU, 2001; T.D.Thanh, 2012; Haiphong PPC, 2014; Quangninh PPC, 2015).</td></tr>
<tr><td>Importance for threatened, endangered or declining species and/or habitats</td><td>Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species.</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">The location provides a diversity of habitats for a number of different species, including birds: limestone landscape, limestone caves, small beaches, saline embayments, karst saline lakes, reefs, seagrass and mangroves, intertidal zone (N.C.Hoi, 2013). They are very important elements for the biodiversity of the marine waters.</td></tr>
<tr><td>Vulnerability, fragility, sensitivity, or slow recovery</td><td></td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">The area contains a number of habitat and species types, including coral reefs, seagrass beds, mangroves, sandy and coral beaches, and marine mammals (Haiphong PPC, 2014; Quangninh PPC, 2015).</td></tr>
<tr><td>Biological productivity</td><td></td><td></td><td></td><td>X</td><td></td></tr>
<tr><td colspan="6">The productivity of this area is demonstrated by the catch of various types of species, which include snout otter clam (some 64 tonnes in 18 grounds), abalone (10 tonnes), and the pearl clam culture industry (around 5 million individuals in one farm). There is a yearly catch of 18,000 tonnes of fish, 1000 tonnes of cuttlefish/squid and 50 tonnes of oyster from this area (V.S.Tuan, 2005; Haiphong PPC, 2014; Quangninh PPC, 2015).</td></tr>
</table>

Biological diversity					X
This is a special limestone islet ecosystem of 2400 limestone islets and islands. The diversity of coastal, marine and island terrestrial habitats and ecosytems remarkably includes: coral reef, seagrass bed, mangrove, sandy and coral beach, hard and soft bottom and substrata, tidal marsh, karst saline lake, embayment, coastal bay, karst cave, underwater karst valley, karst funnel, karst well, channelstone and shallow-water (V.S.Tuan, 2005; N.C.Hoi, 1996, 2013; T.D.Thanh, 2012; Haiphong PPC, 2014; Quangninh PPC, 2015). Diversity of species is relatively high (about 2500 species), including: 230 phytoplankton species, 120 zooplankton species, 4 species of seagrass, 110 species of seaweed, 19 mangrove species, 200 mollusca, 36 crustacean species, 106 coral species, 68 marine fish species, 22 reptile species, 7 species of snake, 4 sea turtle species, 1 mammal (dolphin), 60 annelid species, 32 crinoiderm species (N.V.Tien, 2004; V.S.Tuan, 2005; D.C.Thung et al, 2005; T.D.Thanh, 2012; Haiphong PPC, 2014; Quangninh PPC, 2015). The coral reef is mainly of the fringing type and mass type, extending over 2500 ha and in the shallow embayment, ranging from 2 to 25m in depth. The reefs are mostly composed of the genera *Porites, Favites, Favia* and *Pavona*, as well as strong growth of soft and stone corals. The average coverage of coral reef in the marine waters is 40% (12-65%) ((N.V.Tien, 2004; V.S.Tuan, 2005; Haiphong PPC, 2014; Quangninh PPC, 2015).					
Naturalness	Area with a comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or degradation.			X	
This area contains a number of protected areas, which seek to protect it from different types of pressures, such as increasing tourism and urbanization activities. There are also some impacts from land-based sources, from fishing, mariculture and aquaculture (N.T.T.Nguyen et al, 2013).					

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Maps and Figures

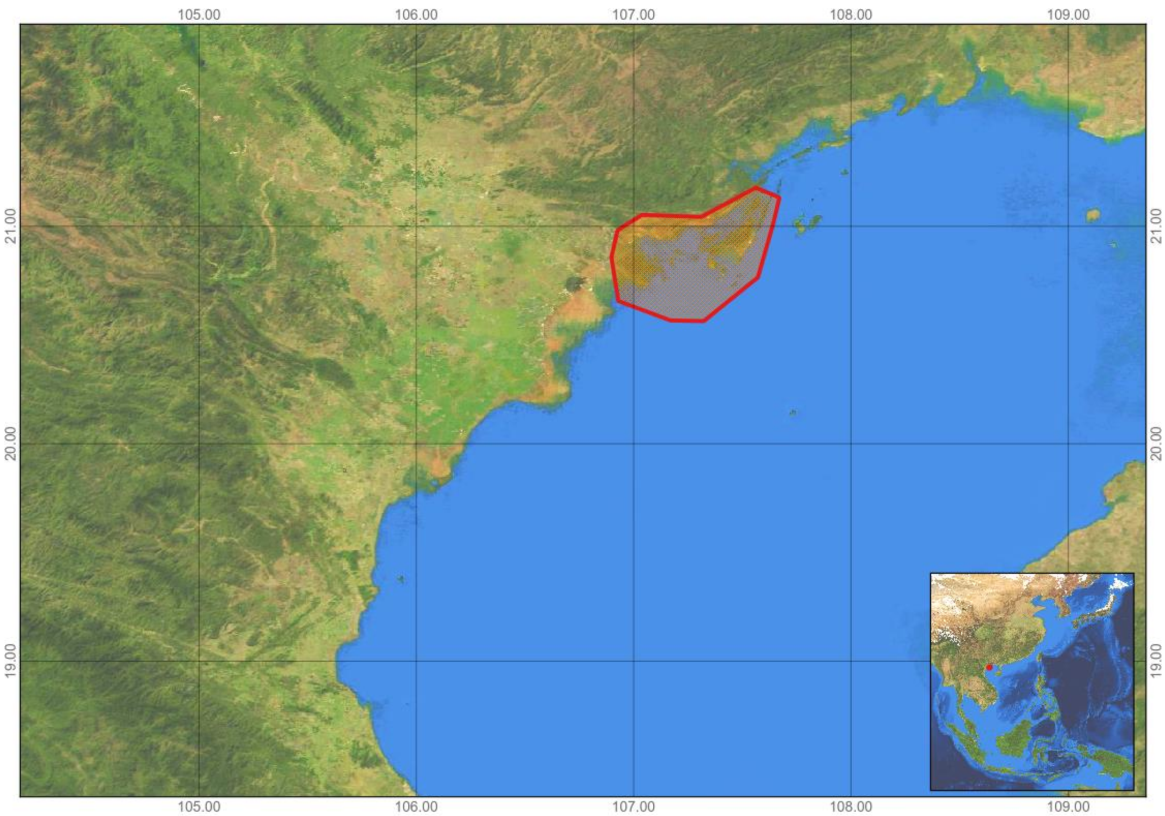

Figure 1. Area meeting the EBSA criteria

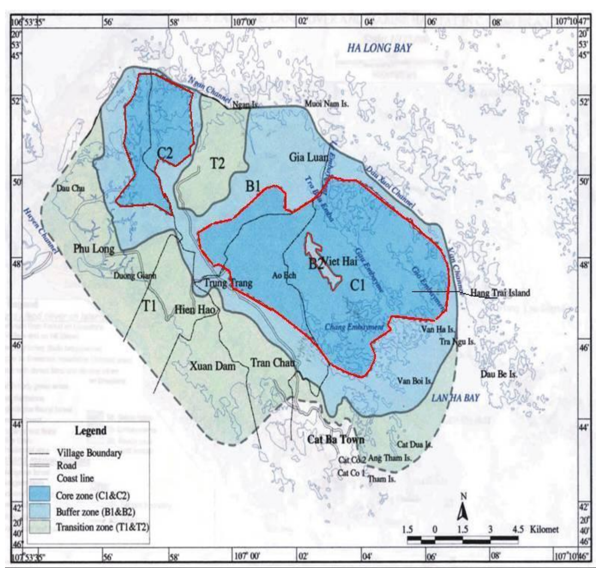

Figure 2. Catba National Park zones

Figure 3. Haiphong city and Catba limestone islands (green)

Figure 4. A corner of marine waters of the Catba islands

Figure 5. Aquaculture in Halong bay

Figure 6. A karst cave in Halong Bay

Figure 7. An embayment in Halong Bay

Figure 8. Catdua coral shoal in Catba Islands

Figure 9. Baitulong Bay

Figure 10. Ang Vem karst saline lake in Catba Islands (green mussel site)

Figure 11. Red seaweed bed in the floor of Halong Bay
(Photo: Nguyen Van Quan. Source T.D.Thanh, 2012)

Figure 12. Coral reef in Halong Bay
(Photo: Nguyen Dang Ngai. Source T.D.Thanh, 2012)

Area no. 13: Tioman Marine Park

Abstract

The coral reefs in Tioman Marine Park are some of the best on the east coast of Malaysia and are generally in good condition. A study conducted in 2014 showed that the area's coral was in good condition, with 60 per cent live coral cover, 26 per cent in excellent condition and 37 per cent in good condition. The diversity of fish and invertebrates is average, and they are generally in low abundance. With its biological diversity, Tioman is believed to be the seed-souce for most of the marine biodiversity of the eastern part of Malaysia.

Introduction

Tioman Marine Park archipelago consists of nine islands: Tioman, Tulai, Chebeh. Labas, Sepoi, Seri Buat, Sembilang, Tokong Bahara and Jahat Island. The marine park was established in 1994 for resource conservation, protection, management for the environment and also for awareness and education. The Tioman Marine Park is considered a sensitive area under the environment Quality Act 1974 (Act 127). All development projects on the island and surroundings require approval before work may commence. The topography of Tioman is unique with many beautiful features like the twin mountain peaks of Nenek Semukut a mesmerizing geological feature. The highest point is Mount Kajang at 1030 metres above sea level, which is located at the heart of the islands. Most of the islands' eastern shores are rugged, with rocky outcrops inaccessible to boat landings. The terrestrial flora closely ressembles that of Borneo rather than mainland Peninsular Malaysia, which indicates that during the last ice age, Tioman Island was probably connected to both Peninsular Malaysia and Borneo (Ng et al.1999).

The island is bestowed with a wide range of ecotypes. The flora of Tioman is rich and contains many endemic species. Mangrove forests (0m) are usually distributed in narrow belts along the coastline; coastal vegetation (0-80m) forms a narrow zone between the mangrove forests and the lower reaches of lowland dipterocarp forest; lowland dipterocarp forest (usually 80-300m) occurs on the alluvial slopes between coastal vegetation and hill dipterocarp forest; hill dipterocarp forest (300-950m) is situated immediately above and adjacent to the lowland dipterocarp forest which it is continuous; and ridge forest (hilltop summits between 950-1035m) occurs on summits where mosses, ferns, lichens and bryophytes dominate (Razali & Latiff,1999, Grismer, 2005).

It is situated at the edge of second-highest coral biodiversity hotspot in the world. Harbone et al. (2000) reported that it has the highest coral diversity compared to all other marine parks on the East Coast.

Location

The Tioman Marine Park archipelago consists of nine islands, which are the largest of the 42 marine park islands of Peninsular Malaysia. Located at 104^0 11' E longitude and 02^0 47'N latitude, the archipelago is 19km in length and 11km wide, and covers 25,115 hectares of sea area.

Feature description of the proposed area

Marine Biodiversity

Coral reefs and inter-tidal habitats are abundant and are among the main attractions that support the ecotourism industry. The marine area was gazetted as a marine park to protect its biodiversity. A total of 326 species of coral reef fish from 55 families were observed in the coral reefs of Tioman Marine Park, based three studies (Harbone et al., 2000, Yusof et al., 2005 and Yusri et al., 2008).

Table 1: Comparison of Butterflyfish Species and Total Number of Coral Reef Fishes at Tioman Marine Park and other Marine Parks in Peninsular Malaysia (Harbone et al., 2000, Yusof et al., 2005 and Yusri et al., 2008)

	Number of butterflyfish (*Chaetodontidae*)	Number of coral reef fishes
Tioman Marine Park, Pahang	8	326
Payar Marine Park, Kedah	19	234
Redang Marine Park, Terengganu	12	209
Tinggi Marine Park, Johor	11	219

Fifty-three macro invertebrate species were recorded by Kee Alfian et al. (2005), including three *Tridacna* species and sea cucumbers that are of commercial or medical importance.

Ahman & Rusea (1994) provided an inventory of 53 species of macro algae from 33 genera. Among these, 24 were new records. The diversity comprised 39.6 per cent Rhodophyta, 35.8 per cent Chlorophyta and 24.5 Phaeophyta, representing one-third of Malaysia's seaweed species richness.

Green (*Chelonia mydas*) and hawksbill (*Eretmochelys imbricata*) turtles nest on the beaches of Tioman (Juara Beach, Tulai Island, Seri Buat and Tekek).

Tioman island subtidal seagrass meadows provide good refuge for dugong traveling between islands on the east coast of Peninsular Malaysia.

Some rare and important fish species have been observed in Tioman, such as the black stripe coris (*Coris pictoides*), two rare and undescribed gobies (Gobiidae) Amblyeleotris sp. and the rare perch parapercis sp., in addition to 17 species that are categorized by Veron & Stafford-Smith (2000) to be rare worldwide.

The Climate

The climate of the island group is typically hot and humid all year around. The temperature usually reaches 30^0 C or more during the day. Humidity is generally about 90 per cent. The monsoon season is between November and March. During this time there is heavily rainfall and the surrounding seas are rough, making the island almost inaccessible by boat (Department of Marine Park Malaysia, 2013).

Coastal Water Quality

A study of 16 different sites was conducted in the coastal water around Tioman Island in 2012 (Department of Marine Park Malaysia, 2013). The overall mean values of different water quality recorded in the all sampling stations were temperature 27.98 ± 0.40 oC, pH 8.34 ± 0.02, dissolved oxygen 6.92 ± 0.43 (mg/l), salinity 33.54 ± 0.11pss, TSS 0.39 ± 0.03 g/L, nitrate 0.85 ± 0.55µM, phosphate 0.16 ± 0.09 µM, silicate 2.62 ± 076 µM. The water temperature was more or less constant with a very narrow range of 27.2^0 C (station 9) – 28.5^0 C (station 5). Statistical analysis gave evidence that different anthropogenic activities affect some of the water quality parameters. For example, temperature, dissolved oxygen, transparency, salinity and ammonia were significantly affected by anthropogenic activity, while anthropogenic activity had no significant effects on pH, total suspended solids, nitrate and phosphate.
Significantly lower water temperature was observed in stations located near residential areas than in stations, which are characterized only by snorkeling activity and followed by the stations with no human activity. The possible reason of lower water temperature in the stations near residential area might be due to more agitation of water by human activity (both residential and snorkeling activities). Mixing of surface and bottom water through human activity can also explain why oxygen concentration was higher and water transparency was lower in stations with human activity than in other stations. Nitrate and phosphate were higher in stations with human activity than in stations with snorkeling activity, followed by stations with no human activity. The possible reason for highest nitrate and phosphate in the stations near residential areas might be the presence of organic and inorganic waste, which are normally discharged from residential areas. Organic and inorganic waste is normally very rich in nitrogen and

phosphorous and increase nitrate and phosphate concentration of water after bacterial decomposition (Rahman et al. 2008a; Rahman et al., 2008b; Rahman et al., 2008c)

Substrates

A study (Department of Marine Park Malaysia, 2013) was conducted in 2012 to map the substrate coverage details of the survey areas based on data acquisition (image and profile of seabed). A total of 24,194 signals were sent and recorded using single frequency echo sounder throughout the substrate data acquisition for all twelve predetermined sites. Twelve types of substrates were identified and classified. The substrate composition is shown in figure 3.

The results indicate that sand is the most common substrate (45.65%) followed by mixed coral (20.86%) and branching coral (13.26%), while coral rubble has the lowest percentage of signal (0.38%) followed by boulder coral (0.43%).

Overall Coral Reef Health

In 2014, a total of 19 coral reef sites in Tioman island were surveyed to provide the status of coral reefs. (Department of Marine Park Malaysia, 2014). The surveys are a continuation of a successful National Reef Check Survey Programme that ran for eight years. The results indicate that 26 per cent of the reefs were in excellent condition, 37 per cent were in good condition, while 32 per cent were in fair condition. Five per cent of the reefs were in poor condition. Coral reefs in Tioman are considered to be in good condition, with 60 per cent live coral cover, the highest of all states surveyed (Terengganu, Johor, Perak, Sarawak and Sabah).

Fish surveys were also conducted. Butterflyfish recorded the highest abundance in Tioman, follow by snapper and parrotfish. The number of butterflyfish in Tioman is the highest recorded, compared to the states of Terengganu, Johor, Perak, Sarawak and Sabah. Other indicators were recorded in very low numbers. Of all states surveyed, only Pahang (Tioman island) and Sabah recorded both humphead wrasse and bumphead parrotfish, prized food fish that is also targeted for the live food fish market (Department of Marine Park Malaysia, 2014).

Mangrove Diversity

Mangrove composition and species is richly diverse in Tioman and Tulai islands. A total of 22 mangrove species were found across the Tioman island and Tulai islands, including endemic and non-endemic species (Department of Marine Park Malaysia, 2013). Species richness showed that both islands were suitable for mangrove ecosystems and that coverage could be even more extensive than at present.. Out of 22 mangrove species, 15 were exclusive and seven were non-exclusive. Species from the genera Avicennia, Rhizophora, Sonneratia and Bruguiera were found in almost every station. However, in Kg. Nipah, *Nypa frutican* was dominant and other species were only observed behind the *Nypa frutican* belt. The natural physical properties of Kg. Nipah protected the coastline, and the vast freshwater discharge from upstream has reduced the salinity of the water, thus creating a suitable habitat for *Nypa frutican*.

Table 2: List of Mangrove Species Found in Tulai and Tioman Islands (Department of Marine Park Malaysia, 2013)

No	Family	Species	Life-form	Type*
1	Avicenniaceae	*Avicennia sp*	Tree	E
2	Combretaceae	*Lumnitzera racemosa*	Shrub/tree	E
3	Combretaceae	*Terminalia cattappa*	Tree	NE
4	Leguminosae	*Mitelia pinnate*	Tree	NE
5	Leguminosae	*Aganope heptaphylla*	Tree	NE
6	Malvaceae	*Hibiscus tiliaceus*	Tree	NE
7	Malvaceae	*Thespecia populnae*	Tree	NE
8	Meliaceae	*Xylocarpus granutum*	Tree	E
9	Myrsinaceae	*Aegiceras sp*	Shrub	E

10	Palmae	*Nypa frutican*	Palm	E
11	Palmae	*Oncosperma tigillarium*	Palm	NE
12	Pteridaceae	*Acrosticum aureum*	Fern	NE
13	Rhizophoraceae	*Rhizophora apiculata*	Tree	E
14	Rhizophoraceae	*Rhizophora mucronata*	Tree	E
15	Rhizophoraceae	*Rhizophora stylosa*	Tree	E
16	Rhizophoraceae	*Brugeira cylindrica*	Tree	E
17	Rhizophoraceae	*Brugeira gymnorrhiza*	Tree	E
18	Rhizophoraceae	*Brugeira sexangular*	Tree	E
19	Rhizophoraceae	*Cerios sp.*	Tree	E
20	Sonneratiaceae	*Sonneratia alba*	Tree	E
21	Sonneratiaceae	*Sonneratia ovate*	Tree	E
22	Sterculiaceae	*Heritiera globosa*	Tree	E

*E = Endemic species, NE = non-endemic species. Source; Aston and Macintosh 2002; Lokman, M., 2004

Phytoplankton

Tioman Island has high diversity of phytoplankton, with a total of 121 species having been identified. The dominant species was from the family of Rhizosoleniiceae, followed by the family Chaetocerotaceae (Department of Marine Park Malaysia, 2013).

Table 3: List of Phytoplankton Species in Tioman Coastal Water (Department of Marine Park Malaysia, 2013)

Species division	**Species name**	
Diatoms (Bacillariophyta)		
Biddulphiales		
Biddulphiineae	ChaetocerotaceaeRalfs in Prichard 1861	
		Bacteriastrum comosum
		Bacteriastrum delicatulum
		Bacteriastrum hyalinum
		Bacteriastrum varians
		Chaetoceros aequatorialis
		Chaetoceros affinis
		Chaetoceros compressum
		Chaetoceros constrictum
		Chaetoceros curvisetus
		Chaetoceros danicus
		Chaetoceros decipiens
		Chaetoceros distans
		Chaetoceros furcellatus
		Chaetoceros laciniosum
		Chaetoceros laeve
		Chaetoceros lauderii
		Chaetoceros lorenzianum
		Chaetoceros paradoxum
		Chaetoceros peruvianus
		Chaetoceros pseudocurvisetum
		Chaetoceros radians
		Chaetoceros similis

		Chaetoceros sp.
	EupodiscaceaeKutzing 1849	
		Odontella sinensis
		Odontella mobilensis
	HemiaulaceaeJouse, Kisselev&Poretsky 1949	
		Cerataulina bicornis
		Cerataulina pelagica
		Eucampia cornuta
		*Eucampiazodiacus*f. *zodiacus*
		Hemialus hauckii
		Hemialus indicus
		Hemialus membranaceus
		Hemialus sinensis
		Pseudoguinardia recta
	LithodesmiaceaePeragallo 1897-1908 emend. Simonsen 1979	
		Ditylum brightwellii
Coscinodiscineae	Asterolampraceae H.L. Smith 1872 emend. Gombos 1980	
		Asteromphalus cleveanus
	CoscinodiscaceaeKutzing 1844	
		Coscinodiscus concinnus
		Coscinodiscus excentricus
		Coscinodiscus gigas
		Coscinodiscus lineatus
		Coscinodiscus sp.
		Coscinodiscus subtilis
	LeptocylindraceaeLebour 1930	
		Corethron criophilum
		Leptocylindrus danicus
		Leptocylindrus minimus
	ThalassiosiraceaeLebour 1930 emend. Hasle 1973	
		Lauderiaannulata
		Skeletonema menzellii
		Skeletonema costatum
Rhizosoleniineae	Rhizosoleniaceae De Toni 1863	
		Dactyliosolen antarticus
		Dactyliosolen fragilissimus
		Dactyliosolen phuketensis
		Guinardia cylindrus
		Guinardia delicatula
		Guinardia flaccida
		Guinardia striata
		Pseudosolenia calcar-avis
		Proboscia alata
		Proboscia truncata
		Rhizosolenia arafurensis
		Rhizosolenia bergonii
		Rhizosolenia crassa
		Rhizosolenia curvata
		Rhizosolenia debyana

		Rhizosolenia formosa
		*Rhizosolenia hebetata*f. semispina
		Rhizosolenia hebetate f. hebetata
		Rhizosolenia hyaline
		Rhizosolenia imbricata
		Rhizosolenia setigera
		Rhizosolenia stolterforthii
		Rhizosolenia striata
		Rhizosolenia styliformis
Diatoms (Bacillariophyta)		
Bacillariales		
Bacillariineae	Bacillariaceae Ehrenberg 1831	
		Bacillaria paradoxa
		Nitzschia closterium
		Nitzschia longissima *Nitzschia sicula*
		Pseudo-nitzschia sp
	NaviculaceaeKutzing 1844	
		Diploneis didyma
		Diploneis smithii *Amphora sp.*
		Ephemera planamembranacea
		Haslea trompii
		Haslea wawrikae
		Membraneis challengeri
		Meuniera membranacea
		Navicula elongatulum
		Navicula distans
		Navicula glacialis *Navicula lyra*
		Navicula pelagi
		Navicula transitran *Navicula sp.*
		Pinnularia acuminata
		Pinnularia bogotensis
		Pleurosigma elongatum
		Pleurosigma naviculaceum
		Pleurosigma normanii
		Pleurosigma salinarum
Fragilariineae	Thalassionemataceae F.E. Round in Round et al., 1990	
		Lioloma elongatum
		Lioloma pacificum
		Thalassionema bacillare
		Thalassionema javanicum
		Thalassionema nitzschioides
Diatoms (Bacillariophyta)		
Cymbellales	Gomphonemataceaen	
		Gomphonema parvulum
Dinoflagellates (Dinophyta)		

Dinophysiales	Dinophysiaceae	
		Dinophysis caudata *Dinophysis miles*
Gonyaulacales	Ceratiaceae Lindemann 1928	
		Ceratium declinatum
		Ceratium furca
		Ceratium fusus
		Ceratium trichoceros
		Ceratium tripos
	Goniodomataceae	
		Alexandrium sp.
		Schuetiella mitra
Noctilucales	Noctilucaceae Kent 1881	
		Noctiluca scintillans
Peridiniales	Oxyphysaceae	
		Oxytoxum sp.
	Protoperidiniaceae F.J.R. Taylor 1987	
		Protoperidinium pellucidum
		Protoperidinium sp.
Prorocentrales	Prorocentraceae Stein 1883	
		Prorocentrum sigmoides
		Prorocentrum sp.
Cyanobacteria		
Nostocales	Nostocaceae	
		Anabaena sp.
	Phormidiaceae	
		*Trichodesmium*sp.

Source: Department of Marine Park Malaysia, 2013.

Feature condition and future outlook of the proposed area

Reef Health

In 2014, the condition of live coral cover in Tioman Island Archipelago was good, with a 60 per cent mean live coral (Department of Marine Park Malaysia, 2014). Thus, though the coral cover was still high in this area, while Kg Genting and Soyak Island exhibited relatively high percentages of dead coral (Department of Marine Park Malaysia, 2013). Moreover, based on field observations, the high sedimentation in Teluk Juara also resulted in poor coral cover. The strong current from the open sea might be the reason, but evidence indicated that the other two sites (Teluk Bayat and Teluk Benuang), which also face the open sea, have good coral cover. Therefore, it is speculated that anthropogenic release and boating activities from Kg Juara might increase the sedimentation, which is smothering the coral in this area. Renggis Island, which is located near Kg Tekek, has among the highest percentage of coral cover. It is assumed that the effluent from this village might be carried away by the strong current between Renggis Island and Kg Tekek, resulting in good coral conditions in this area.

Table 4: Coral Reef Health Criteria (Department of Marine Park Malaysia, 2013)

Percentage of live coral cover	Rating
0-25	Poor
26-50	Fair
51-75	Good
76-100	Excellent

The management effectiveness assessment tool (MEAT) was used in 2013 to evaluate the effectiveness of management by authorities in Tioman. The resulting score of 3 out of 4 indicated that the management was sustainable (Department Marine Park Malaysia 2015).

New dive sites, such as sunken ships, were introduced to divert divers from diving at the natural reef. Habitat mapping in Seri Buat and Sembilang island was carried out in 2015 in order to get the baseline data of the Tioman archipelago.

A management plan was developed to protect the special preservation areas in Tioman (Marine Park Management Plan, 2013). The zoning plan was developed in the Management Plan for Tioman Island. The zones are classified into four zoning categories, based on intended or designated usage of the area. They are zones for : General Use; Habitat Protection and Preservation; Conservation; Tourism and Recreation.

Assessment of the area against the CBD EBSA Criteria

CBD EBSA Criteria (Annex I to decision IX/20)	**Description** (Annex I to decision IX/20)	**Ranking of criterion relevance** (please mark one column with an X)			
		No information	**Low**	**Medium**	**High**
Uniqueness or rarity	Area contains either (i) unique ("the only one of its kind"), rare (occurs only in few locations) or endemic species, populations or communities, and/or (ii) unique, rare or distinct, habitats or ecosystems; and/or (iii) unique or unusual geomorphological or oceanographic features.				X
Largest of the 42 marine park islands of Peninsular Malaysia and on the east coast (Department of Marine Park Malaysia, 2013) Multi ecosystem: 221 hard coral species from 14 families (Amri et al., 2005) 121 species of phytoplankton (Department of Marine Park Malaysia, 2013) 2 species sea turtle (Department of Marine Park Malaysia, 2013) 53 species of macro algae from 33 genera, representing one third of Malaysia's seaweed species richness (Ahman & Rusea, 1994) 22 species of mangrove (Department of Marine Park Malaysia, 2013), 3 types of volcanic rock namely rhylolite, dacite and andesite describe by A.G. Azman, 2008) Some rare and important species have been observed in Tioman, such as the blackstripe coris (*Coris pictoides*), two rare and undescribed gobies (Gobiidae sp), *Amblyeleotris sp*. and the rare perch *parapercis sp*., in addition to 17 species of hard coral which have been categorized as 'rare' by Veron & Stafford-Smith (2000). First discovery of the *Salinospora spp* from Malaysian marine sponges is reported at Tioman waters. The discovery of *Salinospora spp* proved that Malaysian waters may harbour a gene pool of novel actinomycetes yet to be explored and exploited for the biotechnological and pharmaceutical industries (Christabel et al. 2007). *T.maxima* found at the study site were gigantic, rare and possibly have reached very old age (Kee Alfian et al., 2005)					
Special importance	Areas that are required for a population to survive and thrive.				X

for life-history stages of species					
Nesting sites for the endangered green turtle (*Chelonia mydas*) (M.T. Noraini and W.H. Tan, 2008). Four sea turtle nesting beaches (Kg. Juara, Tulai island, Tekek and Seri Buat) (Marine Park Management Plan, 2013). Fairly extensive seagrass meadows have been found growing to the southwest of Tioman, off Kg. Genting, Teluk Nipah and Teluk Mukut, with *Halodule universis* and *Halophila ovalis.* The presence of seagrass could indicate the presence of sea mammals, which are known to live on an island to the south of Tioman. Dugong sitings have been reported (M.T. Noraini and W.H. Tan, 2008).					
Importance for threatened, endangered or declining species and/or habitats	Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species.				X
Turtle landing beaches at Seri Buat, Sembilang, Tioman and Tulai Island (Marine Park Management Plan, 2013). Renggis North, Rengis South and Soyak North recorded the highest resilience scores for coral reefs. The score of Renggis North, Renggis South and Soyak North are 56.5, 53.0 and 52.5, respectively. High scores indicate a healthy reef environment and high recovery rates from previous bleaching events (Sukarno et al. 2013) 53 macro invertebrate species were recorded by Kee Alfian et al. (2005), including 3 species of giant clams (*Tridacna squamosal, T.maxima, T. crosea*). *T.maxima* found at the study site were gigantic, rare and possibly have reached very old age.					
Vulnerability, fragility, sensitivity, or slow recovery	Areas that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery.			X	
Coral reefs are vulnerable to global warming, pollution and sedimentation (Department of Marine Park Malaysia, 2014). The first bleaching event took place in 1998, when an estimated 40 per cent of coral reefs died. They are also vulnerable to the rough seas and strong winds associated with monsoon season, which occurs from November to March every year (Department of Marine Park Malaysia, 2013).					
Biological productivity	Area containing species, populations or communities with comparatively higher natural biological productivity.			X	
High diversity of coral and mangrove. Twenty-two mangrove species have been found across Tioman and Tulai islands, including endemic and non-endemic species (Department of Marine Park Malaysia, 2013). A total of 59.895 hectares of mangrove coverage has been identified in both islands, with 86.49 per cent (52.7625 hectares) in Tioman island and 13.51 per cent (7.1325 hectares) in Tulai island. 121 species of phytoplankton (Department of Marine Park Malaysia, 2013). 221 hard coral species from 14 families (Amri et al, 2005)					
Biological diversity	Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity.				X

A total of 326 species of coral reef fish from 55 families have been observed among the coral reefs of Tioman Marine Park, based on the three studies (Harbone et al., 2000, Yusof et al., 2005 and Yusri et al., 2008)

53 macro invertebrate species were recorded by Kee Alfian et al. (2005), including three species of giant clams (*Tridacna squamosal, T.maxima, T. crosea*). *T.maxima* found at the study site were gigantic, rare and possibly have reached very old age.

Ahman and Rusea (1994) provided an inventory of 53 species of macro algae from 33 genera. Among these, 24 were new records. The diversity comprised 39.6 per cent Rhodophyta, 35.8 per cent Chlorophyta and 24.5 per cent Phaeophyta, representing one-third of Malaysia's seaweed species richness.

121 species of phytoplankton (Department of Marine Park Malaysia, 2013).

221 hard coral species from 14 families (Amri et al., 2005)

Green (*Chelonia mydas*) and hawksbill (*Eretmochelys imbricata*) turtles nest on some of the beaches of Tioman Island (Kg. Juara, Tulai island, Tekek and Seri Buat).

The subtidal seagrass meadows of Tioman Island would provide good refuge for dugong (*dugong dugon*) traveling between islands on the east coast of Peninsular Malaysia. There have been dugong sightings in this area.

Sea snake and shark's eggs have also been seen during surveys (Department of Marine Park Malaysia, 2014).

Naturalness	Area with a comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or degradation.			X	

There are seven villages occupied by the local communities of Pulau Tioman: Kg. Tekek, Kg. Ayer Batang, Kg. Salang, Kg. Juara, Kg. Mukut, Kg. Nipah, Kg. Paya and Kg. Genting. The population size is estimated at 3900. Out of nine islands in the archipelago, only Tioman is populated.

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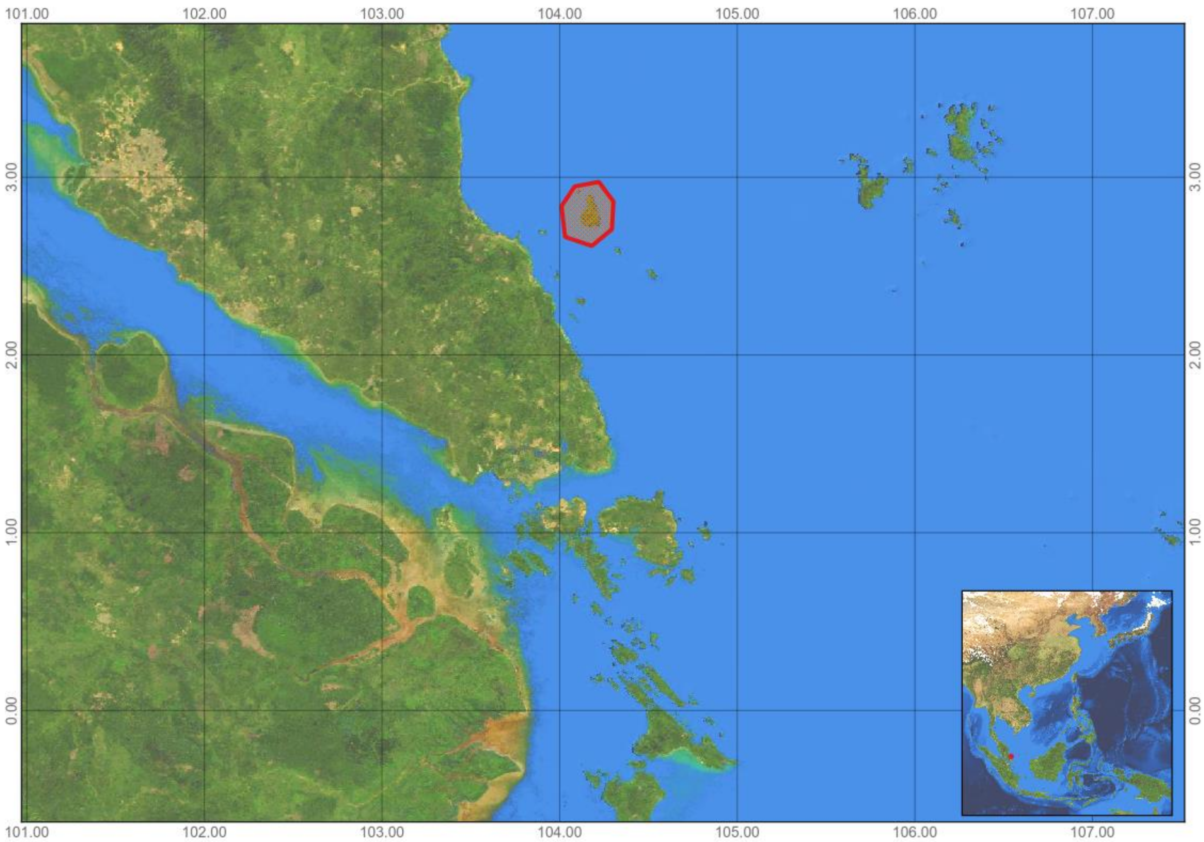

Figure 1. Area meeting the EBSA criteria

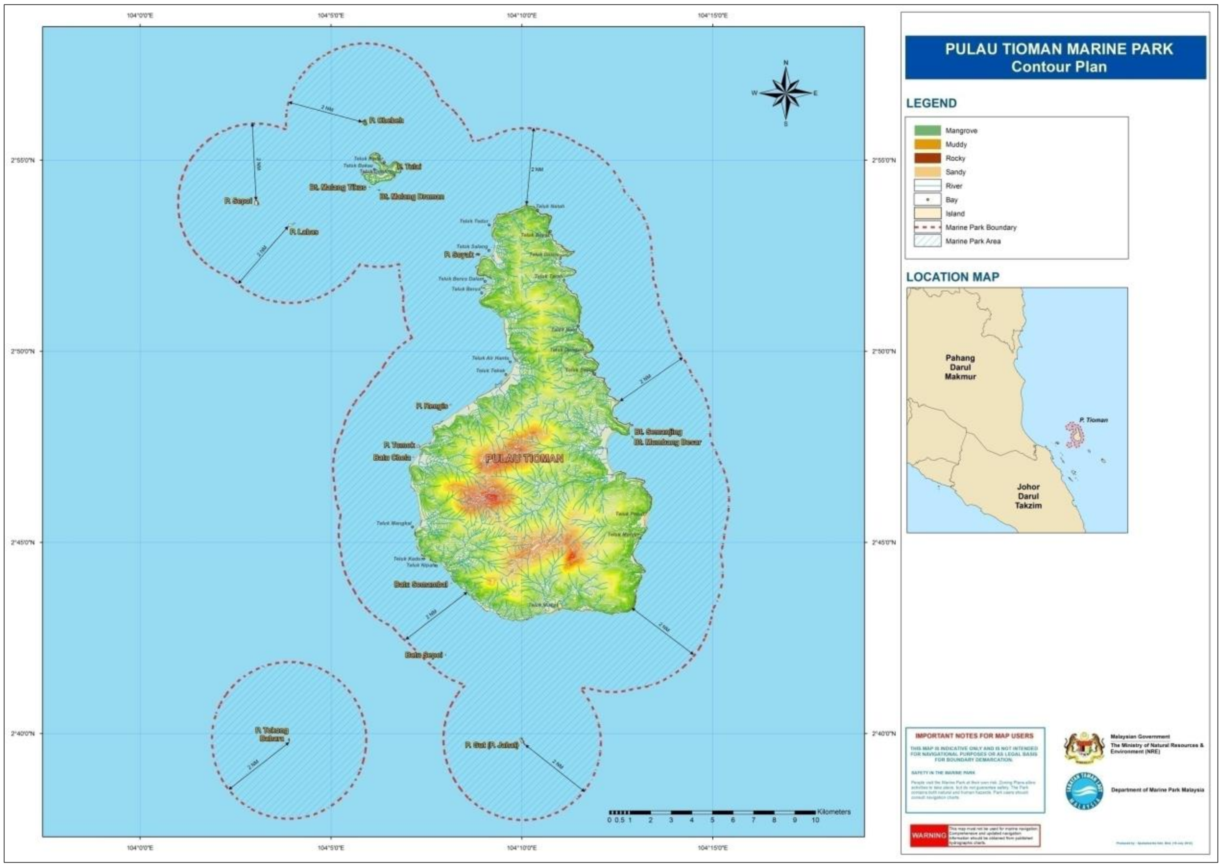

Figure 2. Tioman Island, located on the east coast of Peninsular Malaysia (Marine Park Management Plan, 2013)

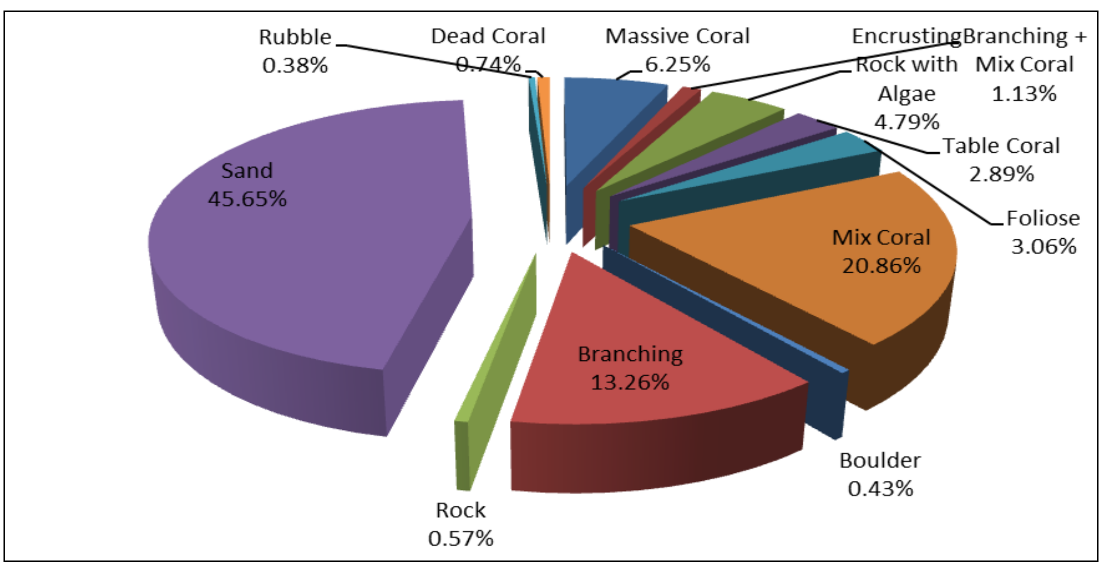

Figure 3: Percentage of substrate distribution around Tioman Island for all 12 sites (Department of Marine Park Malaysia, 2014).

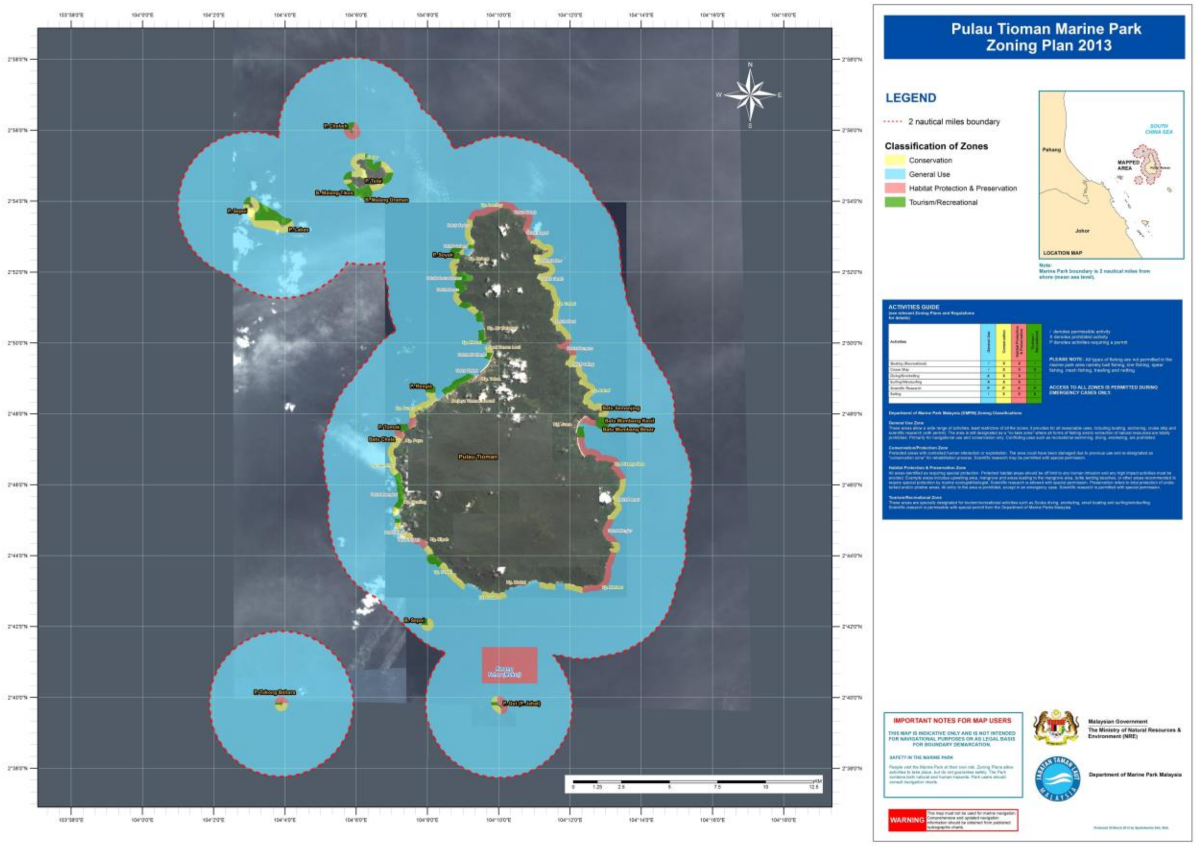

Figure 4. Zoning Map of Tioman Island (Marine Park Management Plan, 2013).

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Area no. 14: Koh Rong Marine National Park

Abstract

The area is located around a large island in the Gulf of Thailand off the Cambodian mainland. The island has about 43 kilometres of coastline with 23 beaches of varying length and composition. The area contains coral reefs and seagrass habitats, and supports regionally significant populations of several marine mammals, including the dugong, the false killer whale (*Pseudorca crassidens*), a long-breaked form of common dolephin (*Delphinus capensis tropicalis*), pantropical spotted dolphin (*Stenella attenuata*), dwarf spinner dolphi (*S. Longirostris roseiventris*), Indo-Pacific bottlenose dolphin (*Tursiops aduncus*), and Indo-Pacific humpback dolphin. It also supports three globally threatened species of sea turtles, namely the green turtle (*Chelonia mydas)*, the hawksbill (*Eretmochelys imbricata)* and the leatherback (*Dermochelys coriacea).*

Introduction

The island has about 43 kilometres of coastline with 23 beaches of varying length and composition. (BBC, 2012). The southern coastline—exposed to the weather and open sea—is particularly spectacular, whereas the eastern coast, which faces landward, is characterized by a sequence of smooth hills, gently sloping towards the numerous crescent-shaped beaches, inlets and bays. Several small islets and many reefs provide an abundance of natural environments for a great variety of marine life. The centre of the island is a flat "belt" of sediments that joins the two hilly massifs of the south-east and north-west (MoE, 2015).

Location

The area is located at at 10°35'7.49"N, 103°17'55.36"E. It encompasses approximately 78 km^2 around the Koh Rong Archipelago, which lies 25 km off the coastal town of Sihanoukville, Cambodia.

Feature description of the area

Koh Rong is one of at least 52 islands off the Cambodian mainland, many of which, including Koh Rong, are uninhabitated (Beasley et al., 2007). The island is a famous diving site known for its coral reefs, marine animals, seagrass and other biodiveristy in the seabed. The average depth of the island seems to be shallow, seldom exceeding 60 m even in the most remote offshore water (Beasley et al., 2007). Hammerhead sharks can be seen in abundance throughout the year in depths of 25-60 metres. A critically endangered species, hawksbill turtle (**Eretmochelys imbricata),** is an initiative conservation effort of the island. Since tourism is relatively new to Koh Rong, the island acts as a sanctuary for juvenile fishes to grow in safety; for this reason the island is a home for a large number of reef fish and is frequently visited by their predators. Various fisheries take place on the island, including snapper fisheries, lobster fishery and sea cucumber harvesting.

Mammals

Ten species of marine mammales have been recored in the waters in and around this area, including *Sousa chinensis*, Indo-pacific humpback dolphin, *Tursiops aduncus*, Indo-pacific bottlenose dolphin, *Stenella attenuata*, Pantropical spotted dolphin *Stenella longirostris sp*., Spinner dolphin, *Delphinus sp*., Common dolphin, *Orcaella brevirostris*, Irrawady dolphin, *Pseudorca crassidens*, False killer whale, *Globicephala macrorhynchus*, Short-finned pilot whale, *Neophocaena phocaenoides*, Finless porpoise and *Dugong dugon*, Dugong (Beasley and Davidson, 2007).

Corel reef

The status of coral reefs in this area is very limited and remains largely unknown. Some research has been conducted, but there is no verification on the distribution and species composition. At least 28.065 km^2 was defined as coral reef beds (DoF, 2004), and coral occurs around many islands, including Koh Rong (Bersley, et al., 2007). At least 70 species of corals in 33 genera and 11 families have been identified in the waters in and around this area (UNEP, 2007). Coral diveristy is higher on the offfshore reefs, whereas those inshore are in poor condition with low species diveristy. Koh Rong is refuge of up to 50 per cent of the identified and record coral reefs (Chou, 2000).

Seagrass

The Fisheries Administration of the Ministry of Agriculture, Forestry and Fisheries estimated that the seagrass beds in Cambodia cover 33,814 ha. Eight species of seagrass have been recorded in Cambodian waters (Ethirmannasingan, 1996), while Ouk *et al.,* (2010) reported 12 seagrass species found in Kampot area. A survey found four species of seagrass, including *Halodule pinifolia*, *Thalassia hemprichii*, *Enhalus acoroides* and *Halophila minor* (Leng, *et el.*, 2014) and seven species near Koh Rong Archipelago (Skopal-Papin, 2011)

Table 1. Seagrass Species in Cambodia

Species	**Cambodia**	**Koh Rong**	**Reference**
Thalassia hemprichii		x	Kampot Working Group (2002) Leng, et al., 2014
Halodule uninervis		x	Kampot Working Group (2002)
Enhalus acoroides		x	Kampot Working Group (2002) Leng, et al., 2014
Halophila decipiens		x	Kampot Working Group (2002)
Halophila ovalis		x	Kampot Working Group (2002)
Halodule pinifolia		x	Leng, et al., 2014
Halophila			Leng, et al., 2014
Cymodocea rotundata		x	Kampot Working Group (2002)
Syringodium isoetifolium		x	Kampot Working Group (2002)

Table 2. Coral Species in Cambodia

Group	**Estmated Number of Species**	**Reference**
Hard Coral	70	Nelson (1999)
Soft Coral	17	Nelson (1999)
Marine Fish	520	Ing (2003)
Echinoderms	21	Ing (2003)
Crustaceans	50	Ing (2003)
Mollusks	250	Ing (2003)
Marine Turtles	5	Ing (2003)
Marine Mammals	12	Ing (2003)
Seadeeds	16	Ing (2003)
Seagrass	9	CZM/MoE (2002)

Source: Cambodia Reef Conservation Project 2011

Mangrove

Mangroves are prevalent and extensive along the coast and river mouth of the canal zone.

Turtles

Three globally threatened species of sea turtles are found in the island: the green turtle, *Chelonia mydas*, the hawksbill, *Eretmochelys imbricata* and the leatherback, *Dermochelys coriacea* (Charter, *et al.*, 2014).

Fishes

Koh Rong is hotspot for marine fishes, where mean density ranges from 161 to 200 individuals per 500 $m^{3.}$. Local commercially valuable species are in the following families: Siganidae, Lutjanidae, Nemipteridae, Lethrinidae, Carangidae, Sphyraenidae, Scaridae, and Haemulidae. The last is most common, followed by Siganidae and Lutjanidae (Thorne, *et al.*, 2015)

Feature condition and future outlook of the area

There is a need for further research and data gathering on Koh Rong Marine National Park. Of the four islands, Koh Rong is the most inhabited island, with four villages. At the moment, around 60 to 80 per cent of people in nearby communities are engaged in fishing or related activities. There is no remarkable infrastructure or permanent building on the island. Ensuring the sustainability of fisheries and other valuable marine habitats and threatened species, while pursuing other development objectives, such as tourism, is a primary conservation objective in the management of the island (Local Authoties, per. communication, 2015). The Koh Rong Marine National Park will encompass approximately 78 km^2 around the Koh Rong Archipelago, which lies 25 km off the coastal town of Sihanoukville in the Gulf of Thailand. It is the continuation of Botum Sakor National Park coastal, in a line of several islands.

Locals and tourists use these resources for different livelihood and personal activities. Demand for these resources is increasing as the tourism sector booms and with the increasing local population (Kampot Working Group 2002).

Rapid assessment was conducted to better understand the key concerns of local communities, tour operators and local authorities, including line agencies. The concerns in the survey are based on conditions, situation, how and for what purpose the natural resources are being utilized and managed and the view and perspectives regarding the conservation and protection of the biodiversity and habitats, and the conservation efforts and initiatives in the island. However, the rich biodiversity and local livelihoods associated with the habitats and resources were also addressed in the assessment (MoE, 2015).

Seagrass beds, coral coverage and some marine population are threatened (Chou, *et al*., 2003). Several marine mammal species are reported to be caught from time to time (Beasley, *et al*., 2007).

Assessment of the area against the CBD EBSA Criteria

<table>
<tr><td rowspan="2">CBD EBSA Criteria
(Annex I to decision IX/20)</td><td rowspan="2">Description
(Annex I to decision IX/20)</td><td colspan="4">Ranking of criterion relevance
(please mark one column with an X)</td></tr>
<tr><td>No information</td><td>Low</td><td>Medium</td><td>High</td></tr>
<tr><td>Uniqueness or rarity</td><td>Area contains either (i) unique (“the only one of its kind”), rare (occurs only in few locations) or endemic species, populations or communities, and/or (ii) unique, rare or distinct, habitats or ecosystems; and/or (iii) unique or unusual geomorphological or oceanographic features.</td><td></td><td>X</td><td></td><td></td></tr>
<tr><td colspan="6">This area is one island of a unique chain of 52 islands in the coastal waters of Cambodia, many of which are uninhabited. The waters of this area appear to support regionally, if not globally, significant populations of several marine mammal species, including the dugong, which is almost certainly the most highly threatened marine mammal in the region (Beasley et al., 2007).

Six of the cetacean species found in this area, namely the false killer whale (Pseudorca crassidens), a long-breaked form of common dolphin (Delphinus capensis tropicalis), pantropical spotted dolphin (Stenella attenuata), dwarf spinner dolphi (S. Longirostris roseiventris), Indo-Pacific bottlenose dolphin (Tursiops aduncus), and Indo-Pacific humpback dolphin, are considered new country records for Cambodia, having been sighted in the coastal waters of the country (Beasley et al., 2007).</td></tr>
<tr><td>Special importance for life-</td><td>Areas that are required for a population to survive and thrive.</td><td></td><td></td><td>X</td><td></td></tr>
</table>

<table>
<tr><td>history stages of species</td><td></td><td></td><td></td><td></td><td></td></tr>
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The Koh Rong Archipelago contains habitats of three globally threatened species of sea turtles, namely the green turtle Chelonia mydas, the hawksbill, Eretmochelys imbricata and the leatherback, Dermochelys coriacea (Charter, et al., 2014).</td></tr>
<tr><td>Importance for threatened, endangered or declining species and/or habitats</td><td>Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species.</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">Ten marine mammal species have now been confirmed to occur in the waters in and around this area, including Koh Rong Archipelago. These initial results indicate that the current status of marine mammals in the area is encouraging, both in terms of species diversity and abundance. These waters appear to support regionally, if not globally, significant populations of several of these species. The dugong is almost certainly the most highly threatened marine mammal in the region (Beasley et al., 2007).

Koh Rong Archipelago contains habitats of three globally threatened species of sea turtles, namely the green turtle Chelonia mydas, the hawksbill, Eretmochelys imbricata and the leatherback, Dermochelys coriacea (Charter, et al., 2014).

Information on reefs in the area is very limited, particlularly the status of coral reefs, their distribution and species composition. However, it assumed that there are roughly 70 hard coral species found in the offshore islands of this general area (Chou, 2000).

Small seagrass beds are located in the waters adjacent to Koh Rong and Koh Rong Sanlem (Wetland International Asia-Pacific and Lower Mekong Basin Program, 2001). Marine fish and shrimp species are significantly dependent upon the seagrass areas (Tana and Chamnam, 1995), however the seagrass beds have been heavily impacted by the activities of trawl and weighted bottom-net fisheries (Nelson, 1999; Tana, 1995).</td></tr>
<tr><td>Vulnerability, fragility, sensitivity, or slow recovery</td><td>Areas that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery.</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">Previous research has shown that species inhabiting coral reefs, reef beds and seabeds, as well as other species are vulnerable to degradation, and in this area, the seagrass beds are vulnerable to certain types of destructive fishing practices, including trawling for shrimp (Adulyanukisol, 2002) and push-netting</td></tr>
</table>

(Tana, 1995). Monofilament gillnets were reported to be the greatest threat to dolphins, and the local communities have confimed that the dolphins are occasionally by-caught in the gillnets (Beasley, *et al*, 2007). There have been reported catches of several marine mammal species. Six cetacean species are considered new country records for Cambodia, namely the false killer whale (Pseudorca crassidens), a long-breaked form of common dolphin (*Delphinus capensis tropicalis*), pantropical spotted dolphin (*Stenella attenuata*), dwarf spinner dolphi (*S. Longirostris roseiventris*), Indo-Pacific bottlenose dolphin (*Tursiops aduncus*), and Indo-Pacific humpback dolphin (Beasley *et al*., 2007).					
Biological productivity	Area containing species, populations or communities with comparatively higher natural biological productivity.			X	
The coral reef benthic habitat along the coastline is diverse, with varying structural complexity. At least 70 species of corals in 33 genera and 11 families have been identified in the waters in and around this area (UNEP, 2007). Eight species of seagrass have been recorded in the waters in and around this area (Ethirmannasingan, 1996).					
Biological diversity	Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity.			X	
Despite the limited research in this area, the following information is available: • 520 marine fish species from 202 genera and 97 families have been recorded (Ing, 2003). Three seahorse species were observed near Koh Rong island and at least one, identified as *Hippocampus spinosissimus*, is listed as vulnerable on the IUCN Red List (Wiswedel, 2012). • 10 species of marine mammals have been recored in the waters in and around this area (Beasley, *et al*, 2007) • Eight species of seagrass have been recored in the waters in and around this area (Ethirmannasingan, 1996). • At least 70 species of corals in 33 genera and 11 families have been identified in the waters in and around this area (UNEP, 2007)					
Naturalness	Area with a comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or degradation.			X	
Field surveys show that coral reef benthic habitat along the coastline is diverse, with varying structural complexity, partly affected by water quality (Charter, 2014).					

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Maps and Figures

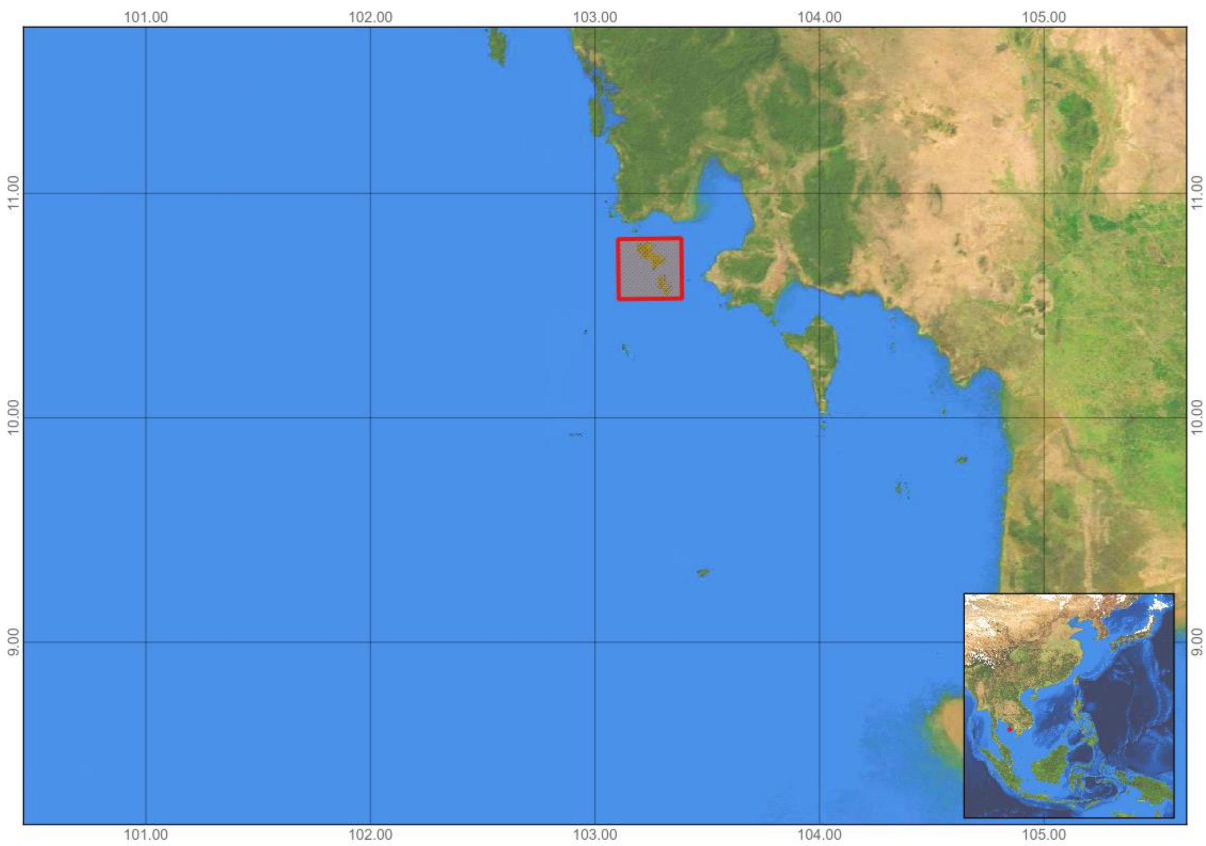

Figure 1. Area meeting the EBSA criteria

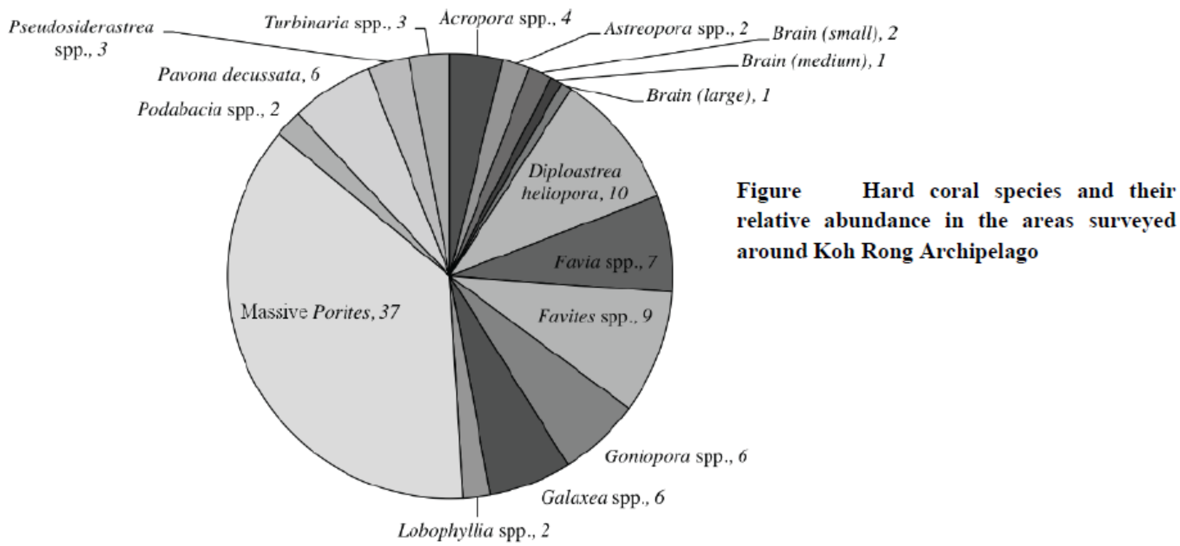

Figure 2. Hard coral species and their relative abundance in the areas surveyed around Koh Rong Archipelago (Thorne et al., 2015)

Area no. 15 : Lampi Marine National Park

Abstract

This area is one of the 43 protected areas of Myanmar and its only national marine park. It is located in the Myeik Archipelago, which comprises more than 800 islands distributed along 600km of coastline in the Andaman Sea. The area contains a number of ecologically important habitats, including mangrove forests, coral reefs and seagrasses, which serve as critical habitats for molluscs, crustaceans, echinoderms and fishes, as well as threatened species such as the green turtle and the dugong, which feed on seagrass, and a variety of birds that feed in the intertidal and sublittoral zones.

Introduction

Lampi Marine National Park is one of the 43 protected areas of Myanmar and the only marine national park. It is located in the Myeik Archipelago, which comprises more than 800 islands distributed along 600km of coastline in the Andaman Sea. Geologically, the Archipelago was formed by a combination of tectonic and volcanic activity (MOECAF and Instituto Oikos, 2014).

It is the only protected area in the Myeik Archipelago and comprises Lampi Island and about 20 smaller surrounding islands. It contains a variety of habitats such as mangroves, beaches and dune forests, coral reefs, seagrass beds and rich diversity of fauna. The islands in the area range in size from very small to hundreds of square kilometres and are covered by tropical lowland wet evergreen forests with a high biodiversity and surrounded by an extensive coral reef system. The whole Myeik Archipelago is rich in coral reefs, seaweed and seagrass beds, which serve as important habitats for molluscs, crustaceans, echinoderms and fishes. The area provides food, water and energy to the local population of about 3000 people in five settlements. The seagrass meadows in the area support threatened species like the green turtle and the dugong that feed on seagrass, and a variety of birds that feed in the intertidal zone and sublittoral zone. The park's mangrove forests, found to be of a very good conservation status, also provide an important habitat for many species of molluscs, crustaceans and fishes (MOECAF and Instituto Oikos, 2014).

Location

The area is located in Boke Pyin Township of Tanintharyi Division in Myanmar. The boundaries of the area are as follows:

- North boundary: two nautical miles north from the shoreline of Two Hill Island.
- East Boundary: two nautical miles east from the shoreline of Pu lo-abon Island, Dolphin Islands, Marble Island, Gregory Group Islands, Palo Taban Islands.
- South Boundary: two nautical miles south from the shoreline of Palo tu han Island which is south east of Lampi island, Palo Nalo Island, Palo Kugyi Island, Palo lobiaung Island.
- West Boundary: two nautical miles west from the shoreline of Kun zagyi Island, Wa-al- kyun Island, Kubo Island, Palo Tayo Island, Kular Island, Observation Island, Palo-Tu-ante Island, Pulo Lobiaung Island.

Feature description of the area

Mangroves

The mangrove forests in the area, although minor in terms of extent, are almost intact, with high ecological value. The pristine areas are located at Nabi Chaung, Khe Chaung, Mi Gyaung Aw and Thit Wa Aw on the west coast and in Bulet Aw on the east coast of Lampi island. The mangrove survey conducted in the area in February-April 2010 recorded a total of 63 species belonging to 31 families, comprising both woody species (40 species) and mangrove associates (23 species of shrubs and climbers). This high diversity of mangrove species is common in the Indo-Malayan biogeographic region. There are two main types of mangrove communities in the area, the *Rhizophora apiculata* and the *Bruguiera cylindrica*. Dominant species of mangrove are *Rhizophora apiculata* (Byu-che-dauk-apo) and *Rhizophora mucronata* (Byu-che-dauk-ama). Those are the only salinity-resistant species that occur in the intertidal areas. On the other hand, some mangrove species such as *Sonneratia apuitala* (Kan-pa-la), *Sonneratia cassialoris* (La-mu), *Xylocarpus mulocensis* (Kya-na) and *Amoora cucullata* (Pan-tha-ka), present in other mangrove areas of Myanmar, are not found in the Lampi area, due to high salinity (3.5% - 3.8%) and soil types (loamy sand and sandy loam soils are common) (MOECAF and Instituto Oikos, 2014).

Coral Reefs

Fischer (1985), Reef Check Europe (2001) and GCRMN (2005) report that the Myeik Archipelago contains 1,700 km^2 of coral formations, with the major reef formations around the smaller islands, especially in the Gregory Group, and relatively poor formations around the main island of Lampi. The coral formations consist of fringing reefs, submerged pinnacles and seamounts, limestone caves, sheer and sloping rock walls, and boulder-strewn sand bottoms. Reef Check Europe in 2001 identified 61 species and 31 genera of hermatypic corals, and 4 species and 3 genera of ahermatypic corals in the Myeik Archipelago. Reef Check Europe estimated that between 60 and 95 species of hard corals are found in the Myeik Archipelago. According to research by the Department of Marine Science at Mawlamyine University, a total of 512 species of hard corals (*Scleractenian* and *Hydrozoa* corals) were identified from 24 island of the Myeik Archipelago. The highest species composition was observed at Pa lei Island (Sir J. Malcolm Island) representing 104 species and 42 genera, and followed by Sin Island (High Island), Ka mar Island (Sir E. Owen Island) and Thayawthedangyi Island (Eiphinstone Island). Additional coral reef surveys are required in the area to confirm species composition (MOECAF and Instituto Oikos, 2014).

Seagrass

Eleven species of seagrass have been found in the vicinity, with *Halophila minor* and *Thalassia hemprichii* being the dominant species in the area. Cymodocea serrulata is the rarest species in the area, as it was recorded at only one site on the east of Lampi Island. There is evidence that seagrass beds in the area provide feeding habitat for dugongs (*Dugong dugan*) and green turtles (*Chelonia mydas*), both of which are threatened. *Halophila ovalis* is the dominant species in the seagrass beds grazed by dugongs. The number, size and species composition of the meadows observed in the area suggest that there is enough seagrass in the area to support a small population of dugongs (MOECAF and Instituto Oikos, 2014).

Plankton

A plankton survey conducted in March 2010 recorded 136 species of phytoplankton belonging to 49 genera and 150 species of zooplankton belonging to 93 genera. Eight species of plankton were identified as newly recorded species for Myanmar: one phytoplankton species, the pinnate diatom *Pleurosigma nicobaricum*, and seven zooplankton species, namely: *Pegantha sp*. (Hydromedusa), *Pelagia noctiluca* (jelly fish), *Pleurobranchia rhodopis* (Ctenophore), *Phtisica marina* (Amphipod), *Thallassomysis sewelli* (Mysid), *Salpa maxima* (Salp), *Iasis zonaria* (Salp) (MOECAF and Instituto Oikos, 2014).

Seaweed

Seaweed surveys recorded 73 species belonging to 46 genera, belonging to blue-green algae *Cyanophyta* (2 species), green algae *Chlorophyta* (24 species), brown algae *Phaeophyta* (9 species) and red algae *Rhodophyta* (38 species) (MOECAF and Instituto Oikos, 2014).

Some economically, industrially and medicinally important seaweed species were observed in the area. Some green algae, such as *Catenella*, *Caulerpa* and *Ulva* can be used for the production of health foods and sea vegetables. *Catenella* which is known as "Kyauk Pwint" in Myanmar, is a famous seafood item and it is also used as medicine to cure or prevent gout. Certain species of brown algae, for example, *Dicthyota, Padina, Turbinaria* and *Sargassum*, could be utilized for the production of alginates, manitol and iodine. Certain species of red algae, such as *Gracilaria* could be used for the production of agar-agar (MOECAF and Instituto Oikos, 2014).

Molluscs

A survey of molluscs found in the area and surrounding waters identified 50 gastropod species belonging to 27 families and 41 bivalve species belonging to 18 families. Among the Gastropods found in the area, many species are of economic importance as a source of food and for traditional decoration and shell jewellery: i) *Trochus niloticus* is the most economically important shell, collected for commercial use by local divers; ii) *Strombus conarium (Strombidae*), very common and abundant in mud, muddy sand habitat and algae bottom of south and southeast part of Lampi, is collected for food and traditional decoration, for both local use and export to neighbouring countries; iii) *Cerithidea cingulata (Potamidaet)* a shell traditionally used for decoration in other coastal areas of Myanmar but not in the area, is abundant in muddy sand, muddy rock and mangrove fringe habitats; iv) *Babylonia areolata* (*Buccinidae*), harvested on sand and mud grounds near Kophawt Island, for food and traditional decoration, both for local use and for export to Thailand; v) *Turbo marmoratus* is collected for export to Thailand as a food resource and for shell jewellery. Most of the species of Family Cypraeidae, generally known as "Kywe poke kha yu", are very common and inhabit reef areas and sandy habitats among rock environments, tidal pools, branch corals and seaweed of the intertidal and sublittoral zone. Almost all species are collected for the seafood and shell market. The most famous is *Cypraea tigris (tiger cowriet)* collected for its shell. Only one individual of this species was found in the area, suggesting the need for further investigation. Among the bivalves found in the area, the species of economic importance are: i) pearl oyster *Pinctada margaritifera* found on hard substrate in clear water along the coast of Lampi Island and several nearby islands north of Lampi island; ii) three species of hammer oyster (*Malleidae*), *Malleus malleus, Malleus albus, Malleus regula*, abundant in rocky and coral reef habitats around the Island, are used by Moken people as traditional food; iii) edible *Polymesoda bangalensis* found in brackish water in mangrove swamps area of Crocodile River bank. Giant clams (*Tridacna spp*.), collected for their flesh and shell, also have high commercial value both for the export market and for local trade (MOECAF and Instituto Oikos, 2014).

Crustaceans
A survey of crustaceans, which was concentrated only on crabs, recorded 42 crab species in the area belonging to 25 genera and 11 families. Among these, families *Grapsidae*, *Potunidae* and *Ocypodidae* are the most diverse groups represented respectively by 11, 9 and 8 species. The species *Sesarma intermedia* has the highest abundance followed by *Sesarma minutum* and *Sesarma picta*. Highest abundance of crabs were observed in the seagrass habitat type with 15 species (*Charybdids* and *Matuta* species) followed by mangrove, sandy beach and sea habitat types respectively with 10, 8 and 7 species. Many of these crabs are potentially economically important as primary food species such as the mud crab, *Scylla serrata*, and the larger species belonging to the genus *Sesarma*, which is also the most abundant in the area. A species with commercial potential is the mangrove stone crab of the genus *Potunus*. Many species, in particular the *sesarmines* and *ocypodids*, are ecologically important in mangrove energetics, being involved in nutrient cycling (MOECAF and Instituto Oikos, 2014).

Sea Cucumber
A survey identified 32 species of sea cucumbers, 17 of which were found in the catches of local fishers. The diverse sea cucumber fauna supports a small-scale industry that is an important source of income for local fishers. Interviews with local fishers of sea cucumbers and dry fish revealed that the sea-cucumber market is a very profitable one, both for the local and for the foreign market, with prices ranging from about 10 USD/kg for species like *Holoturia atra* up to more than 35 USD/kg for species like the sandfish *Holothuria scabra*, one of the most valuable species (MOECAF and Instituto Oikos, 2014).

Uncontrolled fishing of sea cucumber inside the park is arguably leading to over-exploitation, as is the case with other sea cucumber fisheries in the region. However, there are some apparently healthy stocks in some of the bays of Lampi (MOECAF and Instituto Oikos, 2014).

Fish
A partial preliminary icthyological (fish) assessment survey in the area recorded a total of 42 fish species belonging to 22 families, including 7 new records for Myanmar belonging to the family *Oryziatidae*. More detailed fish suveys are needed, including a fish stock assessment (MOECAF and Instituto Oikos, 2014).

Sea Turtles
Three species of sea turtles, out of the five species reported in the waters of Myanmar, are reported to inhabit the area and the surrounding waters, although hawksbill (*Eretmochelys imbricata*) and leatherback (*Dermochelys coriacea*) are considered extremely rare. Carapaces of green turtle (*Chelonia mydas*) and loggerhead turtle (*Caretta caretta*) were found on the beaches in the area, and local populations have reported sightings of the olive ridley turtle (*Lepidochelys olivacea*), although these have yet to be confirmed by a survey. Several beaches on the main Lampi island and on smaller islands of the area were indicated by local people to be sea turtle breeding sites. Evidence of this is found only on a beach close to Sitta Galet village, where two nests with open eggshells were found. Local people reported that the turtle hatchlings emerged between 15 and 20 November (MOECAF and Instituto Oikos, 2014).

Dugong
The dugong (*Dugong dugan*) have been known to occur in the area, since feeding trails were observed starting in 2008 on a dense seagrass meadow on the east coast of Lampi island, where *Halophila ovalis* is the dominant seagrass species (one of the dugong's preferred seagrass species). Occurrence of dugong on some islands of Myeik Archipelago such as Sular Island, La Ngan Island, Bo Lut Island and Wa Kyuun Island was also reported by the local people. The feeding trails found in Lampi constitute the first proof of the occurrence of the dugong in the Myeik Archipelago (MOECAF and Instituto Oikos, 2014).

Birds
A total of 228 species were observed in Lampi Marine National Park and surrounding areas, including several marine species that are newly recorded for Myanmar: Malaysian Plover (*Charadrius peronii*) Bar-tailed Godwit (*Limosa lapponica*), Common Tern (Sterna hirundo), Greychested Jungle Flycatcher (Rhinomyias umbratilis) and Golden-bellied Gerygone (*Gerygone sulphurea*). Nineteen species are listed as threatened in the IUCN Red List of Threatened Species (MOECAF and Instituto Oikos, 2014).

Feature condition and future outlook of the area
The area was designated as a national marine park (Lampi Marine National Park-LMNP) in 1996 and is the first and, thus far, only Marine National Park of Myanmar. Lampi MNP is categorized under the IUCN category f "national park": IUCN Category II - National Park: Protected Area Managed Mainly for Ecosystem Conservation and Recreation. It is managed by the Nature and Wildlife Conservation Division of Forest Department (Ministry of Environmental Conservation and Forestry). The NWCD park office in Aung Bar is responsible for carrying out the day-to-day management including the policies and prescriptions incorporated in the Lampi Marine National Park Management Plan and for developing and executing annual operational management plans. The Department of Fisheries (DOF) is responsible for management, law enforcement and related activities in relation to fisheries in the LMNP MNP. The Navy is responsible for patrolling and ensuring the security of the resident population and visitors (MOECAF and Instituto Oikos, 2014).

The park suffers from a lack of effective management leading to an increasing amount of illegal activities. As human populations near the park continue to rise, there is an increase in illegal activities in the area, including illegal fishing, overharvesting of marine flora and fauna (including sea cucumbers, sea shells, etc.) and illegal logging for house and boat construction. Some of the most pressing threats include dynamite fishing, fish trawling that damages the coral reefs in the area and heavy commercial fishing in the area (MOECAF and Instituto Oikos, 2014).

The LNMP has gained major global and regional recognition. Since its establishment, it has also been designated an Important Bird Area (IBA) and was also declared an ASEAN heritage site in 2003. In 2014, it was proposed by the Ministry of Environmental Conservation and Forestry as a UNESCO World Heritage site (MOECAF and Instituto Oikos, 2014).

Assessment of the area against the CBD EBSA Criteria

<table>
<tr><td rowspan="2">CBD EBSA Criteria
(Annex I to decision IX/20)</td><td rowspan="2">Description
(Annex I to decision IX/20)</td><td colspan="4">Ranking of criterion relevance
(please mark one column with an X)</td></tr>
<tr><td>No information</td><td>Low</td><td>Medium</td><td>High</td></tr>
<tr><td>Uniqueness or rarity</td><td>Area contains either (i) unique (“the only one of its kind”), rare (occurs only in few locations) or endemic species, populations or communities, and/or (ii) unique, rare or distinct, habitats or ecosystems; and/or (iii) unique or unusual geomorphological or oceanographic features.</td><td></td><td></td><td>X</td><td></td></tr>
<tr><td colspan="6">Explanation
Surveys in the area revealed a number of species that had not previously been reported in the waters of Myanmar, such as:
Two new recorded species of seagrass (Halophila minor and Thalassia hemprichii)
Eight new recorded species of plankton (one phytoplankton species, the pinnate diatom Pleurosigma nicobaricum, and seven zooplankton species, namely: Pegantha sp. (Hydromedusa), Pelagia noctiluca (jelly fish), Pleurobranchia rhodopis (Ctenophore), Phtisica marina (Amphipod), Thallassomysis sewelli (Mysid), Salpa maxima (Salp}, /asis zonaria (Salp).
Seven new recorded species of fish belonging to the Oryziatidae family
Several newly recorded species of birds, namely the Malaysian Plover (Charadrius peronii) Bar-tailed Godwit (Limosa lapponica), Common Tern (Sterna hirundo), Greychested Jungle Flycatcher (Rhinomyias umbratilis), Golden-bellied Gerygone (Gerygone sulphurea)(MOECAF and Instituto Oikos, 2014).</td></tr>
<tr><td>Special importance for life-history stages of species</td><td>Areas that are required for a population to survive and thrive.</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">Explanation
The area contains a number of habitat types that are known to play an important role in the life history stages of various types of animals, including (MOECAF and Instituto Oikos, 2014):
Mangroves (total of 63 species belonging to 31 families)
Coral reefs (61 species and 31 genera of hermatypic corals, and 4 species and 3 genera of ahermatypic corals in the Myeik Archipelago)
Seagrass (1 species of seagrass found in the vicinity of the area, which are grazed on by dugong)
Local communities have also reported sea turtle breeding sites in the area (MOECAF and Instituto Oikos, 2014).</td></tr>
<tr><td>Importance for threatened, endangered or declining species and/or habitats</td><td>Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species.</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">Explanation</td></tr>
</table>

The area contains 11 species of seagrass were in the vicinity, with *Halophila minor* and *Thalassia hemprichii* being the dominant species in the area, which are grazed on by dugongs (*Dugong dugan*) and green turtles (*Chelonia mydas*), both of which are threatened. *Halophila ovalis* is the dominant species in the seagrass beds grazed by dugongs (MOECAF and Instituto Oikos, 2014).

The area also contains 19 bird species that are listed as threatened in the IUCN Red List of Threatened Species (MOECAF and Instituto Oikos, 2014).

Vulnerability, fragility, sensitivity, or slow recovery	Areas that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery.			**X**	

Explanation

The area contains a a number of habitat types that are known to be vulnerable to various anthropogenic pressures, including (MOECAF and Instituto Oikos, 2014):

- Mangroves (total of 63 species belonging to 31 families)
- Coral reefs (61 species and 31 genera of hermatypic corals, and 4 species and 3 genera of ahermatypic corals in the Myeik Archipelago)
- Seagrass (1 species of seagrass, which are grazed on by dugong, found in the vicinity)

Biological productivity	Area containing species, populations or communities with comparatively higher natural biological productivity.			**X**	

Explanation

A plankton survey conducted in March 2010 recorded 136 species of phytoplankton belonging to 49 genera and 150 species of zooplankton belonging to 93 genera. Eight species of plankton were identified as newly recorded species for Myanmar: one phytoplankton species, the pinnate diatom *Pleurosigma nicobaricum*, and seven zooplankton species, namely: *Pegantha sp*. (Hydromedusa), *Pelagia noctiluca* (jelly fish), *Pleurobranchia rhodopis* (Ctenophore), *Phtisica marina* (Amphipod), *Thallassomysis sewelli* (Mysid), *Salpa maxima* (Salp), *Iasis zonaria* (Salp) (MOECAF and Instituto Oikos, 2014).

Biological diversity	Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity.				**X**

Explanation

Mangroves

The mangrove survey conducted in the area in February-April 2010 recorded a total of 63 species belonging to 31 families, comprising both woody species (40 species) and mangrove associates (23 species of shrubs and climbers) (MOECAF and Instituto Oikos, 2014).

Coral Reefs

Fischer (1985), Reef Check Europe (2001) and GCRMN (2005) report that the Myeik Archipelago contains 1,700 km^2 of coral formations. Reef Check Europe in 2001 identified 61 species and 31 genera of hermatypic corals, and 4 species and 3 genera of ahermatypic corals in the Myeik Archipelago. Reef Check Europe estimated that between 60 and 95 species of hard corals are found in the Myeik Archipelago. A total of 512 species of hard corals (*Scleractenian* and *Hydrozoa* corals) were identified from 24 island of the Myeik Archipelago (MOECAF and Instituto Oikos, 2014).

Seagrass

11 species of seagrass were found in the vicinity of the area, with *Halophila minor* and *Thalassia hemprich*ii being the dominant species in the area (MOECAF and Instituto Oikos, 2014).

Plankton

A plankton survey conducted in March 2010 recorded 136 species of phytoplankton belonging to 49 genera and 150 species of zooplankton belonging to 93 genera (MOECAF and Instituto Oikos, 2014).

Seaweed

Seaweed surveys recorded 73 species belonging to 46 genera, belonging to blue-green algae *Cyanophyta* (2 species), green algae *Chlorophyta* (24 species), brown algae *Phaeophyta* (9 species) and red algae *Rhodophyta* (38 species) (MOECAF and Instituto Oikos, 2014).

Molluscs

A survey of molluscs found, in the area and surrounding waters, 50 gastropod species belonging to 27 families and 41 bivalve species belonging to 18 families (MOECAF and Instituto Oikos, 2014).

Crustaceans

A survey of crustaceans, which concentrated on crabs, recorded 42 crab species in the area belonging to 25 genera and 11 families. Among these, families *Grapsidae*, *Potunidae* and *Ocypodidae* are the most diverse groups represented respectively by 11, 9 and 8 species (MOECAF and Instituto Oikos, 2014).

Sea Cucumber

A survey identified 32 species of sea cucumbers, 17 of which were found in the catches of fishers of the area (MOECAF and Instituto Oikos, 2014).

Fish

A partial preliminary icthyological (fish) assessment survey in the area recorded a total of 42 fish species belonging to 22 families, including 7 new records for Myanmar belonging to the family *Oryziatidae* (MOECAF and Instituto Oikos, 2014).

Sea Turtles

Three species of sea turtles, out of the five species reported in the waters of Myanmar, are reported to inhabit the area and the surrounding waters, although hawksbill (*Eretmochelys imbricata*) and leatherback (*Dermochelys coriacea*) are considered extremely rare (MOECAF and Instituto Oikos, 2014).

Dugong

Dugongs (*Dugong dugan*) have been known to occur in the area, since feeding trails were observed starting in 2008 on a dense seagrass meadow in the east coast of Lampi island, where *Halophila ovalis* is the dominant seagrass species (one of the dugong's preferred seagrass species) (MOECAF and Instituto Oikos, 2014).

Birds

A total of 228 species were observed in Lampi Marine National Park and surrounding areas (MOECAF and Instituto Oikos, 2014).

Naturalness	Area with a comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or degradation.		X		

Explanation

Lampi Marine National Park suffers from a lack of effective management leading to an increasing amount of illegal activities in the park. As the human population near the park continues to rise, there is an increase in illegal activities in the area, including illegal fishing, overharvesting of marine flora and fauna (including sea cucumbers, sea shells) and illegal logging for house and boat construction. The most pressing threats include dynamite fishing, fish trawling that damages the coral reefs in the area and heavy commercial fishing in the area (MOECAF and Instituto Oikos, 2014).

References

Ministry of Environmental Conservation and Forestry (MOECAF) and Instituto Oikos (2014). *Lampi Marine National Park General Management Plan: 2014-2018*. Ministry of Environmental Conservation and Forestry. Available at: http://www.lampipark.org

Maps and Figures

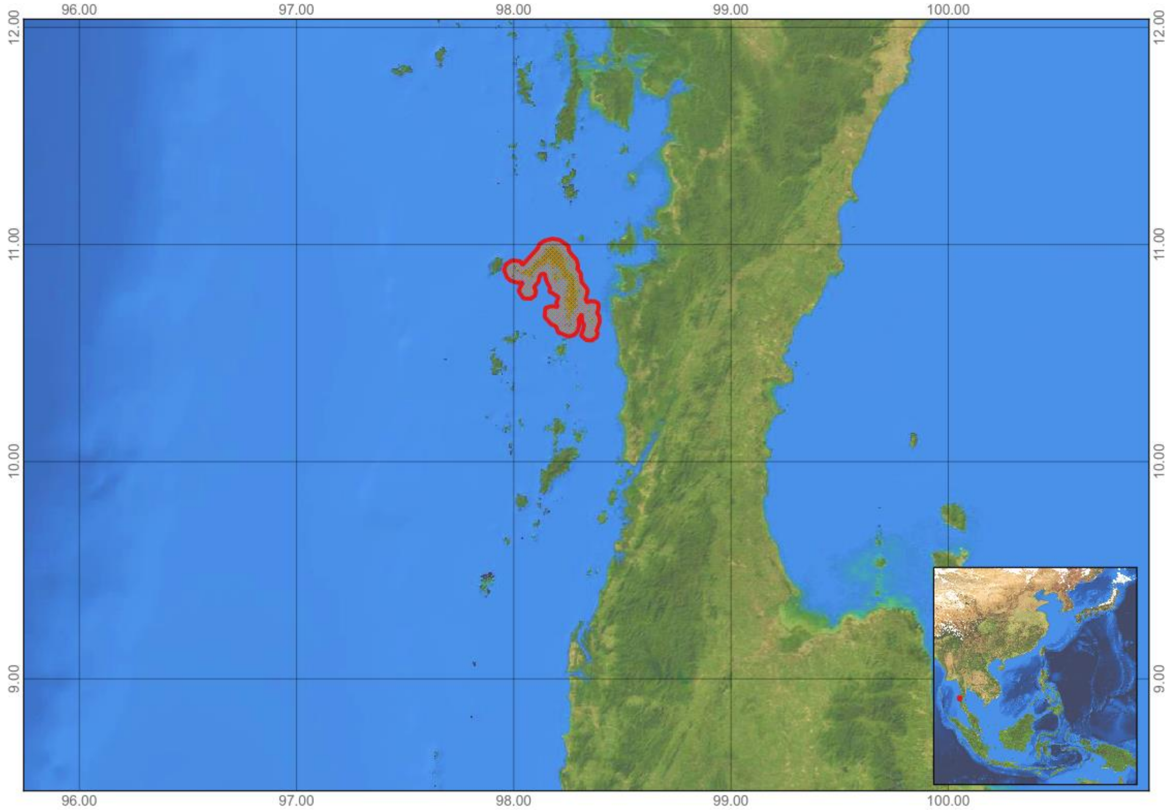

Figure 1. Area meeting the EBSA criteria

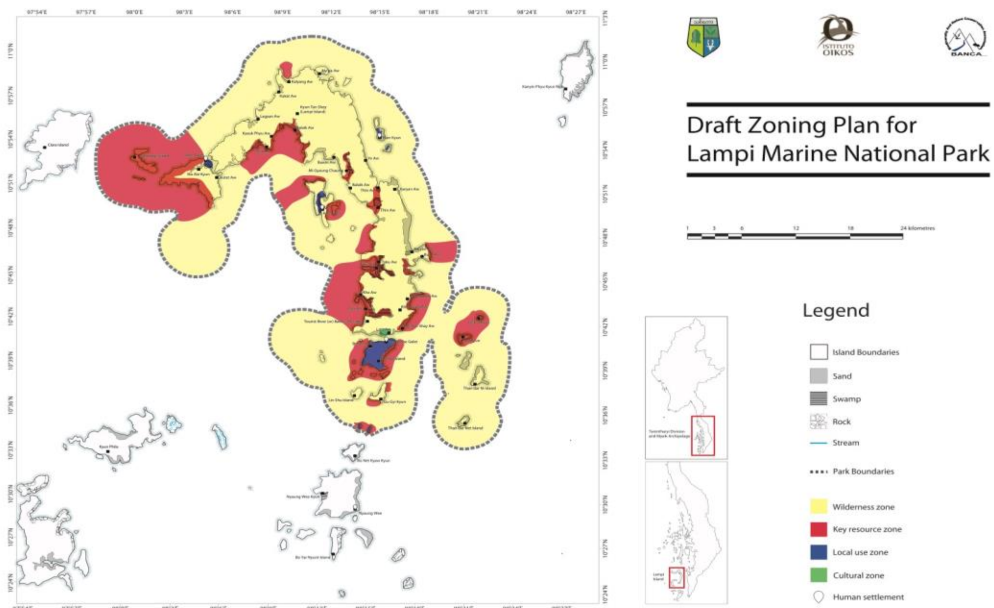

Figure 2. Draft Zoning Plan for Lampi Marine National Park

Area no. 16: Raja Ampat and Northern Bird's Head

Abstract

The Bird's Head Seascape is one of the world's most important biodiversity hotspots, covering a high diversity of geographical features, habitats and marine species. Situated in the heart of the Coral Triangle, it is the global epicenter of tropical shallow-water marine biodiversity, with more than 600 coral species and 1,638 reef fish species. The area is known for particularly significant diverse reef habitat and species richness, providing foraging ground for tuna as well as breeding habitats for leatherback turtles. The local eddies and turbulence in Raja Ampat, generated by strong current flow, lead to good larval connectivity among the reefs, which contributes to high coral reef resilience. The importance for life history stages of various threatened species like turtles and cetaceans as well as high endemism, together with the above features, makes this a globally important area.

Introduction

The Raja Ampat and Northern Bird's Head area contains extremely high diversity of habitat types, coral and reef fish richness, as well as an important feeding ground for tuna, and the largest nesting population of leatherback turtles in the region. It was recognized as one of the most globally outstanding areas within Bismarck Solomon Seas Ecoregion. This area is located in the northwestern part of the Bird's Head Seascape, which encompasses a diversity of habitats, including the shallow fringing, barrier, patch, lagoon and atoll reefs in Raja Ampat, mangrove-dominated coasts, rivers and inlets in Bintuni Bay, as well as the enclosed shallow Cendrawasih Bay (Mangubhai et al. 2012). Due to its specific location and biogeographic features, it also provides critical nesting and feeding habitats, and migration routes for various threatened species, including sea turtles and cetaceans. The outstanding marine biodiversity of this region has been revealed by scientific expeditions to Raja Ampat as early as the 1800s (Palomares et al. 2007), and it has raised the global priority concern for conservation of the Bird's Head Seascape (Roberts 2002).

This ecologically important area with rich biodiversity area has fortunately not been seriously influenced by human activities as it is rather isolated and remote from major human settlement. This ecoregion is regarded as one of the last tropical marine ecoregions that is still relatively free from human disturbances (WWF, 2003).

Location

The area is located in northwestern Papua, eastern Indonesia (Figure 1). Situated near the Equator in Southeast Asia, this area is at the heart of the Coral Triangle and encompasses myriads of small islands and coral reefs. Raja Ampat consists of four main islands and hundreds of other small islands, located at the western side of the Bird's Head Seascape. The boundary of the globally outstanding area of Raja Ampat and Northern Bird's Head covers two adjacent areas (NNGC 01 and NNGC 04) within the Bismarck Solomon Seas Ecoregion.

Feature description of the proposed area

Physical description

Bird's Head Seascape has a diverse and complex oceanographic pattern due to the shape of its coastline and location at the entrance of the "Indonesian Throughflow", which flows from the Pacific Ocean to the Indian Ocean in a north-south direction (Vranes and Gordon, 2005) (Figure 3). When passing through the numerous small islands and reefs, the strong current generates local eddies and turbulence, which leads to good larval connectivity among the reefs (Barber et al. 2002; Crandall et al. 2008).

In Raja Ampat, the sea surface temperatures vary according to the seasons, with warmer temperatures around 30°C in summer (Dec – Feb), cooling down to 26.5 °C during winter (Jun – Aug), a pattern mainly governed by the monsoons (Agostini et al. 2012). The sea surface temperature across the coral reef habitats in the Bird's Head Seascape was shown to have remarkable geographic and seasonal differences (Figure 4). The average SST in the northern part of Raja Ampat (around 29.0 °C, and ranging from 28.0 to 34.1 °C around Mayalibit Bay) and Northern Bird's Head Seascape are quite stable except the western and southern part of Raja Ampat (Southeast Misool, Dampier Strait, Sagewin Strait and Bougainville Strait), which are more influenced by cold-water upwelling, especially when the strong monsoon wind from the south blows (Mangubhai et al. 2012). Cold-water upwelling or extreme temperature fluctuation in lagoons can have large short-term temperature variability up to 13°C over 24 hours (Agostini et al. 2012).

Biological description

Raja Ampat and Northern Bird's Head are regarded as among the six globally important areas within the Bismarck Solomon Seas Ecoregion. Raja Ampat has extremely diverse marine habitats, including coral reefs with diverse reef types (fringing, barrier, patch and atoll reefs), seagrass beds and mangrove forests and deep channels between the islands, which support high variety of corals, reef fish assemblages, marine mammals and invertebrates, as well as serve as important feeding areas for skipjack and yellowfin tuna (WWF 2005). Northern Bird's Head, on the other hand, has the largest nesting aggregation of the endangered leatherback turtles in the Pacific region, as well as three other turtle species (WWF 2005). The biological features of this area are described in detail below.

Coral reefs

Raja Ampat has uniquely high biodiversity of corals and reef fishes because of its high diversity of habitats, ranging from shallow reef habitats, which include fringing, barrier, patch and atoll reefs to deep channels between the main islands (Agostini et al. 2012). Records of 1,427 species of fish (1,357 species of coral reef fish) were made in Raja Ampat Islands, which is the highest record in this relatively small area (Dimara et al. 2010). The 553 known species of scleractinian coral in Raja Ampat is the highest diversity in the world, which constitutes up to 75% of world's total (Veron et al. 2009). The level of endemism is high in the reefs, with 5–6% of all coral species and 2.5% of reef fish found only in this region (Allen and Erdmann, 2012).

The coral reefs in the area are also relatively healthier than the other parts of Indonesia and Southeast Asia (Ainsworth et al., 2008; Burke et al., 2011) because of its isolated location and fairly low human population nearby (Pauly and Martosubroto 1996, Donnelly et al. 2003). The resilience of the coral reefs of Raja Ampat is relatively high because of the local eddies and turbulence generated by the passage of strong currents, which contributes to good connectivity among the reefs (Barber et al. 2002). Corals could also reach 160 m in some parts of Raja Ampat (Mangubhai et al. 2012).

Mangrove forest

The world's most extensive and diverse mangrove communities can be found in Papua (Alongi, 2007; Spalding et al., 2010). Although mangroves are not as extensive in Raja Ampat as on the mainland communities, the species diversity is high; 25 mangrove species have been recorded (Firman and Azhar 2006).

Seagrass beds

There is high diversity of seagrass communities in the Bird's Head Seascape. Twelve to 15 species of seagrass species have been recorded in the whole Bird's Head Peninsula region, though no estimate of species numbers is available for Raja Ampat (Short et al. 2007). Deepwater seagrass beds dominated by

Halophila are important feeding grounds for dugongs (McKenzie et al. 2007). The seagrass beds at Sayang, Kawe, Waigeo, Batana and Salawati in Raja Ampat are also important foraging ground for green turtles and rabbit fish, which supports the local commercial fishery (Firman and Azhar, 2006; McKenzie et al., 2007)

Marine lakes

Tidal fluctuations bringing seawater into islands through porous karst or subterranean crevices create land-locked water bodies called marine lakes (Becking et al., 2009). Because of the variation in bathymetry, size, coastline, salinity, temperature, pH, degree of connection to the sea and the other biophysical parameters of the lakes (Becking et al., 2011), diverse species can be found. In the more than 45 marine lakes in Raja Ampat, various corals, nudibranchs, shrimps, fish, bivalves, sponges (including a number of endemic species), ascidians, ctenophores, and jellyfish have been recorded (Becking et al., 2009).

Sea turtles

The distribution pattern of the sea turtles is largely based on their life history stages and habitats. The turtles prefer to forage at coastal areas, especially the coral reefs and seagrass beds, and their migratory routes in Indonesia are shown in Figure 5. The Raja Ampat and Bird's Head Peninsula are the nesting sites of four turtle species, including green (*Chelonia mydas*), olive ridley (*Lepidochelys olivacea*), hawksbill (*Eretmochelys imbricata*), and leatherback (*Dermochelys coriacea*). The area covering Raja Ampat Sea and Bird Head's coast has the largest green turtle nesting site in Southeast Asia (2,000-2,500 nests/year), while the Bird Head's coast has a nesting population of olive ridley turtles (400-500 nests/year), which is the largest in Indonesia, and the largest remaining population of leatherback turtles in the Pacific Region (4,000-5,000 nests/year) (EBM turtles 2010).

Sharks

Various shark species have been recorded in the Bird's Head Seascape, including blacktip reef shark (*Carcharhinus melanopterus*), tasseled wobbegongs (*Eucrossorhinus dasypogon*), and three species of epaulette or ''walking'' sharks that are endemic to the region (*Hemiscyllium freycineti*, *Hemiscyllium galei*, and *Hemiscyllium henryi*) (Allen and Erdmann, 2008). Although there is relatively low abundance of sharks even in the MPAs in Raja Ampat, probably due to overharvesting for their valuable fins, it has been speculated that the blacktip reef shark population in Kawe and Southeast Misool MPA is recovering (Mangubhai et al. 2012).

Cetaceans

Surveys and reports around the Bird's Head Seascape suggest that this region is a cetacean hotspot that supports a high diversity and healthy population of cetacean species (Mangubhai et al. 2012), including Bryde's (*Balaenoptera edeni*), false killer (*Pseudorca crassidens*), killer (*Orcinus orca*), and sperm whales (*Physeter macrocephalus*), and Indo Pacific humpback (*Sousa chinensis*), pan tropical spotted (*Stenella attenuata*) and Fraser's dolphins (*Lagenodelphis hosei*) (Rudolf et al., 1997; Kahn, 2007, 2009; Mangubhai et al. 2012). The occurrence of narrow continental shelves, which creates the variety of coastal and oceanic habitats, including seamounts and canyons in the region, is one of the major factors causing this high cetacean species diversity (Kahn, 2007). In particular, migratory species such as baleen and sperm whales as well as resident populations of Bryde's whales have been recorded in Raja Ampat (Wilson et al. 2010a, Kahn 2009).

Dugongs

Dugongs have been recorded in coastal areas of Sorong and Raja Ampat (Marsh et al., 2002; De Iongh et al., 2009; Kahn, 2009). Aerial surveys revealed the wide distribution of dugongs around the main islands of Raja Ampat, including Salawati and Batanta Islands, east Waigeo Island, Dampier Strait and northern

Misool, and sightings of family groups of dugongs were observed in some of these areas (Wilson et al., 2010a). This highlights the importance of conservation focused on protecting seagrass beds as important dugong habitat as well as reducing illegal hunting and fishing threats to them (Mangubhai et al. 2012).

Crocodiles
Crocodiles are found in Raja Ampat and some parts of Bird's Head Peninsula. All crocodile species are protected by Indonesian law, yet they have been hunted for their valuable skin. Limited data is available about their distribution and abundance in the region. In Mayalibit Bay, and Waigeo, Batanta and Misool islands of Raja Ampat, remnant populations of saltwater crocodiles were observed (Mangubhat et al. 2012).

Feature condition and future outlook of the proposed area
The relatively low population and the isolated location of Raja Ampat and Northern Bird's Head enables it to avoid human disturbance, which keeps its coral reefs and other habitats in better condition than the rest of Indonesia (Pauly and Martosubroto 1996, Donnelly et al. 2003) as well as the wider Southeast Asian region (Ainsworth et al., 2008; Burke et al., 2011). Besides, many of the mangrove stands are still in good condition (Alongi 2007), and most of the marine lakes (except six of the more than 45 identified ones) in Raja Ampat are in pristine condition without serious threats from invasive species or human disturbances (Becking et al., 2009, 2011). The livelihood of the local communities largely depends on the healthy marine resources for their food and income in the coastal area (Amarumollo and Farid 2002; Larsen et al., 2011), and the importance of the resources is indicated by the traditional tenurial system and management practices of the local communities (McLeod et al. 2009b).

The relatively small population of the coastal communities depends highly on the marine resources for their income and food, especially from fisheries (Larsen et al. 2011). Before the 1960s, the traditional subsistence fishers fished from small canoes using hand-lines (Mangubhai et al. 2012). However, the situation has changed drastically since the introduction of the commercial fishery, which over-exploited the fishery resources (Palomares et al. 2007), and it was exacerbated by the use of destructive fishing techniques involving dynamite, cyanide and compressor fishing since the 1980s (Ainsworth et al. 2008). Other stressors, including transmigration, mining and pollution, have further deteriorated the habitat conditions (Mangubhai et al. 2012).

Fisheries have been the major influence on the ecosystems, which includes large-scale commercial fisheries like lift net fishing, long-lining, tuna fishing, shark finning, and live reef fish food trade (Bailey et al. 2008; Wilson et al. 2010). Targeted reef and pelagic fish species, including wrasse, grouper, snapper, parrotfish, surgeonfish, sardine, anchovy, skipjack tuna and Spanish mackerel (McKenna et al. 2002, Donnelly et al. 2003, TNC 2004), as well as invertebrates such as sea cucumbers and shellfish, are also important commercial species for the local fishery (Varkey et al. 2010). Overharvesting of the fishery resources and destructive fishing practice such as the use of dynamite and cyanide lead to a significant decline of fish stocks (Palomares et al. 2007, Ainsworth et al. 2008) and damage the coral reefs; the situation is exacerbated by illegal, unreported and unregulated fisheries (Heazle and Butcher, 2007; Varkey et al. 2010).

Other uses of marine resources in the area include mariculture, scuba diving, oil and gas extraction, and commercial shipping (Agostini et al. 2012). Without proper management, the mining activities, forestry and coastal development activities lead to sediment runoff and eutrophication into the marine environment, which deteriorates the water quality and degrades important habitats like mangroves, seagrass beds and coral reefs (Agostini et al. 2012). Habitat degradation by coastal development, beach erosion, pollution, as well as egg predation, poaching and bycatch are major threats to the turtles (Hitipeuw et al., 2007; Tapilatu and Tiwari, 2007). Rapid expansion of the population in the coastal areas due to encouragement of transmigration as well as the accelerated development supported by the government to alleviate poverty also lead to additional stress to the ecosystems.

Across the marine protected areas of Bird's Head Seascape, varied levels of reef damage have been recorded, according to point intercept transect (11.8-24.0%) and manta towing surveys (8.8-33.4%) (Mangubhai et al. 2012). There was also an estimation of a four-fold decline in leatherback turtle nesting population from 1985 (1000–3000 females/ annum) to 2004 (300–900 females/annum), with this pattern of decline continuing to 2011 (Hitipeuw et al. 2007). The cetacean populations are susceptible to threats and stressors like ship strikes, entanglement in fishing nets, loss of coastal habitats and plastic pollution as well as the unique threat of undersea mining and seismic testing around Bird's Head Seascape (Mangubhai et al. 2012), which can disrupt cetaceans as well as their natural migration and feeding patterns (McCauley et al., 2000). The populations of dugongs and crocodiles are also threatened by bycatch, illegal hunting and habitat degradation (Mangubhai et al. 2012). There has also been systematic harvesting of sharks from Raja Ampat and other parts of the Bird Head's Seascape since the 1980s, mainly for their high-valued fins, leading to their overharvesting. However, with the protection by MPAs and no take zones, the shark population seems to be recovering especially in the case of black-tip shark *Carcharhinus melanopterus* (Mangubhai et al. 2012).

In view of the high importance of the Raja Ampat and the Bird's Head Peninsula to a variety of species as well to the livelihoods of local communities, various MPAs have been designated for sustainable management of the natural resources. Raja Ampat Regency was designated as a "national strategy area" for marine conservation, and the Raja Ampat MPA network was declared in 2007 through declaration of six new MPAs. The network covers a total of 1,185,940 ha, and is joined together with five other areas across the Bird's Head Seascape to form a larger network encompassing more than 3 million ha (Agostini et al. 2012) (Figure 6). Capacity-building for sustainable management of marine resources through the joint effort of government and NGOs is in progress in order to balance the development pressures (Mangubhai et al. 2012). Patrols with enforcement agencies and local communities have also proved to be effective in reducing destructive fishing in the MPAs (Mangubhai et al. 2012). The dramatic expansion of marine tourism in the Bird Head's Seascape (Jones et al., 2011) is also regulated by the establishment of a marine tourism licensing system since 2011, which limits the scale of tourism development while ensuring the sustainable income of the communities. Through development of management and zoning plans in the MPAs with support from NGOs, better conservation and sustainable use of natural resource is expected to be achieved (Mangubai et al. 2012).

Nevertheless, the Bird's Head Seascape is also vulnerable to the impacts of climate change, including increased frequency and severity of elevated SSTs and extreme weather events, sea-level rise and ocean acidification. Although no record of severe coral bleaching events was reported until 2012 (Mangubhai et al. 2012), there is an estimated doubling in magnitude and frequency of thermal stress events, which are severe enough to cause bleaching over the next 100 years (McLeod et al. 2010). The combined effects of elevated temperature, extreme weather events, sea-level rise and ocean acidification are serious potential threats to the endangered species, important ecosystems as well as the livelihood and food security of the local communities (Klein and Nicholls, 1999; Mangubhai et al. 2012).

In view of the urgency to protect this important area, NGOs, government and the local communities started to cooperate to promote a sustainable fishery, build local capacity in implementing resource management and facilitate the establishment of an MPA network since the 2000s. While some signs of gradual recovery of marine resources have been observed, which apparently reflect some conservation success in this area, long-term monitoring and implementation of more management measures are crucial in limiting the human disturbances to the ecosystems for the sustainability of this globally important biodiversity hotspot.

Assessment of the area against the CBD EBSA Criteria

<table>
<tr><td rowspan="2">CBD EBSA Criteria
(Annex I to decision IX/20)</td><td rowspan="2">Description
(Annex I to decision IX/20)</td><td colspan="4">Ranking of criterion relevance
(please mark one column with an X)</td></tr>
<tr><td>No information</td><td>Low</td><td>Medium</td><td>High</td></tr>
<tr><td>Uniqueness or rarity</td><td>Area contains either (i) unique (“the only one of its kind”), rare (occurs only in few locations) or endemic species, populations or communities, and/or (ii) unique, rare or distinct, habitats or ecosystems; and/or (iii) unique or unusual geomorphological or oceanographic features.</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">Explanation for ranking (must be accompanied by relevant sources of scientific articles, reports or documents)
Raja Ampat has uniquely high biodiversity of corals and reef fishes because of its high diversity of habitats, ranging from shallow reefs, which include fringing, barrier, patch and atoll reefs, to deep channels between the main islands (Agostini et al. 2012). The level of endemism is high in the reefs, with 5–6% of all coral species and 2.5% of reef fish found only in this region (Allen and Erdmann, 2012). The coast and offshore areas of Bird’s Head are the most important leatherback turtle breeding areas for the largest population in the Pacific Region (WWF, 2003). In addition, there are saltwater lakes throughout Raja Ampat, which nourish endemic species of sponge or species with special adaptations like stingless jellyfish (Becking et al. 2011).</td></tr>
<tr><td>Special importance for life-history stages of species</td><td>Areas that are required for a population to survive and thrive.</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">Explanation for ranking (must be accompanied by relevant sources of scientific articles, reports or documents)
Raja Ampat and Bird Head’s coast has globally important nesting beaches for green turtles, hawksbill turtles, leatherback sea turtles and Olive Ridley sea turtles (Huffard et al. 2012). The area covering Raja Ampat Sea and Bird Head’s coast has the largest green turtle nesting site in Southeast Asia (2,000-2,500 nests/year), while the Bird Head’s coast has the largest nesting population of Olive Ridley turtles (400-500 nests/year) in Indonesia, and the largest remaining population of leatherback turtles in the Pacific Region (4,000-5,000 nests/year) (EBM turtles 2010).

The sea around Raja Ampat provides important feeding areas for tuna, while the seagrass beds on the islands of Sayang, Kawe, Waigeo, Batanta and Salawati, as well as several smaller islands, are important foraging sites for green turtles and habitat for rabbitfish (WWF, 2003, Mungabhai et al. 2012). In addition, 17 species of marine mammals have been recorded in Raja Ampat, including nine whale species, seven dolphin species, and dugong (Kahn 2007, Muljadi 2009, Syakir and Lantang 2009, Wilson et al., 2010a). This shows that it is probably an important migratory pathway, feeding and breeding ground of these species. One significant grouper spawning aggregation (>300 individuals) is also recorded in Raja Ampat (Wilson et al., 2010b).</td></tr>
<tr><td>Importance for</td><td>Area containing habitat for the survival and recovery of endangered, threatened, declining</td><td></td><td></td><td></td><td>X</td></tr>
</table>

threatened, endangered or declining species and/or habitats	species or area with significant assemblages of such species.				

Explanation for ranking (must be accompanied by relevant sources of scientific articles, reports or documents)

Raja Ampat and the Bird's Head Peninsula are important habitats of green (Endangered), hawksbill (Critically Endangered), leatherback (Vulnerable) and olive ridley sea turtles (Vulnerable) (Huffard et al. 2012). This region also is a cetacean 'hotspot' and supports diverse and healthy populations for numerous species on the IUCN Red List. Fifteen cetacean species have been recorded in the Bird's Head Seascape, including Bryde's (*Balaenoptera edeni*) (Data Deficient), false killer (*Pseudorca crassidens*) (Data Deficient), killer (*Orcinus orca*) (Data Deficient), and sperm whales (*Physeter macrocephalus*) (Vulnerable), and Indo Pacific humpback (*Sousa chinensis*) (Near Threatened), pan tropical spotted (*Stenella attenuata*) (Least Concern) and Fraser's dolphins (*Lagenodelphis hosei*) (Least Concern) (Rudolf et al., 1997; Kahn, 2007, 2009; Mangubhai et al. 2012). In Raja Ampat, dugongs (*Dugong dugon*) (Vulnerable) are widely distributed, according to aerial survey results (Wilson et al., 2010a).

Vulnerability, fragility, sensitivity, or slow recovery	Areas that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery.			X	

Explanation for ranking (must be accompanied by relevant sources of scientific articles, reports or documents)

The resilience of the coral reefs of Raja Ampat is relatively high because of the local eddies and turbulence generated by the passage of strong currents, which contributes to good connectivity among the reefs. (Barber et al. 2002). There is currently only one significant grouper spawning aggregation site found in Raja Ampat, and it remains vulnerable to overharvesting in migratory corridors by adjacent fisheries during the spawning season (Wilson et al., 2010b). Nevertheless, it is suggested that if adequate protection is in place, the other potential or historic spawning aggregation sites may still slowly recover (Grantham et al. 2013).

An estimated four-fold decline in leatherback turtle nesting population took place from 1985 (1000–3000 females/ annum) to 2004 (300–900 females/annum), with this pattern of decline continuing to 2011 (Hitipeuw et al. 2007) which shows the vulnerability, fragility and sensitivity of the population.

Biological productivity	Area containing species, populations or communities with comparatively higher natural biological productivity.				X

Explanation for ranking (must be accompanied by relevant sources of scientific articles, reports or documents)

The high diversity and coverage of coral reefs, seagrass and mangrove habitats are important in supporting reef fish assemblages as well as sea turtle, dugong and a highly diverse population of marine invertebrates (WWF, 2005). The area's high productivity makes it also an important foraging ground for skipjack and yellowfin tuna (WWF, 2005).

Biological diversity	Area contains comparatively higher diversity of ecosystems, habitats, communities, or				X

	species, or has higher genetic diversity.				

Explanation for ranking (must be accompanied by relevant sources of scientific articles, reports or documents)

There is high diversity of mangroves and seagrass communities in the area. Twelve to fifteen species of seagrass have been recorded in the whole Bird's Head Peninsula region, though no estimate of the number of species was available within the boundary (Short et al. 2007). Twenty-five mangrove species have been recorded in Raja Ampat (Firman and Azhar 2006).

An astounding number of fish species, 1,427, (1,357 species of coral reef fish) have been recorded in Raja Ampat Islands, which is the highest record in this relatively small area (Dimara et al. 2010). The 553 known species of scleractinian coral in Raja Ampat is the highest diversity in the world and constitutes 75% of world's total (Veron et al. 2009). In addition, 41 of the 90 Alcyonacean coral genera, 669 species of mollusc, 16 species of cetacean, dugong, and three species of turtles (Brooks et al. 2002; McKenna et al., 2002; Donnelly et al., 2003) were also found in Raja Ampat.

Naturalness	Area with a comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or degradation.				X

Explanation for ranking (must be accompanied by relevant sources of scientific articles, reports or documents)

The Bismarck Solomon Seas Ecoregion is one of the tropical marine ecoregions that remains relatively unaffected by human activity (WWF, 2003), which is less severe than the rest of Indonesia (TNC, 2008). For instance, the coral reefs in the area are relatively healthier than the other parts of Indonesia and Southeast Asia (Ainsworth et al., 2008; Burke et al., 2011) because of its isolated location and fairly low population (Pauly and Martosubroto 1996, Donnelly et al. 2003). Destructive fishing practices such as dynamite, cyanide and compressor fishing occur in lower intensity or geographic spread than other parts of Indonesia (McKenna et al., 2002; Ainsworth et al., 2008). However, overfishing is still largely uncontrolled and continues to threaten the coral reefs (Mangubhai et al. 2012). There has been systematic harvesting of sharks from Raja Ampat and other parts of the Bird Head's Seascape since the 1980s, mainly for their high-valued fins, which leads to their overharvesting. However, with the protection by MPAs and no take zones, the shark population seemed to be recovering especially for the case of black-tip shark *Carcharhinus melanopterus* (Mangubhai et al. 2012).

Most of the marine lakes (except six of the more than 45 identified ones) in Raja Ampat are in pristine condition without serious threats from invasive species or human disturbances (Becking et al., 2009, 2011).

Shipping, coastal development and plastic pollution are realities in the area, as are undersea mining and seismic testing, which occur around Bird's Head Seascape (Mangubhai et al. 2012).

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(e.g. relevant documents and publications, including URL where available; relevant data sets, including where these are located; information pertaining to other relevant material, models, etc.)

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Maps and Figures

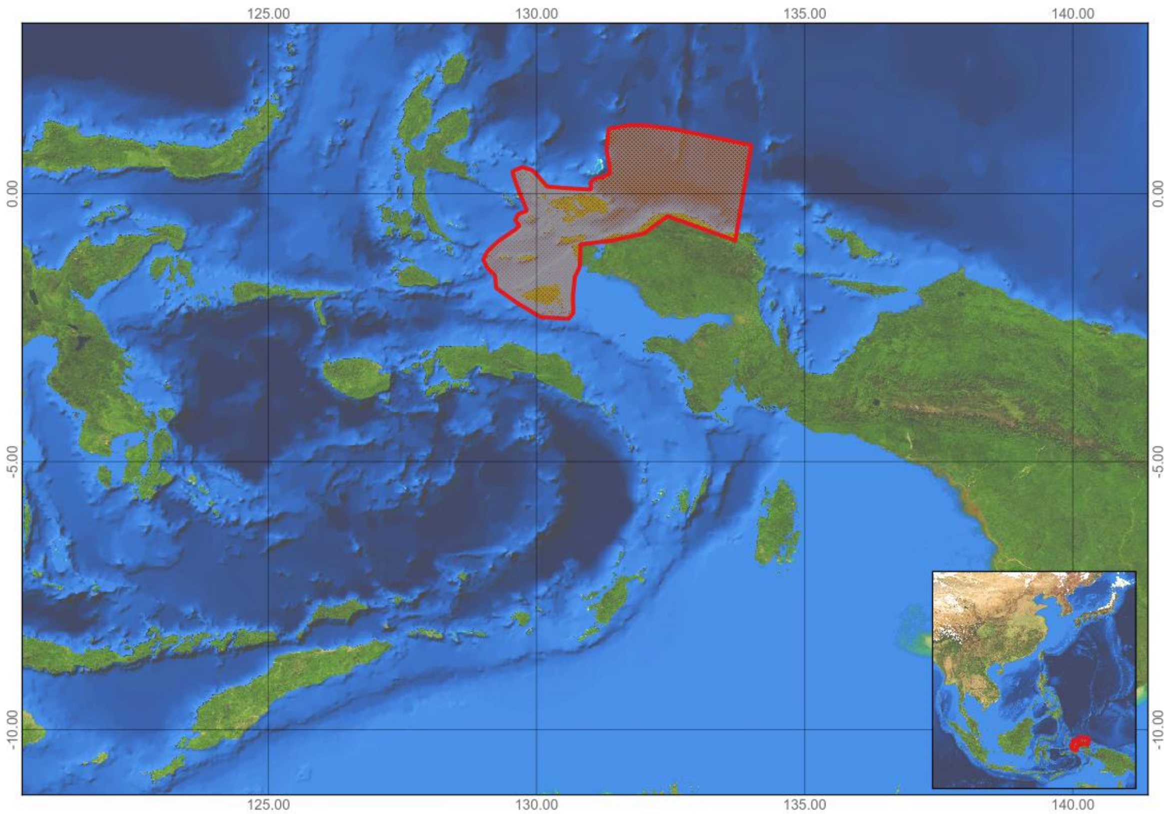

Figure 1. Area meeting the EBSA criteria

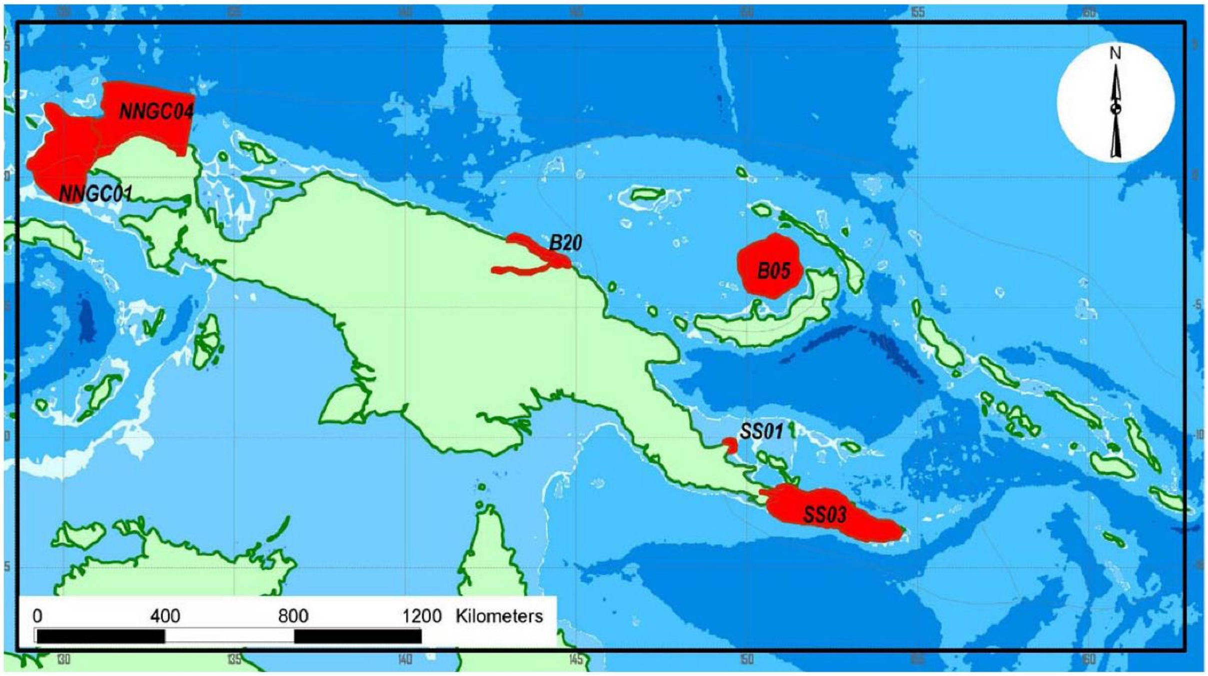

Figure 2. Map showing the globally outstanding areas (areas filled in red) in Bismarck Solomon Seas Ecoregion. The areas of NNGC 01 and NNGC 04 mark the boundary of Raja Ampat and Northern Bird's Head respectively (WWF PNG, 2005)

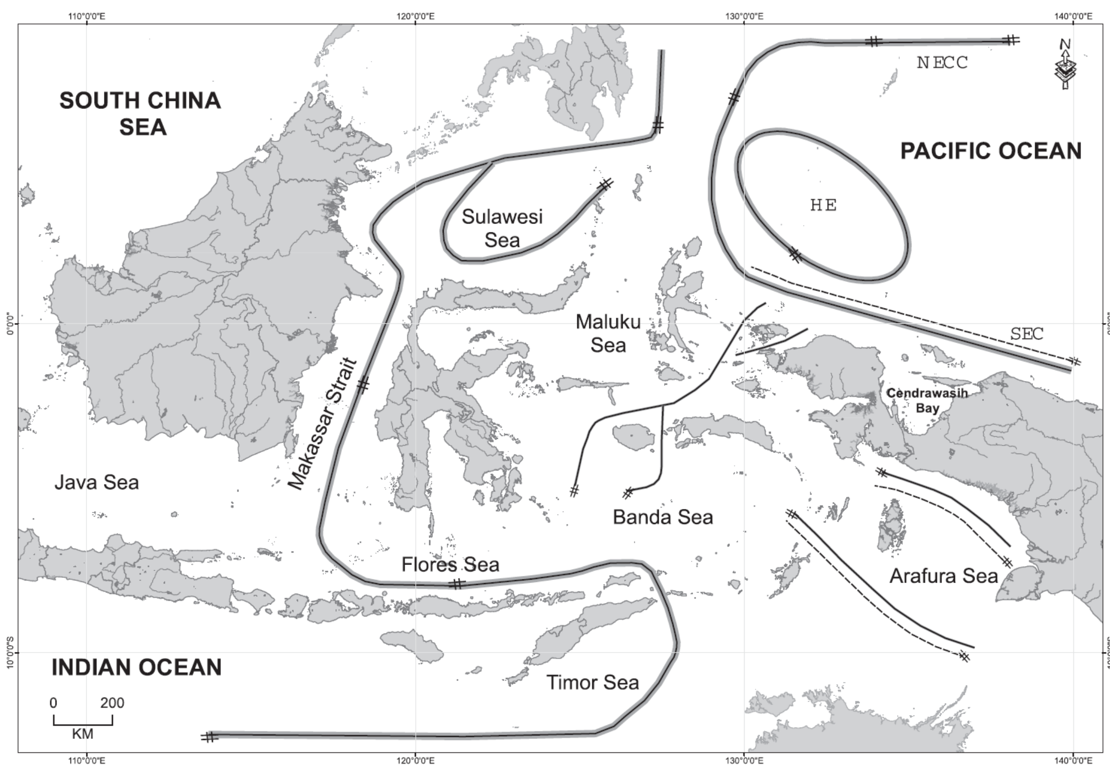

Fig. 4. Main oceanographic currents during the northwest and southeast monsoons in Eastern Indonesia. Dotted arrows indicate reverse flow of currents during the southeast monsoon. Source: Atlas Sumberdaya Kelautan, Bakosurtanal, 2006.

Figure 3. The oceanographic currents during the northwest and southeast monsoons in Eastern Indonesia. During the northwest monsoon, the "Indonesian Throughflow" passes through Raja Ampat from the Pacific Ocean to the Indian Ocean in a north-south direction (Mangubhai et al. 2012)

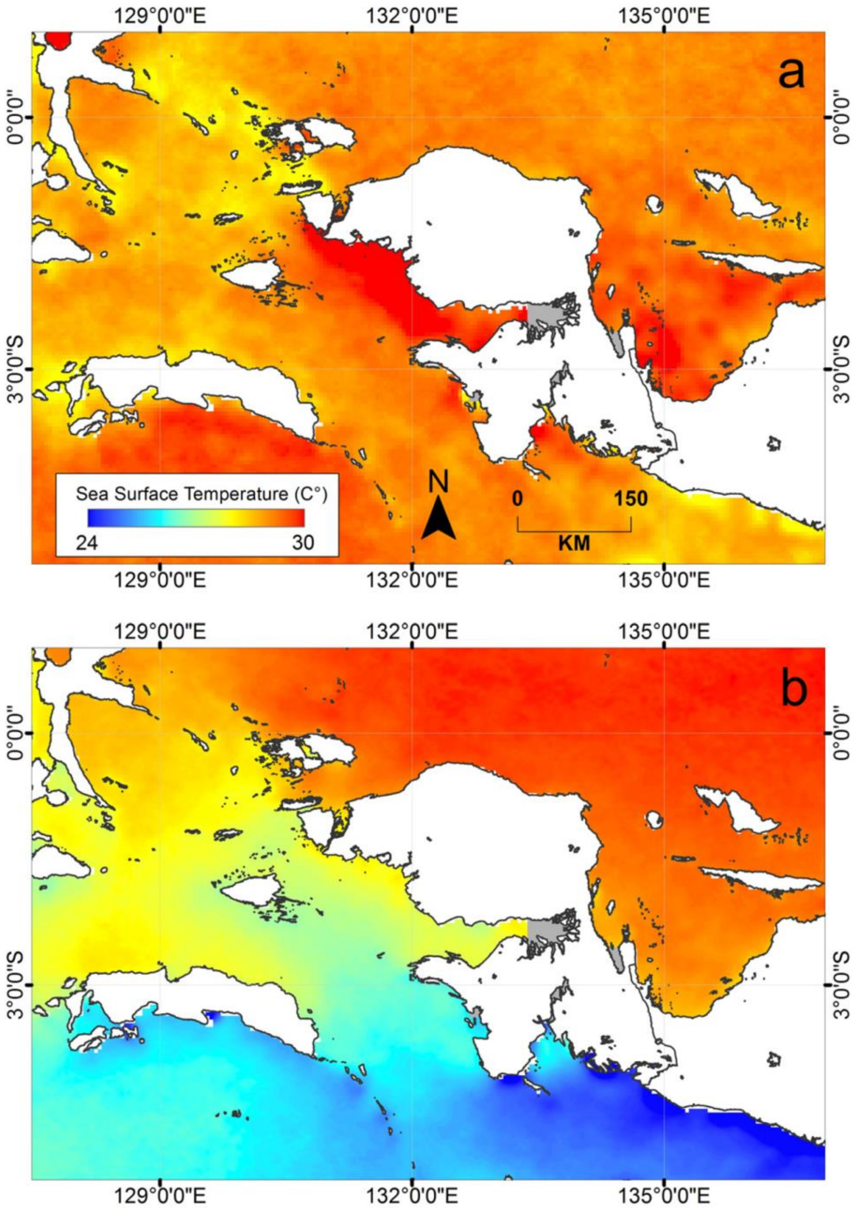

Figure 4. Seasonal average sea surface temperature patterns in the Bird's Head Seascape in 1985-2009 (a) November to March; and (b) May to October (Mangubhai et al. 2012)

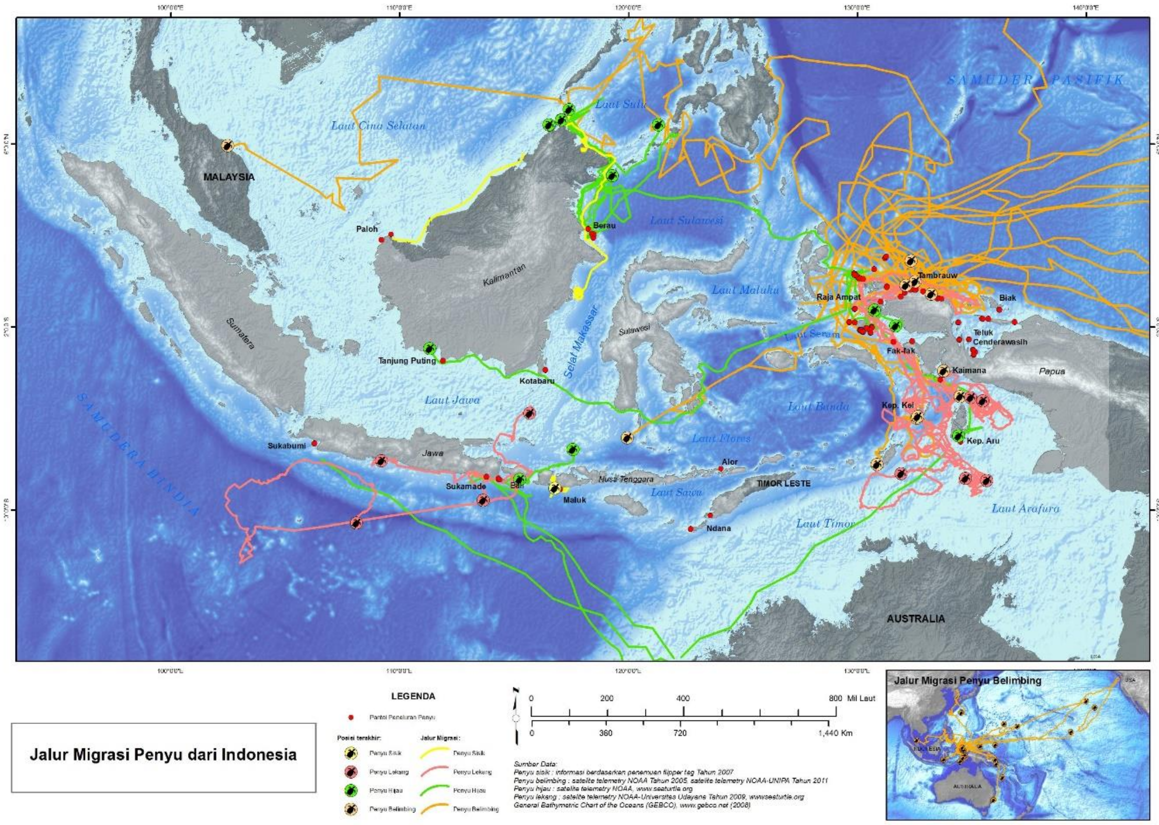

Figure 5. Sea turtle migratory routes from Indonesia. Yellow, red, green and orange lines represent the migratory routes of Hawksbill, Olive Ridley, Green and Leatherback turtles respectively.

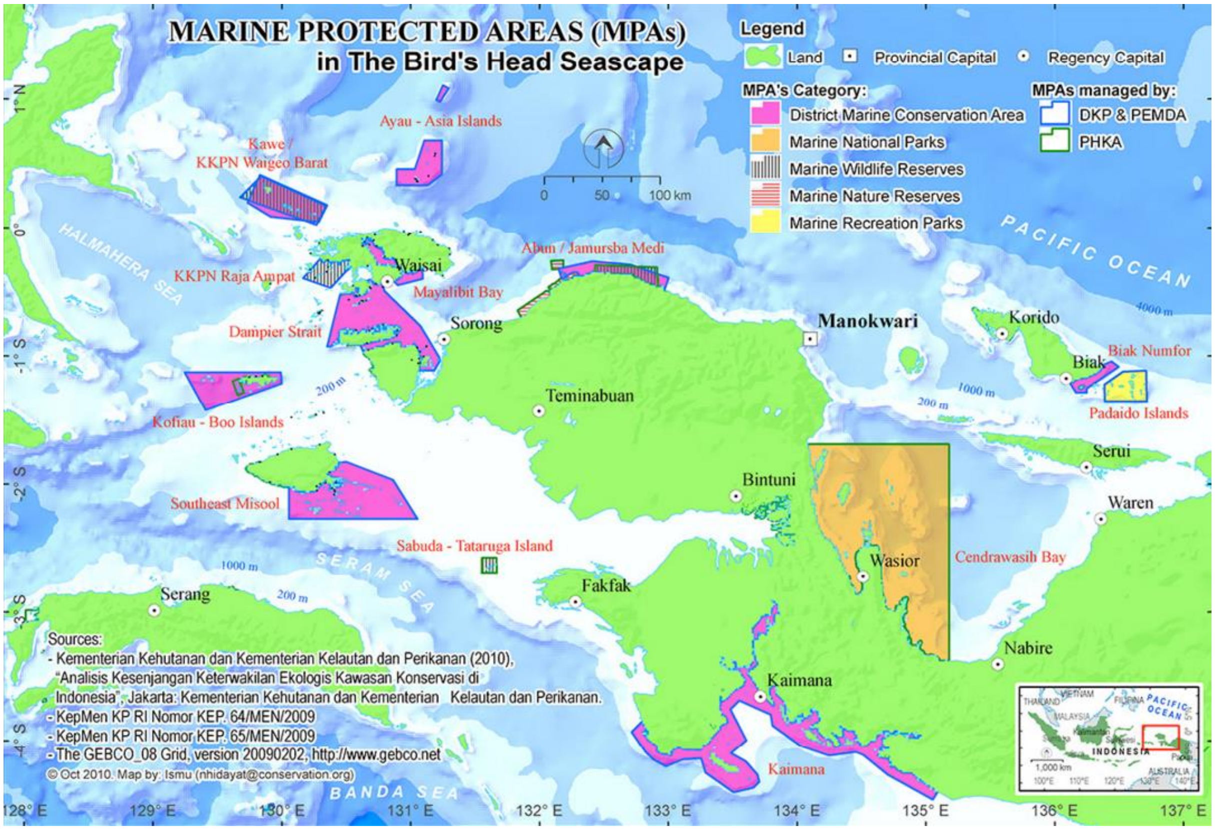

Figure 6. Map showing the MPA network across the Bird's Head Seascape encompassing more than 3 million ha of marine areas (Bird's Head Seascape – Conservation International, 2015)

Area no. 17: Atauro Island

Abstract

Atauro Island is a small island surrounded by a pristine marine area. Even though there are limited studies by scholars, one study from the Coral Triangle Support Program (CTSP) showed that Atauro Island has potentially high biodiversity and is oceanographically highly significant because it is situated in the epicenter of Ombai Strait.

Introduction

Atauro Island is “oriented slightly north to south direction and has a mountainous ridge running throughout its length” (Cabanban A.S./CTI Pacific, 2014). The island is rich in biodiversity resources and natural beauty, including magnificent coral reefs, pristine coastal waters and megafauna assemblages that include whales, dolphins, whale sharks, orcas and mantas (Erdmann M.V. & Mohan C., 2013).

Based on the study by Erdmann and Mohan (2013), Atauro Island has “extremely high biodiversity and highly strategic oceanographic setting in the center of the Ombai Strait (bathing these reefs with strong currents and frequent cool upwellings and thus affording it both outstanding connectivity with other reefs of the Lesser Sunda marine ecoregion and also likely strong climate change resilience”.

Location

Atauro Island is located about 27 km north of the city of Dili, the capital of Timor-Leste, and covers an area of about 144 km^2 (Figure 1) (National Coordinating Committee of Timor-Leste, 2012).

Feature description of the proposed area

A preliminary study conducted by the CTSP indicated that Atauro Island is rich in biodiversity resources that need to be protected and conserved by the government (Erdmann and Mohan, 2013). Like Nino Konis Santana National Park (area no. 10), the marine waters of Atauro Island contain a wealth of marine species that are densely concentrated on coral reefs. For instance, the condition and conservation status/resilience of hard corals and coral reef fishes of approximately four sites (Figure 3) represent the full range of oceanographic and ecological conditions found in the area (Erdmann and Mohan, 2013). Most of the marine area of Atauro Island has been designated by the Government of Timor-Leste as a marine protected area.

Feature condition and future outlook of the proposed area

During an environmental campaign from the National Directorate for Biodiversity Protection and Restoration (2015) it was indicated that many local communities still use firewood for cooking and traditional house construction, which are affecting the sustainability of mangroves. Coral reefs are also threatened by the use of unsustainable fishing practices.

The primary challenge for the local community in Atauro Island is that their livelihoods depend on fishing (Amaral A.L., 2010). Without an alternative solution for the communities’ livelihoods it is expected that the protected species could be used unsustainably because local people depend heavily on those resources.

Lack of management of marine protected areas and coastal areas around Atauro also lead to degradation of biological diversity. During public awareness-raising meetings organized by the National Directorate for Biodiversity Protection and Restoration (2015) it was indicated that unsustainable fishing by some local communities is still common.

One of the threats to the area is erosion, the cause of which is unclear (Cabanban A.S./CTI Pacific, 2014). Further study in this area is needed.

Assessment of the area against the CBD EBSA Criteria

CBD EBSA Criteria (Annex I to decision IX/20)	**Description** (Annex I to decision IX/20)	**Ranking of criterion relevance** (please mark one column with an X)			
		No information	**Low**	**Medium**	**High**
Uniqueness or rarity	Area contains either (i) unique ("the only one of its kind"), rare (occurs only in few locations) or endemic species, populations or communities, and/or (ii) unique, rare or distinct, habitats or ecosystems; and/or (iii) unique or unusual geomorphological or oceanographic features.			X	
Explanation for ranking (must be accompanied by relevant sources of scientific articles, reports or documents) The area has rich marine biodiversity. A study from Erdmann and Mohan (2013) found a new species called Humann's Fairy-wrasse (*Cirrhilabrus humanni*) around Atauro Island towards Alor Island, Indonesia (Figure 2). Atauro marine area is also considered a hotspot for dugong populations living and migrating within Indian and the Pacific Ocean.					
Special importance for life-history stages of species	Areas that are required for a population to survive and thrive.			X	
Explanation for ranking (must be accompanied by relevant sources of scientific articles, reports or documents) The available literature does not explain clearly the importance of the waters around Atauro Island for the life-history stages of species, but the assumption is that the coral reefs in the area are of definite importance to several reef fish species that live there as spawning and nursery grounds as well as important feeding grounds.					
Importance for threatened, endangered or declining species and/or habitats	Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species.			X	
Explanation for ranking (must be accompanied by relevant sources of scientific articles, reports or documents)					

<table>
<tr><td colspan="6">The mangrove stand is rich in species but is threatened by various human activities, including cutting of branches, beach erosion, and littering (Cabanban A.S./CTI Pacific, 2014). A report from the National Coordinating Committee of Timor-Leste (2012) also stated that “erosion resulting from deforestation, particularly of mangroves and riparian vegetation, has impacted many of marine ecosystems”. More information is needed to assess this criterion.</td></tr>
<tr><td>Vulnerability, fragility, sensitivity, or slow recovery</td><td>Areas that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery.</td><td></td><td></td><td>X</td><td></td></tr>
<tr><td colspan="6">Explanation for ranking (must be accompanied by relevant sources of scientific articles, reports or documents)

The area contains a wealth of marine species, including fish species, that are densely concentrated on coral reefs and different species of mangroves (Cabanban A.S./CTI Pacific, 2014), which are known to be vulnerable to different types of anthropogenic pressures and major drivers of change.

Based on information provided by the UNEP dugong and seagrass project in Timor-Leste (2015) the life of the dugong is vulnerable due to seagrass degradation. Most of the seagrass here is polluted by sedimentation, therefore the dugong population around Atauro Island is considered vulnerable. More information is needed to assess this criterion.</td></tr>
<tr><td>Biological productivity</td><td>Area containing species, populations or communities with comparatively higher natural biological productivity.</td><td></td><td></td><td>X</td><td></td></tr>
<tr><td colspan="6">Explanation for ranking (must be accompanied by relevant sources of scientific articles, reports or documents)

The marine waters of Atauro Island have rich marine biodiversity and highly strategic oceanographic setting because the area is situated in the centre of the Ombai Strait (Erdmann and Mohan, 2013). For instance, a study has identified 294 species of coral reefs in Atauro Island (Erdmann and Mohan, 2013), indicating that the marine areas of Atauro have considerably high biological productivity.</td></tr>
<tr><td>Biological diversity</td><td>Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity.</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">Explanation for ranking (must be accompanied by relevant sources of scientific articles, reports or documents)

A study from Cabanban A.S./CTI Pacific (2014) also indicated that Atauro Island has rich biological diversity in terms of mangrove species in the coastal areas (Avicennia marina , Bruguiera cylindrica Sonneratia sp.14 , S. caseolaris , S. ovata, Xylocarpus granatum) and significant species of fish (Acanthuridae: Acanthurus gahm, A. lineatus, A. triostegus, Zebrasoma velifer; Chaetodontidae : Chaetodon kleinii, C. octofasciatus, Heniochus acuminatus; Caesionidae: Pterocaesio pisang; Labridae: Cheilio inermis, Halichoeres sp., H. timorensis, H. margaritaceus, H. multilineatus;
Mullidae: Parupeneus spp.; Pomacentridae: Dascyllus aruanus, D. melanurus, Pomacentrus azuremaculatus). Data gathered from this study was mainly focused on Atauro Villa (Atauro town) (Figure 4).</td></tr>
</table>

According to a survey conducted by CTSP in 2012, the biodiversity of this area is the second-highest average for any survey in the region. From the top 7 sites studied for reef fish diversity in Timor-Leste, Atauro is one of the high spots in terms of number of reef species (294 species) identified during the survey (Erdmann and Mohan, 2013).					
Naturalness	Area with a comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or degradation.		X		
Explanation for ranking (must be accompanied by relevant sources of scientific articles, reports or documents) Most of the coral reefs in the marine area of Atauro Island are still considered among the most pristine spots in the country. However, unsustainable fishing methods such as the use of fish traps, spear, hook and line, and gill nets (Figure 5) also destroy the coral reefs (Timor-Leste NBSAP, 2015). The mangrove area measures only 0.97 ha (Figure 4) along the coastline in the northern part of the island and runs parallel along about half the coastline of the marine protected area (Cabanban A.S./CTI Pacific, 2014). Unsustainable tourism development on this island also contributes to the degradation of marine resources because this area is one of the busiest tourist destinations in the country.					

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Maps and Figures

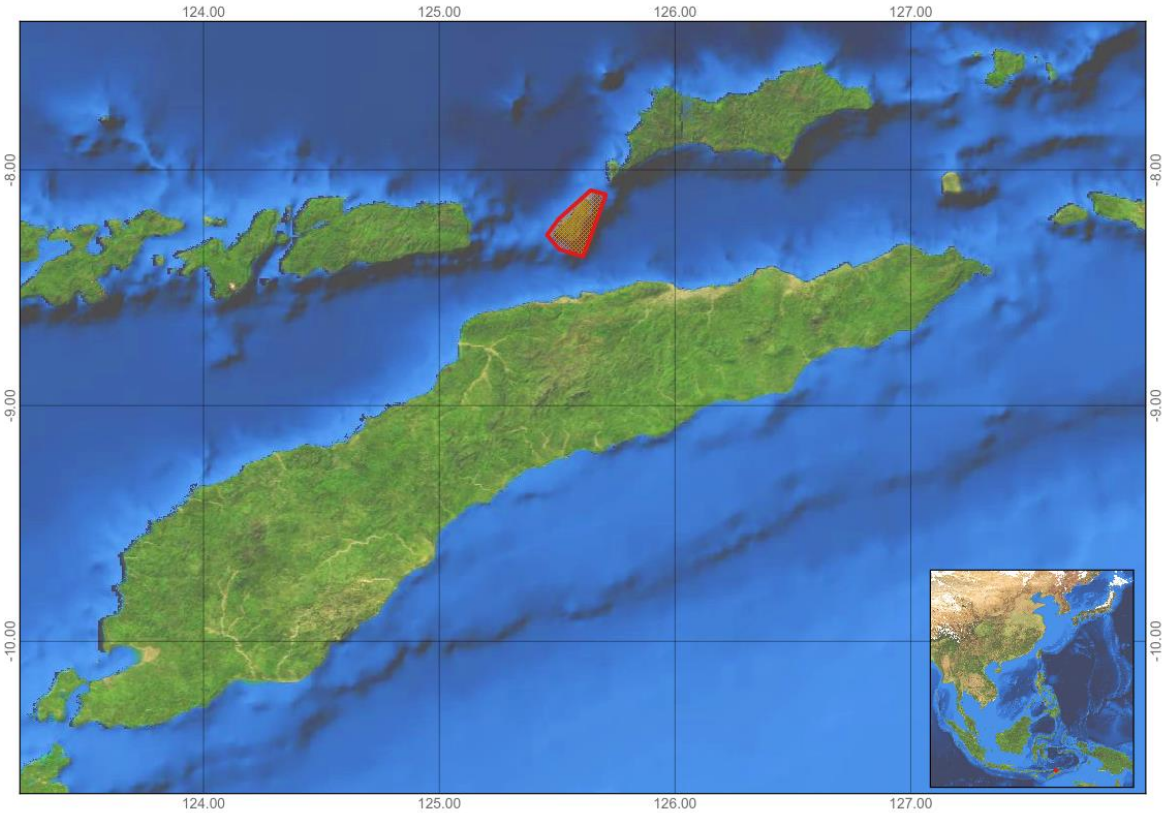

Figure 1. Area meeting the EBSA criteria

Figure 2. Humann's Fairy-wrasse (*Cirrhilabrus humanni*), currently known only from Timor-Leste and nearby Alor, Indonesia (Erdmann and Mohan, 2013).

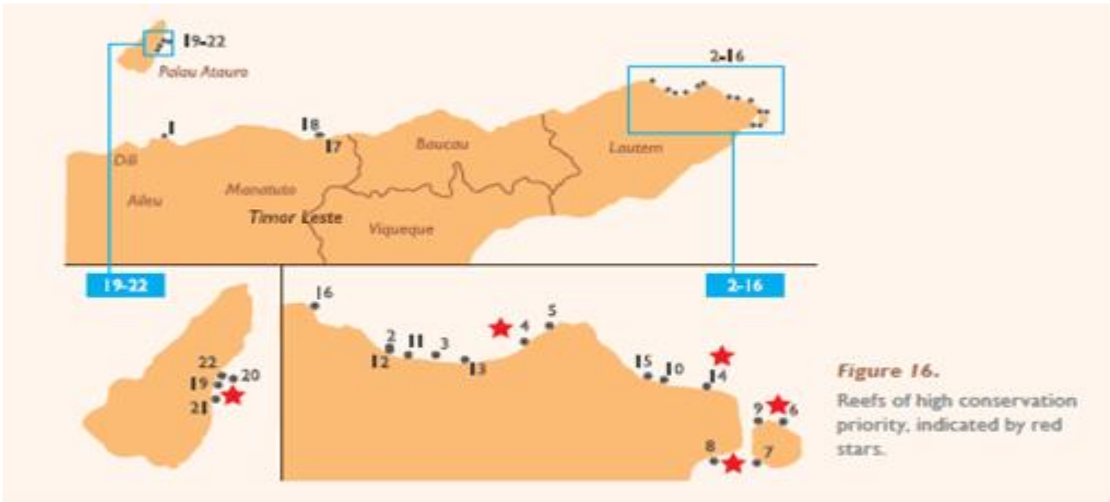

Figure 3. Reefs of high conservation priority. Marine protected areas of Atauro Island shown on the left side of this figure (Erdmann and Mohan, 2013).

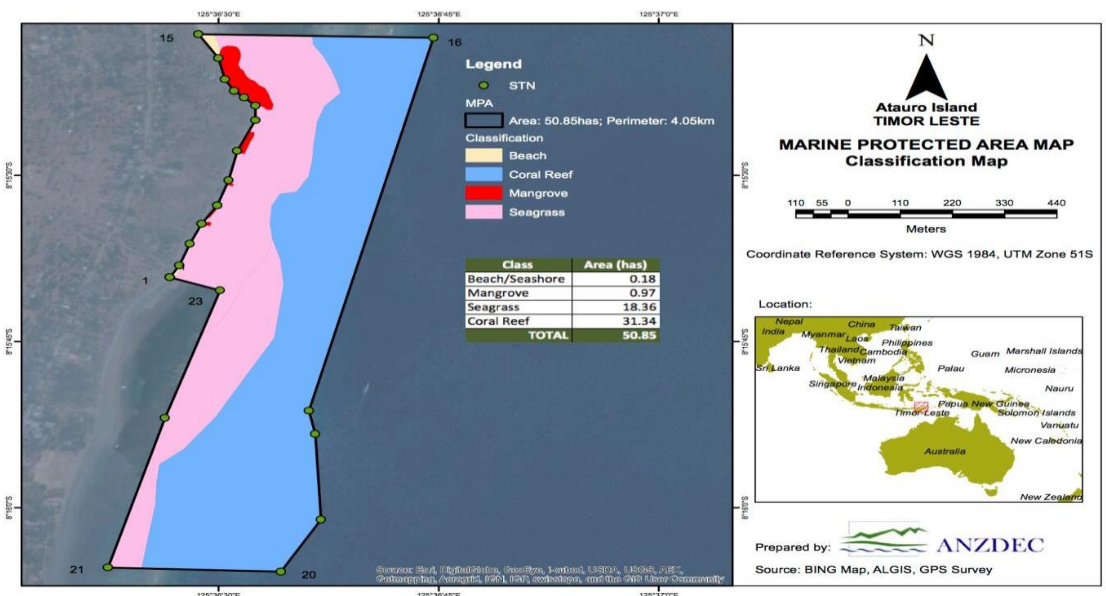

Figure 4. Map showing mangrove, seagrass, and coral reef areas in the proposed marine protected area Atauro Island.

Figure 5. Abandoned fishing net caught on the reef at site (Erdmann and Mohan, 2013).

Area no. 18: Sulu-Sulawesi Marine Ecoregion

Abstract

The Sulu-Sulawesi Marine Ecoregion (SSME) is situated at the apex of the Coral Triangle (CTI) region in the Indo-West Pacific, at the global centre of marine biodiversity. It is an area of maximum coral and tropical reef fish diversity, based on numerous scientific studies. The SSME occupies an area of about a million square kilometres and is home to coral reefs, seagrass meadows and mangrove forests, which in turn support fishes, sea turtles, dolphins, whales, sharks, rays, and other less-known but equally important marine flora and fauna.

Introduction

The Sulu-Sulawesi Marine Ecoregion (SSME) is located in the Coral Triangle (Ablan et al., 2002). It is considered to be the centre of the world's highest concentrations of marine biodiversity (Carpenter and Springer, 2005; Allen, 2008). The marine waters of the Sulu and Sulawesi seas form a large marine ecosystem (LME), a management unit identified by its unique hydrogeographic regime, topography, biochemical characteristics and trophically linked populations (Sherman and Duda, 1999; Watson et al., 2003; Gerasmio et al., 2014.).

Geologic History

The Sulu-Sulawesi Marine Ecoregion is situated on the boundaries of the Philippine Sea Plate, the Eurasian Plate, and the Australian Plate. The Sulu Sea and the Sulawesi Sea were formed because of the tectonic movements of these plates during the Meiocene period. These tectonic movements in geological history and glacial and interglacial periods of Southeast Asia have made the Indo-West Pacific the richest region for corals and reefal organisms from the Neogene to the present (Wilson and Rosen, 1998). Marine flora and fauna were carried towards the ecoregion during the movement of the plates and fragments. For example, the rising and falling of water levels during the late Pleistocene, fluctuating down to 120m and exposing the continental shelf of northern Borneo, Palawan, and the Sulu Archipelago, provided environmental stimuli for adaptation and diversification of marine organisms in these seas (SSME Biophysical Orientation Material, compiled by WWF, 2004).

Location

The SSME is located between 15° N latitude and 116° E longitude and 0° N latitude and 127° E longitude just above the equator. It covers an area of 1,003,526 square kilometres (Trono et al., 2002). The SSME covers the southwestern shoreline of southern Luzon (coastline of Batangas southwards to Bicol); the western shorelines of Samar-Leyte; rounding off the northern and entire southern coastal area of Mindanao until the Pujada Peninsula in Davao del Oriental. From the tip of Pujada Peninsula the boundary extends southwards to the Indonesian territory of Sulawesi. The line runs to the east of Sangihe Islands (Talaud Island and the other smaller islands). It gently curves to the west at the tip of the Sulawesi (Bunaken and Manado) and then follows the northern coastline of the northern arm of Sulawesi. It continues westerly until Sabah, where it swings to the north following the coastline of northeast Borneo up to Samungat and Marchesa Bay. From this region it arches to the north, passing west of Banguey Island, across the Balabac Strait traversing the eastern seaboard of Palawan. It continues its northeasterly trend, passing to the west of Busuanga and Batangas (WWF, 2004).

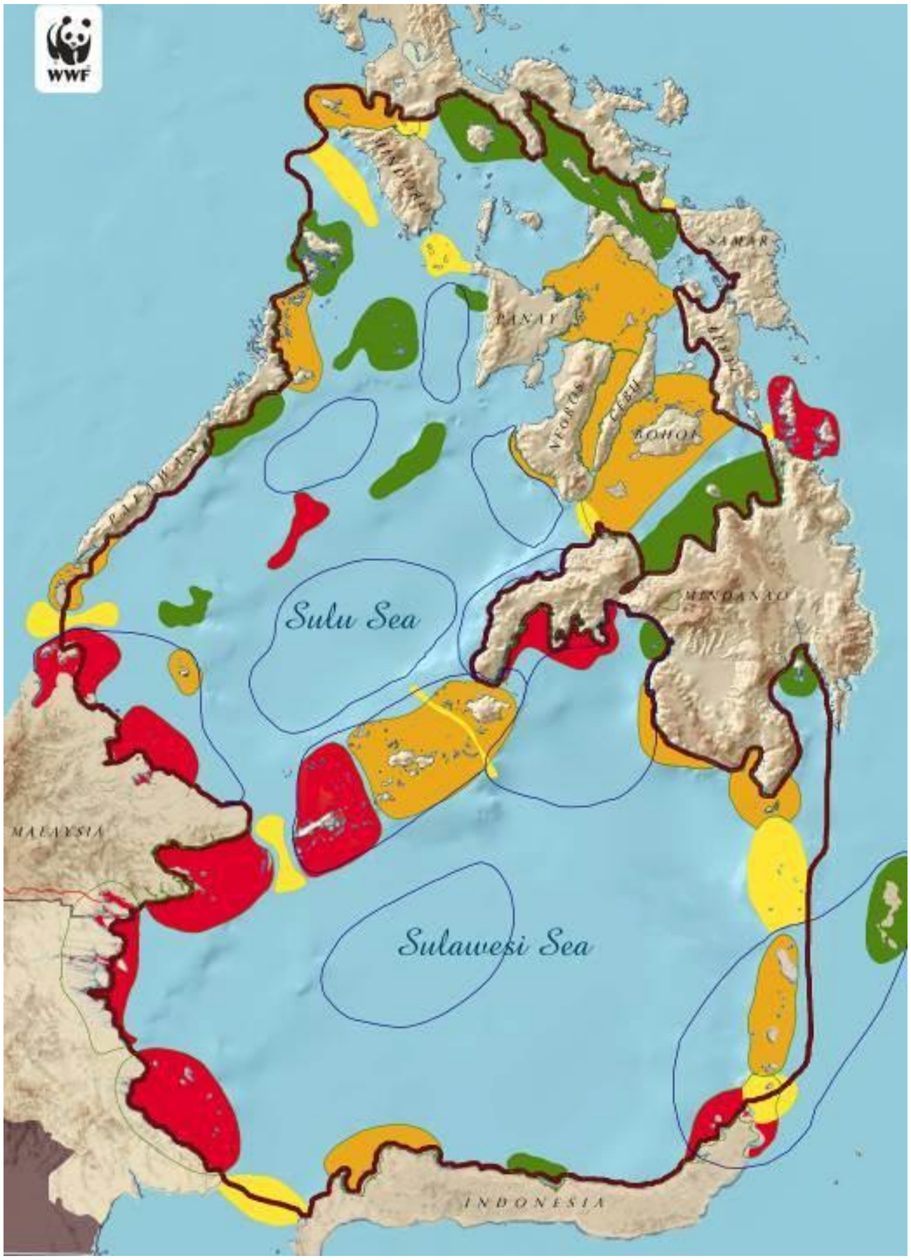

Figure 2. Location of Sulu-Sulawesi Marine Ecoregion (WWF, 2004)

Feature description of the proposed area

<u>Oceanographic features</u>

The shelf or neritic zone of the Sulu-Sulawesi extends from the lowest tide limit to depths of about 60 fathoms. The shelf of Sulu Sea, considerably wide around the northern end of Borneo and northern Palawan, extends far to the east in the region occupied by the Cuyo Group of islands.

The SSME has varying bathymetry depths. There is an island chain on the shallow continental shelf between the Sulu Sea and Sulawesi Sea that effectively separates these two large semi-enclosed seas.

However, exchange of water between these two seas occurs with differential heights of the tides. This exchange of water between the Sulu and Sulawesi Seas, and the complexity of the region's oceanography favour the transport of larvae from one sea to the other and could enhance the productivity through local upwellings and gyres (Munro, 1986; Villanoy et al., 2011).

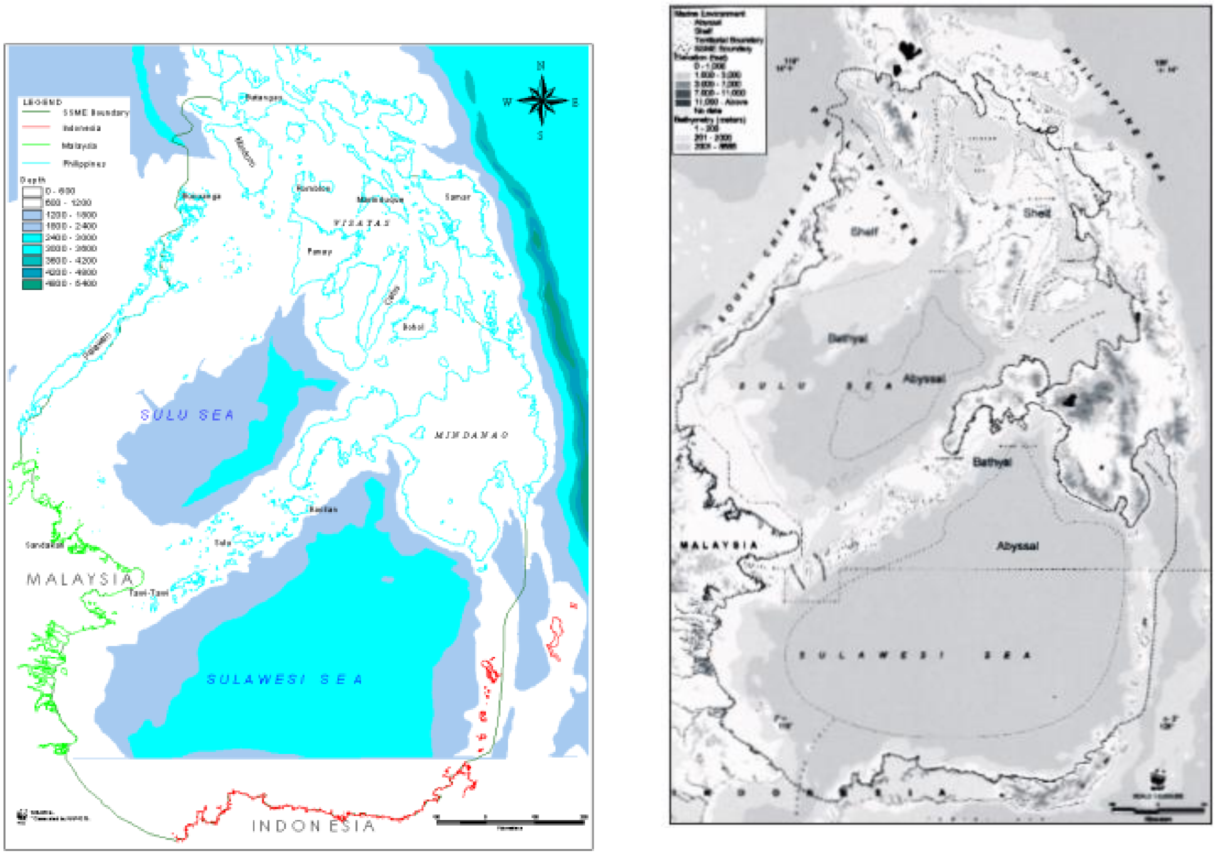

Figure 3. *Left* (a). Bathymetric contour of SSME (source: Alcaca et. al, 2003) and *Right (*b). SSME Map showing major seas (source: SSME conservation planning document)

The Seas and Embayments

Philippine Inland Seas: As shown in Figure 3b, the Inland Seas are bounded by Bicol peninsula in the northeast, Leyte to the east, Surigao, northern Mindanao to the south, Panay and Batangas to the northeast. The inland seas from the Bicol region are the Sibuyan Sea, Visayan Sea, Camotes Sea, Central Visayan Sea, and Bohol/Mindanao Sea (SSME Biophysical Orientation Material, compiled by WWF, 2004).

Sulu Sea: The Palawan Island separates the Sulu Sea from the South China Sea. The Sulu Sea, which is semi-enclosed, is connected to the South China Sea to the north through the shallow Mindoro Strait; to the Pacific Ocean to the east through the Mindanao Sea; to the Sulawesi Sea across the Sulu-Tawi-Tawi Archipelago to the south; to the South China Sea through the Balabac Strait to the southwest. The Sulu Sea is divided into the Northwest Basin and Southwest Basin by the Cagayan de Sulu Ridge in a northeasterly direction (SSME Biophysical Orientation Material, compiled by WWF, 2004).

Sulawesi Sea: Like the Sulu Sea, the Sulawesi Sea is semi-enclosed and connected to the Pacific Ocean through the Celebes Sea between Davao and North Sulawesi and to Java Sea through the Makassar Strait between Sulawesi Islands and Borneo (SSME Biophysical Orientation Material, compiled by WWF, 2004).

For the embayments, which includes bays and gulf, among the notable in the region are Ragay Gulf, Sogod Bay, Murcielagos Bay, Illana Bay, Moro Gulf, Sarangani Bay, Davao Gulf, Darvel Bay, and Cowie Bay.

Currents

The flows of the marine water within the SSME region are rather complex but mainly driven by the surface currents within the basins. The water within the Sulu and Sulawesi basins can flow from the adjoining ocean and sea or local upwelling. The dynamic of the flow promotes primary and secondary productivity through nutrient discharge from the adjacent area and/or influenced by the diverse marine ecosystem (WWF, 2004)

The water flow in the Pacific Ocean and the monsoons control the water currents in the Sulu Sulawesi basins (Wyrkti, 1961). These water masses flow into the basins from Surigao during the northeast monsoon and separate into two branch flows, one flowing counterclockwise and the other clockwise. The water mass from the Pacific Ocean might flow directly to Makassar Straits and along the Kalimantan coast or get reverted back to the Pacific Ocean if it hits the Northern Sulawesi (WWF, 2004).

The Sulawesi currents flow into the Sulu Sea in a counterclockwise direction through Tawi Tawi –Sulu Archpelago. In August during the late southwest monsoon, water from the Pacific Ocean flows from Mindanao Strait to Sabah through Tawi Tawi and Tubbataha Reefs, and the same direction of flow to Makassar Strait (WWF, 2004).

Internal waves generated from the east Palawan and the upwelling parallel to Sulu Archipelago move water from the inner part to the southeast coast of Palawan. These physical processes carry high-nutrient water to the surface and toward the coast (WWF, 2004). Both the monsoon flow and hydrodynamic forces mentioned above affect larvae dispersal patterns and recruitment patterns for diverse marine populations (WWF, 2004). The water exchange between the Sulu and Sulawesi Sea only happens during the beginning of the southwest monsoon (June), when larvae recruitment can occur and shifts with prevailing currents, and the high productivity water from the Sulu Sea can spill over to the Sulawesi Sea (WWF, 2004).

Biodiversity

Mangrove Distribution

Mangrove forests are commonly associated with estuarine habitat, and others are found in narrow, fringing coastlines of the SSME. The North Sulawesi has limited stands of mangrove fringing the coastline, where the largest almost intact mangrove forests are found in Palawan and Mindanao (Philippines), in the northern part of Darvel Bay, Sabah (Malaysia), East Kalimantan, Borneo, and North Sulawesi (Indonesia) (WWF, 2004) (as in Table 1) .

Location	Mangrove Cover
Kalimantan (including P.Panjang, P.Samana, P.Maratung, P. Kakaban)	950,000 hectares

Palawan	5,317 hectares
Mindanao	4.854 hectares
Cape Arakan	800 hectares
Mantehaga	750 hectares

Table 1. Large mangrove forests (source: WWF, 2004)

A total of 33 species of mangrove plants are found in the SSME. Honda Bay and Palawan have the highest number of species (33spp.), followed by the east coast of Sabah (32 spp.), Bunaken National Park, North Sulawesi (28 spp.), and Derawan Archipelago (26 spp.) (WWF, 2004).

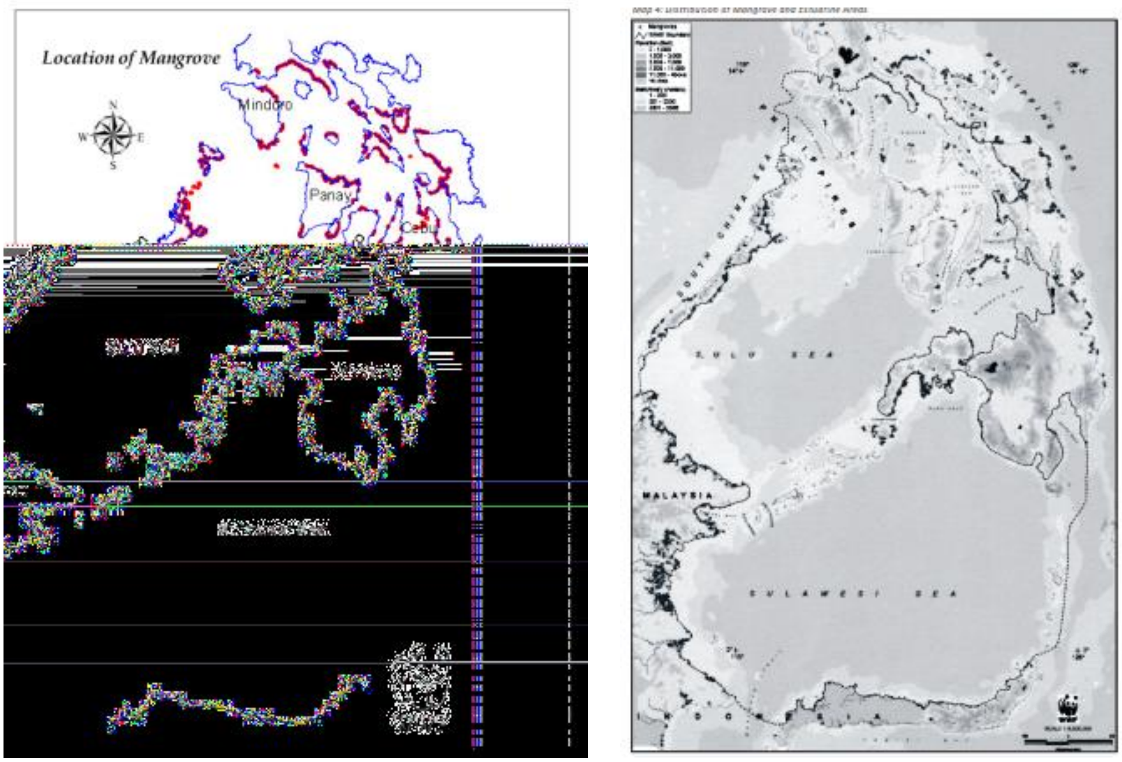

Figure 4. Mangrove distribution in SSME (Alcaca et al., 2003) and (WWF, 2004).

Seagrass Beds

Seagrass beds are found throughout the SSME, however the complete distribution of seagrass is still unknown. With recent developments in remote sensing techniques, seagrass mapping can be done to genus level but it depends significantly on the cloud cover and the turbidity of the coastal area. Furthermore, the growth and reproductive cycles of annual or perennial seagrasses also result in changing seagrass bed cover, according to the time of the year (WWF, 2004).

Region within SSME	**Location**
Sulu Sea	Palawan, Tubbataha, Sabah, Tawi-Tawi, Sulu, and Basilan
Philippines inland seas	Batangas, Mindoro, Marinduque, Sorsogon, Masbate, Leyte, Bohol, Cebu, Siquijor, Negros and Panay

East Kalimantan	P. Miang Besar, Derawan Island, Sabah and Maatum Island
North Sulawesi	Zamboanga, Davao, and Minahasa, Arakan Peninsula, and Wawontutap

A total of 16 species of seagrasses are found in the region, where it serves its ecological function as the feeding ground for marine turtles and dugongs, such as Kudat and Semporna in Sabah; Pulau Miang Besar, Derawan Island, and Maratua Island in East Kalimantan; North Minahasa in North Sulawesi; and Arakan and Wawontutap Peninsula in the Bunaken National Park (WWF, 2004). More than 10 species of seagrass can be found in Batangas, Mindoro, Palawan, and Darvel Bay (WWF, 2004).

Coral Reefs

Coral reefs are patchy, fringing, platform, barrier, or atoll in formation, and all types of coral reefs can be found in the SSME. The most common coral reefs are the patch and fringing reefs that are found along the coastline of islands. Platform reefs, barrier reefs, and atolls are found in the region but are neither common nor extensive in coverage (WWF, 2004).

Reef types in SSME	**Location**
Patch and fringing reefs	Southeast shelf of Tawi-Tawi, Birah-Birahan and Berau River Delta, Sulawesi Sea.
Fringing reefs	Coast of Palawan and along Kalimantan, Borneo, and Sulawesi Island among others
Platform reefs	Cagayan Ridge from Arena, Tubbataha, to Pangutaran in the Sulu Sea. Sibutu Island, Tumindao Reef, Omapay Island, Sipadan, Manado, and Minahasa are islands with platform reefs in the Sulawesi Sea.
Barrier reefs	Siasi, Jolo, Kr. Baliktaba - Kr. Malalungun and Mangkalihat Peninsula, and Great Sunda Barrier Reef
Double barrier reef	Danajon Bank, Bohol.
Atolls	Apo Reef, Northeast Tawi-Tawi, the Tubbataha Reef, in the Sulu Sea and Muras, Maratua, Pasige, and Kakaban in the Sulawesi Sea

Table 3: Reef types in SSME and the location within SSME (source: WWF, 2004).

Soft-Bottom Environment

The soft-bottom environment in the SSME region generally can be found on the continental shelf. The soft and thick sediment can be found along Palawan and east Sabah and in the Visayan Sea. The eroded material from the mountains accumulates at the estuaries and bays. Many bays are found in the Philippine Inland Seas (e.g., Tayabas Bay, Ragay Gulf, Sorsogon Bay, Carigara Bay, Ormoc Bay, Sogod Bay, Panguil Bay and Bais Bay). In the Sulawesi Sea, the Moro Gulf, Davao Gulf, and Berau Delta are notable examples of a demersal environment (WWF, 2004).

Feature condition and future outlook of the proposed area

Few intact reefs remain in the SSME. All the fringing reefs near coastal villages are under high threat from sedimentation, eutrophication, overfishing and destructive fishing (Burke et al., 2012). The remaining excellent areas (which means the live coral cover exceeds 75 per cent) are the reefs in Tubbataha, Palawan, East Kalimantan, Sipadan Island, Maratua, Berau Islands, and Kakaban Island, Sulawesi. These reef areas are located far from human populations and local stressors, although tourism activities might take place (WWF, 2004).

As an example of the area, the reef status of the Semporna was over-exploited and stressed by fishing activities (Ho & Kassem 2009), especially destructive fishing, includings blast and cyanide fishing, which threatens 85 per cent of Malaysia's reefs (Burke *et al*., 2012). Blast fishing, also known as fish bombing, is highly irreversible (Fox *et al*., 2003) and poses the highest threat to the nearshore reefs of Sabah (Burke *et al*., 2012). Hence, the enforcement authorities are working together to curb this activity.

Table 3. Coral Fish Diversity Index (CFDI) for restricted localities in the Indo-Pacific region. All data provided by (Allen 2002a, 2002b) except for current study (shown in bold).

Locality	CFDI	No. reef Fishes obs.	Estimated reef fishes
Milne Bay, Papua New Guinea	337	1109	1313
Maumere Bay, Flores, Indonesia	333	1111	1107
Raja Ampat Islands, Indonesia	326	972	1084
Togean & Bangagai Islands, Indonesia	308	819	1023
Semporna, Sabah, Malaysia	**291**	**680**	**966**
Komodo Islands, Indonesia	280	722	928
Calamianes Islands, Philippines	268	736	888
Madang, Papua New Guinea	257	787	850
Kimbe Bay, Papua New Guinea	254	687	844
Manado, Sulawesi, Indonesia	249	624	823

Source : Kassem et al. 2010

Assessment of the area against the CBD EBSA Criteria

CBD EBSA Criteria (Annex I to decision IX/20)	**Description** (Annex I to decision IX/20)	**Ranking of criterion relevance** (please mark one column with an X)			
		No information	**Low**	**Medium**	**High**
Uniqueness or rarity	Area contains either (i) unique ("the only one of its kind"), rare (occurs only in few locations) or endemic species, populations or communities, and/or (ii) unique, rare or distinct, habitats or ecosystems; and/or (iii) unique or unusual geomorphological or oceanographic features.				X

Explanation for ranking (must be accompanied by relevant sources of scientific articles, reports or documents)

The SSME forms a large marine ecosystem (LME), a management unit identified by its unique hydrogeographic regime, topography, biochemical characteristics and trophically linked populations (Sherman and Duda, 1999; Watson et al., 2003; Gerasmio et al, 2014).

The SSME shelters, among others, 22 species of whales and dolphins, including sperm and killer whales; 5 of the world's 7 species of sea turtles; the endangered dugong or sea cow; whale shark, the largest fish in the world; the very rare megamouth shark; the highly prized Napoleon wrasse (Apo Reef); and even the extremely rare deep-dwelling coelacanth in the abyssal zone of Sulawesi Sea, the only living representative of a group of fishes from the dinosaur era (Trono et. al., 2002)

Lithophyllon ranjithi (Ditlev et al., 1999*)* is an endangered reef-building coral that is found within a highly restricted range around northeast Borneo. Colonies form plate-like structures that protrude from the edge of steep rocky substrate-like ledges. Little is known about this species' ecology as it is still relatively new to science, having only been discovered in 2003. This species has a highly limited distribution, found within an area of just 243 km^2 around northeast Borneo.

Moreover, the Visayan Sea has diverse, endemic, and possibly new species of chondrichthyans (sharks, rays and chimeras), including the rare thresher sharks (WWF, 2004).

The SSME harbours different geomorphological reefs. In the Sulawesi Sea, the Semporna Reefs alone consist of five major geomorphological reef types, which include lagoonal reefs inside a proto-atoll, fringing reefs, continental patch reefs, a barrier reef and a reef capping an oceanic island (Kassem et al., 2011;Waheed & Hoeksema, 2013). In the Sulu Sea, Tubbataha Reefs is a unique example of an atoll reef with a very high biodiversity of marine species, and pristine coral reefs with extensive lagoons and two coral islands: the North Islet serving as a nesting site for birds and marine turtles (UNESCO- World Heritage List, whc.unesco.org/en/list/653). Moreover, the Danajon Bank located in Bohol, Central Visayas of the Philippines is one of the only six double barrier reefs in the world, and the only double barrier reef in the country (Calumpong, 2004).

Special importance	Areas that are required for a population to survive and thrive.				X

<table>
<tr><td>for life-history stages of species</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="6">Explanation for ranking (must be accompanied by relevant sources of scientific articles, reports or documents)

The SSME is known as a significant nesting ground for seabirds and a nursery, spawning / breeding ground for many species of commercially important species of fishes (groupers, tunas), sea turtles, and other marine life (C.I. Philippines, 2009; ADB, 2014).

There are large numbers of scientific studies, mostly species and site specific, showing evidence that SSME is a significant spawning and breeding ground for marine species. Chung & Komilus (2012) and Chung (2015) indicated that the reefs around Lankayan Island are important breeding grounds (spawning aggregation sites) for coral trout Plectropomus leopardus, which is listed as Near Threatened in CITES, IUCN Grouper and Wrasse Specialist Group.

The SSME is also a known migration route for tuna species (Morgan and Valencia, 1983).

The area is important to post-nesting migrations of green turtles from Redang Island, Malaysia, to the Balabac Straits at the Southern tip of Palawan Island, Philippines and within the Sulu-Sulawesi Marine Ecoregion (Liew & Chan, 1995) and from the Berau Marine Turtle Conservation Area, Indonesia to the Tun Mustapha Park / southern tip of Palawan, to the Tawi-Twai islands, Philippines, and to Sipadan Island, Malaysia (Coyne & Godley, 2005).

Tubbataha reef supports internationally important breeding populations of several regionally significant seabird species, with more than 10,000 black noddies (Anous minutus) of the regional worcesteri subspecies, almost 10,000 great crested terns (Sterna bergii) and 3,000 red-footed boobies (Sula sula). The critically endangered Christmas Island frigatebird (Fregata andrewsi) has also been recorded.</td></tr>
<tr><td>Importance for threatened, endangered or declining species and/or habitats</td><td>Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species.</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">Explanation for ranking (must be accompanied by relevant sources of scientific articles, reports or documents)

The SSME functions as important habitat for diverse marine life, including among others, 5 out of 7 species of marine turtles. All seven sea turtle species are listed under Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), and under Appendices I and II of the Convention on Migratory Species (CMS). Three important habitats of green and hawksbill turtles are found in the Sulu-Sulawesi Seas. These include the nine of the Turtle Islands (six within the Philippines and three within Malaysia); Sipadan Island, located in one of the corridors that connect the Sulu and Sulawesi Seas; and the Derawan Group of Islands on the side of Sulawesi Sea, in East Kalimantan, Indonesia. These islands play an important part in the life cycle of sea turtles in the region (Trono et al., 2002).</td></tr>
</table>

The east coast of Sabah provides suitable nesting and foraging sites for green and hawksbill turtles, as can be seen through the Tun Mustapha Park, SIMCA, Sabah Turtle Islands Park and Semporna. The Sabah Turtle Islands Park and Sugud Islands Marine Conservation Area (SIMCA) are important nesting sites for endangered green turtles in Malaysia (Basintal, 2001). The Gulisaan island of the Turtle Islands Park provides a nesting habitat for the largest hawksbill turtle population in the entire Southeast Asian Region (Chan *et al.*, 1999).

The SSME is home to one species of endangered dugong *(Dugong dugon)*. Dugongs feed in meadows formed by the species Cymodocea rotundata and Halophila spp. in Green Island in Palawan and Arakan and Wawontutap Peninsula in North Sulawesi (WWF, 2004).

The Dinagat-Siargao has the largest contiguous mangrove stand in the Philippines, harbouring the endangered seawater crocodile. Most of the species of the giant clams (*Tridacna spp.*, *Hippopus spp*.) are endangered and are found in substantial numbers in the coral reefs in Balayan Bay, Batangas, Apo Reef, Quiniluban Island Group, Palawan, Cuyo Island Group, Palawan, Tubbataha Reef, and Semporna Islands. In Sulawesi Sea, giant clams are found in the reefs of Teluk Gorontalo, Arakan Peninsula, Bunaken, Manado Tua, Siladan, Mantehage, and Nain Island (WWF, 2004). The endangered humphead wrasse (*Cheilinus undulatus*) was recorded at densities of 1.24 fish per 10,000 m^2 in 2011 (Chung et al, 2011) and 0.94 fish per 10,000 m^2 in 2014 (Reef Guardian, 2014) at Lankayan Island.

Vulnerability, fragility, sensitivity, or slow recovery	Areas that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery.				X

Explanation for ranking (must be accompanied by relevant sources of scientific articles, reports or documents)

Coastal habitats, including coral reefs, tidal flats, seagrass beds and mangrove forests, found inside the SSME are considered highly vulnerable to threats and impacts brought by climate change and human-induced activities, as supported by evidence provided by numerous site-specific studies in the region.

The threats to coral reefs in the Coral Triangle Region are much higher than the global average; more than 85% of the reefs are threatened by local stressors (Burke, 2012). Other threats, such as increasing water temperatures globally, are causing mass coral bleaching; ocean acidification also impairs coral growth.

More locally, a coral vulnerability assessment in Sabah (Burke, 2003), based on the depth, embayment, fetch, and proximity to land and pollution sources, found that 50 per cent of corals in Semporna are in categories of high / very high. These reefs that are near the land are also prone to coastal development,where the other half of the reefs (further away from mainland) are threatened by destructive fishing (Burke, 2003)

Biological productivity	Area containing species, populations or communities with comparatively higher natural biological productivity.				X

Explanation for ranking (must be accompanied by relevant sources of scientific articles, reports or documents)

Studies have shown that the SSME, bordered by major islands with important river systems (particularly on the island of Borneo), have in general a much higher primary productivity (250-300 gC/m2/yr) than the open tropical ocean. This primary productivity would translate into a secondary production of 200-300 mgC/m3. One of the early references on the plankton of the Sulu and Sulawesi Seas confirms that a distinct seasonal change in the abundance of zooplankton occurs with an appreciable increase from spring to summer (Raymont, 1983).

The biological productivity of the Sulu and Sulawesi Seas is comparable to other sites in Southeast Asia. The reported estimates of primary productivity for the Sulu Sea was 195 +/-2 gC*m-2*yr-1 (Han et al., 1990), and for Sulawesi Sea it was estimated at 135.05 gC/m2/yr (Wyrtki, 1961). The other estimates from the region are:

- Kalayaan, South China Sea – oceanic – gC*m-2*yr-1 (Han et al., 1990)
- Kalayaan, South China Sea – shoal – 166 +/-3 gC*m-2*yr-1 (Han et al., 1990).

However, the oceanographic features of the twin basins are complex. There is the internal wave (along the eastern portion of Palawan), upwelling along the Tawi-Tawi ridge (on the northwestern part), and exchange of water between the Sulu and Sulawesi basins on this ridge. There are also local upwellings and gyres in Sulawesi Sea (Munro, 1986). This complex oceanography brings up and circulates nutrients, enhancing the productivity of the twin basins.

Biological diversity	Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity.				X

Explanation for ranking (must be accompanied by relevant sources of scientific articles, reports or documents)

The SSME, located at the apex of the Coral Triangle Region, is acclaimed as the centre of the world's highest concentrations of marine biodiversity based on several studies conducted by Conservation International, WWF, Carpenter and Springer (2005) and Allen (2008) .

The four corridors alone found in the SSME region exhibit highly exceptional diversity: The Verde Island Passage Corridor occupies more than 10,000 km² between the provinces of Batangas, Oriental and Occidental Mindoro, Marinduque and Romblon in the Philippines. A recent coral survey conducted in Anilao, Balayan Bay, recorded an impressive 319 species and 74 genera of hard corals. More than half the Philippines' documented fish species as well as many threatened species can be found here, identifying it as the "Center of the Center of Marine Biodiversity". The Cagayan Ridge Corridor is home to the 96,828 ha Tubbataha Reefs Natural Park, a UNESCO World Heritage Site. The Ridge boasts 481 species of fish, 379 coral species, 79 algae species, 11 shark species, 11 cetacean species and over 100 species of birds. Tubbataha's north and south islets are known sea turtle nesting sites and important seabird habitat. The Cagayan Ridge Corridor is also a fish egg and larvae repository for the Sulu Sea. The Balabac Strait Corridor links the Sulu Sea with the South China Sea and serves as a passageway for plankton, fishes, sea turtles, cetaceans, nutrients, as well as pollutants and large oceangoing vessels. The Strait is home to 23 mangrove species (70% of mangrove species reported in the Philippines). The Strait contains a variety of critical marine habitats and threatened species such as sea turtles, cetaceans, rays, seabirds and giant clams. The Tri-National Sea Turtle Corridor harbours the largest aggregation of nesting green turtles in the ASEAN region as well as significant nesting populations of hawksbill turtles. The Corridor is a major source of prized fish and shellfish including prawns, crabs and groupers. It hosts extensive mangrove forests, seagrass beds and coral reefs which serve as habitats for endangered and migratory marine species.

The coral reefs of Semporna rival other top spots in the Coral Triangle in numbers of species of corals, fish and shrimps. Mushroom coral species (Family Fungiidae) were counted as a proxy for coral species

richness. A total of 44 species were recorded from 63 sites (Waheed & Hoeksema, 2013). The total of 44 species of mushroom corals that have been recorded from this expedition surpasses other areas with very high biodiversity in the Coral Triangle, and to date Semporna holds the record for the highest species diversity of this coral family (Waheed et al. 2012). The reef fish diversity of Semporna is among the top five sites in the world for fish species richness (refer to table). A total of 690 species belonging to 265 genera and 72 families has been found during field surveys, and others have been recorded in local markets, resulting in a combined diversity of 768 species for the entire expedition (Kassem et al. 2011). Other taxa surveyed included shrimps, gall crabs (van der Meij & Hoeksema, 2013), and ovulid snails. The surveys found 104 shrimp species, which ties with Ternate, Indonesia as the highest in the Coral Triangle. Three shrimp species were seen as co-inhabitants of the mushroom coral *Heliofungia actiniformis* (Hoeksema and Fransen, 2011). The surveys of gall crabs and Ovulidae have contributed to a growing literature on these relatively unknown taxa. The algae surveys found more than 130 species.					
Naturalness	Area with a comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or degradation.		X		
Explanation for ranking (must be accompanied by relevant sources of scientific articles, reports or documents) The naturalness score is low because the SSME coasts are highly inhabited, yet there are still pristine areas present, such as Tubbataha Reefs.					

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Maps and Figures

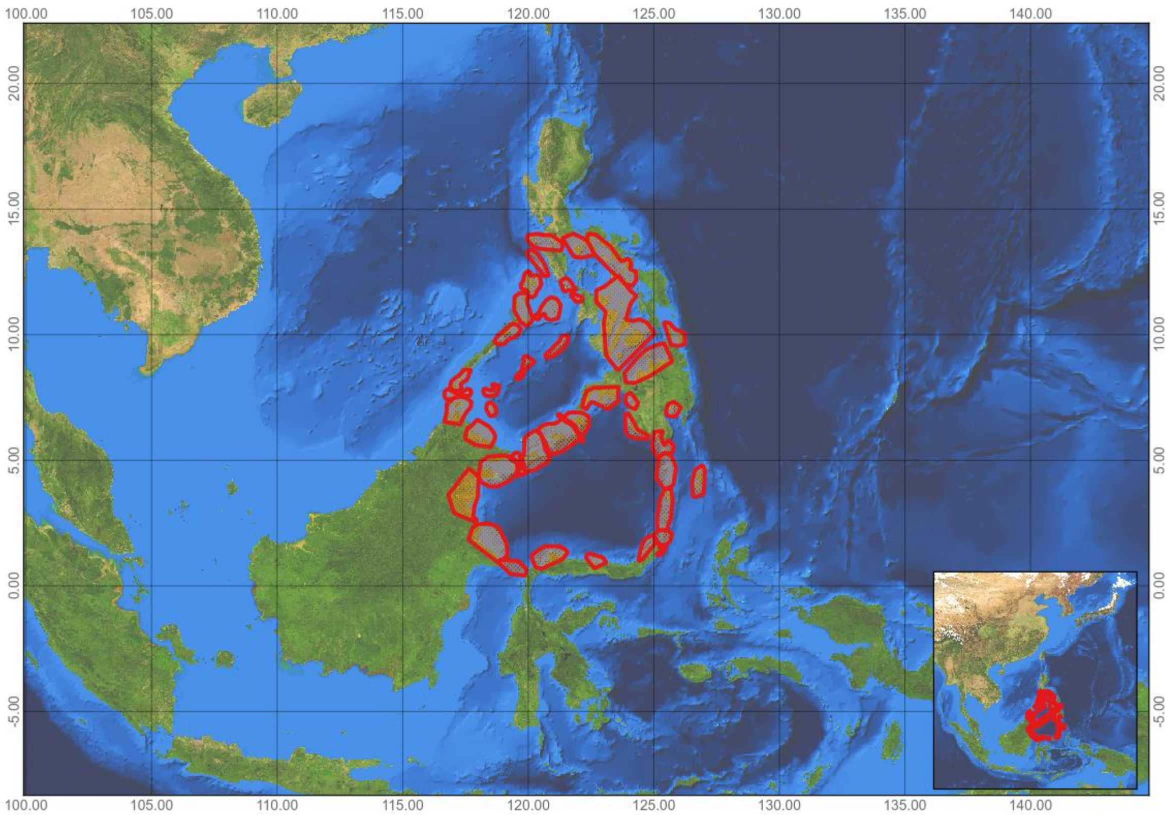

Figure 1. Area meeting the EBSA criteria

Area no. 19: Benham Rise

Abstract

Benham Rise is a relatively pristine 13-million-hectare undersea plateau off the eastern coast of Luzon Island. It is of critical ecological importance, including for offshore mesophotic coral reef biodiversity and for the sustainability of fisheries. Aside from being an important source of biodiversity and contributing to the resiliency of threatened ecosystems, the area also forms part of the only known spawning area of the Pacific bluefin tuna, *Thunnus orientalis.* In addition, recent studies suggest that the interaction of the western boundary currents with the Benham Rise can lead to enhanced biological productivity.

Introduction

The Benham Rise is a 13-million-hectare undersea extinct volcanic ridge located on the eastern coast of Luzon Island. The area remains relatively pristine with only a handful of fisheries activities.

Much of the area remains unexplored. Little is known about the fisheries resources of the Benham Rise region aside from what is caught by fishers operating in the area. A recent survey provided new information on the very rich biodiversity of the Benham Bank, the shallowest part of the region, where very high biodiversity of the coral reef system has been demonstrated. The survey also conducted oceanographic sampling to ground truth results of the models of water circulation in the area and the influence of Kurushio current annual variability on the seabed and pelagic ecosystem of the area. Ongoing research suggests that the interaction of the western boundary currents with the Benham Rise can lead to enhanced biological productivity (Andres, 2015, *in prep.* as presented at the 13th National Symposium on Marine Science–Philippines, 2015)

Location

The area is bounded to the North and East by the West Philippine Basin, and to the West and South by the island of Luzon. It is enclosed by the coordinates 123° 30’ E to 126° 00’ E longitude and 17° 42’ N to 15° 36’ N latitude.

Feature description of the area

Within the area, there are various undersea features off the coast of Luzon, the largest of which is Benham Rise. The submerged region is connected to the island of Luzon at the Palanan Saddle and Bicol Shelf, comprising the main body of the Rise, the Narra Saddle to the northeast and the Molave Spur to the west. The Rise is generally between 1,500 and 4,500 metres below sea level, rising above the rest of the seafloor located at 5,000 metres or more. The structure spans an area of roughly 1,900 km^2 beneath the Pacific Ocean, and extends as much as 330m directly east from Luzon. The shallowest portion of Benham Rise is a seamount designated Benham Bank, located approximately 95m directly north of Catanduanes, at about 124° 15’ E longitude and 15° 48’ N latitude. At about 48 to 70m deep, the seamount is around 34.5 km^2 in area.

The Benham Rise is situated in a seismically and hydrodynamically active area where major oceanic currents in the Northern Pacific (Kurushio Current and North Equatorial Current) meet (Poral, et al. 2015 *in prep*, as presented at the 13th National Symposium on Marine Science–Philippines, 2015).

Biodiversity and Connectivity

Initial surveys at selected sites in May 2014 indicated that the area contains rich benthic and pelagic species biodiversity. The area could provide an important source and sink of biodiversity resources that may help build the resiliency of our already threatened ecosystems. The Benham Bank Seamount itself is potentially a biodiversity hotspot.

A. Benham Bank Seamount

The 2014 scientific exploration on the summit of the Benham Bank Seamount provided the first account of offshore mesophotic coral reef biodiversity for the country. The area is found to harbour a significantly large contiguous coral reef area (mesophotic corals) in relatively pristine condition. An excellent cover (75 to 100%) of mostly tiered, thick, rigid and foliose plate-forming *Porites rus* was found in the mesophotic depths below 60 m. The bottom also exhibits varying relief and coral rugosity. The prominent sponges were arborescent in growth form. The sediments have coarse surface and are biogenic in origin, sheltering mostly aerobic infauna. Initial findings indicate that the reefs appear to be less diverse than the shallower fringing reefs in nearby areas (Nacorda et al., 2015 *in prep.* as presented at the 13th National Symposium on Marine Science–Philippines, 2015).

In terms of associated fish fauna, the area contains 60 bony fish species and three cartilaginous species. Despite the depth, the majority (13 families) of the reef fish species are commercially important food fish: snappers (maya-maya), emperors (bisugo), groupers (lapu-lapu), trevallies (talakitok), and surgeonfishes (labahita). The majority of the fish observed were mostly adults or large-size individuals. The estimated fish biomass ranges from 17 to 102 mt km^{-2}. The area also exhibits a high diversity of butterfly fishes (*Chaetodontidae)* with 9 species per unit area of reef. (Source: *Initial survey results of Nanola CL et al. of UP Mindanao*)

B. Ecological Importance: Significant spawning ground

The Benham Rise together with the Babuyan Group of Islands in Northern Luzon form the southwestern part of the only known spawning area of the Pacific bluefin tuna, *Thunnus orientalis*. It is also used as a nursery area by juvenile tunas based on the catch of 1-2 kg individuals by purse seine operating in the northern and northeastern portion of Luzon from March to May of each year. Other tropical tunas, including the skipjack, yellowfin and bigeye, also use the Benham Rise region to complete their life cycle: as its spawning and nursery area, as evidenced by catches of gravid individuals and small (1-2 kg) juveniles. There is evidence based on a series of tagging studies (SPC tagging experiments) that tunas from the North West Pacific migrate southwards to supplement tuna population of the West Pacific East Asia region (Flores, 2013; ISC Pacific Tuna Working Group, 2014).

More studies are needed to determine resources present in the region.

Biological Productivity

Since the area is located in a hydrodynamically active area, the interaction of the major boundary oceanic currents with the Benham Rise can lead to enhanced biological productivity. There are ongoing studies being undertaken to understand productivity. It is hypothesized that nutrients could be upwelled, thus enhancing the productivity of oligotrophic waters; abundance of food; and availability of substrates for macrophyte and invertebrate recruitment and settlement (Haney et al. 1995; de Forges et al. 2000; UP MSI. 2014 *in prep*).

Feature condition and future outlook of the area

This is a pristine area where human activity is limited to fishing. Over the last few years, interest in utilization of the resources of Benham Rise has increased, particularly on two fronts: by the oil and gas sector and from the fisheries sector. There is now an ongoing effort to make the Benham Rise a marine managed area, with the Benham Bank as a protected/conserved area and the rest open to exploration.

Assessment of the area against the CBD EBSA Criteria

<table>
<tr><td rowspan="2">CBD EBSA Criteria
(Annex I to decision IX/20)</td><td rowspan="2">Description
(Annex I to decision IX/20)</td><td colspan="4">Ranking of criterion relevance
(please mark one column with an X)</td></tr>
<tr><td>No information</td><td>Low</td><td>Medium</td><td>High</td></tr>
<tr><td>Uniqueness or rarity</td><td>Area contains either (i) unique (“the only one of its kind”), rare (occurs only in few locations) or endemic species, populations or communities, and/or (ii) unique, rare or distinct, habitats or ecosystems; and/or (iii) unique or unusual geomorphological or oceanographic features.</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">The area is a unique submarine geological feature. It is the first account of offshore mesophotic coral reef biodiversity for the country (UP MSI Benham Rise Exploration Team, 2014).

This area forms part of the only known spawning area of the Pacific bluefin tuna, Thunnus orientalis. A stock assessment conducted by International Scientific Committee for Tuna and Tuna-Like Species in the North Pacific Ocean revealed that only 3.6% of spawning biomass remains of this heavily overfished stock. The IUCN Red List (2014) indicates that the species is vulnerable (Flores, 2013; ISC Pacific Tuna Working Group, 2014).</td></tr>
<tr><td>Special importance for life-history stages of species</td><td>Areas that are required for a population to survive and thrive.</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">The area is the only spawning ground and serves as nursery area for juvenile Pacific bluefin tuna and other tuna species. Sun and Yang (1983) documented spawning females in catches of longline by fishing fleets off northeastern Phlippines and in the Benham Rise region. Similarly, Lewis (2005) and more recently, Flores (2013) validated the presence of large spawning bluefin from catch of tuna handline landed in Baler, Aurora.

Other tropical tunas, including the skipjack, yellowfin and bigeye, also use the Benham Rise region to complete their life cycle: utilizing the areas as its spawning and nursery areas as evidenced by catches of fishers with adult gravid individuals and small (1-2 kg) juveniles. (Flores, 2013; ISC Pacific Tuna Working Group, 2014)</td></tr>
<tr><td>Importance for threatened, endangered or declining species and/or habitats</td><td>Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species.</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">The area is part of the only known spawning ground of the Pacific bluefin tuna (T. orientalis), of which only 3.6% of its spawning biomass remains (ITC, 2013)</td></tr>
</table>

<table>
<tr><td colspan="6">According to a modelling study by Maunder (2014), the very low levels of spawning stock biomass of the Pacific Bluefin tuna indicate that the population is probably approaching a "previously unobserved cliff" of the exploitation of the stock recruitment curve, resulting in a reduced spatial or temporal extent of spawning.</td></tr>
<tr><td>Vulnerability, fragility, sensitivity, or slow recovery</td><td>Areas that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery.</td><td></td><td></td><td>X</td><td></td></tr>
<tr><td colspan="6">Reefs found in the area are believed to be vulnerable to the impacts of climate change (sea-level rise, elevated sea surface temperature, changes in the Kurushio currents) and acidification.</td></tr>
<tr><td>Biological productivity</td><td>Area containing species, populations or communities with comparatively higher natural biological productivity.</td><td>X</td><td></td><td></td><td></td></tr>
<tr><td colspan="6">There are indications of high biological productivity in the area. It has a rich chlorophyll structure related to circulation and interaction with the shelf (Cabrera, O. & Villanoy CL, in prep; Andres, 2015, in prep. as presented at the 13th National Symposium on Marine Science–Philippines, 2015).</td></tr>
<tr><td>Biological diversity</td><td>Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity.</td><td></td><td></td><td>X</td><td></td></tr>
<tr><td colspan="6">The area harbours a significantly large contiguous coral reef area (mesophotic corals) that is in relatively pristine condition. It has an excellent cover (75 to 100%) of mostly tiered, thick, rigid and foliose plate-forming corals was found in the mesophotic depths of <60 m (Figure 5). Initial findings indicate that the reefs appear to be less diverse than the shallower fringing reefs of nearby areas (Nacorda et al., 2015 in prep. as presented at the 13th National Symposium on Marine Science–Philippines, 2015).

More studies are needed to determine resources present in the region.</td></tr>
<tr><td>Naturalness</td><td>Area with a comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or degradation.</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">Mesophotic reefs are in very pristine condition and exhibit comparatively higher degree of naturalness (Nacorda et al., 2015 in prep. as presented at the 13th National Symposium on Marine Science–Philippines, 2015); however the plan to open the area to fishing and mineral resources exploration might affect the level of naturalness in the area in the future</td></tr>
</table>

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Flores, J. 2013. Survey of pacific bluefin presence in catches of fishers operating in North and Eastern Philippine waters. A WWF commissioned study. 14pages

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Proc. No. 370. Declaring as subject to the jurisdiction and control of the Republic of the Philippines all mineral and other natural resources in the continental shelf. Promulgated 20 Mar 1968.

Republic of the Philippines. 2012. *Executive Summary: A Partial Submission of Data and Information on the Outer Limits of the Continental Shelf of the Republic of the Philippines Pursuant to Article 76(8) of the United Nations Convention on the Law of the Sea*. Commission on the Limits of the Continental Shelf online: <http://www.un.org/Depts/los/clcs_new/submissions_files/phl22_09/phl_esummary.pdf>

1Rep. Act No. 387, An Act to promote the exploration, development, exploitation, and utilization of the petroleum resources of the Philippines; to encourage the conservation of such petroleum resources; and to authorize the Secretary of Agriculture and Natural Resources to create an administration unit and technical board in the Burea of Mines; to appropriate funds therefor; and for other purposes. Enacted 18 Jun 1949.

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- Andres, J.K. 2015 *in prep*. *Zooplankton composition and distribution in the Benham Rise as affected by the North Pacific western boundary currents*: 13th National Symposium in Marine Science-Philippines, October 2015, General Santos City.

- Poral, et al. 2015 *in prep. A biophysical 3D Nutrient-Phytoplankton-Zooplankton-Detritus (NPZD) model model for the Benham Rise:* 13th National Symposium in Marine Science-Philippines, October 2015, General Santos City.

- Nacorda, J.O. et al. 2015 *in prep. Benthic algae in the mesophotic reefs of the Benham Bank, Philippines:* 13th National Symposium in Marine Science-Philippines, October 2015, General Santos City.

- Nacorda, H.M.E. et al 2015 *in prep. Benthos of the mesophotic coral reef habitats on the Benham Bank Seamount:* 13th National Symposium in Marine Science-Philippines, October 2015, General Santos City.

Maps and Figures

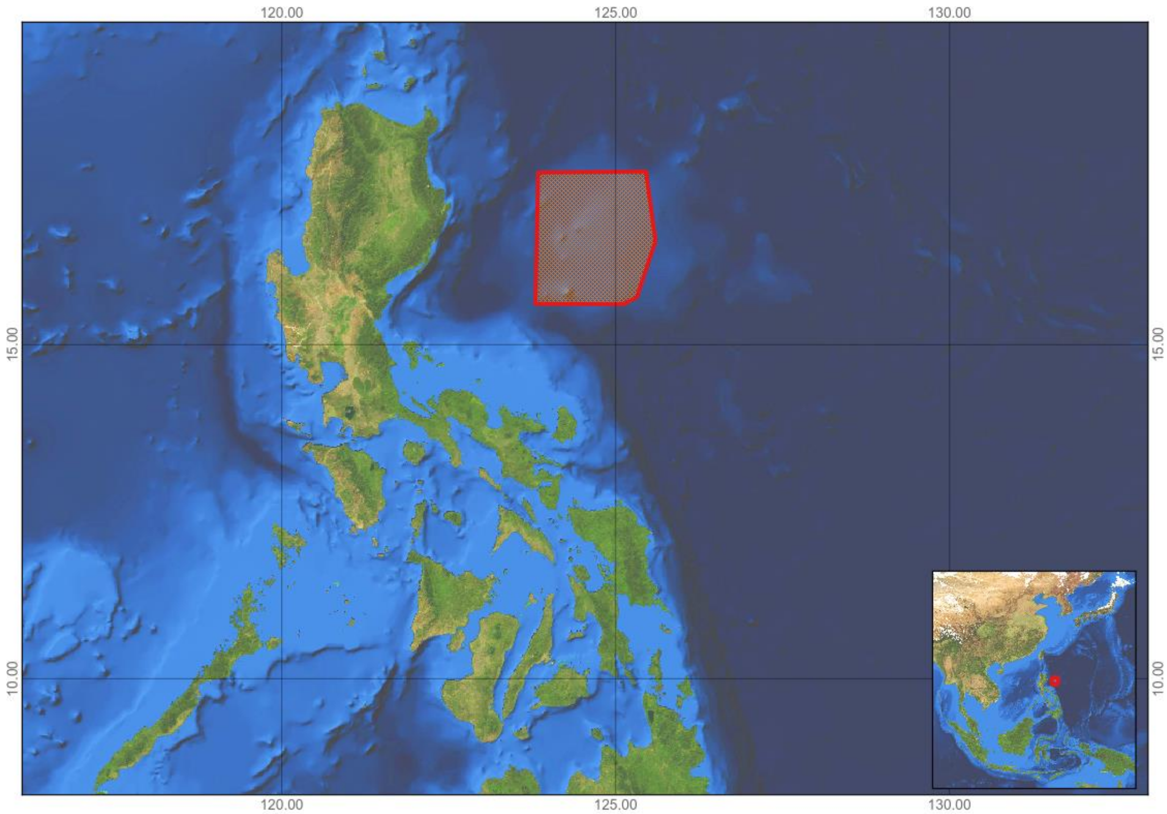

Figure 1. Area meeting the EBSA criteria

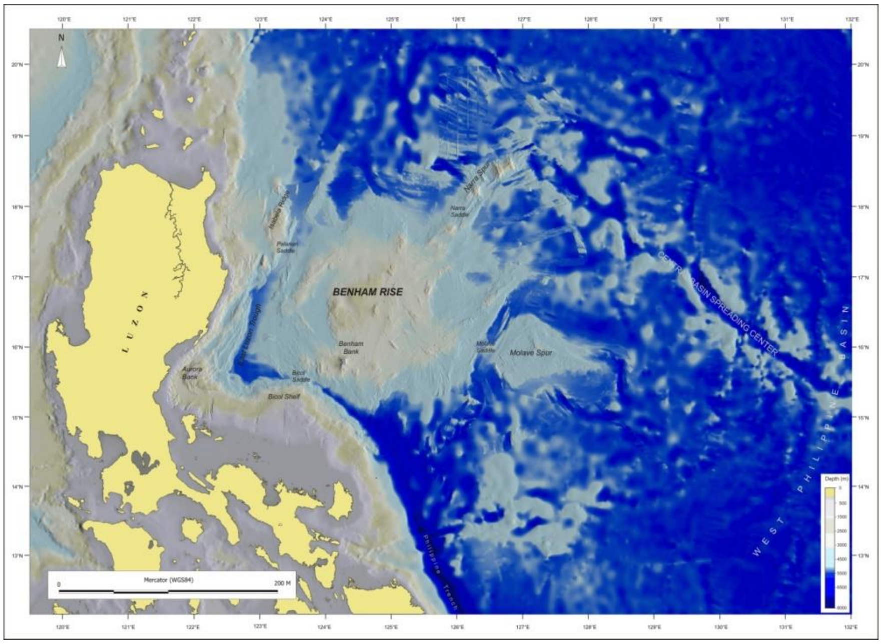

Figure 2. The geomorphology of the Benham Rise *(Image courtesy of NAMRIA)*

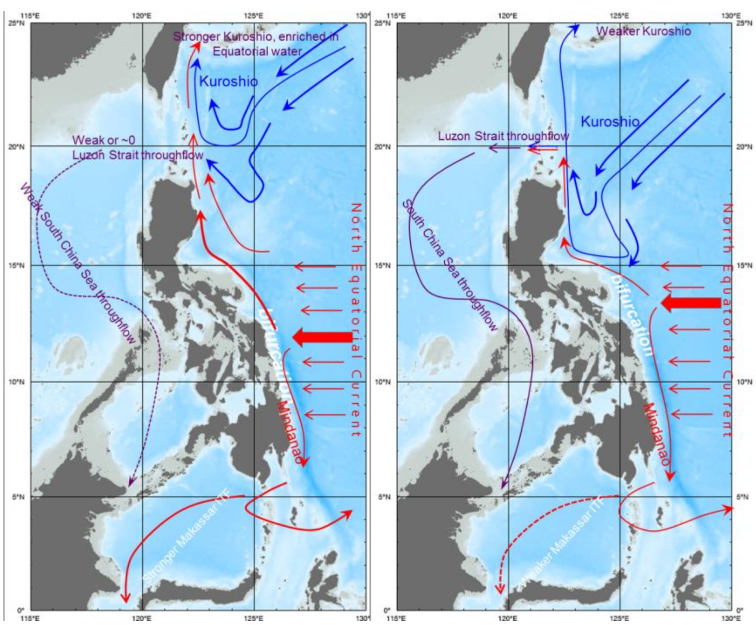

Figure 3. The northern branch of the NEC squeezes through the Bicol Saddle and Palanan Saddle as it transforms into the Kuroshio Current (Rudnick et al., 2011). (*Map courtesy of CL Villanoy)*

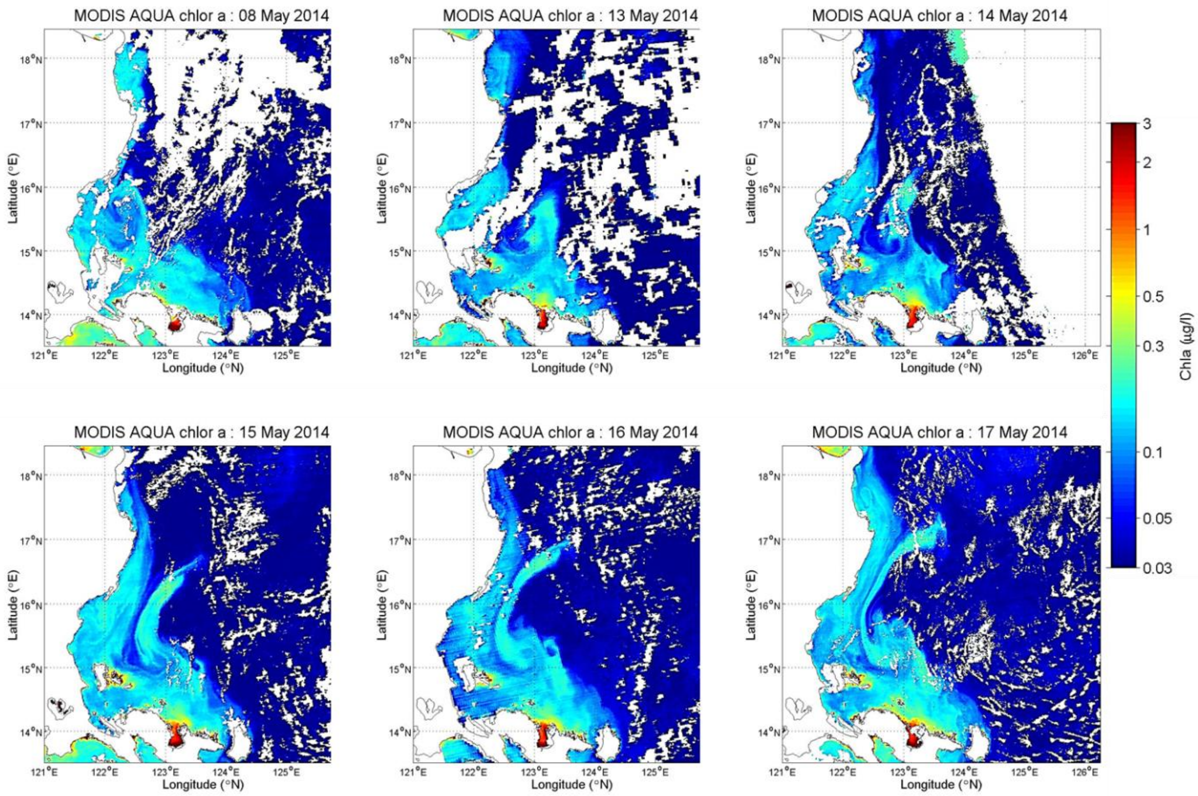

Figure 4. Rich chlorophyll structure related to circulation and interaction with the shelf. (University of Philippines Marine Science Institute, in prep.) (*Image courtesy of O. Cabrera and CL Villanoy: needs permission before publishing)*

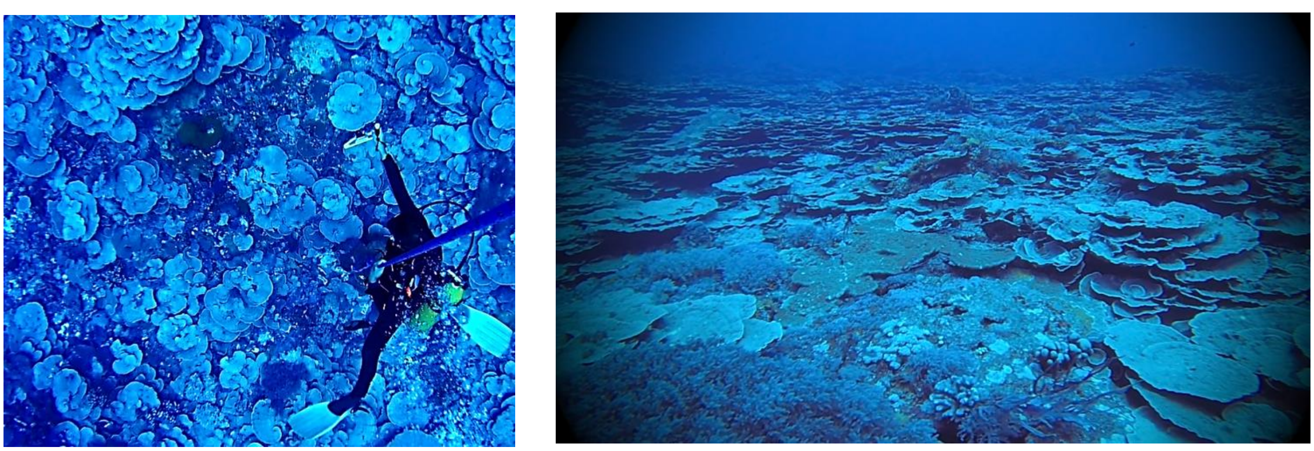

Figure 5. The bottoms were found to have excellent cover (75%-100%) of mostly tiered, thick, and rigid foliose plate-forming corals. *(Left: Photo courtesy of DO De Jesus of UP MSI; Right: Photo grabbed from the video clip courtesy of CL Nañola Jr, UP Mindanao)*

Figure 6. The bottoms exhibiting varying relief and coral rugosity. *(Left: Photo from a video clip courtesy of AT Yñiguez, UPMSI; Right: Photo from a video clip courtesy of LAB Meñez, UP MSI)*

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Area no. 20: Eastern Hokkaido

Abstract

The area covers the most pristine natural ecosystems of Japan. The marine ecosystem here is strongly influenced by the cold Oyashio current and winter ice cover, making this area home to marine species specially adapted to a cold climate. The area contains various types of ecosystems, including brackish estuaries and a lagoon, intertidal flats, rocky intertidal shores, seagrass beds and kelp forests.

Introduction

Eastern Hokkaido has best pristine natural ecosystems of Japan with low human-induced stresses. The coastal area here is strongly affected by the cold Oyashio current, and less influenced by any warm currents, and thus regional marine biodiversity is composed mostly of species adapted to cold temperatures. The area contains various types of ecosystems, including brackish estuaries and lagoon, intertidal flats, rocky intertidal shores, seagrass beds and kelp forests. Most notably, seagrass beds in this region consist of several *Zostera* species, including some threatened species like *Z. asiatica*, and they are very productive (Nakaoka and Aioi 2001, Aioi and Nakaoka 2003, Watanabe et al. 2005). The species richness of kelp is also among the highest in this region (Yotsukura, Nakaoka & Watanabe, unpublished data).

Location

The area is located between 42.9°N and 45.4°N latitude, and between 144.3°E and 145.8°E longitude.
It covers rocky shores around Shiretoko Peninsula; coastal and lagoonal areas along Nemuro Straits; rocky habitats around Nemuro Peninsula, Habomai Islands and Shikotan Island; and rocky shores and estuaries along the eastern Pacific coast.

Feature description of the proposed area

Rocky shores around Shiretoko Peninsula:

This subsection comprises the waters on the Sea of Okhotsk side (Utoro side) and the east side of the Shiretoko Peninsula (Rausu side). The waters are rich in primeval nature, with the coastal ecosystem on the Sea of Okhotsk side being registered as a UNESCO World Heritage Site. These are the lowest-latitude waters in the world where ice floes are distributed (Government of Japan, 2004). The ice floes lead to massive increases in ice algae, the high productivity of which supports diverse creatures, including fish, pinnipeds, birds and others types of animals. Another distinguishing feature of the area is the large number of rivers in which wild (not hatchery-bred) salmon (salmon, pink salmon) swim upstream (Miyakoshi et al., 2012). Breeding of spectacled guillemot and white-tailed eagle has been confirmed here as well (Government of Japan, 2004).

The east side of the Shiretoko Peninsula (Rausu side) differs from the Okhotsk side in that it is dominated by a broad coastline of seaweed bed ecosystems, particularly on the north side of the peninsula. These seaweed beds are unique in that both cold-water seaweed (which occur up to the Kuril Islands and Sakhalin) and warm-water seaweed (which range down to southern Hokkaido and further south) can be seen here (Government of Japan, 2004). *Saccharina* kelp here supports the productivity of the area. The banks extending from the cape of the Shiretoko Peninsula to the north side are highly productive and serve as important spawning grounds for Okhotsk atka mackerel, Alaska pollock and others. Like the Okhotsk side of the Shiretoko Peninsula, wild salmon have been observed to swim upstream from the coastal areas (Miyakoshi et al., 2012). Another feature here is the occurrence of many marine mammal species like Steller sea lion, spotted seal, ribbon seal, Minke whale, sperm whale, killer whale and others, and these waters are visited by the largest number of pinniped species (seven species) in Japan. During the migration seasons in spring and fall, large flocks of short-tailed shearwater, red-necked phalarope, and fulmar can be seen here, and during the winter many species of sea duck and ancient murrelet have been confirmed around the sea ice (Ministry of the Environment, 2015).

Coastal and lagoonal areas along Nemuro Straits:
The waters extend to the vicinity of Notsuke Peninsula and the coast of Lake Furen. Inside Notsuke Bay, surrounded by the sandbar of the Notsuke Peninsula, broad tidal mud flats and eelgrass beds have formed, inhabited by numerous benthic animals such as shrimp and shellfish, fish, nereid and others. This is an important fishing ground for Hokkai shrimp. The water is visited by at least 20,000 migratory birds each year during the spring and fall (Japan Wildlife Research Center, 2012). At least 1% of the minimum estimated populations of the ruddy turnstone and grey-tailed tattler and at least 0.25% of that of the black-bellied plover have been recorded here (Ministry of the Environment, 2001), and for these reasons it is a wetland listed under the Ramsar Convention. An ecosystem centred on seaweed beds also extends in the waters from the Notsuke Peninsula to Lake Furen. This area is highly important as a landing ground for flocks of migratory birds, particularly the grey-tailed tattler, whooper swan, Brent goose, Eurasian wigeon, greater scaup and common goldeneye, for each of which at least 1% of the regional population is confirmed to visit here (Ministry of the Environment, 2001). On the other hand, the ecosystem of the vicinity of the Nemuro Peninsula differs in distinguishing features, as it is home to diverse seaweed species, especially *Saccharina* kelps (Sakurai, Mukai, personal communication).

Rocky habitats around Nemuro Peninsula, Habomai Islands and Shikotan Island:
Highly natural shore zones extend off the coasts of Habomai and Shikotan. The waters less than 50 m deep extend continuously from Habomai and Shikotan to the Nemuro Peninsula. These highly productive waters are home to diverse seaweed species. This high productivity is thought to be a result of the very high concentrations of chlorophyll in the offshore zones in the vicinity of the island regions plus the contribution of nutritive salt flowing from the Sea of Okhotsk. While sea otter can be seen at Kanakuso Crag, Kabuto Crag, Harukashirimoshiri Island, Odake Island and elsewhere in the waters from Shikotan Island to Cape Nossapu, particularly large numbers have been observed at Harukashirimoshiri Island (Center for Marine Animals of the Northern Sea, 2004), where breeding has been confirmed as well (Committee on the Four Northern Islands--Expert Exchange on Sea Mammal and Bird Species, 2000). At Kanakuso Crag and Todo Crag in the Habomai Islands, Steller sea lion have been confirmed to come ashore at non-breeding ground sites, with the vicinity of Kanakuso Crag in particular being their largest landing site in the four northern islands. Numerous common seal can be seen in the northern part of Shikotan Island. The Habomai Islands also are home to many common seal, which are distributed broadly all the way to Cape Nossapu. Numerous taluses can be observed to have developed in the shore zone of the northern part of Shikotan Island, serving as a nesting ground for spectacled guillemot (Committee on the Four Northern Islands--Expert Exchange on Sea Mammal and Bird Species, 2000). Numerous spectacled guillemot, rhinoceros auklet and tufted puffin also can be seen centred on the Habomai Islands (Hokkaido Hoppo Yonto; Hokkaido Four Northern Islands Group, 2001). Numerous pinnipeds and sea birds inhabit Nemuro Peninsula as well (Ministry of the Environment, 2015).

Rocky shores and estuaries along eastern Pacific coasts (Hamanaka and Akkeshi):
In the extensive sandy bottoms of the Hamanaka area, seagrass beds dominated by an endemic *Zostera asiatica* develop in shallow subtidal habitat. Biwase Bay is visited by Brent goose, and an endangered trout, Sakhalin taimen (*Parahucho perryi*), is also observed near the river mouth. In the shore zones of Daikoku Island, Kojima Island, Cape Aininkappu and Cape Aikappu of Akkeshi Bay, 11 species of Saccharina kelps grow massively. Akkeshi Bay is also unique because extensive seagrass beds consisting of *Zostera asiatica*, *Z. marina*, *Z. japonica* and *Phyllospadix iwatensis* occur here. The vicinity of Akkeshi-ko estuary is a spawning ground of Pacific herring, and the shallows around the rocky shores in Akkeshi Bay are important for the occurrence of bryozoan reef (Mukai, 1997). Daikoku Island, located

near the mouth of Akkeshi Bay, is an important breeding ground for seabirds and a spotted seal. The extensive seaweed beds cover the coastline between Akkeshi and Kushiro city, and the area is visited by numerous birds (sand martin, slaty-backed gull, Japanese cormorant, common guillemot and others). Spectacled guillemot (*Cepphus carbo*) also can be seen here (Ministry of the Environment, 2015).

Feature condition and future outlook of the proposed area

Although the environmental conditions in eastern Hokkaido coasts seem to remain healthy, recent temperature rise, as well as more frequent occurrence of high tides, especially with extremely low pressures, could influence these ecosystems negatively in the near future. A rocky intertidal in Hamanaka, two tidal flats and two seagrass beds in Akkeshi have been monitored quantitatively by the government since 2008. In addition, other seagrass beds in Hichirippu and Lake Furen are under scientific investigation by some institutions. However, coverage by such programmes is not sufficient to understand the overall conditions of this area.

Assessment of the area against the CBD EBSA Criteria

CBD EBSA Criteria (Annex I to decision IX/20)	**Description** (Annex I to decision IX/20)	**Ranking of criterion relevance** (please mark one column with an X)			
		No information	**Low**	**Medium**	**High**
Uniqueness or rarity	Area contains either (i) unique ("the only one of its kind"), rare (occurs only in few locations) or endemic species, populations or communities, and/or (ii) unique, rare or distinct, habitats or ecosystems; and/or (iii) unique or unusual geomorphological or oceanographic features.				X
Explanation for ranking • These are the lowest-latitude waters in the world where ice floes are distributed (Government of Japan, 2004). • Only area of Japan where ice floes occur in winter, which induces unique ecosystem processes (such as ice algae blooms). • Occurrence of some unique mammals like spotted seal, sea birds like Steller's sea eagle, and fish, such as Dolly Varden trout. • The seaweed beds are unique in that both cold-water seaweeds (distributed in the Kuril Islands and Sakhalin) and warm-water seaweeds (distributed in Hokkaido and to the south) can be seen here (Government of Japan, 2004) • All resources summarized in Ministry of the Environment (2015), unless otherwise cited.					
Special importance for life-history stages of species	Areas that are required for a population to survive and thrive.				X
Explanation for ranking • Breeding sites for various species of birds such as *Fratercula cirrhata*, *Oceanodroma leucorhoa* and *Cerorhinca monocerata*, and fish such as *Theragra chalcogramma*, *Sebastes schlegeli* and *Clupea*					

pallasii (Government of Japan, 2004, Ministry of the Environment, 2015) • Notsuke Bay, Furen Lake, Kiritappu wetland and Akkeshi-ko estuary are Wetlands of International Importance, under the Ramsar Convention.					
Importance for threatened, endangered or declining species and/or habitats	Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species.			X	
Explanation for ranking Globally and locally endangered marine species of various taxa occur here, including some mammals (e.g., *Enhydra lutris)*, seabirds (e.g. *Phalacrocorax urile* and *Fratercula cirrhata*), seagrass (e.g., *Zostera asiatica*) and kelp (e.g. *Alaria angusta*) (Ministry of the Environment, 2015).					
Vulnerability, fragility, sensitivity, or slow recovery	Areas that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery.				X
Explanation for ranking Brackish estuaries and lagoons in the area, like Notsuke Bay, Lake Furen, Biwase and Akkeshi-ko, are considered unstable and vulnerable. In addition, breeding colonies of seabirds such as *Oceanodroma leucorhoa* and *Cerorhinca monocerata*, in nearshore islands (such as Daikokujima Island, Yururi Island and Moyururi Island) are of low resilience once disturbed (Ministry of the Environment, 2015).					
Biological productivity	Area containing species, populations or communities with comparatively higher natural biological productivity.				X
Explanation for ranking • The ice floes lead to massive increases in ice algae, the high productivity of which supports diverse creatures, including fish, pinnipeds, birds and others types of animals (Ministry of the Environment, 2015). • Very highly productive sites known as major salmon fishery grounds, and grass shrimp fisheries yield is also high in seagrass beds of Notsuke, Hamanaka and Akkeshi (Ministry of the Environment, 2015). • Primary productivity of seagrass beds known as highest in the world (Watanabe et al. 2005). • Nearshore pelagic ecosystems are known to have high productivity during spring due to occurrence of massive phytoplankton bloom with flow of coastal Oyashio (Isada et al. 2010).					
Biological diversity	Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity.			X	
Explanation for ranking Species diversity of key foundation species, such as seagrasses (e.g., *Zostera marina*, *Z. asiatica* and *Z. caespitosa*) and kelps (e.g., *Alaria angusta* and *Saccharina japonica*), are among the highest in Japan (Nakaoka & Aioi 2001; Yotsukura, Nakaoka and Watanabe, unpublished). However, species diversity of					

benthic invertebrates is lower than in southern Japan (Okuda et al. 2004)					
Naturalness	Area with a comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or degradation.				X
Explanation for ranking • The waters are rich in primeval nature, with the coastal ecosystem on the Sea of Okhotsk side being registered as a UNESCO World Heritage Site. • Presence of natural rocky shore, sea cliff, sandy beach and muddy coast (Ministry of the Environment, 2015).					

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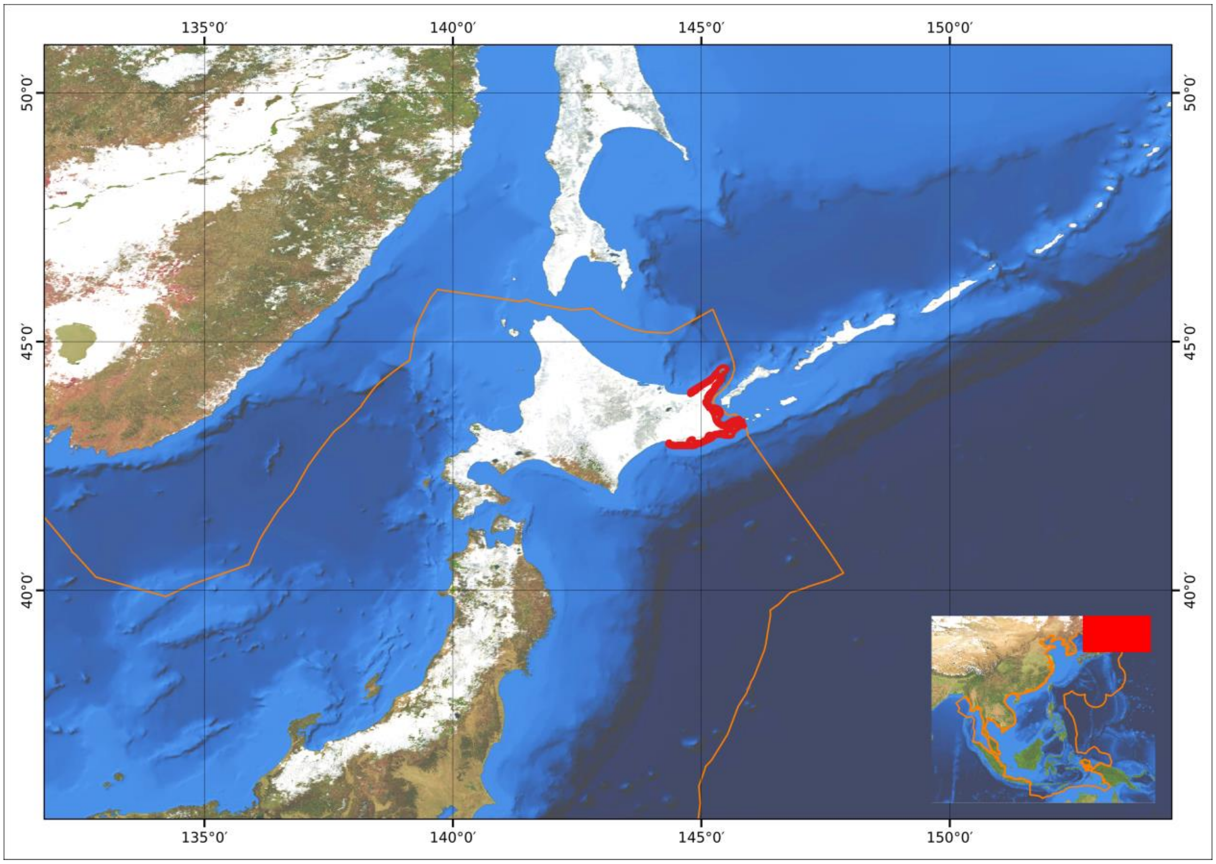

Figure 1. Area meeting the EBSA criteria

Note : The thin orange line depicts the geographic scope of the workshop.

Area no. 21: Southwest Islands

Abstract
The southwest islands of Japan, including Amami Islands, Okinawa Islands, Miyako Islands and Yaeyama Islands, belong to the subtropical region, characterized by the occurrence of fringing, barrier and atoll reefs. In most areas, mangrove and seagrass beds occur within the reef, and the continuous seascape by these habitats hosts a wide variety of associated flora and fauna, including many endemic species.

Introduction
The Southwest Islands of Japan, ranging from Amami Islands, Okinawa Islands, Miyako Islands to Yaeyama Islands, belong to the subtropical region, characterized by the occurrence of fringing, barrier and atoll reefs. In most areas, mangrove and seagrass beds occur within the reef, and the continuous seascape by these habitats hosts a wide variety of associated flora and fauna, including many endemic species. Most tropical species have a wide distribution down to the Coral Triangle Area or even to northern Australia, and their northern range limits are within these islands.

This area is represented by four main islands (and one associated set of small islands) where sufficient biological information is available; 1) Amami Island, 2) Okinawa Island and associated Kerama Islands, 3) Miyako Islands and 4) Yaeyama Islands.

Location
The area is located between 23.9°N and 28.7°N latitude, and between 122.8°E and 130.2°E longitude. It encompasses the Amami Islands, Okinawa Islands, Kerama Islands, Miyako Islands and Yaeyama Islands.

Feature description of the proposed area

Amami Oshima Island is 713 km² in area. At its southwest, it is accompatied by Kakeromajima Island, Ukejima Island, and Yoroshima Island. The sandy beaches of Katoku on Amami Oshima, the island's sole sandy shore not fringed by coral reefs, provide habitat for distinctive shellfish such as Kyushu coquina shell, *Dosinia juvenilis*. In the area of the mouth of the Katoku River, flat-headed goby, *Sicyopus leprurus* and other unique fish can be seen as well. In addition, this area is important as a feeding ground and spawning ground for green turtle. In inner Kuji Bay, an intertidal mud flat in a highly natural state remains, providing habitat for *Pitar sulfureum, Semele zebuensis, Psammotaea elongata, Upogebia carinicauda* (with their parasite *Peregrinamor gastrochaenans*). Numerous endangered species, including *Ellobium chinense, Nerita albicilla, Microtaralia acuteocinoides.* live in the high-tide zone (Kato, personal communication). While Oshima Strait between Amami Oshima and Kakeromajima Island is only 2-6 km wide, it is distinguished by the formation of inland sea coral reefs near its mouth. The coastline of Kakeromajima Island is least affected by human activities, and many important marine speices can be seen here, including *Psammotaea elongata, Gari squamosa, Semele zebuensis, Pitar sulfureum, Bonartemis histrio, Pitar pellucidum, Tapes literatus, Ruditapes variegata, Gafrarium tumidum,* and *Upogebia carinicauda*. A number of benthic animals associated with tidal mud flats are known to be endemic to Amami (Kato, 2006). These waters are an important green turtle feeding and spawning ground (Mizuno, 2013; Kamezaki, 1991b). Kasari Bay, northwestern Amami Oshima Island, is distinguished as the northern limit for tropical seagrass (Hirayama et al., 2005). In addition, its intertidal zone is one of the few places in Japan where *Lingula* species can be found. It is home to highly diverse species, including *Onchidium hongkongense, Listriolobus riukiuensis, Ptychodera flava* and others (Ministry of the Environment, 2001). Along the eastern part of the island, the mouth of Sumiyo Bay is known as habitat for *Kandelia obovata* and black mangrove, and a rare spot where mangroves are distributed, as well as home to rare conches in proliferation. In the mangrove forests, the fry and larva of species including *Plecoglossus altivelis ryukyuensis*, crustaceans, and other fish, are born and raised (Ministry of the Environment, 2001). *Upogebia sakaii* have been confirmed to inhabit the tidal mud flats, and other important benthos species occur in the large mangrove communities (Itani, 2004a; 2004b).

Okinawajima Island, 1207 km² in area, is the largest of the southeastern islands of Japan. In the northern part, seagrass and seaweed beds, intertidal mud flats, mangrove and coral reefs occur and show very high species diversity (Ministry of the Environment, 2001). The Haneji Inlet is home to highly diverse rare conch species, including the only habitat in Japan for *Azorinus scheepmakeri* and the only habitat in the world for *Ditiropisena sp.* (Ministry of the Environment, 2001). The endangered dugong has been confirmed to live here as well (Ministry of the Environment, 2006). The Yagaji area also is a breeding ground for roseate tern and black-naped tern. Snipe and plover also visit. On the east coast, mangrove forests have developed in the vicinity of Gesashi, and in the areas of the mouths of the Oura, Kinbaru and Okukubi rivers, where *Kandelia obovata*, black mangrove, and *Rhizophora mucronata* grow. The Gesashi mangrove forest is home to four new species of brackish-water *Alpheus brevicristatus* and numerous species of fish including *Periophthalmus argentilineatus*, mudskipper and others. Living in the mangrove forests at the mouth of the Oura River are numerous turreted nerite *Nerita undata*, *Angustassiminea* sp., *Platyvindex* sp. and others. The east coast of Okinawa Island is lined by a series of coral reefs, seagrass beds and seaweed beds with the large communities of *Syringodium isoetifolium, Cymodocea serrulata* and *Cymodocea rotundata*. Dugongs are sited in these waters frequently. The seaweed beds unfolding off the northeast coast of Okinawa Island are green turtle feeding grounds. There also are expansive seagrass and seaweed beds in Nakagusuku Bay, where dugong have also been confirmed to live (Ministry of the Environment, 2001; Ministry of the Environment, 2006). In Kin Bay, a soft bottom environment has developed from the sandy sea floor to the muddy floor, where diverse fish populations, including numerous unique fish, mainly gobies, are being identified (Suzuki et al., 1996; Suzuki et al., 1999; Suzuki et al., 2011).

In the southwestern part of the island, seaweed beds unfold off the coast in the vicinity of Yabuchi Island, the largest habitat for *Sargassum fulvellum* and *Pseudodichotomosiphon constricta*. Tidal mud flats, seaweed beds, and sea grass beds can be seen widely across Nakagusuku Bay. In the northern part of Nakagusuku Bay (off the coasts of Awase, Kuba and other areas) grow eight species of seagrass, including *Thalassia hemprichii*, *Cymodocea serrulata* and *Cymodocea rotundata*. They also are the only habitat in Japan for *Scartelaos histophorus* and *Acentrogobius* and the southern distribution limit of mudskipper and Masago goby in Japan. Awase, the only habitat in Japan for *Macrophthalms quadratus*, in particular, has an abundance of rare shellfish. In the seaweed beds of southern Nakagusuku Bay, several important species are found, including *Sargassum fusiforme* (southern limit), *Sargassum ilicifolium* var. *conduplicatum*, *Ulva conglobata*, *Gelidium pusillium* and others. Both the Awase tidal mud flats and the Sashiki tidal mud flats are visited by snipe and plover, with relatively high numbers of species and populations during the migration seasons of spring and fall. The tidal mud flats of sand and mud that extend from the town of Sashiki, south of Nakagusuku Bay, to the town of Yonabaru are inhabited by *Scartelaos histophorus* and fiddler crab (Ministry of the Environment, 2001). As in Kin Bay (in Nakagusuku Bay), diverse fish populations, including numerous unique fish, centered on gobies, are being identified (Suzuki et al., 1996; Suzuki et al., 1999; Suzuki et al., 2011). The Gushi tidal mud flats also welcome relatively high numbers of species and populations of snipe and plover visiting during the migration seasons of spring and fall and wintering here, and at least 0.25% of the grey-tailed tattler's minimum estimated population has been recorded here. In the intertidal zone of the reef belt extending from the Gushi tidal mud flats to Omine Cape live *Armatocillenus yokohamae*. The Yone tidal mud flats are home to numerous *Ephippodonta gigas, Auriculodes opportunatum, Serratina capsoides* and other rare species (Ministry of the Environment, 2001).

The Kerama Islands, located west of Okinawajima Island, are a leading region for the identification of rare species, with fringing coral reefs and a high degree of species diversity. They are an important source of larva (Ministry of the Environment, 2001). Coral reefs are distributed densely in these highly transparent waters. The waters in the vicinity of Yakabi Island and Kuba Island are both important green turtle and loggerhead turtle spawning grounds and home to a valuable ecosystem in which the Ryukyu odd-tooth snake (a species of Colubridae) feeds on hatchlings. They also are a feeding ground for green turtle and hawksbill turtle (Ministry of the Environment, 2001; Kamezaki and Taniguchi, 2013; Miyahira et al., 2000; Tomiyama and Miyahira, 2007), and are also are important waters where humpback whales raise their young in the winter (Ogasawara Maritime Center, 2000; Calambokids et al., 2001).

The Miyako Islands (1207 km^2 in area) are surrounded by some associated small islands (Ikema Island, Irabu Island, Shimoji Island, Kurima Island, and others). To the north of Ikema Island lies Yabiji Reef, an expansive coral reef in a highly natural state. The gravelly tidal mud flats in the vicinity of Ikema Island are home to *Uca tetragonon*. The coast and waters are distinguished by bright white sandy beaches and coral reefs. Shimajiri Inlet in northern Miyako Island is home to mangrove forests, where *Kandelia obovata*, black mangrove, *Rhizophora mucronata*, and grey mangrove grow. The Shimajiri mangrove forest is the largest on Miyako Island. Numerous commercially important marine animals such as mud crab, *Okinawa seabream* and others live here. On the east coast of Miyako Island (Cape Agarihenna) are *Sargassum fulvellum* seaweed beds, important as large-scale subtropical Sargassum beds. At Kadekari Inlet in the south is another mangrove forest where *Kandelia obovata*, black mangrove, and grey mangrove grow. In Yonaha Bay and environs on the west side of the island unfold tidal mud flats and seagrass and seaweed beds, where eight species of seagrass, including *Thalassia hemprichii, Cymodocea serrulata* and others, are mixed. Also to be seen here are sea grape (northern limit) and, on reef shores, *Emoia atrocostata atrocostata* (a reptile). Snipe and plover visit here, with high numbers of species and populations visiting during the spring and fall migrations and wintering here. At least 1% of the minimum estimated population of Pacific golden plover and at least 0.25% of the minimum estimated population of lesser sand plover, *Numenius phaeopus*, Eurasian curlew, and grey-tailed tattler have been recorded here. Mangrove forests of *Kandelia obovata*, black mangrove, and *Rhizophora mucronata* are found in the inlets of Irabu Island as well (Ministry of the Environment, 2001). The vicinity of these waters also includes green turtle feeding waters (Kamezaki, personal communication).

The Yaeyama Islands consist of two major islands, Ishigaki Island (222 km^2) and Iriomote Island (290 km^2) and some smaller islands. An extensive coral reef (the Sekisei Reef) develops between the two islands. Coral reefs have formed in the vicinity of Ishigaki Island, and numerous mangrove forests and tidal mud flats can be found in the river mouth and bay areas. Coral species are highly diverse in the coral reefs off the coast of the Hirakubo Peninsula on northern Ishigaki Island, the coast from Cape Ugan to Ishizaki, and the Shiraho coast. Mangrove forests of *Kandelia obovata*, black mangrove, and *Rhizophora mucronata* unfold at the mouths of the Kara River in the northwest and the Fukido River in the central west of the island, Nagura Bay, Miyara Bay, and the mouth of the Miyara River. Grey mangrove, *Lumnitzera racemosa*, and *Sonneratia alba* also grow in Nagura Bay. These mangrove forests are populated by highly diverse organisms, unique in terms of their mangrove species, sizes, origins, bird species, fish and benthic species. The river mouth areas and mangrove forests are home to large numbers of species and populations of snipe and plover. In Miyara Bay and the area of the Miyara River mouth, at least 1% of the minimum estimated population of lesser sand plover and at least 0.25% of the minimum estimated population of Pacific golden plover, Kentish plover, ruddy turnstone, and grey-tailed tattler have been recorded. At Shiraho at least 1% of the minimum estimated population of lesser sand plover and at least 0.25% of the minimum estimated population of Pacific golden plover, Kentish plover, ruddy turnstone, and grey-tailed tattler have been recorded. Breeding colonies of roseate, black-naped and bridled tern are located in this area. Kabira Bay and the coast of the sea extending in front of Yonabaru have highly diverse deep bay environments, with seaweed beds where *Sargassum fulvellum* and

Gelidiella acerosa grow as well as fringing reefs with high degrees of diversity of species. Nagura Bay also is home to a community of *Acetabularia ryukyuensis*. In addition, seagrass and seaweed beds, including *Enhalus acoroides*, grow here (Ministry of the Environment, 2001). The Sekisei Reef is Japan's leading coral habitat. It is important as a source of larvae and is both in a highly natural state and highly diverse (Ministry of the Environment, 2001). Mangrove forests form at the mouths of rivers flowing into the waters in the vicinity of Iriomote Island. *Kandelia obovata*, black mangrove, *Rhizophora mucronata*, grey mangrove, *Lumnitzera racemosa*, *Sonneratia alba* and other species grow at the Nakama, Shiira, Aira, and Maira rivers, Yubu Island and its tidal mud flats, from Cape Kuba to Cape Akaya on Kohama Island, in Funaura Bay, at the Urauchi River, at the Ayanda, Udara, and Kuira rivers in the southwest. These spots also are highly diverse in benthic animals endemic to mangrove wetlands. Funaura is the northern limit of mangrove palm distribution. The sandy beaches on the southern coast of Iriomote Island (Takahama, Wakarehama) have the highest density of green turtle spawning of any sandy beaches in the Nansei Islands, and the seaweed beds deep in the bays are green turtle feeding grounds. Sakiyama Bay in the western waters, a place that remains in a highly natural state and lacks roads and settlements, is home to expansive pure communities of *Enhalus acoroides*, with a high diversity of coral species. Amitori Bay is also home to expansive *Thalassia hemprichii*, *Cymodocea serrulata*, and *Enhalus acoroides* communities, with a high degree of diversity of coral species, including rare species (Ministry of the Environment, 2001).

Feature condition and future outlook of the proposed area

Since the mid-twentieth century, the coastal areas of these islands have been damaged by various human activities, such as land reclamation, silt and nutrient input from terrestrial areas. In addition, other types of threats, such as temperature rise and intensified storm activities, negatively affect the coastal areas, as represented by mass occurrence of coral bleaching in Okinawa and Yaeyama Islands (Kayanne et al. 2002). Various types of conservation activities have been ongoing in these islands. Okinawajima and Ishigaki Islands are centees for coral reef research in Japan. Research on mangrove, seagrass and seaweed beds has also been conducted. Monitoring of these habitats by annual government census is ongoing for some sites, including the seagrass bed, tidal flat and coral reefs in these regions.

Assessment of the area against the CBD EBSA Criteria

CBD EBSA Criteria (Annex I to decision IX/20)	**Description** (Annex I to decision IX/20)	**Ranking of criterion relevance** (please mark one column with an X)			
		No information	**Low**	**Medium**	**High**
Uniqueness or rarity	Area contains either (i) unique ("the only one of its kind"), rare (occurs only in few locations) or endemic species, populations or communities, and/or (ii) unique, rare or distinct, habitats or ecosystems; and/or (iii) unique or unusual geomorphological or oceanographic features.				X

Explanation for ranking (must be accompanied by relevant sources of scientific articles, reports or documents)

A diverse array of coral reefs, seagrass/seaweed beds, mangrove, and intertidal flats occurs in almost all the islands in this area. Many tropical species have their northern distributional limit within this region, and the number of endemic species is high, especially for benthic animals in intertidal flats, such as *Upogebia carinicauda*, *Peregrinamor gastrochaenans* and <u>Octolasmis</u>

unguisiformis (Kato, 2006; Ministry of the Environment, 2015).					
Special importance for life-history stages of species	Areas that are required for a population to survive and thrive.				X
Explanation for ranking (must be accompanied by relevant sources of scientific articles, reports or documents) • Important migratory routes of shorebirds, supporting >1% population of some species like lesser sand plover (Ministry of the Environment, 2015). • The area supports breeding populations of roseate, black-naped and bridled tern, migratory pelagic species outside the breeding season. Some migratory shorebirds also use this area in internationally significant numbers. • Important green turtle feeding and spawning grounds (Mizuno, 2013; Kamezaki, 1991b).					
Importance for threatened, endangered or declining species and/or habitats	Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species.				X
Explanation for ranking (must be accompanied by relevant sources of scientific articles, reports or documents) • Offers diverse habitats for many threatened species. For example, the Haneji Inlet in Northern Okinawajima Island is home to rare conch species, including the only habitat in Japan for *Azorinus scheepmakeri* and the only habitat in the world for *Ditiropisena sp.* (Ministry of the Environment, 2001). • Northern range limit of dugong occurs in the northern Okinawajima Islands (Ministry of the Environment, 2006).					
Vulnerability, fragility, sensitivity, or slow recovery	Areas that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery.				X
Explanation for ranking (must be accompanied by relevant sources of scientific articles, reports or documents) Subtropical coral reefs are considered highly vulnerable to multiple stresses, as shown by frequent beaching events since 1998 (Kayanne et al. 2002). Other types of marine habitats, like seagrass beds, seaweed beds, mangrove and intertidal mud flats, are also sensitive to human-induced stresses.					
Biological productivity	Area containing species, populations or communities with comparatively higher natural biological productivity.				X
Explanation for ranking (must be accompanied by relevant sources of scientific articles, reports or					

documents) ➢ Dominated by highly productive mangrove, seagrass/seaweed beds and coral reef community (Ministry of the Environment, 2015)					
Biological diversity	Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity.				X
Explanation for ranking (must be accompanied by relevant sources of scientific articles, reports or documents) Region with one of the highest species diversity for tropical marine organisms in the world (Fujikura et al. 2010). For example, a total of 363 species of corals (such as *Acanthastrea bowerbanki, Acanthastrea hemprichii, Acanthastrea ishigakiensis, Acropora abrolhosensis, Acropora acuminate, Acropora anthocercis, Acropora caroliniana*) are recorded from Ishigaki and Iriomote islands, a number comparable to that of the Philippines (414 species) and the Great Barrier Reef (330 species) (Nishihira and Veron 1995).					
Naturalness	Area with a comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or degradation.				X
Explanation for ranking (must be accompanied by relevant sources of scientific articles, reports or documents) • The presence of natural sandy beach, rocky and cobble shores. • The naturalness of the islands is protected by the designation of national parks here: Kerama Shoto National Park (Kerama Islands), Iriomote-Ishigaki National Park (Yaeyama Islands), Amami Guntō Quasi-National Park (Amami Islands) and Okinawa Kaigan Quasi-National Park (Okinawajima Island).					

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Maps and Figures

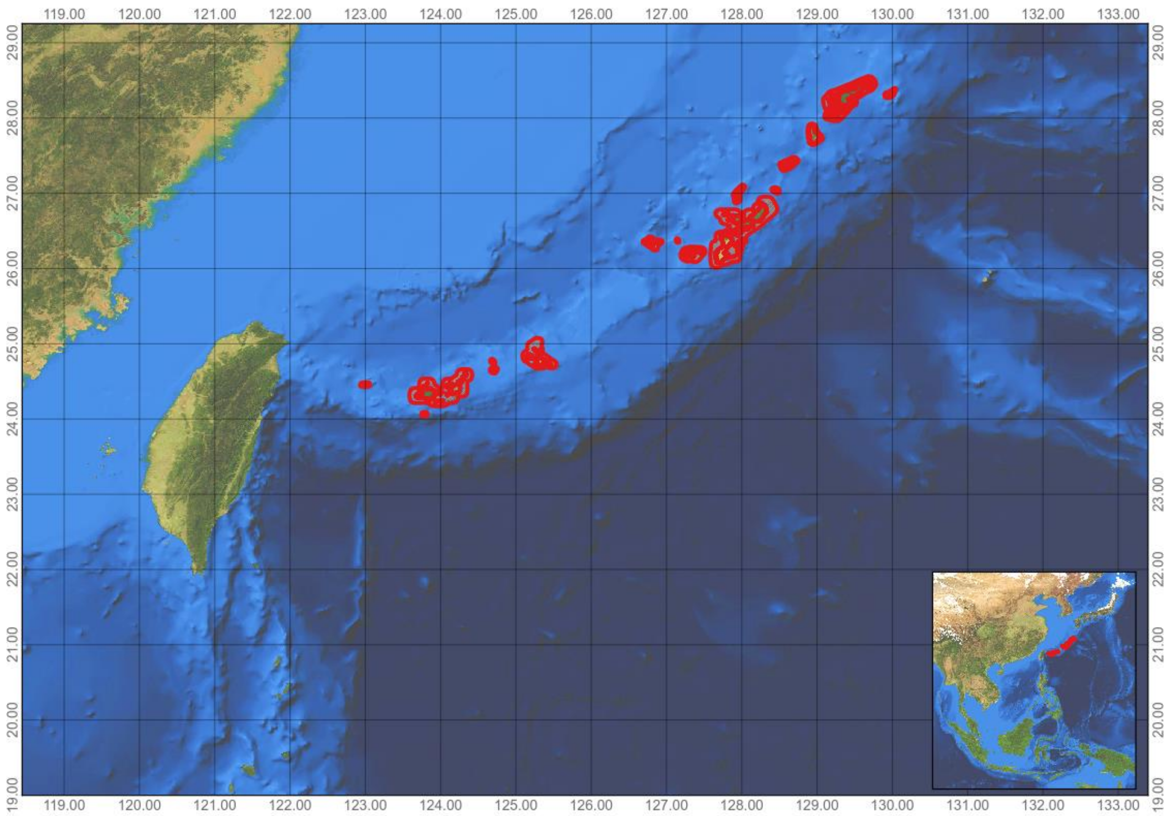

Figure 1. Area meeting the EBSA criteria

Area no. 22: Inland Sea Areas of Western Kyushu

Abstract
This area is unique due to its large tidal amplitude. Extensive mud flats appear at inner parts of the waters in Ariake Sea and Yatsushiro Sea. In these intertidal flats, many benthic organisms belonging to diverse taxa occur, as do many endemic species. The outer coastal areas host a variety of intertidal and subtidal habitats, including rocky shores, seaweed and seagrass beds, and temperate coral communities.

Introduction
Inland sea areas in the western part of the Kyushu Islands are unique due to their large tidal amplitude. As a result, extensive mud flats appear at inner parts of the waters in Ariake Sea and Yatsushiro Sea. In these intertidal flats, various types of benthic organisms belonging to diverse taxa occur, including many endemic species (such as *Boleophthalmus pectinirostris* and *Ilyoplax deschampsi*). Some of the endemic species are more closely related to those in Korea and China rather than other parts of Japan (Sato 2000). In addition to unique intertidal areas in inner parts of the inland seas, the other coastal areas are also significant in that they host a variety of intertidal and subtidal habitats, including rocky shore, seaweed and seagrass beds, and temperate coral communities. The area comprises three sub-areas; 1) Ariake Sea coast, 2) Amakusa and southern Yatsushiro Sea, and 3) Northeastern Yatsushiro Sea.

Location
The area is located between 31.9°N and 33.2°N latitude, and between 129.9°E and 130.7°E longitude. It covers the Ariake Sea, Amakusa and Yatsushiro Sea (Nagasaki, Saga, Kumamoto and Kagoshima Prefectures).

Feature description of the proposed area

The coast of the Ariake Sea includes waters from the mouth of the Chikugo River to the mouth of the Yabe River, the Higashiyoka coast, the waters from the mouth of the Rokkaku River to the mouth of the Shioda River, the Kajima coast, the mouth of the Tagori River, the Arao coast, the mouths of the Kikuchi, Shirakawa, and Midori rivers, and others. Deep in the Ariake Sea are expansive saltwater marshlands and tidal mud flats that are habitat for bluespotted mud hopper, *Octopus minor*, *Scapharca globosa ursus*, pen shell and others, including 23 endemic species and 40 or more quasi-endemic species. Oyster reefs form in these waters. From the mouth of the Chikugo River to the mouth of the Yabe River are habitats where continental relict inland water species not seen in other regions of Japan, including *Cleistostoma dilatatum*, *Ilyoplax deschampsi*, *Salinator takii* and others, are prolific. The tidal zone of the Chikugo River is a spawning ground for *Salanx ariakensis*, *Neosalanx reganius* and Japanese grenadier anchovy, and the coast of the Ariake Sea is a spawning ground for roughskin sculpin. The Higashiyoka coast is Japan's largest habitat for *Suaeda japonica* and a place where large numbers of species and populations of snipe and plover winter visit during the spring and fall migrations; at least 1% of the minimum estimated population of black-bellied plover, dunlin, and Eurasian curlew has been recorded here, as has at least 0.25% of the minimum estimated population of Kentish plover, lesser sand plover, greenshank, Terek sandpiper and grey-tailed tattler. Other species recorded here are spotted greenshank, little curlew, common redshank, Far Eastern curlew and common shellduck. The Kajima coast too is a place where relatively large numbers of species and populations of snipe and plover winter and visit during the spring and fall migrations, and it is visited by common shellduck and Saunders' gull as well (Ministry of the Environment, 2001; BirdLife International, 2012). *Euspira fortunei*, *Tegillarca granosa*, *Serratina capsoides*, *Camptandrium sexdentatum* and other rare species are distributed at the mouth of the Tagori River. The waters from the mouth of the Rokkaku River to the mouth of the Shioda River are a habitat where *Angustassiminea kyushuensis* proliferate to an unparalleled degree, as do the rare species *Cerithidea ornata*, *Cerithidea largillierti*, and *Melampus sincaporensis.* The Arao coast is a place where relatively large numbers of species and populations of snipe and plover winter and visit during the spring and fall migrations. The mouths of the Shirakawa and Midori rivers also see relatively large numbers of species and populations of snipe and plover wintering and visiting during the spring and fall migrations. Endemic endangered species proliferate in the saltwater marshlands here. In the muddy tidal mud flats, *Estellarca olivacea* are prolific. This is also habitat to *Salanx ariakensis* and *Neosalanx reganius* (Ministry of the Environment, 2001). It is known that small Japanese squid, particularly *Loliolus (Nipponololig) beka*, are distributed in Japan only in the central Seto Inland Sea and the Ariake Sea. They are distributed widely in the shallow waters in the inner reaches of the Ariake Sea, where it is thought that they spend their entire life cycle, including spawning grounds (Natsukari, 1994). The Ariake Sea's finless porpoise and many of its fish move widely around the Ariake Sea during their life cycles (Takita, Yamaguchi, 2013).

Amakusa and southern Yatsushiro Sea. The Ariake Sea's largest eelgrass beds unfold off the southern Shimabara Peninsula. The Nagaura tidal mud flats off the coast in the vicinity of Amakusa and Oyano Island are Japan's largest *Uca lactea lacteal* habitat. Myokenura in the Amakusa Sea is a diving spot where numerous sea urchin, crab, and other marine creatures are found (Henmi, personal communication). Off the coast of the sea extending in front of Tomioka in the town of Reihoku is an outer belt of *Sargassum patens* and *Sargassum horneri* surrounding *Sargassum hemiphyllum* and *Sargassum piluliferum*. Off the coast in the vicinity of Tsuji Island in the Hayasakiseto Strait are seagrass and seaweed beds rich in biodiversity, with a mixture of eelgrass, sargassum, *Ecklonia cava* and *Ecklonia kurome* beds and others. At Tsuji Island grow more than 10 species of Sargassum seaweeds, dominated by *Myagropsis myagroides, Sargassum horneri, Sargassum patens, Sargassum macrocarpum* and others (Ministry of the Environment, 2001). The sandy tidal mud flats of Hino Island are home to *Paracondylactis hertwigi, Leptocardia, Lingula anatina* and others (Henmi, 2005), while *Ellobium chinense* and others live at Goshoura and Makishima islands. On the west side of Shimojima Island is a natural beach where loggerhead turtle spawn, as well as a green turtle feeding ground (Henmi, personal communication). Katashima, Oshima, and Kuwashima islands southwest of Amakusa Shimojima are highly diverse in species of coral, important habitat in western Kyushu for the reef-building coral *Acropora hyacinthus* and *Acropora solitaryensis* (Ministry of the Environment, 2001; Nojima, 2004). The waters to the east of Amakusa Shimojima are feeding grounds for green turtle (Kamezaki, personal communication). At Cape Nagasakibana on southern Nagashima Island are waters high in biodiversity, with a mixture of eelgrass and seaweed beds. The seaweed beds off the coast of the city of Akune include expansive Sargassum beds, including subtropical *Sargassum fulvellum* species (Ministry of the Environment, 2001).

Northeastern Yatsushiro Sea. Many rivers flow into the Yatsushiro Sea and form tidal mud flats, with those at the mouth of the Kuma River being particularly expansive. Snipe and plover visit the vicinity of the Kuma River mouth, with relatively large numbers of species and populations visiting during the spring and fall migrations and wintering here. At least 1% of the minimum estimated population of Kentish plover, Terek sandpiper, and grey-tailed tattler has been recorded here, as has at least 0.25% of the minimum estimated population of black-bellied plover, lesser sand plover, *Numenius phaeopus*, grey-tailed tattler, and dunlin. Saunders' gull also visits here. These waters are visited by as many as 90 species of birds, including snipe and plover. The tidal mud flats unfolding at the mouths of the Ono and Sunagawa rivers are also visited by numerous snipe and plover, and Saunders' gull and Far Eastern curlew have been recorded here as well. Also abundant at the mouth of the Ono River are the typical Ariake Sea species *Cerithidea largillierti, Cerithidea ornata, Pseudomphala latericea,* fiddler crab, *Cleistostoma dilatatum*, and bluespotted mud hopper. *Salinator takii*, whose current distribution in the Ariake Sea is limited, can be seen here, too. Black-faced spoonbill have visit the mouth of the Hikawa River (Ministry of the Environment, 2001). Oyster reefs form in these waters.

Feature condition and future outlook of the proposed area

The area has been heavily affected by human threats. The majority of the intertidal and shallow subtidal flats of the Ariake Sea and Yatsushiro Sea were reclaimed in the past century, including the latest reclamation in Isahaya tidal flat, the biggest tidal flat at the innermost part of the Ariake Sea, in 1997. Eutrophication, frequent occurrence of red tides and anoxic water are negatively affecting the biodiversity and fisheries in many parts of Ariake Bay.

Along the outer coast of this area, the ecosystem still remains healthy. However, a change in benthic fauna and flora has been noted over the past two decades. Notably, a decline in the extent of seaweed beds and an increase in temperate corals have been observed, which may be due to warming in the region. Monitoring and research in marine biodiversity and coastal ecosystems have been conducted by multiple institutions along the coastal areas, including a tidal flat census in Nagaura and rocky intertidal community census at Tomioka conducted by the government. Intensive research has been ongoing in Ariake Bay after the closure of Isahaya Water Gate to examine its impacts on coastal ecosystems.

Assessment of the area against the CBD EBSA Criteria

<table>
<tr><td rowspan="2">CBD EBSA Criteria
(Annex I to decision IX/20)</td><td rowspan="2">Description
(Annex I to decision IX/20)</td><td colspan="4">Ranking of criterion relevance
(please mark one column with an X)</td></tr>
<tr><td>No information</td><td>Low</td><td>Medium</td><td>High</td></tr>
<tr><td>Uniqueness or rarity</td><td>Area contains either (i) unique (“the only one of its kind”), rare (occurs only in few locations) or endemic species, populations or communities, and/or (ii) unique, rare or distinct, habitats or ecosystems; and/or (iii) unique or unusual geomorphological or oceanographic features.</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">Explanation for ranking (must be accompanied by relevant sources of scientific articles, reports or documents)
• Tidal mud flats that are habitat for bluespotted mud hopper, octopus minor, Scapharca globosa ursus, pen shell and others, including 23 endemic species and 40 or more quasi-endemic species.
• Habitats for continental relict inland water species not seen in other regions of Japan, including Cleistostoma dilatatum, Ilyoplax deschampsi, Salinator takii. (Sato, 2000)</td></tr>
<tr><td>Special importance for life-history stages of species</td><td>Areas that are required for a population to survive and thrive.</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">Explanation for ranking (must be accompanied by relevant sources of scientific articles, reports or documents)
• Spawning ground for Salanx ariakensis, Neosalanx reganius, and Japanese grenadier anchovy, and the coast of the Ariake Sea is a spawning ground for roughskin sculpin.
• 1% of the minimum estimated population of black-bellied plover, dunlin, eurasian curlew, Kentish plover, Terek sandpiper, and grey-tailed tattler has been recorded (Ministry of the Environment, 2001; BirdLife International, 2012)
• Finless porpoise and many fish move widely around the Ariake Sea during their life cycles (Takita,</td></tr>
</table>

Yamaguchi, 2013).					
Importance for threatened, endangered or declining species and/or habitats	Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species.				X
Explanation for ranking (must be accompanied by relevant sources of scientific articles, reports or documents) • *Euspira fortunei*, *Tegillarca granosa*, *Serratina capsoides*, *Camptandrium sexdentatum* and other rare species are distributed at the mouth of the Tagori River. • Black-faced spoonbill visit the mouth of the Hikawa River (Ministry of the Environment, 2001)					
Vulnerability, fragility, sensitivity, or slow recovery	Areas that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery.			X	
Explanation for ranking (must be accompanied by relevant sources of scientific articles, reports or documents) Extensive tidal flats, seagrass/seaweed beds and temperate coral reefs areas are subjected to major changes due to warming, sea level change, ocean acidification, and so on (Ministry of the Environment, 2015).					
Biological productivity	Area containing species, populations or communities with comparatively higher natural biological productivity.			X	
Explanation for ranking (must be accompanied by relevant sources of scientific articles, reports or documents) Productivity of tidal flats and seagrass beds are relatively highcompared to other regions of Japan (Nakaoka and Aioi 2001).					
Biological diversity	Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity.				X
Explanation for ranking (must be accompanied by relevant sources of scientific articles, reports or documents) Various types of benthic organisms belonging to diverse taxa occur, including some endemic species such as *Cleistostoma dilatatum*, *Ilyoplax deschampsi* and *Salinator takii*, and thus the area is considered one of the hotspots of Japan (Ministry of the Environment, 2015).					
Naturalness	Area with a comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or degradation.			X	
Explanation for ranking (must be accompanied by relevant sources of scientific articles, reports or documents) • The presence of natural mud flats, sandy beach, rocky and cobble shore. • Coastal areas around Amakusa are included in Unzen-Amakusa National Park					

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Maps and Figures

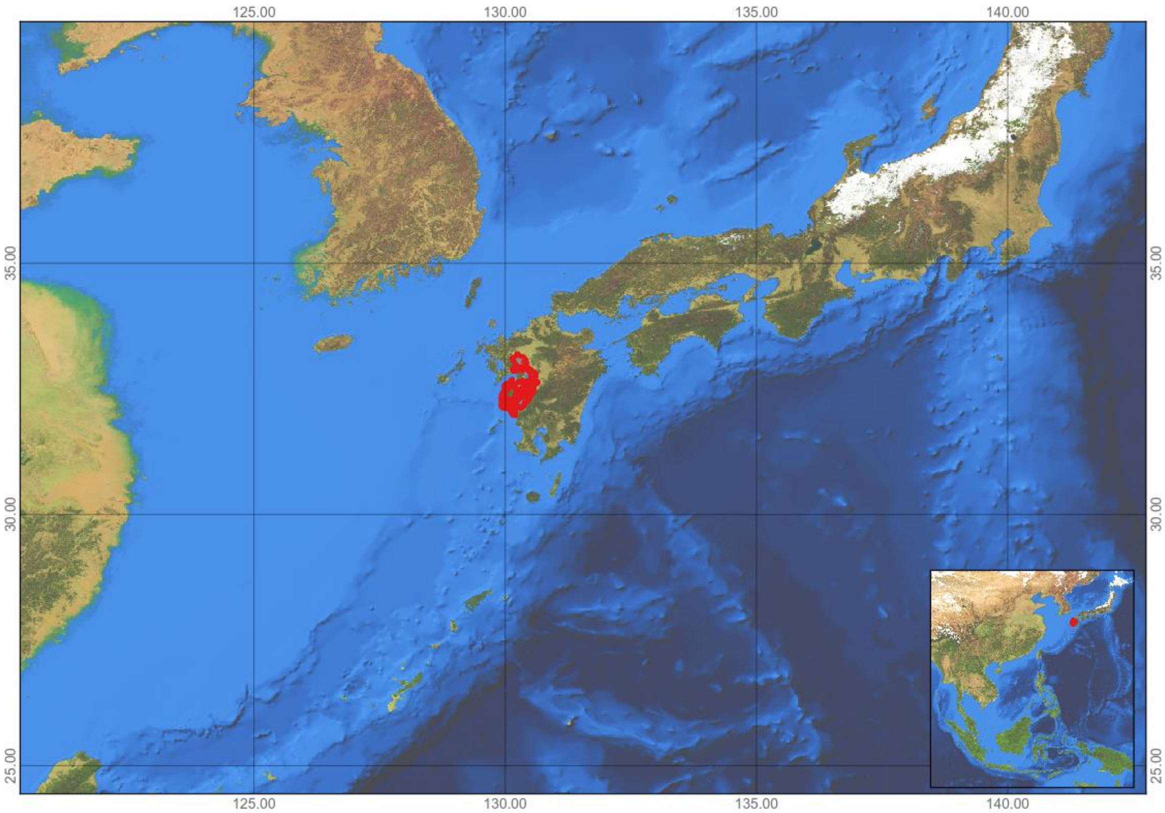

Figure 1. Area meeting the EBSA criteria.

Area no. 23: Southern coastal areas of Shikoku and Honshu Islands

Abstract

The southern coastal areas of Shikoku and Honshu islands, including the Izu Islands, are heavily influenced by the Kuroshio current, which characterizes the benthic flora and fauna of this area. Open coastal areas are mostly rocky shore, whereas semi-enclosed bays behind the exposed capes are suitable habitats for soft-bottom, benthic organisms, including seagrass beds. Temperate coral communities are also observed in most of this area.

Introduction

The major Kuroshio warm current runs along southern parts of the Japanese mainland, characterizing the benthic flora and fauna of this area. This area, ranging from the southwestern tip of Shikoku Island to the Boso Peninsula in the central Honshu and Izu Shichito Islands, offshore of Tokyo Bay, shares common geographical and biogeographical features. Open coastal areas are mostly rocky and inhabited by various types of benthic organisms both in the intertidal and subtidal hard bottom zones, whereas semi-enclosed bays behind the exposed capes are suitable habitats for soft-bottom benthic organisms, including seagrass and various marine invertebrates. Most notably, temperate coral communities are observed in most of this area. Despite small areas in each site, the reef-forming corals provide habitats for many different types of marine organisms and serve also as temporary habitats for some tropical reef fish transported northward with the Kuroshio current (Ministry of the Environment, 2015).

Among many similar types of habitats along the coast, which extends more than 700 km in length, there are five sub-sites for which sufficient information is available: 1) southwestern Shikoku Island, 2) southern Kii Peninsula, 3) Shima Peninsula 4) Izu Peninsula, 5) Boso Peninsula and 6) Izu Shichito Islands.

Location

The area is located between 32.7°N and 35.4°N latitude, and between 132.2°E and 139.9°E longitude. It covers southwestern Shikoku Island (Kochi and Ehime prefectures), southern Kii Peninsula (Wakayama Prefecture), Shima Peninsula (Mie Prefecture), Izu Peninsula (Shizuoka Prefecture), Boso Peninsula (Chiba Prefecture) and Izu Shichito Islands.

Feature description of the proposed area

Southwestern part of Shikoku Island consists of subareas in Kochi and Ehime prefectures. In Kochi, the waters include the sea floor off the coast of Okinoshima Island, Kashiwajima Island and Cape Ashizuri. Off the rocky shores in the vicinity of Kashiwajima, reef-building coral are building a large community, and southern benthos and fish are very diverse. In addition, 1792 species of shellfish have been taken from the sea floor at depths of 100-300 m in the vicinity of Okinoshima Island, Kashiwajima Island and Cape Ashizuri (Azuma, 1960). Most of these were taken through trawling conducted at the sea floor in an area known as Okezoko, off Okinoshima, and in that vicinity, and through coral fishing conducted at the sea floor about 100 m deep off Okinoshima. Distribution of precious corals has been confirmed here as well. These waters are home to the greatest diversity of shellfish in the vicinity of Japan outside the Ryukyu Islands (Kato, personal communication). In addition, in the vicinity of Kashiwajima Island there is high diversity not just of shellfish but of fish as well (Hirata et al, 1996). Many types of coral can be seen here as well, and a coral reef ecosystem has developed. A new species of damselfish is among those species discovered here (Endo, personal communication). Among bird species, there is a breeding colony of Japanese murrelet (an IUCN endangered species) in these waters, which have been named an Important Bird Area (BirdLife International, 2012). They also are an important feeding ground for green turtle (Uetsuki and Watanabe, 2013). In addition, the vicinity of Cape Ashizuri is very high in biodiversity (particularly for fish). *Meretrix lamarckii* are prolific, and there are numerous

Latona cuneata, *Chion semigranosa*, and *Hippapacifica* as well (Itani, personal communication). Coral is distributed at Tosashimizu, Uhae, Hirabae and along the nearby Minokoshi coast. These coral are very diverse in species and include rare species (Ministry of the Environment, 2001). Also, one of the two pods of Bryde's whale in the vicinity of Japan is distributed in these waters (Hattori and Yamamura, 2014a). The Ehime area includes the ria coastline and islands from the town of Ainan to the Port of Uwajima. While many natural coastlines remain ihealthy, at the same time it is a thriving centre of pearl and young yellowtail aquaculture. Many endangered species of shellfish and others can be seen in the coastal reefs. The seaweed beds that continue to the waters of Uwajima are an important feeding ground for green turtle (Uetsuki, Watanabe, 2013).

Southern Kii Peninsula: Along the coast from Karekinada through Cape Shiono to Kushimoto Oshima, reef-building coral can be seen, and their species of temperate coral are one prominent feature. Kushimoto Sabiura and the west coast of Cape Shiono provide a living environment for numerous coral-reef animals and benthic organisms, with high levels of cover and species diversity, and these include many species for which this area is the northern limit of their distribution. This is the only place in the world where a dense concentration of elegance coral occur (Ministry of the Environment, 2001). Particularly important waters in this area are those in front of Zobana on the north coast of Kii Oshima Island (habitat for highly diverse reef-building coral, mainly *Echinophyllia aspera*, and also good habitat for seaweed and soft coral), Omimi beach on Kii Oshima (home to the easternmost community of *Acropora hyacinthus* in Japan east of Cape Shiono and relatively diverse in other reef-building coral as well), the north coast of Tsuya Island (home to the largest community of rare elegance coral in Japan), and the sea extending in front of Naminoura on the south coast of Cape Shiono (home to communities of *Acropora hyacinthus*) (Kushinomoto Marine Park Center, 2010; 2011). In addition, the beach beneath the Cape Shiono lighthouse, known as Ogokuda beach, has the greatest diversity of shellfish on Honshu (Ogawa, 1954; Okutani et al., 1981). There have been reports of 828 gastropods, 237 bivalves, six tooth shells, three cephalopods, and 15 Chitonidae, for a total of 1089 species of shellfish, on Cape Shiono (Kato, personal communication). The area of the mouth of the Koza River too is home to numerous species unique to brackish water, such as *Luciogobius palliduse*, and it is a place where numerous migratory creatures (Japanese eel, ayu, freshwater goby, freshwater prawn, *Clithon retropictus* and others) go upstream (Kato, personal communication). In addition, Cape Esa has a shore reef with no bank protection, where *Cavernacmella yamamotonis* lives in the high-tide zone, and the intertidal zone has rich biota as well (Kato, personal communication). In the shore zone in the vicinity of Uragami Bay and the town of Taiji, seagrass beds develop consisting of eelgrass, *Zostera japonica* and others; multiple cetaceans have been confirmed to live here. In addition, breeding of finless porpoise has been confirmed in Nachi Bay. Ota River and Yukashi Lagoon have good brackish-water environments, habitat for saltwater plants as well as many fish, crustaceans, shellfish and others (Hirajima, personal communication).

The area extends to the coastal waters from the mouth of the Tomita River through Shirahama to Hidakagawa and Enjugahama Beach. The Tomita River mouth is a treasure trove of creatures living in brackish water, with distinguishing feature that include *Luciogobius palliduse*, *Taenioides crirratus*, *Eutaeniichthys gilli*, *Clithon faba*, *Clithon chlorostoma*, *Upogebia yokoyai* and *Deiratonotus tondensis.* In the reefs in the vicinity of Tsubaki and the inner bay can be seen biodiversity similar to that of Karekinada and Shirahama (Itani et al., 1996; Itani and Uchino, 2003; Yamada et al., 2009). Off the coast from Shirahama to Tabe Bay unfold seaweed beds with high species diversity, which are home to sargassum, *Ecklonia kurome* and others, and there is highly diverse coral in Shirahama's Namariyama Bay and Seto vicinity. Tabe Bay is home to numerous *Anomalocardia squamosa*, and its intertidal zone is habitat to the rare acorn worm (Ministry of the Environment, 2001). In addition, the Minabe Senri coast and Iwashironohama are important loggerhead turtle spawning grounds (Goto, 1994). The coasts of Kirime and Inami are home to continuous reef shores and pebble beaches, with numerous spiny lobster living on the reef shores and a high diversity of benthos species as well (Kato, personal communication, Nakaoka, personal communication). On the pebble beaches live diverse flat-headed gobies. At the mouth of the Hidaka River are expansive saltwater marshlands and a community of *Hibiscus hamabo*. Benthic organisms living here include *Clistocoeloma sinensis*, fiddler crab, *Parapyxidognathus deianira, Cerithideopsilla djadjariensis* and other rare species (Ministry of the Environment, 2001). Furthermore, in the tidal mud flats of the mouth of the Hidaka River, breed rare fish such as *Apocryptodon punctatus, Eutaeniichthys gilli, Taenioides crirratus* and mudskipper. The presence of Japanese lates (*Lates japonicas*) has been confirmed here as well (Hirajima, personal communication).

Shima Peninsula: These are the waters off the coasts of Ira and Shima, extending to the islands in the southern Irako Channel and to Kumano. This typical ria coastline is home to deep inlets, including Ago Bay and Gokasho Bay as well as numerous large and small islands. It is a flourishing cultured-pearl district, and abundant horned turban, abalone and other species are caught here as well. The vicinity of the Shima Peninsula is a shore zone dominated by complex mixtures of seagrass and seaweed, and the vicinity of Cape Daio is home to expanses of *Eisenia arborea, Ecklonia cava,* and *Sargassum giganteifolium* (now the southern limit since this species became extinct from Kawaminami, Miyazaki Prefecture in 1995). Tasoura is home to sea jungles in which are distributed *Sargassum segii* (a specialty of the Shima Peninsula) and *Sargassum spathulophyllum* (which grows only in Shimoda and Tasoura), while Oshima is home to distributions of *Sargassum sagamianum* (which grows only on the east coast of the Kii Peninsula, thought to be its largest community), *Gelidium elegans* and others. In Gokasho Bay are distributed annual eelgrass (smaller than in other habitats), *Chorda filum* (a rare community formed on the Pacific coast) and others (Ministry of the Environment, 2001). The vicinity of Ise and Shima is also important as the waters in front of a loggerhead turtle spawning ground, and this entire region also is an important feeding ground for green turtle (Wakabayashi, 1994; Taniguchi and Kamezaki, 2011). Centered on Oshima are the waters of a breeding colony of Japanese murrelet (an IUCN endangered species) (BirdLife International, 2012).

Izu Peninsula. Off the coast in the vicinity of Hatsushima, there are communities of *Pterocladia capillacea, Gelidium pacificum, Gelidium elegans, Gelidium japonicum*, and agar (Ministry of the Environment, 2001). Off the Nishikigaura coast (in the city of Atami) diverse species of fish occur, including the rare gobies *Vanderhorstia auropunctata, Vanderhorstia macropteryx, Cryptocentrus shigensis* and *Maroubra yasudai*. The waters off the Jogasaki coast, centred on the Izu Oceanic Park, have a remarkably high degree of species diversity, including rare species such as *Maroubra yasudai, Pseudanthias leucozonus, Pseudotrichonotus altivelis* and others. Off the coast of the southeast Izu Peninsula (from Shirahama to Touji) are seaweed communities, mostly *Sargassum fulvellum, Ecklonia cava*, a species highly similar to *Sargassum siliquastrum, Sargassum piluliferum,* and *Eisenia bicyclis* (Ministry of the Environment, 2001). In addition, Oura Bay is home to the westernmost seaweed beds in Sagami Bay as well as a central location in the distribution of warm-water seaweed, and a habitat for rare species of fish that live at the sandy sea floor, including *Matsubaraea fusiforme, Silhouettea dotui* and others (Seno et al, 1997; Senou et al., 2006; Seno and Matsuura, 2007; Takeuchi et al, 2012a; Takeuchi et al., 2012b; Kanagawa Prefectural Museum of Natural History, eds., 2013). The seaweed beds off the southern Izu Peninsula are feeding waters for green turtle (Wakabayashi, 2010), and there is a high diversity of coral species in the waters near Izu Hirizo Beach, Tondai, and the Port of Nakagi in the town of Minamiizu, Kamo-gun (Ministry of the Environment, 2001). Among the number of islands in the south, the waters of Mikomoto Island are home to a breeding colony of Japanese murrelet (an IUCN endangered species) (BirdLife International, 2012). The waters off the coast from Ugusu through Cape Kogane to Arari are highly diverse in fish species, including Blenniidae, gobies and others. The waters off Cape Ose, like those off the Jogasaki coast, are among the waters of the Izu Peninsula that have a remarkably high degree of diversity of species, including numerous rare species such as *Maroubra yasudai, Pseudanthias leucozonus, Pseudotrichonotus altivelis* and others (Seno et al., 1997; Senou et al., 2006; Seno and Matsuura, 2007; Takeuchi et al, 2012a; Takeuchi et al, 2012b; Kanagawa Prefectural Museum of Natural

History, eds., 2013), and in the river mouth area in the inner bay can be seen creatures that live in brackish water, such as flat-headed goby and others (Kato, personal communication). Eura Bay is a rare habitat for *Acropora tumida* (*Acropora pruinosa*), once plentiful but now greatly reduced in number (Nanto et al., 2009).

Western part of Boso Peninsula. These waters extend from Cape Sunosaki to Cape Futtsu in the coastal area at the mouth of Tokyo Bay on the southern Boso Peninsula. Between Tateyama and the north from Cape Sunosaki, a seagrass *Halophila* sp. is observed, while coral is found in the shallow subtidal areas of Hasama and Sakata, with a high level of species diversity. The waters extending in front of Futtsu to the north of Cape Futtsu, include the largest eelgrass bed in Tokyo Bay (Yamakita et al. 2010). The Futtsu tidal flats are habitats of Japanese littleneck clam and *Mactra veneriformis*. During the migratory seasons of spring and fall, many snipers and plovers come here to feed on these benthic organisms. Their numbers are relatively high in terms of both species and populations. At least 1% of the minimum estimated population of sanderling has been recorded here. In addition, rock sandpiper, common redshank, and Far Eastern curlew have been recorded here. A large number of greater scaup visit this tidal flat in winter (Ministry of the Environment, 2015).

Izu Shichito Islands. The coastal areas of several of the Izu Shichito Islands are described here. The waters in the vicinity of Hachijo Island are home to a breeding colony of Japanese murrelet (an IUCN endangered species) (BirdLife International, 2012). They also are home to expansive seaweed communities, mainly kelps and sargassum (Ministry of the Environment, 2001). In addition, the waters in the vicinity of Hachijo Island are important green turtle feeding waters (Shimada, 2013). The waters in the vicinity of Miyake Island are home to a breeding colony of Japanese murrelet (an IUCN endangered species) (BirdLife International, 2012). The coral reef area is estimated to be 0.03 km^2.

Feature condition and future outlook of the proposed area

Compared to inland sea areas and inner bays along the southern Pacific coast of the Japanese mainland, the exposed rocky shores and subtidal habitats of the Kuroshio-affected coast remain in relatively healthy condition. However, ongoing long-term climate change has led to the replacement of dominant benthic species in rocky intertidal areas since the 1960s (Ohgaki 2010). Recently, a gradual increase in the temperate coral community and a decline in the kelp forest has been observed on the Kochi coast, possibly related to sea temperature rise (Mezaki and Kubota 2012). Various monitoring and research projects are ongoing in these regions, including annual census of rocky intertidal shore, coral reef coverage by the Japanese government's Monitoring Sites 1000 project.

Assessment of the area against the CBD EBSA Criteria

CBD EBSA Criteria (Annex I to decision IX/20)	**Description** (Annex I to decision IX/20)	**Ranking of criterion relevance** (please mark one column with an X)			
		No information	**Low**	**Medium**	**High**
Uniqueness or rarity	Area contains either (i) unique ("the only one of its kind"), rare (occurs only in few locations) or endemic species, populations or communities, and/or (ii) unique, rare or distinct, habitats or ecosystems; and/or (iii) unique or unusual geomorphological or oceanographic features.				X
Explanation for ranking					

The presence of a temperate coral reef is very unique as it attracts a wide range of both tropical and temperate species, such as *Maroubra yasoudai*, *Pseudanthias leucozonus* and *Pseudotrichonotus altivelis* (Ministry of the Environment, 2015).					
Special importance for life-history stages of species	Areas that are required for a population to survive and thrive.				X
Explanation for ranking • Some seaweed beds along the coast are important feeding grounds for green turtles, such as in Uwajima (Uetsuki, Watanabe, 2013), the vicinity of Ise and Shima (Wakabayashi, 1994; Taniguchi and Kamezaki, 2011), and of Hachijo Island (Shimada, 2013), and the southern Izu Peninsula (Suganuma et al., 2010) • The area contains some important loggerhead turtle spawning grounds, such as in the Minabe Senri coast and Iwashironohama in Kii Peninsula (Goto, 1994). • At least 1% of the minimum estimated population of sanderlings has been recorded in Futtsu, Boso Peninsula.					
Importance for threatened, endangered or declining species and/or habitats	Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species.			X	
Explanation for ranking Many endangered and threatened marine species inhabit the coast and offshore of these islands, including Japanese murrelet (an IUCN endangered species) in the vicinity of southwest Kochi, Oshima in Shima Peninsula, Mikomoto Island near Izu Peninsula, Hachijo Island and Miyake Island (BirdLife International, 2012)					
Vulnerability, fragility, sensitivity, or slow recovery	Areas that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery.				X
Explanation for ranking Temperate coral reefs are considered vulnerable as they can suffer from various human-induced threats (Ministry of the Environment, 2015).					
Biological productivity	Area containing species, populations or communities with comparatively higher natural biological productivity.				X
Explanation for ranking Coastal productivity is high by virtue of the strength of the Kuroshio Current and associated local currents (Ministry of the Environment, 2015).					
Biological diversity	Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity.				X

<table>
<tr><td colspan="6">Explanation for ranking
Species diversity of reef fish, such as Maroubra yasoudai, Pseudanthias leucozonus and Pseudotrichonotus altivelis, is extremely high in these temperate coral reefs (Ministry of the Environment, 2015). For example, 1792 species of shellfish have been taken from the sea floor at depths of 100-300 m in the vicinity of Okinoshima Island, Kashiwajima Island, and Cape Ashizuri. (Higashi, 1960). The greatest diversity of molluscs occurs in the Kii Peninsula, along the Japanese coast (Ogawa, 1954; Okutani et al., 1981).
Coral species are very diverse, and they include rare species such as Catalaphyllia jardinei (Ministry of the Environment, 2001).</td></tr>
<tr><td>Naturalness</td><td>Area with a comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or degradation.</td><td></td><td></td><td>X</td><td></td></tr>
<tr><td colspan="6">Explanation for ranking
Most of these areas remain in pristine condition, however, some human infrastructure has been constructed along some coasts, such as fisheries ports, dikes and embayments.
Ashizuri-Uwakai National Park protects southwestern Shikoku Island; Yoshino-Kumano National Park protects southern Kii Peninsula; Ise-Shima National Park protects Shima Peninsula; Fuji-Hakone-Izu National Park protects Izu Peninsula and Izu Shiticho Island; and Minami Bobo Quasi-National Park protects Boso Peninsula</td></tr>
</table>

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Maps and Figures

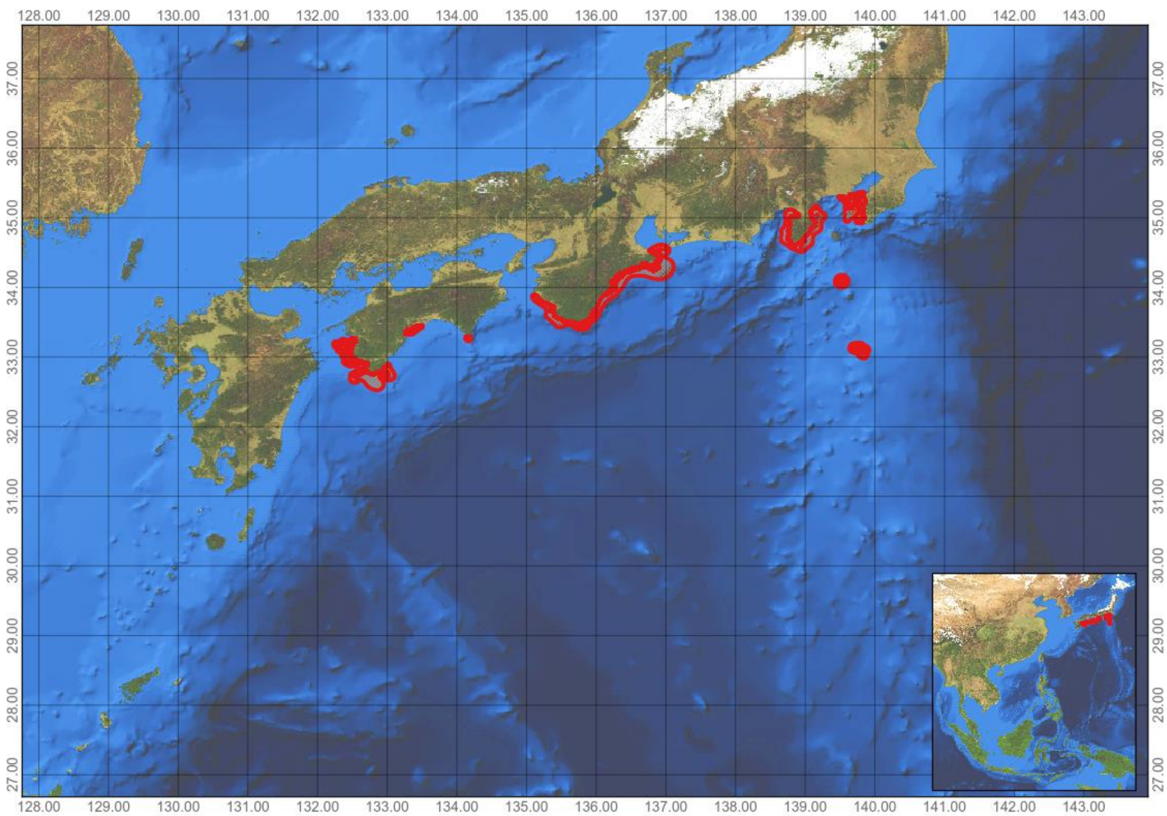

Figure 1. Area meeting the EBSA criteria

Area no. 24: South Kyushu including Yakushima and Tanegashima Islands

Abstract

This area is located at the southernmost part of the temperate zone. The southern limits of many temperate marine species are found around this region. The area consists of variety of habitats, including rocky intertidal shores and subtidal seaweed beds at exposed coast, seagrass beds at the inner part of the bay, and temperate coral reefs in Tanegashima and Yakushima Islands. Representative parts of this area include 1) Tanegashima Island, 2) Yakushima Island, and 3) Kinko Bay and adjacent coastal area.

Introduction

Southern Kyushu, including Tanegashima and Yakushima Islands, is located at the southernmost part of the temperate zone. The southern limits of many temperate marine species are found around this region, such as eelgrass *Zostera marina*. The area consists of a variety of habitats, including rocky intertidal shores, and subtidal seaweed beds in an exposed area, seagrass beds in semi-closed inner waters (such as Kinko Bay), and temperate coral reefs in Tanegashima and Yakushima (Ministry of the Environment 2001; Shimabukuro et al. 2012). The area includes Tanegashima Island, Yakushima Island and Kinko Bay and adjacent coastal area.

Location

The area is located between 30.1°N and 31.8°N latitude, and between 130.3°E and 131.2°E longitude. It covers Tanegashima Island, Yakushima Island, Kinko Bay and surrounding coastal areas (Kagoshima Prefecture).

Feature description of the proposed area

Tanegashima Island is 445 km² in area. The coastal area varies greatly among shores. Along waters from Okigahamada to the port of Masuda on the east side of Tanegashima Island, highly diverse coral species grow in the vicinity of the Port of Oshioya, including rare species (Ministry of the Environment, 2001). The south coast of Tanegashima Island contains important waters, including the coral of Kumanoura, which includes numerous rare species (Ministry of the Environment, 2001). Tidal mud flats with mangrove forests, including *Kandelia obovate,* have developed in the area around the mouth of the Oura River. This is a rare site where geographically isolated mangroves occur (Ministry of the Environment, 2001). The Nagahama coast at the southern tip of Tanegashima Island consists of sandy shares with massive sand dunes. Prolific here are *Meretrix lamarckii*, and there is a diverse range of shellfish. The Nagahama coast on western Tanegashima Island is one of the longest natural sandy beaches in Japan, rich in biota typical of sandy beach ecosystems. In addition, these waters also are important as loggerhead turtle spawning ground (Kamezaki, 2007).

The sandy beaches and shallow waters on the west side of Yakushima havethe highest density of loggerhead turtle spawning, and they also may be breeding grounds for loggerhead turtle (Kamezaki, 2012). There is a very high diversity of coral species in the vicinity of Kurio and Tsukazaki on the south side of Yakushima Island. In addition, mangroves grow at the mouth of the Kurio River, which is a habitat of *Kandelia obovata*. This is a rare site where geographically isolated mangroves occur (Ministry of the Environment, 2001). Yakushima Island is very important due to its remarkably high diversity of coastal fish in the area affected by the Kuroshio Current (Motomura and Matsuura, 2010; Matsunuma et al., 2011; Yoshida et al., 2011; Motomura and Aizawa, 2011; Murase et al., 2011; Matsuura, 2012). At the northeastern tip of Yakushima, Inakahama and Nagatahama are gently shelving shallow sandy beaches where shellfish typical of sandy beach ecosystems, such as *Cyclosunetta concinna, Dosinia juvenilis* and others, are plentiful (Kato, personal communication).

Kagoshima Bay is approximately 1130 km^2 in area and is divided into inner bay and outer bay. The mouth of the Amori River at the inner bay is a healthy habitat for common Orient clam, native to Japan. Also common here are the bivalve *Psammotaea minor*, *Moerella rutila*, and parasitic *Peregrinamor ohshimai*. *Lovenia elongata* live here in high densities as well. *Macrophthalmus abbreviatus* is common, too. At the Shigetomi coast are some natural tidal mud flats that remain in Kagoshima Bay, with highly diverse species of benthic organisms (Ministry of the Environment, 2001). In addition, these waters also are home to locally isolated hydrothermal vents and seep communities (Fujikura et al, 2008). Annual eelgrass beds are found around the western coast of Sakurajima Island, which is considered valuable due to its high biomass and high canopy size of 2 m (Ministry of the Environment, 2001). Along the waters of Kagoshima Bay from the town of Kiriire to Nukumi, mangroves occur at the far northern limit of their distribution. Here, striped shore crab occurs. Near the mouth of Kagoshima Bay in the vicinity of Cape Nagasakibana is the southern limit of the distribution of annual eelgrass (Shimabukuro et al. 2012). This also is a green turtle feeding ground (Kamezaki, personal communication).

Feature condition and future outlook of the proposed area

The area retains relatively natural conditions compared to other parts of the main islands of Japan. However, the shift in major marine organisms is related to ongoing temperature rise. The annual eelgrass populations in Kagoshima Bay seem to be increasingly fluctuating especially after the warmer seasons (Hori M. and Shimabukuro H, personal communication).
Yakushima is a UNESCO World Heritage Site, and a variety of conservation activities are ongoing, although most of them are focused on terrestrial ecosystems. The annual eelgrass population in Ibusuki has been surveyed annually by the Ministry of the Environment's "Monitoring Sites 1000" project since 2009.

Assessment of the area against the CBD EBSA Criteria

<table>
<tr><td rowspan="2">CBD EBSA Criteria
(Annex I to decision IX/20)</td><td rowspan="2">Description
(Annex I to decision IX/20)</td><td colspan="4">Ranking of criterion relevance
(please mark one column with an X)</td></tr>
<tr><td>No information</td><td>Low</td><td>Medium</td><td>High</td></tr>
<tr><td>Uniqueness or rarity</td><td>Area contains either (i) unique ("the only one of its kind"), rare (occurs only in few locations) or endemic species, populations or communities, and/or (ii) unique, rare or distinct, habitats or ecosystems; and/or (iii) unique or unusual geomorphological or oceanographic features.</td><td></td><td></td><td>X</td><td></td></tr>
<tr><td colspan="6">Explanation for ranking (must be accompanied by relevant sources of scientific articles, reports or documents)
• The area is unique as the southern distributional limit of temperate species such as eelgrass (Shimabukuro et al. 2012), and the northern limit for geographically isolated mangrove (Ministry of the Environment, 2001)
• Locally isolated hydrothermal vents and seep communities occur at the inner part of Kagoshima Bay (Fujikura et al., 2008)</td></tr>
<tr><td>Special importance for life-</td><td>Areas that are required for a population to survive and thrive.</td><td></td><td></td><td>X</td><td></td></tr>
</table>

<table>
<tr><td>history stages of species</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="6">Explanation for ranking (must be accompanied by relevant sources of scientific articles, reports or documents)
Important as loggerhead turtle spawning and breeding grounds (Kamezaki, 2007).</td></tr>
<tr><td>Importance for threatened, endangered or declining species and/or habitats</td><td>Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species.</td><td></td><td></td><td>X</td><td></td></tr>
<tr><td colspan="6">Explanation for ranking (must be accompanied by relevant sources of scientific articles, reports or documents)
Rare species of some corals, such as Euphyllia paraglabrescens and Acanthastrea bowerbanki, occur in Tanegashima Island and Yakushima Island (Ministry of the Environment, 2001).</td></tr>
<tr><td>Vulnerability, fragility, sensitivity, or slow recovery</td><td>Areas that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery.</td><td></td><td></td><td>X</td><td></td></tr>
<tr><td colspan="6">Explanation for ranking (must be accompanied by relevant sources of scientific articles, reports or documents)
The temperate reef community is considered vulnerable as it is stressed by various human-induced factors. As the southern limit of many temperate species, including eelgrass (Zostera marina), the area is susceptible to the effects of climate change (Ministry of the Environment, 2015).</td></tr>
<tr><td>Biological productivity</td><td>Area containing species, populations or communities with comparatively higher natural biological productivity.</td><td></td><td></td><td>X</td><td></td></tr>
<tr><td colspan="6">Explanation for ranking (must be accompanied by relevant sources of scientific articles, reports or documents)
• Coastal area is generally productive due to the effects of the Kuroshio current.
• Eelgrass productivity may be low in comparison with other sites in Japan (Nakaoka et al. 2013)</td></tr>
<tr><td>Biological diversity</td><td>Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity.</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">Explanation for ranking (must be accompanied by relevant sources of scientific articles, reports or documents)
• Sandy beach ecosystem along Tanegashima Island is rich in diversity (Ministry of the Environment, 2015).
• Highly diverse coral communities occur in southern Yakushima Island (Ministry of the Environment, 2015).
• Coastal fish community is remarkably high in diversity, as a result of the Kuroshio current (Motomura and Matsuura, 2010; Matsunuma et al., 2011; Yoshida et al., 2011; Motomura and</td></tr>
</table>

Aizawa, 2011; Murase et al., 2011; Matsuura, 2012) • Diverse benthic species occur at intertidal mud flats in Kagoshima Bay (Ministry of the Environment, 2001).					
Naturalness	Area with a comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or degradation.			X	
Explanation for ranking (must be accompanied by relevant sources of scientific articles, reports or documents) • The presence of natural sandy beach, rocky and cobble shores. • Yakushima Island a UNESCO World Heritage Site. • Kagoshima Bay and Yakushima Island are part of Kirishima-Yaku National Park					

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Maps and Figures

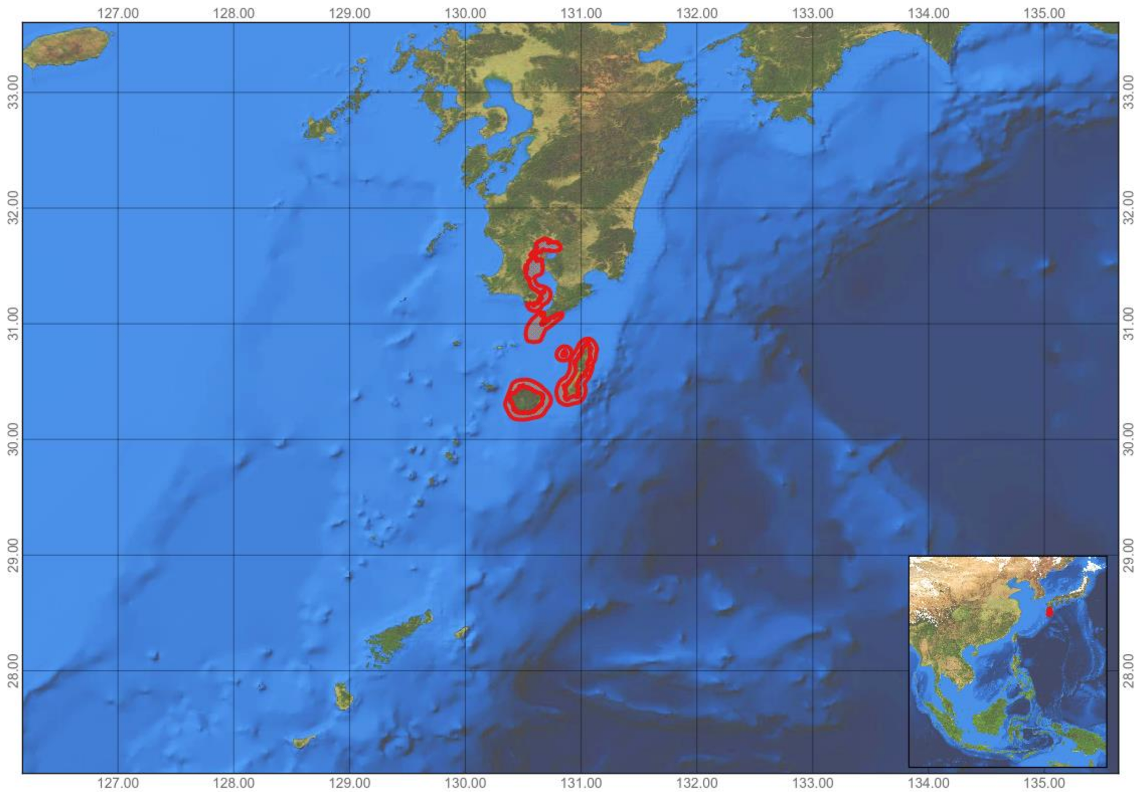

Figure 1. Area meeting the EBSA criteria

Area no. 25: Ogasawara Islands

Abstract
The Ogasawara Islands host a variety of endemic species. In 2011, the whole area was declared a UNESCO World Heritage Site. Located in the subtropical climate region, the coastal areas have well-developed coral reefs specific to oceanic islands, which are also known as important breeding grounds for seabird colonies.

Introduction
The Ogasawara Islands consist of two major sections: the northern groups of islands, of which Chichijima Island is the largest (23 km^2), and the southern groups of islands, which are dominated by Hahajima Island (20 km^2). Far apart from other lands, it hosts a variety of endemic species, making these islands known and the "Oriental Galapagos". In 2011, the whole area was declared a UNESCO World Heritage Site. Located in the subtropical climate region, the coastal areas have well-developed coral reefs specific to oceanic islands, which are also known as important breeding grounds for seabird colonies.

Location
The Ogasawara Islands are located between 27.8°N and 26.5°N latitude, and between 142.0°E and 142.3°E longitude.

Feature description of the proposed area

The Ogasawara Islands, which include Chichijima and Hahajima, are maritime islands that are home to numerous endemic species not just on land but in the nearby waters as well (Government of Japan, 2010). The Ogasawara Islands are the largest spawning ground of the green turtle, with the greatest number of eggs laid on the sandy beaches of Hatsune (Ministry of the Environment, 2001). The waters in the vicinity of Ogasawara are home to members of about 30% of the world's species of cetaceans, and they serve as an important breeding ground for the humpback whale in the Northern Pacific (Tokyo Maritime Environmental Protection Association, Ogasawara Maritime Center, 2002). A total of 226 species of reef-building coral have been reported in these waters, and coral reefs distinctive of maritime islands are found here, although the number of species is small due to limited incoming and outgoing of species because the effects of the Kuroshio current, the Equatorial Countercurrent, and other currents are low here. The coastlines of Hahajima and the islands in its group (Mukojima, Anejima, Imotojima, Meijima) are home to extremely high levels of biodiversity. In particular, the islands in the Hahajima Group include many uninhabited islands, so that there are few naturalized species, with thriving endemic plants and abundant terrestrial hermit crabs (Hayashi et al., 1990). The coastal tide pools include places where whitetip reef shark gather (Kato, personal communication). These coasts can be described as the most natural in Japan, and home to their own unique biodiversity.

Feature condition and future outlook of the proposed area

Due to isolation from the mainlands of Japan, the islands retain pristine habitats in most areas, including coastal environments. However, the introduction of non-native species has caused a lot of problems.Illegal collection of deep-sea corals has recently become a serious problem. Other potential threats include climate change, although long-term data on marine ecosystem change is not sufficient here due to the lack of universities and national institutions in this field of science. Annual change in coral reef coverage, seabird population size and sea turtle landing has been monitored by the Ministry of the Environment's "Monitoring Sites 1000" project.

Assessment of the area against the CBD EBSA Criteria

CBD EBSA Criteria (Annex I to decision IX/20)	**Description** (Annex I to decision IX/20)	**Ranking of criterion relevance** (please mark one column with an X)			
		No information	**Low**	**Medium**	**High**
Uniqueness or rarity	Area contains either (i) unique ("the only one of its kind"), rare (occurs only in few locations) or endemic species, populations or communities, and/or (ii) unique, rare or distinct, habitats or ecosystems; and/or (iii) unique or unusual geomorphological or oceanographic features.				X
Explanation for ranking Chichijima and Hahajima are maritime islands that are home to numerous endemic species, such as *Galeus longirostris*, *Panulirus brunneiflagellum* and *Pagurus insulae* (Government of Japan, 2010; Ministry of the Environment, 2015). Coral reefs distinctive of maritime islands are found in these islands (Ministry of the Environment, 2015)					
Special importance for life-history stages of species	Areas that are required for a population to survive and thrive.				X
Explanation for ranking The Ogasawara Islands are the largest spawning ground of the green turtle, with the greatest number of eggs laid on the sandy beaches of Hatsune (Ministry of the Environment, 2001). The waters in the vicinity of Ogasawara are home to members of about 30% of the world's species of cetaceans, and they serve as an important breeding ground for the humpback whale in the Northern Pacific (Ogasawara Maritime Center, 2002).					
Importance for threatened, endangered or declining species and/or habitats	Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species.				X
Explanation for ranking Many endangered and threatened marine species inhabit the coast and offshore of Ogasawra Islands, such as *Rhinogobius ogasawaraensis*, *Ptychognathus glaber* and *Stenomelania boninensis* (Ministry of the Environment, 2015).					
Vulnerability, fragility, sensitivity, or slow	Areas that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or		X		

recovery	by natural events) or with slow recovery.				
Explanation for ranking Subtropical coral reefs are considered most vulnerable to multiple stresses. Although the risk is very low, the islands are subject to volcanic activity which can induce large-scale disturbances.					
Biological productivity	Area containing species, populations or communities with comparatively higher natural biological productivity.				X
Explanation for ranking Although apart from major current systems in the Pacific, the productivity is high due to local upwelling and other processes caused by geographic characteristics of the islands, represented by the high abundance of high-level consumers such as fish and marine birds (Ministry of the Environment, 2015).					
Biological diversity	Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity.				X
Explanation for ranking A total of 226 species of reef-building coral have been reported in these waters, such as *Acropora aculeus, Alveopora verrilliana, Coscinaraea hahazimaensis, Galaxea astreata, Leptoseris yabei, Montipora angulate, Pachyseris rugose, Pocillopora elegans and Turbinaria mesenterina* (Ministry of the Environment, 2015)					
Naturalness	Area with a comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or degradation.				X
Explanation for ranking These coasts can be described as the most natural in Japan. Pristine natural habitats such as rocky shore, sea cliff, sandy beach remain in good condition. The islands are a UNESCO World Heritage Site and the site of Ogasawara National Park of Japan.					

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Maps and Figures

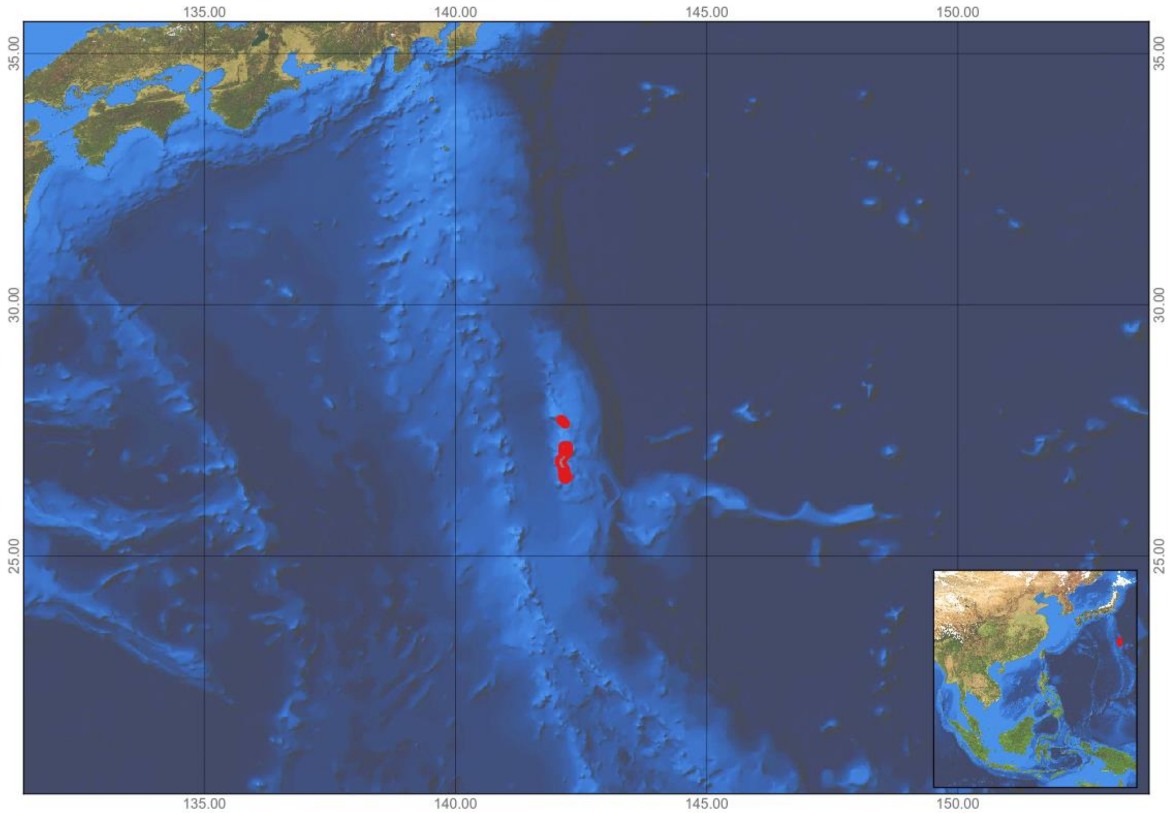

Figure 1. Area meeting the EBSA criteria

Area no. 26: Northern Coast of Hyogo, Kyoto, Fukui, Ishikawa and Toyama Prefectures

Abstract
The northern coast of the middle of Honshu Island is largely affected by the warm Tsugaru Current. The tidal range is very small compared to other parts of the Pacific coast, inhibiting the development of intertidal flats and rocky shores. However, the area is diverse in topography, including sand flats, exposed rocky coast, complex rias coast, semi-closed inner bay, and most notably, a deep bottom in Toyama Bay, which causes local upwelling and highly productive zones around the coast.

Introduction
The northern coast of the middle of Honshu Island is largely affected by the warm Tsugaru Current. The tidal range is very small compared to the Pacific coast, which inhibits the development of intertidal flats and rocky shores. However, the area is diverse in topography, including sand flats, exposed rocky coast, complex rias coast and semi-closed inner bay. Among them, Toyama Bay is unique in terms of depth, which exceeds 1000 m. The geography causes local upwelling and highly productive zones around the coast. The marine biota mostly consists of warm temperate species, but some species endemic to Japan and Korea, such as the seagrass *Zostera caespitosa*, also occur along the coast (Nakaoka and Aioi 2001).

Location
The area is located between 35.4°N and 37.6°N latitude, and between 134.5°E and 137.4°E longitude The area comprises five major subsites: adjacent waters of Takeno coast and Maruyama River mouth; Wakasa-wan Bay; Echizen and Kaga coasts; outer coast of Noto Peninsula; and Nanao Bay and southern Toyama Bay.

Feature description of the proposed area

Adjacent waters of Takeno coast and Maruyama River mouth includes the waters extending from the Kasumi coast (fishing port) to the Port of Shibayama, Cape Nekozaki, the mouth of the Maruyama River (Tsuiyama Bay), and the Kumihama coast (Shotenkyo, Kazuranohama). Off the Takeno coast are seaweed beds with high levels of diversity (Biodiversity Center of Japan, 2013). Natural sandy shores still remain from Kumihama Bay to the Tango Peninsula, confirmed to be home to abundant beach communities.

Wakasa Bay consists of the waters up to 50 m deep from Cape Kyogamisaki on the Tango Peninsula to Cape Echizen in Wakasa Bay, including Tsuruga Bay. The waters of the coast from Cape Kyogamisaki on the Tango Peninsula to Wakasa Bay feature continuous expansive seaweed beds, including the eelgrasses *Zostera marina* and *Zostera caespitosa*. In Wakasa Bay, expansive seaweed beds centred on *Sargassum fulvellum* have developed (approx. 2000 ha). This also is the northern limit of natural *Eisenia bicyclis* (Ministry of the Environment, 2001). In addition, diverse animals, including sea urchin, abalone, horned turban and others, live here, a highly productive area that serves as both spawning grounds and habitat for such organisms (Fukui Prefecture, 2005). The sandy sea floors and sand and mud areas are rich in benthic animals, providing spawning grounds for numerous fish species, including Japanese pufferfish, willowy flounder, red seabream, bastard halibut and others (Uehara et al., 2012; Hayashi, 1985; Izeki et al., 2013; Hayashi and Hamanaka, 1979; Shibuta et al., 2006). These waters also include a Japanese murrelet (an IUCN endangered species) breeding colony and have been named an Important Bird Area by BirdLife International (BirdLife International, 2012).

Echizen and Kaga coasts range from Cape Echizen through the mouth of the Kuzuryu River to Kahoku Lagoon (the mouth of the Ono River). In the subtidal zone of the Echizen coast, abundant seaweed beds occur, and *Sargassum fulvellum* provides habitats and spawning grounds for fish and other animals such as sea urchin, abalone and horned turban. The area is highly productive (Fukui Prefecture, 2005). In the vicinity of Kahoku Lagoon (the mouth of the Ono River) relatively large numbers of species and populations of snipe and plover are present during the migration seasons of spring and fall, and at least 1% of the minimum estimated population of *Numenius phaeopus* and spotted redshank has been recorded here. Other species recorded here are common redshank, oriental pratincole, and Latham's snipe (Ministry of the Environment, 2001).

The outer coast of Noto Peninsula extends from the mouth of the Hakui River on the west coast of the Noto Peninsula through the northern part of the peninsula to Tanoura and Ushitsu. A series of gently shelving shallow sandy beaches continues from Hakui to Shibagaki (Kato, 1999). On these sandy shores, relatively large numbers of species and populations of snipe and plover are present during the migration seasons of spring and fall (Ministry of the Environment, 2001). The Hakui coast is habitat for *Abroscelis anchoralis*. In addition, in the waters in the vicinity of the town of Shika lives *Zoarchias microstomus*, a species endemic to Japan and recorded only in this location (Kimura and Sato, 2007). Off the Noto Peninsula unfold large-scale Sargassum beds (Ministry of the Environment, 2001). In the vicinity of Cape Ama are saltwater marshlands of Juncaginaceae and others, where reef organisms live in abundance (Kato, 1999). In the waters from Cape Suzu to Iida Bay and Ushitsu are expansive seaweed beds and eel grass beds (Ikemori, 2013), an important habitat for threatened *Zostera caulescens* (Tsukumo Bay) and *Zostera caespitosa* (Iida Bay) (Nakaoka and Aioi, 2001). The coast extending in front of the town of Noto, Hosu-gun is home to Sargassum beds, where numerous species, including rare species, are found (Ministry of the Environment, 2001). Tsukumo Bay in these waters is a habitat of the rare species *Oligobrachia mashikoi* (Kanazawa University Nature Monitoring Applied Research Center, 2005).

Nanao Bay and southern Toyama Bay: Nanao Bay is home to massive eelgrass beds where *Zostera caespitosa* occur massively. In addition, another seagrass *Halophila ovalis*, seaweeds *Sargassum trichophyllum* (northern limit), *S. pallidum* (southern limit), *Coccophora langsdorfii*, *Chorda rigida* (southern limit), *Acetabularia calyculus* occur here. Benthic organisms include manyspecies of cerith snails, including *Batillaria attramentaria*, *B. zonalis* and others (Ministry of the Environment, 2001). Nanao Bay is also an important spawning ground for Pacific cod, *Heterololigo bleekeri*, Japanese halfbeak and others (Tsuji et al., 2010; Japan Sea National Fisheries Research Institute, Fisheries Research Agency, 2004; Fujita and Horita, 1998). The seaweed beds in western Toyama Bay are habitat for *Sargassum pallidum* (Ministry of the Environment, 2001). In addition, diverse benthic communities occur in the inner reaches of Toyama Bay (Tsujimoto et al., 2006). There are spawning grounds for bastard halibut, *Heterololigo bleekeri* and others, and the whole of Toyama Bay serves as a firefly squid spawning ground (Hayashi, 1989; Uehara et al. 2011).

Feature condition and future outlook of the proposed area

The area retains relatively natural conditions compared to other parts of Honshu Island, where human threats (such as eutrophication and coastal development) have been more serious. However, recent changes in ecosystems, possibly related to global climate change, are ongoing. Sometimes, great declines in seaweeds and seagrass biomass have occurred in this region, which are ascribed to temperature rise and massive occurrence of herbivorous fish and sea urchins associated with temperature rise. Another threat here is marine pollution due to increasing ship traffic and marine debris (plastics). In fact, the coastal area was heavily affected by the oil spill by "Nakhodka" in 1997 (Komatsu et al. 2003, Yamamoto et al. 2003).

A long-term study of fish communities was conducted by Maizuru Fisheries Station, Kyoto University and a seaweed survey was conducted at Takeno by the Ministry of the Environment's "Monitoring Sites

1000" project, however, this area has been the subject of less research and ecological monitoring than the Pacific coast.

Assessment of the area against the CBD EBSA Criteria

CBD EBSA Criteria (Annex I to decision IX/20)	**Description** (Annex I to decision IX/20)	**Ranking of criterion relevance** (please mark one column with an X)			
		No information	**Low**	**Medium**	**High**
Uniqueness or rarity	Area contains either (i) unique ("the only one of its kind"), rare (occurs only in few locations) or endemic species, populations or communities, and/or (ii) unique, rare or distinct, habitats or ecosystems; and/or (iii) unique or unusual geomorphological or oceanographic features.			X	
Explanation for ranking • Toyama Bay is unique in having deep sea very close to the shore. Other coastal regions here are representative of the whole northern coastline of the middle part of Honshu Island (Ministry of the Environment, 2015). • In the waters in the vicinity of the town of Shika lives *Zoarchias microstomus*, a species endemic to Japan and recorded only in this area (Kimura and Sato, 2007).					
Special importance for life-history stages of species	Areas that are required for a population to survive and thrive.				X
Explanation for ranking • Diverse animals including sea urchin, abalone, horned turban and others live here, a highly productive area that serves as both spawning grounds and habitat for such organisms (Fukui Prefecture, 2005). • Wakasa Bay has a Japanese murrelet (an IUCN endangered species) breeding colony and has been named an Important Bird Area (BirdLife International, 2012). • Nanao Bay is also an important spawning ground for Pacific cod, *Heterololigo bleekeri*, Japanese halfbeak and others (Tsuji et al., 2010; Japan Sea National Fisheries Research Institute, Fisheries Research Agency, 2004; Fujita and Horita, 1998). • There are spawning grounds for bastard halibut and *Heterololigo bleekeri* in Toyama Bay, and the whole of Toyama Bay serves as a spawning ground for firefly squid (Hayashi, 1989; Uehara et al. 2011).					
Importance for threatened, endangered or declining species and/or habitats	Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species.			X	

<table>
<tr><td colspan="6">Explanation for ranking
At least 1% of the minimum estimated population of Numenius phaeopus and spotted redshank has been recorded in Kahokugata lagoon.
In the waters from Cape Suzu to Iida Bay and Ushitsu are expansive seaweed beds and eel grass beds (Ikemori, 2013), an important habitat for threatened Zostera caulescens (Tsukumo Bay) and Zostera caespitosa (Iida Bay) (Nakaoka and Aioi, 2001).
The coast extending in front of the town of Noto, Hosu-gun is home to Sargassum beds, where numerous species, including rare species, are found (Ministry of the Environment, 2001).</td></tr>
<tr><td>Vulnerability, fragility, sensitivity, or slow recovery</td><td>Areas that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery.</td><td></td><td></td><td>X</td><td></td></tr>
<tr><td colspan="6">Explanation for ranking
This area contains both fragile habitats like seagrass/seaweed beds and stable rocky coasts and unvegetated bottoms (Ministry of the Environment, 2015).</td></tr>
<tr><td>Biological productivity</td><td>Area containing species, populations or communities with comparatively higher natural biological productivity.</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">Explanation for ranking
Highly productive area due to the warm Tsushima current. The massive occurrence of seaweed/seagrass contributes to enhanced primary productivity (Ministry of the Environment, 2015; Nakaoka and Aioi 2001).</td></tr>
<tr><td>Biological diversity</td><td>Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity.</td><td></td><td></td><td>X</td><td></td></tr>
<tr><td colspan="6">Explanation for ranking
Off the Takeno coast are seaweed beds with high levels of diversity (Biodiversity Center of Japan, 2013).
The sandy sea floors and sand and mud areas of Wakasa Bay are rich in benthic animals and provide spawning grounds for numerous fish species, including Japanese pufferfish, willowy flounder, red seabream, bastard halibut and others (Uehara et al., 2012; Hayashi, 1985; Izeki et al., 2013; Hayashi and Hamanaka, 1979; Shibuta et al., 2006).</td></tr>
<tr><td>Naturalness</td><td>Area with a comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or degradation.</td><td></td><td></td><td>X</td><td></td></tr>
<tr><td colspan="6">Explanation for ranking
Presence of pristine natural sea cliff, sandy beach, rock reef, muddy coast, cobble beach (Ministry of the Environment, 2015).
Coastal areas around Takeno are part of Sanin Kaigan National Park
Wakasa Bay, Echizen and Kaga coasts and Noto Peninsula are part of quasi-national parks.</td></tr>
</table>

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Maps and Figures

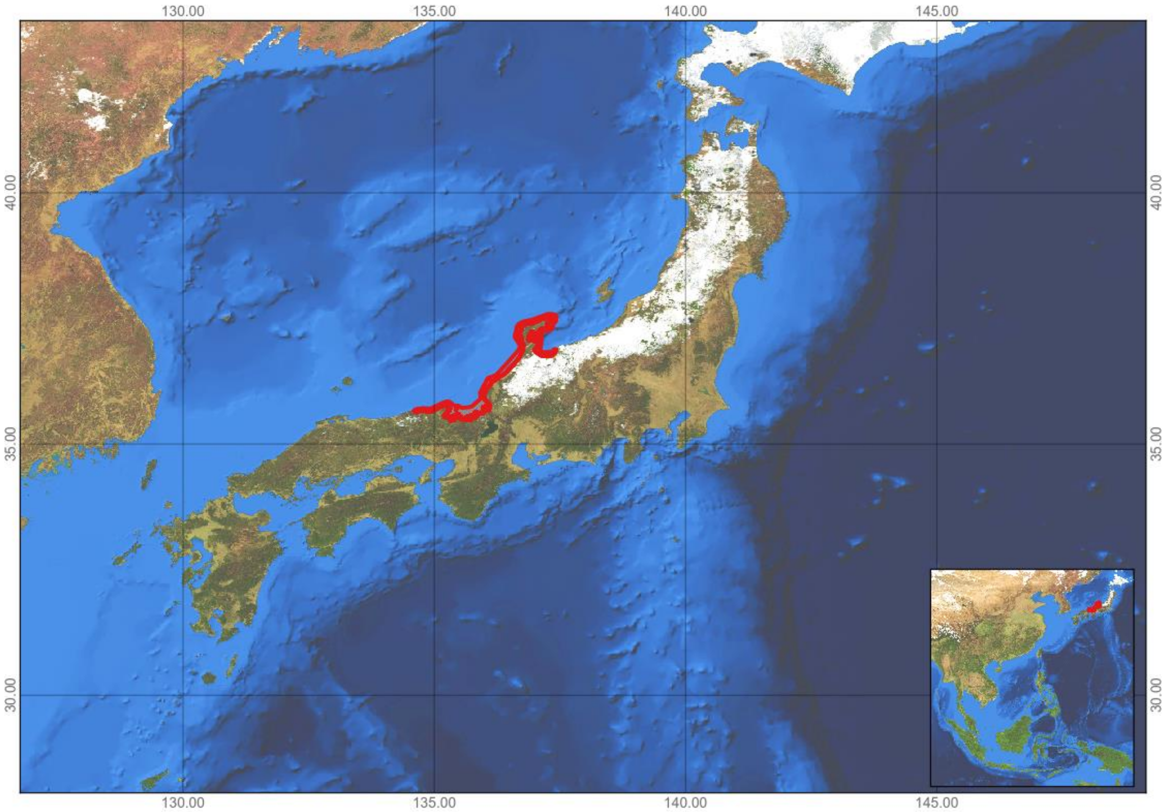

Figure 1. Area meeting the EBSA criteria

Area no. 27: Ryukyu Trench area

Abstract
The Ryukyu Trench corresponds to the intersection of the Philippine plate and the Eurasian plate. It contains important chemosynthetic ecosystems in the slope at depths of 5802-5808m, 1400–1500 m and 636–812 m, which are home to six endemic species. Studies have suggested that the fauna of this trench are distinct from the fauna of other trenches.

Introduction
The Ryukyu Trench is situated in the subtropical latitude of the Western Pacific Ocean at the boundary between the Philippine Plate and the Eurasia Plate. This trench is characterized by its rather shallow depth range (down to only 7,507m) compared to the trenches developing in the western margin of Pacific Plate (sometimes exceeding 10,000 m). However, it is still a trench recognizable as a very deep trough in topography that attracted the interest of biologists, who carried out surveys of the unique biota living in the area. For example, Kitahashi et al. (2014) carried out an extensive study of harpacticoid benthic copepods in the trenches around Japan, and found that the fauna in the Ryukyu Trench are distinct from the fauna of other trenches. In the extensive study of chemosynthetic ecosystems around Japan, Nakajima et al. (2014) reported the existence of two endemic communities in Ryukyu Trench at depths of 1400-1500 m and 636-812 m. Another one is reported from an even greater depth of 5802-5808 m by Fijikura et al. (2008). It is noteworthy these endemic communities include five mollusks and one annelid endemic species.

Location
This area is located south of Ryukyu Islands. The northeast end is located at 26.6°N latitude and 130.1°E longitude, and the southwest end is at 22.7°N latitude and 122.9°E longitude.

Feature description of the proposed area
In the Ryukyu Trench, extensive studies regarding harpacticoid copepods were carried out by Kitahashi et al. (2014). The studies suggested that fauna in the trench is distinct from the fauna of other trenches. According to Nakajima et al. (2014) and Fujikura et al. (2008), there are three known seep chemosynthetic ecosystems in the Ryukyu Trench area. Two are in the slope at depths of 1400–1500 m and 636–812 m, and another one is at a great depth of 5802-5808 m at 25º11' N 128º07'E South of Okinawa Island. Five endemic mollusks and one endemic annelid species have been identified at these seeps. Also, 10 rare mollusk, 2 rare annelid and 7 rare arthropod species were reported.

Feature condition and future outlook of the proposed area

As other trenches, Ryukyu Trench is also an active seismogenic zone. In the event of a major earthquake, species living in the trench will be seriously damaged. Also, like other seep communities, chemosynthetic ecosystems are generally vulnerable, because seepage activity is always fluctuating, and often stops. Also the seep area is small, and therefore the chemosynthetic ecosystem is vulnerable.

Assessment of the area against the CBD EBSA Criteria

CBD EBSA Criteria (Annex I to decision IX/20)	**Description** (Annex I to decision IX/20)	**Ranking of criterion relevance** (please mark one column with an X)			
		No information	**Low**	**Medium**	**High**
Uniqueness	Area contains either (i) unique ("the only one				X

or rarity	of its kind”), rare (occurs only in few locations) or endemic species, populations or communities, and/or (ii) unique, rare or distinct, habitats or ecosystems; and/or (iii) unique or unusual geomorphological or oceanographic features.				
Explanation for ranking In the Ryukyu Trench, extensive studies regarding harpacticoid copepods have been carried out by Kitahashi et al. (2014). The studies suggested that fauna in the trench is distinct from the fauna of other trenches. According to Nakajima et al. (2014) and Fujikura et al. (2008), there are three known seep chemosynthetic ecosystems in the Ryukyu Trench area. Two are in the slope at depths of 1400–1500 m and 636–812 m, and another one is at the great depth of 5802-5808 m at 25º11’ N 128º07’E, south of Okinawa Island. Five endemic mollusks and one endemic annelid species have been identified at these seeps. Also, 10 rare mollusk, 2 rare annelid and 7 rare arthropod species were reported.					
Special importance for life-history stages of species	Areas that are required for a population to survive and thrive.				X
Explanation for ranking For the six species living in the seep areas and endemic to this trench, such as the vestimentiferan worm (*Paraescarpia echinospica)* and half-burried mussel (*Bathymodiolus aduloides)* , this area is the only place for their entire life history (Nakajima et al., 2014).					
Importance for threatened, endangered or declining species and/or habitats	Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species.			X	
Explanation for ranking Six species are endemic to the seep areas of this trench. In general seep areas are unstable and small in size. Thus seep species are always threatened. For example, the normal size of a seep area is less than 10 km^2 and never exceeds 1000 km^2. These species meet the IUCN Red List vulnerable category B: Geographic range in the form of either B1 (extent of occurrence) orB2 (area of occupancy) or both: 1. Extent of occurrence estimated to be less than 20,000 km^2, and estimates indicating at least two of a-c: a. Severely fragmented or known to exist at no more than 10 locations, and c. Extreme fluctuations in any of the following: (ii) area of occupancy (IUCN, 2015).					
Vulnerability, fragility, sensitivity, or slow recovery	Areas that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery.				X
Explanation for ranking					

Generally speaking, seep ecosystems are considered vulnerable, because the seepage is not stable(Fujikura et al., 2008). Especially one undescribed *Calyptogena* species unique to this area and living at great water depth of 5802-5808 m, the recorded number of individuals does not exceed 100. In addition to the species, two other species meet the IUCN Red List vulnerable category B: Geographic range in the form of either B1 (extent of occurrence) or B2 (area of occupancy) or both: 1. Extent of occurrence estimated to be less than 20,000 km^2, and estimates indicating at least two of a-c: a. Severely fragmented or known to exist at no more than 10 locations, and c. Extreme fluctuations in any of the following: (ii) area of occupancy (IUCN, 2015).					
Biological productivity	Area containing species, populations or communities with comparatively higher natural biological productivity.		X		
Explanation for ranking The productivity of trench benthic ecosystem is higher than that of other deep sea ecosystems, but much lower than shallow water ecosystems (McIntyre, 2010).					
Biological diversity	Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity.		X		
Explanation for ranking In general trench fauna is low in diversity.					
Naturalness	Area with a comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or degradation.				X
Explanation for ranking The area is far from any large human populations. Also, seep ecosystems have no economic value, and there is no fisheries activity.					

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Maps and Figures

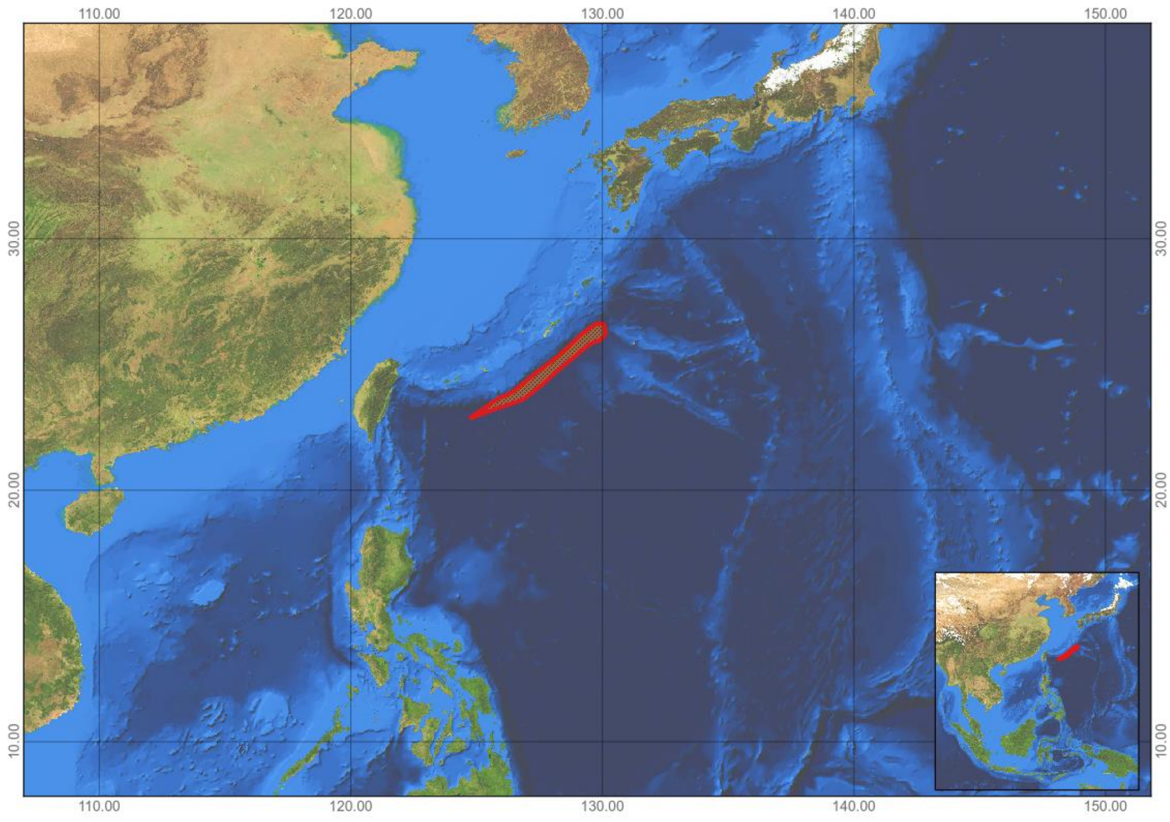

Figure 1. Area meeting the EBSA criteria

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Dr. R. Nakajima and Dr. K. Fujikura provided data used in this template.

Area no. 28: West Kuril Trench, Japan Trench, Izu-Ogasawara Trench and North of Mariana Trench

Abstract

Ocean trenches (area exceeding water depths of 6000 m) are unique habitats. Trench habitats are especially well developed in the western Pacific region, from the Kuril to the Mariana trenches. The uniqueness of the biota inhabiting in this region has been recognized in many scientific articles. In some areas, chemosynthetic ecosystems are developing, and species living in such ecosystems have been known to be associated with only one or two seepages. Thus the species in the trench are endemic, very rare, vulnerable and prone to extinction. Fortunately, the naturalness of this trench environment is well–preserved, thus far, because it is extremely remote.

Introduction

Trenches are unique deep-sea ecosystems developing at the boundary between the Earth's crusts. This topographically and geologically unique ecosystem is especially well-developed in the western Pacific area because the movement of the Pacific plate in the western direction is the fastest (7 to 15 cm per year) in the world.

In the area described, there are Kuril, Japan, Izu-Ogasawara (Bonin) and Mariana trenches, all exceeding water depths of 6000 m. The deepest part of each trench reaches 7000 to 9000 m, meaning the organisms living there are resistant to pressures exceeding 60 to 70 mpa. There are many reports of benthic organisms living in these trenches. The level of reporting has increased recently in association with development of technologies necessary to survey at such great depths (McIntyre, 2010).

In addition to benthic species, information on pelagic species also exists. Few fishes are able to live at depths exceeding 6000 m. Regarding microbes, a recent report by Nunoura et al. (2015) suggested that the microbiota in the trench is unique in that they depend for their energy source not on the organic matter sinking from the surface euphotic zone, but on matter floating from the sea floor due to landslides and other events.

In trenches, chemosynthetic ecosystems often develop in association with the subduction of plates. In the Kuril and Japan trenches, several chemosynthetic ecosystems have been reported (Juniper & Sibuet 1987; Ohta & Laubier, 1987; Ogawa et al., 1996; Kojima et al., 2000; Kojima 2002; Fujikura et al. 2008; Okutani et al., 2009) at depths from 1700 to 7430 m. The world's deepest known chemosynthetic ecosystem is in the Japan Trench at a depth of around 7430 m. In this ecosystem, two bivalves that depend on symbiotic bacteria as their energy source are the dominant megabenthos (Fujikura et al., 1999; Fujiwara et al., 2001).

Location

The north-eastern end of this area is at 42.1°N longitude and 146.8°E latitude, and the south-western end is at 23.2°N latitude and 141.1°E longitude.

Feature description of the proposed area

The four trenches of this area are the only trenches developing in the temperate region of the northern hemisphere. From this geological setting, this area can be considered unique.

Seep chemosynthetic ecosystems are reported from the Kuril and Japan trenches (Gamo et al., 1992, Nakajima et al., 2014). Endemic species have been reported from these ecosystems, such as *Calypthogena phaseoliformis*, other molluscs and annelids (Okutani & Métivier, 1986; Miura & Laubier, 1989; Okutani et al., 1993; Miura & Hashimoto, 1996; Fujikura et al., 2002; Okutani & Fujikura, 2002; Okutani &

Fujiwara, 2005; Fujikura et al., 2008; Okutani et al., 2009). The area of the seep is very small. Thus the species can be considered endangered, and the trench is very important for the life history of the species.

The recent major earthquake in north-eastern Japan caused landslides in the Japan Trench area. According to recent observations of the habitat of *Calyptogena phaseoliformis*, most individuals living in the originally described seep area were killed by the natural disaster. Also meiofauna in the trench was heavily impacted by the earthquake (Kitahashi et al., 2014). Thus the species can be considered vulnerable.

In the Izu-Bonin Trench, unique endemic species such as *Occultamina profunda* (Xenophyophore, Tendal et al., 1984) and *Pliciloricus hadalis* (Loricifera, Kristensen and Shirayama, 1987) have been reported. These species have never been reported again for almost 30 years, and can be considered rare endangered species. At a depth of 9000 m, a dense population of a sea lily (*Bathycrinus volubilis)* has been reported in this trench (Fujikura et al. 2008). This highly populated location suggests that even far from the euphotic area, the energy condition of the hadal zone is tolerable.

In the north of the Mariana Trench, a species of giant amphipod (*Hirondellea gigas*) has been found frequently. The species is known to have a unique enzyme that can catalyze cellulose to glucose directly (Kobayashi et al., 2012).

Fortunately, the naturalness of the trench environment has thus far been retained because it is extremely remote from human populations. It thus retains a high degree of naturalness.

Feature condition and future outlook of the proposed area

Although the trenches are so deep that very little human influence exists, there are several signs that human impacts have reached this unique area (Fujikura et al., 2008).

Assessment of the area against the CBD EBSA Criteria

CBD EBSA Criteria (Annex I to decision IX/20)	**Description** (Annex I to decision IX/20)	**Ranking of criterion relevance** (please mark one column with an X)			
		No information	**Low**	**Medium**	**High**
Uniqueness or rarity	Area contains either (i) unique ("the only one of its kind"), rare (occurs only in few locations) or endemic species, populations or communities, and/or (ii) unique, rare or distinct, habitats or ecosystems; and/or (iii) unique or unusual geomorphological or oceanographic features.				X
Explanation for ranking The four trenches comprising this area are the only trenches developing in the temperate region of the northern hemisphere. Seep chemosynthetic ecosystems are reported from Kuril and Japan trenches (Nakajima et al., 2014). Endemic species have been reported from these ecosystems, such as *Calypthogena phaseoliformis* (Fujikura et al., 2008). In Izu-Bonin Trench, unique endemic species such as *Occultamina profunda* (Xenophyophore, Tendal et al., 1984) and *Pliciloricus hadalis* (Loricifera, Kristensen and Shirayama, 1987) have been reported. In the north of Mariana Trench, a species of giant amphipod (*Hirondellea gigas*) have been found frequently. The species is known to have a unique					

enzyme that can catalyze cellulose to glucose directly (Kobayashi et al., 2012).					
Special importance for life-history stages of species	Areas that are required for a population to survive and thrive.				X
Explanation for ranking For endemic species (mentioned above) adapted to this extreme environment, this is the only area that can sustain the species though their life. As previously mentioned, chemosynthetic ecosystems have been found in these trenches, and endemic species, such as *Calypthogena phaseoliformis*, have been reported from these ecosystems (Fujikura et al., 2008). In addition, from Izu-Bonin Trench, unique endemic species such as *Occultamina profunda* (Xenophyophore, Tendal et al., 1984) and *Pliciloricus hadalis* (Loricifera, Kristensen and Shirayama, 1987) have been reported.					
Importance for threatened, endangered or declining species and/or habitats	Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species.			X	
Explanation for ranking In general, the area of the chemosynthetic ecosystem is very small (McIntyre, 2010). It is the same for seep species endemic to this area (mentioned above), i.e. their habitat size is extremely small, and thus they can be considered endangered.					
Vulnerability, fragility, sensitivity, or slow recovery	Areas that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery.				X
Explanation for ranking Species living in the trench are facing risks of strong natural impact associated with major earthquakes, as shown in the event of the great earthquake of northeastern Japan in 2011.					
Biological productivity	Area containing species, populations or communities with comparatively higher natural biological productivity.		X		
Explanation for ranking Even though biological activity in the trench area is higher than that of abyssal plains, it is still very low compared to shallow water ecosystems (Shirayama and Kojima, 1994).					
Biological diversity	Area contains comparatively higher diversity of ecosystems, habitats, communities, or		X		

	species, or has higher genetic diversity.				
Explanation for ranking The biodiversity of fishes in trench depths is known to be lower than those in the bathyal depths.					
Naturalness	Area with a comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or degradation.				X
Explanation for ranking This trench is extremely remote. Thus naturalness is high at present. There is, however, evidence of impacts at such extreme depth, e.g., photos of plastic bags (Fujikura et al., 2008).					

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Maps and Figures

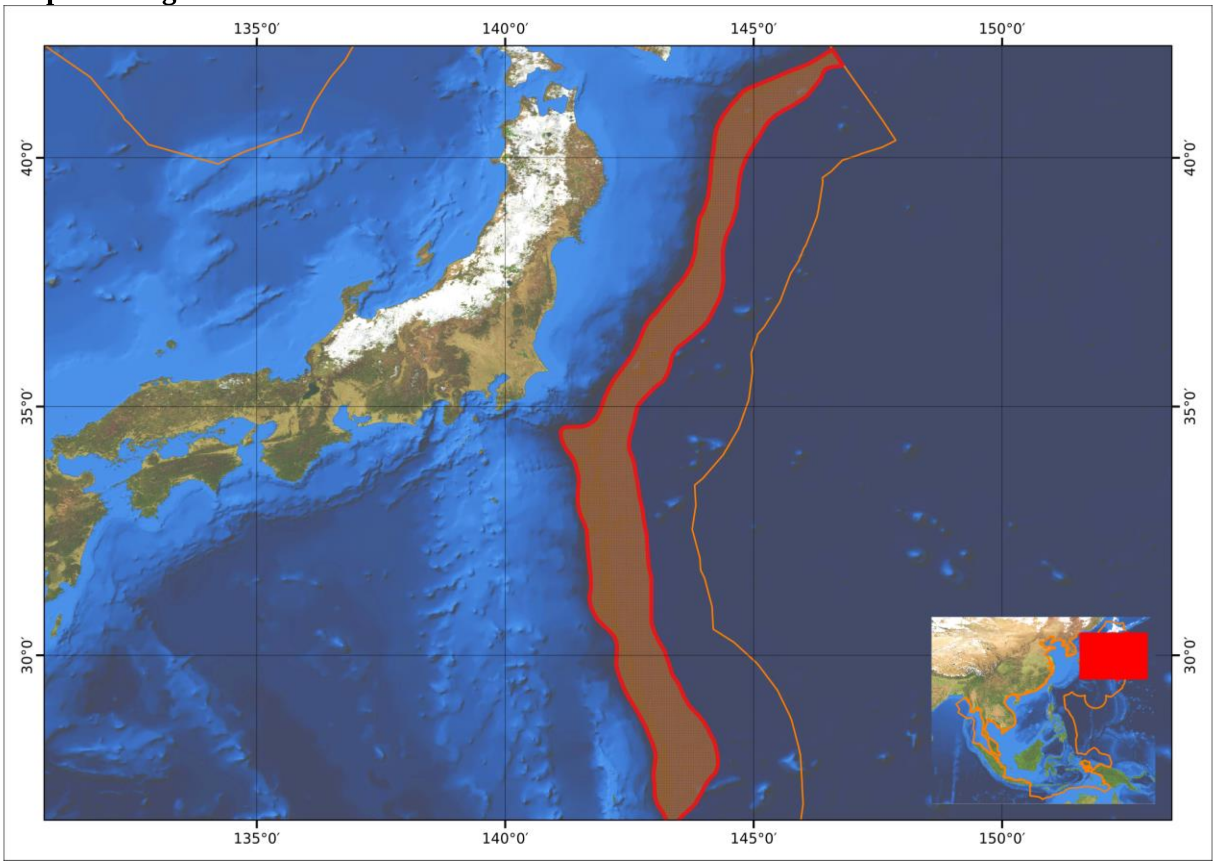

Figure 1. Area meeting the EBSA criteria

Note: The thin orange line depicts the geographic scope of the workshop.

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Area no. 29: Nankai Trough

Abstract
The Nankai Trough is located along the convergent boundary between the Philippine Sea and Eurasian plates. This area is associated with great earthquakes along the subduction zone. Many chemosynthetic communities have been recognized in a wide depth range from 270 m to 4,800 m due to the existence of numerous methane seeps. Although species richness is not as high as the productive areas, the occurrence of endemic species is high in this region: more than 50 per cent of the total number of species in this region is endemic. The seepage fields harbour a higher diversity of endobenthic invertebrates, such as vesicomyid clams.

Introduction

The Nankai Trough is an active plate margin, where the Philippine Sea plate subducts beneath the Eurasian plate. The V-shaped submarine canyon with depths of 2,000 m runs through the middle of Suruga Bay (the Suruga Trough), which separates the Eurasia Plate to the north from the Philippine Plate to the south. The waters extend from the coast of Cape Omaezaki to the Kii Peninsula (south of Cape Ashizuri), reaching a difference in elevation of 1,800 m and a total length of 670 km (Tokuyama et al., 2001). The Nankai accretionary prism forms on the landward slope of the Nankai Trough margin and is associated with great earthquakes along the subduction zone (Ando 1975).

Many chemosynthetic communities have been found from the east side of Suruga Bay to the east of the island of Kyusyu in a wide depth range from 270 to 4,800 m due to the existence of numerous seeps and possible fluid migration from deep zones of the accretionary prism (Toki et al. 2004). Methane seeps have been recognized in three different settings: at thrust faults, mud volcanoes and permeable layers (Ashi 2003). Animal communities dominated by vesicomyid clams and *Alaysia*, *Escarpia*, *Paraecarpia*, and *Lamellibrachia* tubeworms (Ohta and Laubier 1987) are patchily distributed where fluid seeps through thrust faults (Colwell et al. 2004, Watanabe et al. 2010). At least 12 species of vesicomyid clams have been reported from this area (Okutani et al. 2000, Sasaki et al. 2005, Fujikura et al. 2000). The macro- and megafaunal communities in the Nankai Trough are divided into three large groups with respect to depth and horizontal location (Nakajima et al. 2014). One group comprises relatively deeper sites with depths from 2,500 to 4,800 m, while another comprises sites with depths from 1,940-2,360 m, and the other comprises the north-eastern sites of the Nankai Trough with depths from 270 to 1,200 m. There are limited chemosynthetic ecosystems, but there are also gem corals in the surrounding seafloor, distributed offshore from Mie to Kochi prefectures (Iwasaki, 2008), making this area an important coral fishing ground.

Location
The area is located south of Honshu Island, Japan between the latitude of 35.1°N and longitude of 138.8°E, and between the latitude of 29.5°N and longitude of 130.4°E.

Feature description of the proposed area
Seep and vent chemosynthetic ecosystems are reported from the Nankai Trough (700-1500 m deep) (Ohta & Laubier, 1987; Fujioka & Taira, 1989; Gamo et al., 1992; Lallemand et al., 1992; Ashi et al., 1996; Ashi, 1997; Fujikura et al., 2000, 2008; Kuramoto et al., 2001; Kojima, 2002; Tsunogai et al., 2002; Toki et al., 2004, 2007). The number of chemosynthetic communities is the highest in the Nankai Trough among the deep-sea chemosynthetic regions around Japanese archipelago (Watanabe et al. 2010). Regarding the accumulative number of species, the Nankai Trough contains 35 species of macro- and megabenthic fauna (Nakajima et al. 2014). Endemic species have been reported from these ecosystems, such as molluscs and annelids (Okutani & Métivier, 1986; Okutani et al., 1993, 1996, 1997; Kojima &

Ohta, 1997; Kojima et al., 1997, 2000, 2001, 2003, 2006; Okutani & Hashimoto, 1997; Fujikura et al., 2000, 2008; Okutani & Iwasaki, 2003; Sasaki et al., 2003, 2005). Although species richness is not as high as the other productive areas, such as the Okinawa Trough and Sagami Bay, the occurrences of endemic species are high in this region. In terms of the accumulative number of endemic species, 20 endemic species exclusively comprise 57.1% of the total number of species in the Nankai Trough (Nakajima et al. 2014). In addition, higher species richness (over 12 species) of the vesicomyid bivalves has been observed in this area (Okutani et al. 2000). Numerous species of precious cold-water corals are also observed and used as a fishery product in a relatively shallow area. Seeps and vents exist in very limited areas in the Nankai Trough, thus the species in this area can be considered endangered.

Feature condition and future outlook of the proposed area

Since this area periodically experiences massive earthquakes (e.g., Ando 1975), its communities and environment experience changes. The deep-sea fields in the Nankai Trough have also been designated as one of the possible areas for the exploitation of energy such as methane hydrate (Tsuji et al. 2008). Thus the seep communities in the Nankai Trough are at risk for serious anthropogenic damage, requiring an effective conservation strategy for maintaining habitat integrity and species diversity. There are also reports of direct human activities in the coral fishing ground in this area (Iwasaki 2008).

Assessment of the area against the CBD EBSA Criteria

CBD EBSA Criteria (Annex I to decision IX/20)	**Description** (Annex I to decision IX/20)	**Ranking of criterion relevance** (please mark one column with an X)			
		No information	**Low**	**Medium**	**High**
Uniqueness or rarity	Area contains either (i) unique ("the only one of its kind"), rare (occurs only in few locations) or endemic species, populations or communities, and/or (ii) unique, rare or distinct, habitats or ecosystems; and/or (iii) unique or unusual geomorphological or oceanographic features.				X
Explanation for ranking The occurrence of endemic species is high in this region: 20 of the more than 35 species of macro- and megabenthic fauna, such as *Bathyacmaea subnipponica*, *Mesolinga soliditesta*, *Paralepetopsis lepichoni*, *Phymorhynchus turris*, *Serradonta kanesunosensis*, and five species of *Calyptogena* clams (*C. kaikoi*, *C. laubieri*, *C. magnocultellus*, *C. nautilei* and *C. tsubasa*), are endemic to this area (Fujikura et al., 2008, Nakajima et al. 2014).					
Special importance for life-history stages of species	Areas that are required for a population to survive and thrive.				X
Explanation for ranking There is no information about life history of benthic species of this area. But, it is well recognized that for the species living in the chemosynthetic areas and endemic to one of them, such as *Bathyacmaea subnipponica*, *Mesolinga soliditesta*, *Paralepetopsis lepichoni*, *Phymorhynchus turris*, *Serradonta*					

<table>
<tr><td colspan="6">kanesunosensis, and five species of Calyptogena clams (C. kaikoi, C. laubieri, C. magnocultellus, C. nautilei and C. tsubasa), are endemic to this area (Fujikura et al., 2008, Nakajima et al., 2014), this is the only area for their entire life history.</td></tr>
<tr><td>Importance for threatened, endangered or declining species and/or habitats</td><td>Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species.</td><td></td><td></td><td>X</td><td></td></tr>
<tr><td colspan="6">Explanation for ranking

For the species living in the seep areas and endemic to one of them, this area is their only habitat. Usually seep areas are unstable and small in size. Thus the seep species are always threatened. For example, the normal size of the seep area is less than 10 km^2 and never exceeds 1000 km^2. Species such as Bathyacmaea subnipponica, Mesolinga soliditesta, Paralepetopsis lepichoni, Phymorhynchus turris, Serradonta kanesunosensis, and five species of Calyptogena clams (C. kaikoi, C. laubieri, C. magnocultellus, C. nautilei and C. tsubasa), are endemic to this area (Fujikura et al, 2008, (Nakajima et al., 2014) are therefore considered vulnerable, according to the IUCN Red List.</td></tr>
<tr><td>Vulnerability, fragility, sensitivity, or slow recovery</td><td>Areas that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery.</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">Explanation for ranking

Deep-sea gem corals, such as Corallium japonicum, Pleurocorallium elatius and P. konojoi, are observed in this area (Iwasaki, 2008). These species are under fisheries pressure and are considered functionally fragile (Iwasaki, 2008).</td></tr>
<tr><td>Biological productivity</td><td>Area containing species, populations or communities with comparatively higher natural biological productivity.</td><td>X</td><td></td><td></td><td></td></tr>
<tr><td colspan="6">Explanation for ranking

There is little information about the productivity of the benthic communities of this area. In general, production is lower in the offshore, deeper oceans.</td></tr>
<tr><td>Biological diversity</td><td>Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity.</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">Explanation for ranking

Among the deep-sea benthic species, a higher diversity of the vesicomyid clams has been observed (Okutani et al. 2000). So far, six species of Calyptogena vesicomyid clams have been observed (C. fausta, C. kaikoi, C. laubieri, C. magnocultellus, C. nautilei and C. tsubasa), which account for about half</td></tr>
</table>

of the known *Calyptogena* species in Japan (Nakajima et al., 2014) Also, 29 species of mollusk and seven species of annelid have been observed, which account for about 24% and 10%, respectively, of the known mollusk and annelid species in Japanese chemosynthetic fields (Fujikura et al, 2008). All these facts strongly suggest this area is high in biodiversity.					
Naturalness	Area with a comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or degradation.		X		
Explanation for ranking Although the centre of the trench is remote from human activities, the seep communities and corals are abundant in the relatively shallower area. Some sites are affected by human disturbances such as fishing (especially deep-sea gem corals) depending on the location.					

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Maps and Figures

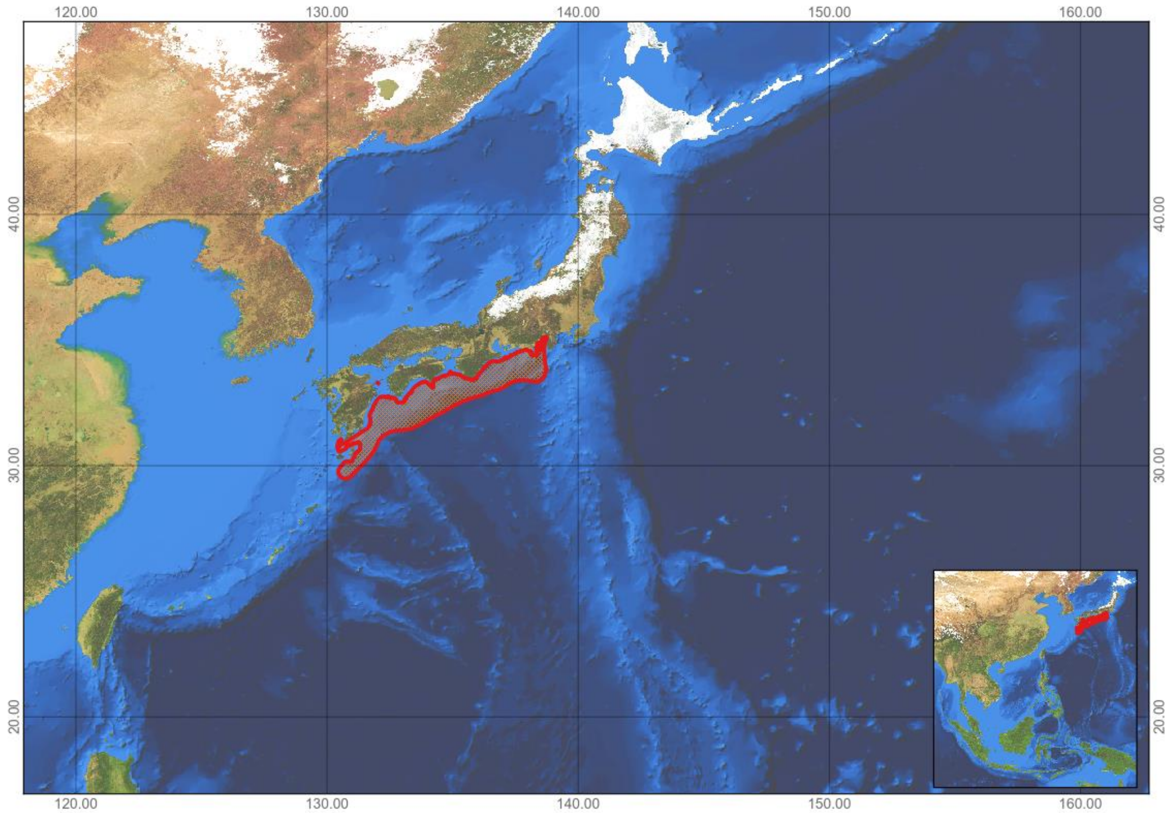

Figure 1. Area meeting the EBSA criteria

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Ministry of Environment Japan provided part of the data used in this description. Dr. K. Fujikura, R. Nakajima and T. Yamakita of Japan Agency for Marine Earth Science and Technology provided information used in this description.

Area no. 30: Sagami Trough and island and seamount chain of Izu-Ogasawara

Abstract

This area includes the Tokyo Submarine Canyon and the submarine canyons that drop steeply from Sagami and Suruga bays as well as the Sagami Trough, spanning 330 km between Sagami Bay, the Boso Peninsula, and Ohshima, and extend to the south to Myojin-sho, the Suiyo Seamount, the Mokuyo Seamount and the Kaikata Seamount. These seamounts are often tectonically active, and, as a result, many chemosynthetic vent communities are developing in this area.

Introduction

This area includes the Tokyo Submarine Canyon and the submarine canyons that drop steeply from Sagami and Suruga bays as well as the Sagami Trough, spanning 330 km between Sagami Bay, the Boso Peninsula, and Ohshima, and extend to the south to Myojin-sho, the Suiyo Seamount, the Mokuyo Seamount and the Kaikata Seamount.

The east side of the Sagami Trough in Sagami Bay is lined with the Okinoyama Bank Chain, the Misaki Bank, the Miura Bank, and the Sagami Bank. Numerous chemotroph populations have been confirmed in Sagami Bay (Fujikura et al., 2008). The boundaries of three plates come together in the Sagami Trough southeast of the Boso Peninsula. Here the terrain and structure of the sea floor is complex, reflecting the interactions of these plates, and there are numerous major earthquakes and volcanoes (Japan Coast Guard, Hydrographic and Oceanographic Department, 1985).

The slope of the submarine canyon in Suruga Bay is very rich in biodiversity (Kimura, personal communication), and these unique waters are inhabited by a large number of creatures (Misawa et al., 2007). In the vicinity live many Japanese spider crabs (*Macrocheira kaempferi),* a species endemic to Japan and Taiwan (Misawa et al., 2007).

The region's geologically active setting creates many hydrothermal vent ecosystems (Ministry of Environment Japan, 2015). The Myojin Knoll is a site of large-scale hydrothermal activity, with communities of creatures formed around hydrothermal vents, including *Gandalfus yunohana*, *Bathymodiolus septemdierum* and others (Fujikura et al., 2008). Suiyo and Mokuyo seamounts also have hydrothermal vent activity on their caldera floors, with *B. septemdierum*, *Alvinocaris brevitelsonis* and other species living near the vents (Fujikura et al., 2008). Hydrothermal vent activity also has been discovered at Kaikata Seamount, a volcano on the sea floor, and species including *Gigantidas horikosii*, Shinkailepadidae and others have been confirmed here (Fujikura et al., 2008). The waters up to roughly 800 m in depth of the Choshi coast are home to numerous shellfish species, including *Fulgoraria* (*Nipponomelon*) *elongata*, thought to be endemic to these waters (Okutani, 2000).

Location

This area is located in the western Pacific, south of Honshu Island, Japan, between 35.8°N, 141.6°E, and 26.5°N, 138.6°E.

Feature description of the proposed area

There are many chemosynthesis-based ecosystems, including hydrothermal vent and hydrocarbon seep communities, in close proximity in this area. Many species are shared between hydrothermal vent and hydrocarbon seep sites due to their geography and deep-water currents, which is an unusual setting worldwide and is considered unique.

The species richness of benthic macro- and megafauna is highly variable amongst the chemosynthetic sites in Sagami Bay and Izu-Bonin Arc. The methane seep off Hatsushima Island in Sagami Bay contains double, or more, the number of species compared with the other sites (29 species). Regarding the accumulative number of species by region, Sagami Bay and Izu-Bonin Arc contain 29 and 28 species of macro- and mega benthic fauna, respectively. The occurrences of endemic species are high in these regions. In terms of the accumulative number of endemic species, 13 and 15 endemic species exclusively comprised both 44.8% of the total number of species in Sagami Bay and Izu-Bonin Arc, respectively (Nakajima et al. 2014).

Seep and vent chemosynthetic ecosystems are reported from Sagami Bay (700-1500 m deep) and the seamount chain of Izu-Ogasawara area (300-1400 m deep) (Okutani & Egawa, 1985; Sakai et al., 1987; Fujioka & Taira, 1989; Hashimoto et al., 1989; Shirayama & Ohta,1990; Masuzawa et al., 1992; Tsunogai et al., 1996; Gamo et al., 2006; Kojima, 2002; Fujikura et al., 2008; Setoguchi et al., 2014). Endemic species, such as protists, molluscs, crustaceans and annelids (Miura & Laubier, 1990; Miura & Hashimoto, 1991a, 1991b, 1996; Okutani et al., 1993, 2000; Hashimoto & Okutani, 1994; Kojima, & Ohta, 1997; Fujikura et al., 2000; Takeda et al., 2000; Sasaki et al., 2003; Yamaguchi et al., 2004; Hashimoto & Yamane, 2005; Takishita et al., 2007; Munroe & Hashimoto, 2008) have been reported from these ecosystems. The area where seeps and vents exist is very limited. Thus the species can be considered endangered, and these areas are very important for the life history of the species.

The seamount chain in this area overlaps with the migration route of the Japanese eel (Chow et al., 2008), *Anguilla japonica*, as it travels to the spawning ground of Suruga Seamount, located east of Mariana Archipelago (Tsukamoto, 2006).

The bathyal depths are known to be an area where rich gem corals grow including *Corallium japonicum*, *Paracorallium elatius*, and *P. konojoi* (Tsounis, 2010, Iwasaki, 2008). Fisheries activities here need to be managed sustainably to conserve these slow-growing animals (Iwasaki, 2008).

Feature condition and future outlook of the proposed area
Sagami Trough is adjacent to the main island of Japan and is heavily influenced by human activities, such as waste disposal and fisheries. Many of the seamounts on the Izu-Bonin Arc are exploited for the deep-water fishery resources, and some are targeted for mining. The hydrothermal fields in the Izu-Ogasawara area are at risk of anthropogenic impacts by the planned commercial mining.

Assessment of the area against the CBD EBSA Criteria

CBD EBSA Criteria (Annex I to decision IX/20)	**Description** (Annex I to decision IX/20)	**Ranking of criterion relevance** (please mark one column with an X)			
		No information	**Low**	**Medium**	**High**
Uniqueness or rarity	Area contains either (i) unique ("the only one of its kind"), rare (occurs only in few locations) or endemic species, populations or communities, and/or (ii) unique, rare or distinct, habitats or ecosystems; and/or (iii) unique or unusual geomorphological or oceanographic features.				X
Explanation for ranking) There are many chemosynthesis-based ecosystems, including hydrothermal vent and hydrocarbon seep					

communities, in close proximity in this area. Many species, such as *Ashinkailepas seepiophila*, *Bathymodiolus aduloides* and *Calyptogena okutanii* are shared between hydrothermal vent and hydrocarbon seep sites (Fujikura et al., 2008) due to their geography and deep-water currents, which is an unusual setting worldwide and is considered unique.					
Special importance for life-history stages of species	Areas that are required for a population to survive and thrive.				X
Explanation for ranking For the species living in the hydrothermal vent and hydrocarbon seep areas and endemic to one of them, such as *Branchinotogluma japonica*, *Homalopoma bicolor*, *Lurifax japonicas, Monilea cocoa*, *Nicomache ohtai, Oenopota sagamiana, Oenopota ogasawarana, Phymorhynchus buccinoides*, *Protomystides hatsushimaensis*, and *Pyropetia yamato* (Fujikura et al., 2008, Nakajima et al., 2014), this is the only habitat for their entire life history.					
Importance for threatened, endangered or declining species and/or habitats	Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species.				X
Explanation for ranking For the species living in the hydrothermal vent areas and endemic to one of them such as *Branchinotogluma japonica*, *Homalopoma bicolor*, *Lurifax japonicas, Monilea cocoa*, *Nicomache ohtai, Oenopota sagamiana, Oenopota ogasawarana, Phymorhynchus buccinoides, Protomystides hatsushimaensis*, and *Pyropetia yamato* (Fujikura et al, 2008, Nakajima et al., 2014), this is their only habitat. Usually hydrothermal vents are unstable and small in size. Thus, hydrothermal species are always threatened. For example, the normal size of hydrothermal vent is less than 10 km^2 and never exceeds 1000 km^2. Thus, the species meet the vulnerable category defined by the IUCN Red List.					
Vulnerability, fragility, sensitivity, or slow recovery	Areas that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery.				X
Explanation for ranking The chemosynthetic ecosystem is supported by geologically supplied chemical energy. The supply is not stable and from this point of view the ecosystem is vulnerable. Gem coral species, such as *Corallium japonicum, Pleurocorallium elatius* and *P. konojoi*, are under strong fisheries pressure, and they are highly susceptible to depletion by human activity (Tsounis, 2010).					
Biological productivity	Area containing species, populations or communities with comparatively higher				X

	natural biological productivity.				
Explanation for ranking The biological activity of hydrothermal vents is the highest within deep-sea areas and can be even higher in biomass compared to shallow water areas (Gaill et al., 1997, Sarrazin & Juniper, 1999; Fujikura et al., 2002; Govenar et al., 2005).					
Biological diversity	Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity.	X			
Explanation for ranking Although there are many unique endemic species associated with these ecosystems, the biodiversity of communities inhabiting hydrothermal vent ecosystems is not well understood.					
Naturalness	Area with a comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or degradation.				X
Explanation for ranking These areas still possess their natural landscape and environment due to their inaccessibility.					

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Maps and Figures

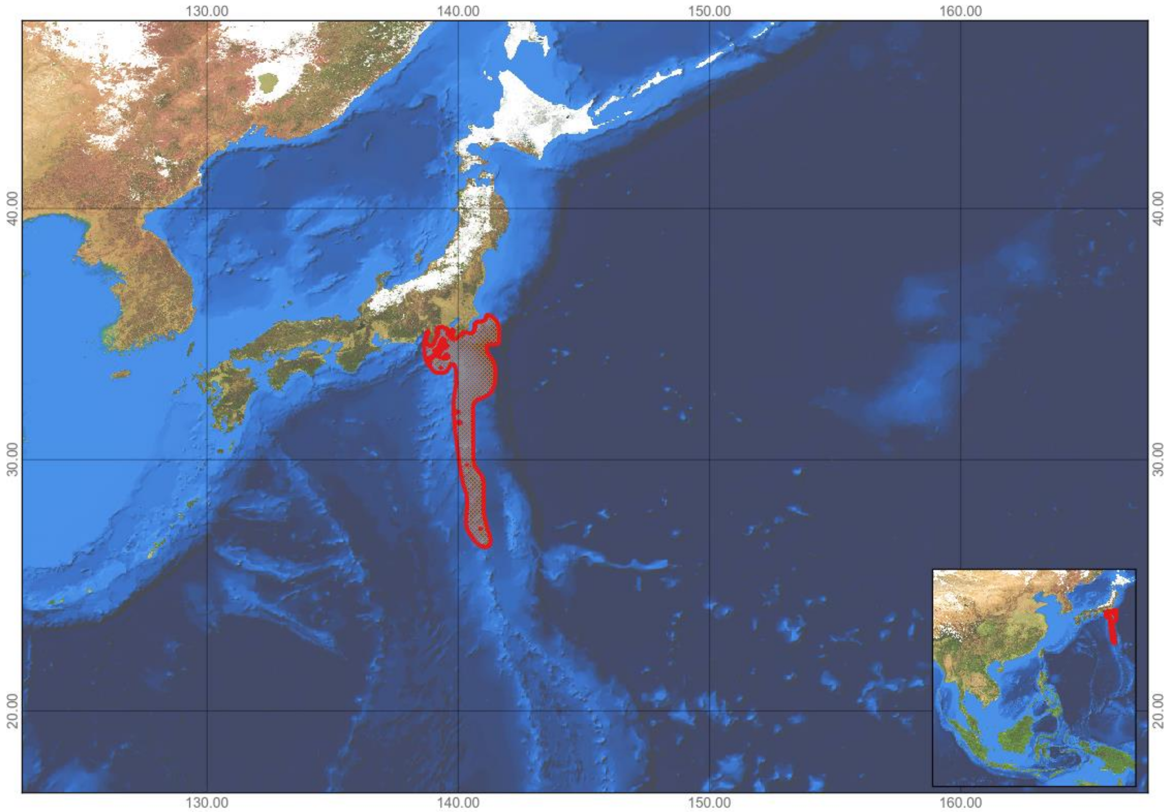

Figure 1. Area meeting the EBSA criteria

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Ministry of Environment Japan and Dr. Katsunori Fujikura, Japan Agency for Marine Earth Science and Technology, offered valuable information used to prepare this template.

Area no. 31: Convection Zone East of Honshu

Abstract

This is the area where the Oyashio Current (cold current) and the Kuroshio Current (warm current) mix. This complex front structure forms eddies of both warm and cold water. In addition, the Tsugaru Current (warm current) flows in off the Sanriku coast, resulting in very complex marine features. Primary production is high in this area, and zooplankton, especially krill, is also rich. Consequently, pelagic fishes and mammals are present in very high in densities, as this is a key feeding area for these higher trophic-level animals. This is also an important feeding area for seabirds.

Introduction

The Oyashio Current and the Kuroshio Current mix in these waters, which are referred to as a transition area or mixture area of these two currents (Sakurai, 2007). Here, a complex front structure forms that includes eddies of both warm and cold water, and the Tsugaru Current flows in off the Sanriku coast, resulting in a very complex marine environment (Coastal Oceanography Research Committee, The Oceanographical Society of Japan, 1985, 1990). As a result, a unique biota has formed here, comprising both warm-water and cold-water species (Tittensor et al., 2015), which also show high levels of productivity (Ministry of Environment Japan (MoEJ), 2015).

Location

This area is located east of the northern part of Honshu Island, Japan, between 41.2°N, 145.3°E and 35.9°N, 140.8°E. It is contiguous with area no. 19, North Pacific Transition Zone, described by the North Pacific Regional Workshop to Facilitate the Description of EBSAs, in 2013 (https://www.cbd.int/doc/meetings/mar/ebsa-np-01/official/ebsa-np-01-04-en.pdf).

Feature description of the proposed area

This complex marine environment, resulting from the mixing of the Oyashio Current (cold current), the Kuroshio Current (warm current), and the Tsugaru Current (warm current), supplies a large quantity of nutrients to the euphotic zone of this area. The nutrients support a large spring bloom of phytoplankton, mainly diatoms, as primary production of this area.

In this area, the species diversity of macro zooplankton, especially copepods, is high. In addition, krills are abundant mainly off the Sanriku coast from spring through early summer (Taki, 2006). This krill population makes this an important feeding area for baleen whales, which feed on krill, to prepare a long-range migration across the equator (Ministry of Environment Japan 2015).

This area is also important for pelagic fish, such as Pacific saury, mackerel, sardine and others (Watanabe 2007, Kubota et al., 2001), as well as squid, tuna, bonito and other large migratory species, which feed intensively on zooplankton in this area.

The high productivity of this surface area is also important for benthic species such as cod, flounder and others, that are live in high densities from the continental shelf to the continental slope of this area (Yamamura, 1994; Yonezaki et al., 2015).
Also, the abundant pelagic fishes are a key food source of seabirds, and BirdLife International has already selected it as an Important Bird Area (BirdLife International, 2012).

Feature condition and future outlook of the proposed area

This area is one of largest fishing grounds of the world (FAO, 2014). Global warming and associated changes in oceanographic conditions may negatively impact on this area because the stronger stratification due to global warming causes a decrease of upwelling activities and consequent lower nutrient supply. The long-term trend of decreasing zooplankton biomass as a result of climate change has already been observed as a phenomenon known as the Pacific Decadal Oscillation (e.g., Kobari et al., 2007; Tadokoro 2009; Chiba et al., 2009; Sugisaki, 2010).

Assessment of the area against the CBD EBSA Criteria

CBD EBSA Criteria (Annex I to decision IX/20)	**Description** (Annex I to decision IX/20)	**Ranking of criterion relevance** (please mark one column with an X)			
		No information	**Low**	**Medium**	**High**
Uniqueness or rarity	Area contains either (i) unique ("the only one of its kind"), rare (occurs only in few locations) or endemic species, populations or communities, and/or (ii) unique, rare or distinct, habitats or ecosystems; and/or (iii) unique or unusual geomorphological or oceanographic features.				X
Explanation for ranking The oceanographic setting, a complex convection area of warm (Kuroshio) and cold (Oyashio) currents, is unique in the world (Kubota et al., 2001; Coastal Oceanography Research Committee; The Oceanographical Society of Japan, 1985, 1990; MoEJ, 2015; Sakurai, 2007; Chiba et al., 2009). This setting provides huge amounts of nutrients to the surface of the ocean. Consequently, the marine biomass in this region is very high. This area is one of the most productive fishing areas, as a result of the unique setting (FAO, 2014; Sugisaki, 2010).					
Special importance for life-history stages of species	Areas that are required for a population to survive and thrive.				X
Explanation for ranking This is key feeding area for baleen whale (MoEJ, 2015; Taki, 2006) and for several seabird species (BirdLife International, 2012). This area is known as breeding area of finless porpoise (*Neophocaena phocaenoides*) (MoEJ, 2015) and a spawning area of several fish species, such as Japanese sand lance (*Ammodytes personatus*), threadfin hakeling (*Laemonema longipes*) and Pacific cod (*Gadus macrocephalus*) (Kubota et al., 2001; Watanabe Y., 2007). This is also a spawning area of firefly squid (*Watasenia scintillans*) (MoEJ, 2015).					
Importance for threatened, endangered	Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species.				X

or declining species and/or habitats					
Explanation for ranking This is the key feeding area for endangered marine mammals, such as baleen whale (MoEJ, 2015; Taki, 2006), and for endangered seabirds (BirdLife International, 2012). A threatened shark species, spiny dogfish (*Squalus acanthias*), is also known from this area (MoEJ, 2015).					
Vulnerability, fragility, sensitivity, or slow recovery	Areas that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery.		X		
Explanation for ranking This area is one of largest fishing grounds of the world (FAO, 2014). Global warming and associated changes in oceanographic conditions may negatively impact on this area because the stronger stratification due to global warming causes a decrease of upwelling activities and consequent lower nutrient supply. The long-term trend of decreasing zooplankton biomass as a result of climate change has already been observed as a phenomenon known as the Pacific Decadal Oscillation (e.g., Kobari et al., 2007; Tadokoro 2009; Chiba et al., 2009; Sugisaki, 2010).					
Biological productivity	Area containing species, populations or communities with comparatively higher natural biological productivity.				X
Explanation for ranking The oceanographic setting, which provides a complex convection of warm (Kuroshio) and cold (Oyashio) currents, is unique in the world (Kubota et al., 2001; Coastal Oceanography Research Committee, The Oceanographical Society of Japan (eds.). 1985, 1990; MoEJ, 2015; Sakurai, 2007; Chiba et al., 2009; Kobari et al., 2007). This setting provides high quantities of nutrients to the surface of the ocean. Consequently, the marine biomass in this region is very high. This is one of the most productive fishing areas, as a result of the unique setting (FAO, 2014, Sugisaki, 2010).					
Biological diversity	Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity.				X
Explanation for ranking As a result of the convergence between cold and warm currents in this area, both cold-water and warm-water species live here; consequently, the species diversity of pelagic species in this area is very high (Kubota et al., 2001; Coastal Oceanography Research Committee, The Oceanographical Society of Japan (eds.). 1985, 1990; MoEJ, 2015; Sakurai, 2007; Chiba et al., 2009; Kobari et al., 2007).					
Naturalness	Area with a comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or		X		

	degradation.				

Explanation for ranking

There is very active fisheries activity here (FAO, 2014, Sugisaki, 2010). As a result, the naturalness of this area is low (Yonezaki et al., 2015). On the other hand, there are number of islands that have retained a high level of naturalness, and that are key habitat for variety of seabirds (BirdLife International, 2012).

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Maps and Figures

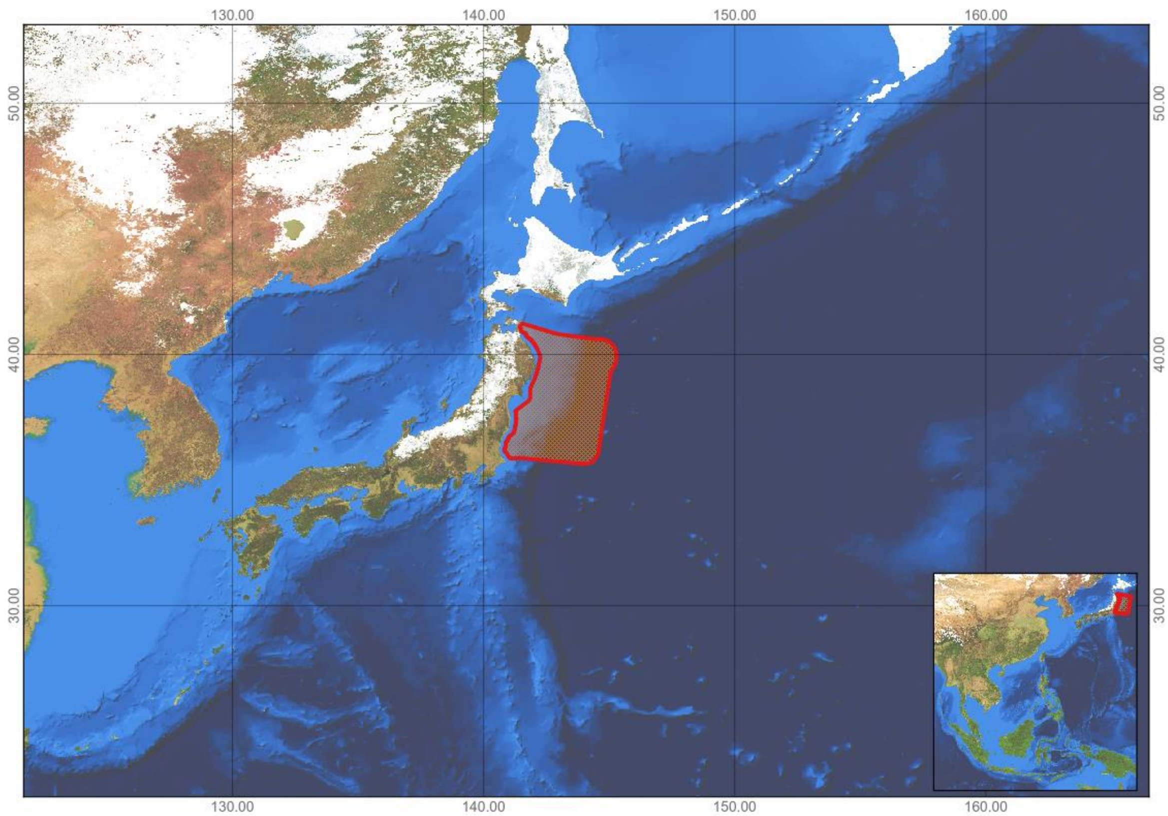

Figure 1. Area meeting the EBSA criteria

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Data used to prepare this description was provided by Ministry of Environment Japan and Dr. Hiroya Sugisaki, K. Nakata and K. Tadokoro, Fisheries Research Agency of Japan.

Area no. 32: Bluefin Spawning Area

Abstract
The waters of the Kuroshio Current's subtropical zone from the Nansei (Okinawa) Islands, where the Kuroshio Current flows north to the waters off the coast of southern Kyushu, are connected to the Coral Triangle and provides a major spawning area for bluefin tuna.

Introduction
The waters of the Kuroshio Current's subtropical zone from the Nansei Islands, where the Kuroshio Current flows north, to the waters off the coast of southern Kyushu is an important spawning area for bluefin tuna. These waters are connected to the Coral Triangle, the most diverse waters in the world, through the Kuroshio Current, and they have a very high level of marine diversity, even by global standards (Tittensor et al., 2010). The Kuroshio Current is a high-temperature, high-salt-content surface layer current with few nutrients, and primary production in the waters of the open-sea zone is supported mainly by microscopic phytoplankton (Ministry of Environment Japan, 2015).

Location
This area is located in the upper reaches of the Kuroshio warm current, which flows off southern Japan, extending between 30.1°N, 130.7 °E and 23.0°N, 122.5°E.

Feature description of the proposed area
This is one of the main spawning areas of Pacific bluefin tuna (*Thunnus orientalis*), whose spawning areas are very restricted (Yamada et al. 2009; Ichinokawa et al. 2014, Fisheries Agency Japan, 2015).
This area is also known to be the spawning area of many other fish species, such as Japanese anchovy (*Engraulis japonicus*), blue mackerel (*Scomber australasicus*), Japanese amberjack (*Seriola quinqueradiata*), Japanese jack mackerel (*Trachurus japonicus*), Japanese pilchard (*Sardinops melanostictus*) and chub mackerel (*Scomber japonicus*). Japanese snapper (*Paracaesio caerulea*), lavender snapper (*Pristipomoides sieboldii*), crimson snapper (*Pristipomoides filamentosus*) and longtailed red snapper (*Etelis coruscans*) are also abundant in this area (Kato 2004).
This area is also known as an important reproductive area of humpback whale (*Megaptera novaeangliae*) (MoEJ, 2015). It is also a migration route for highly migratory fish species and for the north Pacific population of loggerhead turtle.

Feature condition and future outlook of the proposed area
This area is particularly important for the life history of Pacific bluefin tuna, a species considered critically endangered by IUCN. The Japanese Fisheries Agency has devoted significant effort to managing this species, however, its status remains vulnerable, though stable (Fisheries Agency Japan, 2015).

Assessment of the area against the CBD EBSA Criteria

CBD EBSA Criteria (Annex I to decision IX/20)	**Description** (Annex I to decision IX/20)	**Ranking of criterion relevance** (please mark one column with an X)			
		No information	**Low**	**Medium**	**High**
Uniqueness or rarity	Area contains either (i) unique ("the only one of its kind"), rare (occurs only in few			X	

<table>
<tr><td></td><td>locations) or endemic species, populations or communities, and/or (ii) unique, rare or distinct, habitats or ecosystems; and/or (iii) unique or unusual geomorphological or oceanographic features.</td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="6">Explanation for ranking
This area is a major spawning ground of Pacific bluefin tuna (Thunnus orientalis) (Fisheries Agency Japan, 2015; Ichinokawa et al., 2014; Inagake et al., 2001; Yamada et al., 2009)</td></tr>
<tr><td>Special importance for life-history stages of species</td><td>Areas that are required for a population to survive and thrive.</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">Explanation for ranking

This area is a major spawning ground of Pacific bluefin tuna (Thunnus orientalis) (Fisheries Agency Japan, 2015; Ichinokawa et al., 2014; Inagake et al., 2001; Yamada et al., 2009). This area is also known to be the spawning area of many other fish species, such as Japanese anchovy (Engraulis japonicus), blue mackerel (Scomber australasicus), Japanese amberjack (Seriola quinqueradiata), Japanese jack mackerel (Trachurus japonicus), Japanese pilchard (Sardinops melanostictus) and chub mackerel (Scomber japonicus) (MoEJ, 2015). Another species, Randallichthys filamentosus (Fourmanoir,1970) also uses this area for reproduction (Kato, 2004). This area is also known as an important reproductive area of humpback whale (Megaptera novaeangliae) (MoEJ, 2015).</td></tr>
<tr><td>Importance for threatened, endangered or declining species and/or habitats</td><td>Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species.</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">Explanation for ranking

This area is a major spawning ground of Pacific bluefin tuna. The species is an iconic, endangered large marine pelagic fish (Fisheries Agency Japan, 2015; Ichinokawa et al., 2014; Inagake et al., 2001; Yamada et al., 2009). An endangered shark species (whale shark,(Rhincodon typus) is known from this area (MoEJ, 2015).</td></tr>
<tr><td>Vulnerability, fragility, sensitivity, or slow recovery</td><td>Areas that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery.</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">Explanation for ranking

Pacific bluefin tuna is a slow-growing species and vulnerable to fishing pressure (Fisheries Agency Japan, 2015; Ichinokawa et al., 2014; Inagake et al., 2001; Yamada et al., 2009).</td></tr>
</table>

Biological productivity	Area containing species, populations or communities with comparatively higher natural biological productivity.			X	
Explanation for ranking In this area, small-sized phytoplankton is rich in biomass that supports the ecosystem (MoEJ, 2015).					
Biological diversity	Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity.				X
Explanation for ranking This area is closely linked with the "coral triangle" area via the Kuroshio Current. Thus many fish species, including the whale shark (*Rhincodon typus*) can be found from here (MoEJ, 2015). Also *Dugong dugon* is known from this area (MoEJ, 2015).					
Naturalness	Area with a comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or degradation.			X	
Explanation for ranking There is active fisheries activity on blue fin tuna in this area. However, it is under strong management (Fisheries Agency Japan, 2015).					

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Maps and Figures

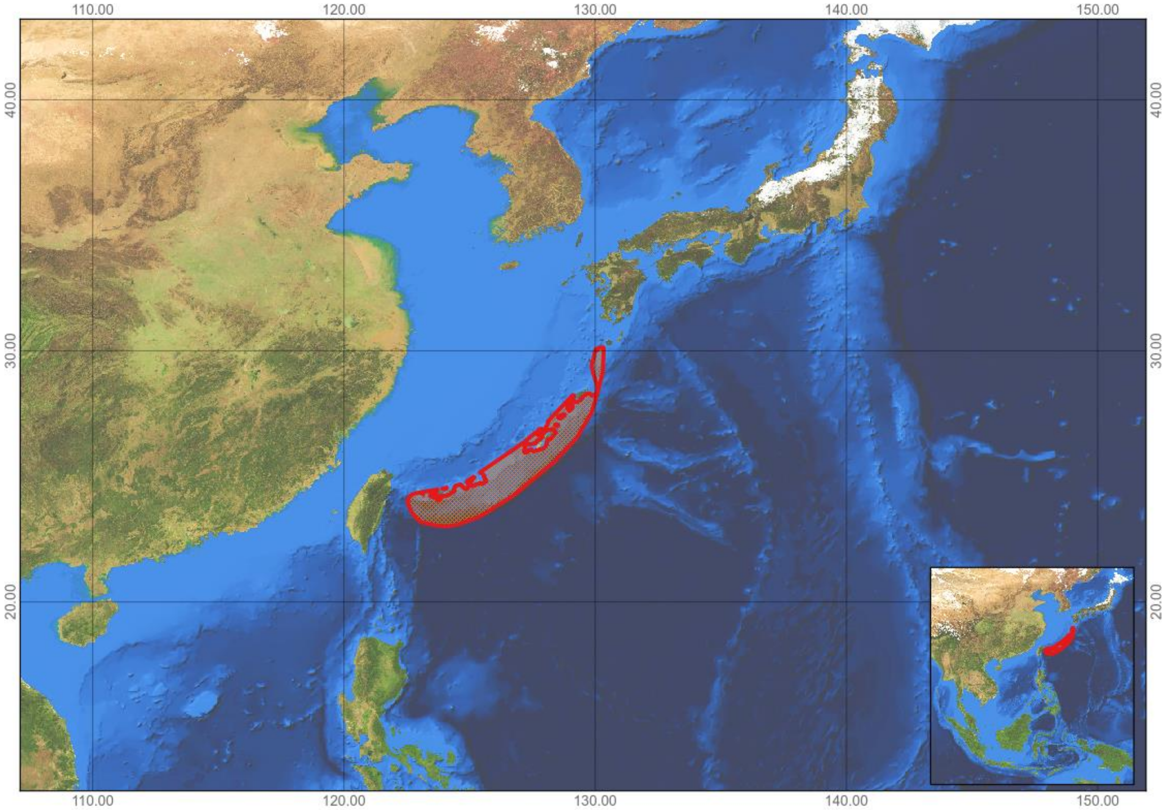

Figure 1. Area meeting the EBSA criteria.

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Part of this description is based on the data provided by the Ministry of the Environment Japan. Dr. H. Sugisaki, K. Nakata and K. Tadokoro of Fisheries Research Agency, Japan, and Dr. T. Yamakita and Dr. Y. Uchifune of Japan Agency for Marine-Earth Science and Technology provided useful information for the preparation of this description.

Area no. 33: Kyushu Palau Ridge

Abstract
Kyushu-Palau Ridge is an ocean floor feature. It comprises a chain of many extinct volcanos mostly below sea level. Surveys of this area found 213 fish species, 14 of which were new to science. A unique deep-sea butterfly fish has also been discovered in this area. This area was found to be the spawning ground of the white spotted conger eel.

Introduction
Kyushu-Palau Ridge is an ocean floor feature, named after the nearby islands. It is about 3000 km long, and at its northern end is the Japanese island of Kyushu. This ridge was made by spreading of Shikoku Basin caused by the movement of Pacific plate under Philippine plate. It comprises a chain of many extinct volcanos mostly below the sea level. The only exception is Okino Torishima, which is above sea level. Thus most of the chain is within EEZ of Japan, but part of this area is beyond national jurisdiction of Japan.

Location
The area starts to the southeast off Cape Toi located on the southeast side of Kyushu Island, with a southern extension near Palau. It separates Shikoku and west Mariana Basins and Philippine Basin. It is located between 31.1°N and 17.0°N, and between 137.1°E and 132.4°E.

Feature description of the proposed area
Robust surveys of fish fauna have been carried out by biologists of Kochi University in these dead volcanos, especially Komahashi seamount (440 m below sea level) and Komahashi seamount no. 2 (289 m). The survey results are summarized in Okamura et al. (1982), which notes that 213 fish species inhabit this area. This number accounts for 6 per cent of all fish species known in the waters around Japan (around 3700 species). The publication describes 14 new species. In addition, one species of butterfly fish (*Prognathodes guyotensis* (Yamamoto and Tameka, 1982) was described from the summit of one seamount (Shimada, 2000).

These seamounts rise from Shikoku Basin at depths of around 5500 m. Thus the height of these seamounts reaches to around 5000 m. Because the area is influenced by the Kuroshio warm current, upwelling occurs when the current strikes the seamount chain. Thus the surface water is highly productive. According to OBIS and BISMaL, several endangered species were recorded from this area, such as black-footed albatross (*Diomedea nigripes*), sperm whale, leatherback turtle and green turtle. The total number of species recorded exceeds 250, though most are zooplankton.

This ridge is the spawning ground of whitespotted conger eel (*conger myriaster*). The Japanese eel, *Anguilla japonica*, is known to migrate from the Japanese coast along the Izu-Bonin archipelago to its spawing ground located close to Mariana Island. On the other hand, the conger species was found to use the area south of Okino Torishima as its spawning ground (Kurogi et al., 2012).

Feature condition and future outlook of the proposed area

Scientific information on this area is very limited. According to the Fisheries Agency of Japan (2015), recent fisheries stock of the conger eel is seriously decreasing, although this species is not yet included in the Red List.

Assessment of the area against the CBD EBSA Criteria

CBD EBSA Criteria (Annex I to decision IX/20)	**Description** (Annex I to decision IX/20)	**Ranking of criterion relevance** (please mark one column with an X)			
		No information	**Low**	**Medium**	**High**
Uniqueness or rarity	Area contains either (i) unique ("the only one of its kind"), rare (occurs only in few locations) or endemic species, populations or communities, and/or (ii) unique, rare or distinct, habitats or ecosystems; and/or (iii) unique or unusual geomorphological or oceanographic features.				X
Explanation for ranking Okamura et al. (1982) described 14 new species from this area, including *Caelorinchus longicephalus*. Such high numbers of endemic species strongly suggest that this area is very unique.					
Special importance for life-history stages of species	Areas that are required for a population to survive and thrive.				X
Explanation for ranking According to Kurogi et al. (2012), this area includes the key spawning ground of whitespotted conger eel (*Conger myriaster*).					
Importance for threatened, endangered or declining species and/or habitats	Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species.	X			
Explanation for ranking Sixteen fish species are considered endemic to this area, but they have not been evaluated in terms of their conservation status.					
Vulnerability, fragility, sensitivity, or slow recovery	Areas that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery.	X			
Explanation for ranking					
Biological productivity	Area containing species, populations or communities with comparatively higher	X			

	natural biological productivity.				
Explanation for ranking) Potentially this area can be highly productive, because it crosses the Kuroshio current. But information is insufficient to evaluate this criterion.					
Biological diversity	Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity.				X
Explanation for ranking According to Okamura et al. (1982), 213 fish species inhabit this area. The number accounts for 6% of all fish species known from waters around Japan (around 3700 species). In the publication, 14 new species were described. In addition, one species of butterfly fish (*Prognathodes guyotensis* (Yamamoto and Tameka, 1982)) was also described from the summit of one seamount in the area (Shimada, 2000). Fish diversity is therefore very high in this region.					
Naturalness	Area with a comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or degradation.				X
Explanation for ranking This area is very remote, and its naturalness can be considered high.					

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Maps and Figures

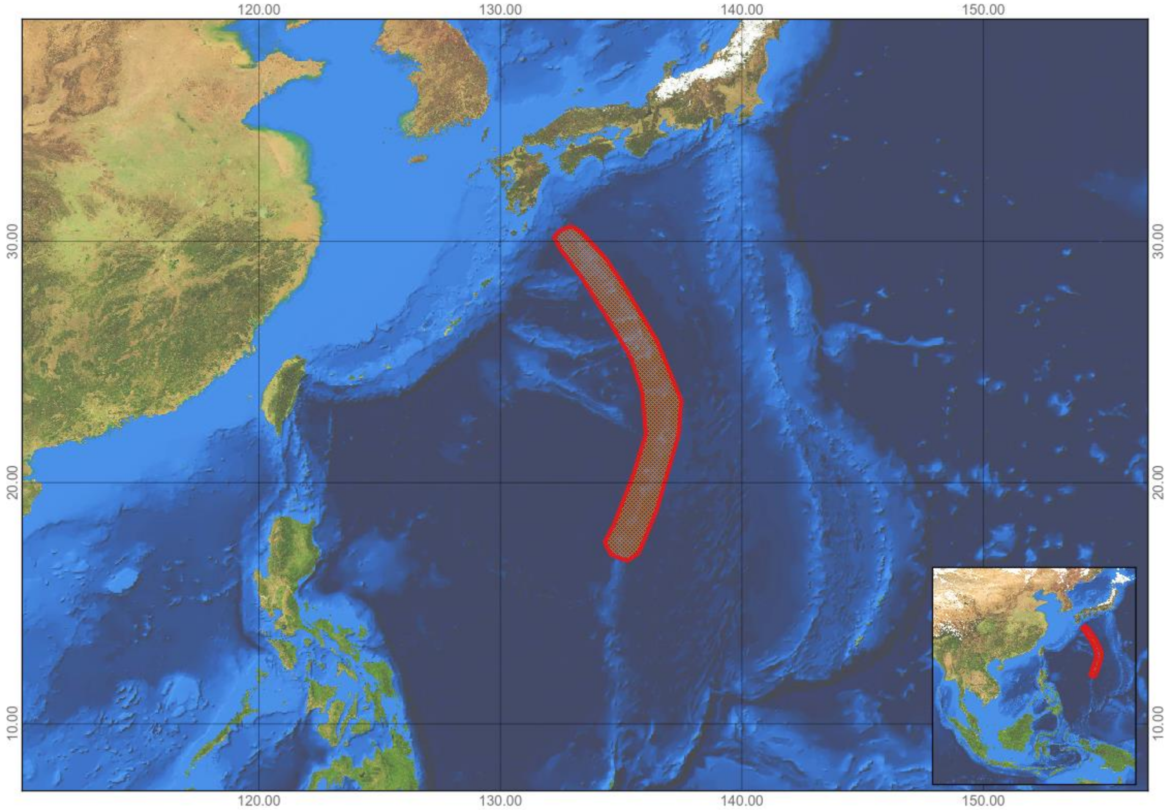

Figure 1. Area meeting the EBSA criteria

Area no. 34: Kuroshio Current south of Honshu

Abstract
This area consists of the waters of the Kuroshio Current's subtropical zone, from the waters off the southern coast of Kyushu Island where the current turns in to follow currents off the Boso Peninsula, and the waters on the landward side of these. As the Kuroshio Current proceeds further eastward, it weakens and merges with the convex area off eastern Honshu Island (area no. 35 of this report). This area is high in biodiversity because the oceanographic setting is complex. It hosts a particularly important spawning ground for commercially important fish and squid species. It is also a migratory pathway of yellow-fin and skipjack tunas. This area is also used as a reproductive area by finless porpoise. Three endangered fish species have been reported from this area.

Introduction

This area consists of the waters of the Kuroshio Current's subtropical zone from the waters off the coast of southern coast of Kyushu Island where the current turns in to follow currents off the Boso Peninsula, and the waters on the landward side of these. As the Kuroshio Current proceeds further eastward, it weakens and merges with the convex area off eastern Honshu Island (area no. 35 of this report). In zones of subtropical waters further offshore than the Kuroshio Current, such as those off Shikoku, a westward-flowing countercurrent of the Kuroshio Current forms. The Kuroshio Current transports marine organisms from the coastal zone and toward the subtropical zone. As such, they can be described as waters with a very high level of biological diversity, even by global standards (Coastal Oceanography Research Committee, 1985; 1990; Ministry of Environment Japan, 2011; Tittensor et al., 2010).

Location
This area is located from the south and southeastern coast of Kyushu island, south of Shikoku Island and south of Honshu island, Japan, between 35.9°N, 141.8°E and between 30.0°N, 129.9°E.

Feature description of the proposed area

The Kuroshio Current is a high-temperature, high-salt-content surface layer current with low level of nutrients. Thus primary production in the waters of the Kuroshio Current and the subtropical water zone is supported mainly by microscopic phytoplankton. Due to the effects of the warm Kuroshio Current, biota seen in this area forms a complex food web (Sugisaki et al., 2010) that includes the microbial food chain and small zooplankton, fish and squid living at medium depths, small pelagic fish, large migratory fish (Inagaki et al., 2001), seabirds and cetaceans.

The waters on the landward side of the Kuroshio Current carry a rich nutrient supply, and primary production is high. Thus, this area supports abundant sardine and mackerel (Watanabe, 2007).

This area is the main spawning ground for the various important fishery species listed in Table 1. Spawning activities are especially high during late fall and early spring (e.g., Nakai 1962; Watanabe and Nakamura 1998; Sugisaki 2010; Tanoue 1966; Oozeki et al. 2007).

Table 1. Important fish species that use this area as their spawning ground.

Fish
Japanese sand lance (*Ammodytes personatus*)
Chicken grunt (*Parapristipoma trilineatum*)
Threadfin hakeling（*Laemonema longipes*）

Red-eye round herring (*Etrumeus teres*) Japanese meager (*Argyrosomus japonicus*) Japanese anchovy (*Engraulis japonicus*) Swordtip squid (*Loligo edulis*) Blue mackerel (*Scomber australasicus*) Largehead hairtail (*Trichiurus japonicus*) Japanese pufferfish (*Takifugu rubripes*) Bastard halibut (*Paralichthys olivaceus*) Japanese amberjack (*Seriola quinqueradiata*) Japanese jack mackerel (*Trachurus japonicus*) Japanese pilchard (*Sardinops melanostictus*) Marbled flounder (*Pleuronectes yokohamae*) Chub mackerel (*Scomber japonicus*) Red seabream (*Pagrus major*)
Cartilaginous fishes Great white shark (*Carcharodon carcharias*-endangered) Leafscale gulper shark (*Centrophorus squamosus*-endangered) Japanese sleeper ray (*Narke japonica*-endangered)
Squid Bigfin reef squid (*Sepioteuthis lessoniana*) Ocellated octopus (*Amphioctopus fangsiao*) Firefly squid (*Watasenia scintillans*) Spear squid (*Loligo bleekeri*)
Cetacean Finless porpoise (*Neophocaena phocaenoides*) use this area for breeding (MoEJ, 2015).

Feature condition and future outlook of the proposed area

This area is a particularly active fishing ground. The industrial fishing activity for offshore pelagic fish is under the management of the Government of Japan.

Assessment of the area against CBD EBSA Criteria

CBD EBSA Criteria (Annex I to decision IX/20)	**Description** (Annex I to decision IX/20)	**Ranking of criterion relevance** (please mark one column with an X)			
		No information	**Low**	**Medium**	**High**
Uniqueness or rarity	Area contains either (i) unique ("the only one of its kind"), rare (occurs only in few locations) or endemic species, populations or communities, and/or (ii) unique, rare or distinct, habitats or ecosystems; and/or (iii) unique or unusual geomorphological or oceanographic features.				X
Explanation for ranking This area incorporates the fastest section of the warm Kuroshio Current. The characteristics of this area are determined by this unique oceanographic setting (MoEJ, 2015). The Kuroshio Current is a high-					

temperature, high-salt-content surface layer current with low level of nutrients. Thus primary production in the waters of the Kuroshio Current and the subtropical water zone is supported mainly by microscopic phytoplankton. Due to the effects of the warm Kuroshio Current, warm water biota seen in this area form a complex food web (Sugisaki et al., 2010) that includes the microbial food chain and small zooplankton, fish and squid living at medium depths, small pelagic fish, large migratory fish (Inagaki et al., 2001), seabirds and cetaceans.					
Special importance for life-history stages of species	Areas that are required for a population to survive and thrive.				X
Explanation for ranking This area is a breeding ground for finless porpoise (*Neophocaena phocaenoides*) (MoEJ, 2015). Many commercially important fish and squid species, listed below, use this area as their spawning ground (e.g. Nakai 1962, Watanabe and Nakamura 1998, Sugisaki 2010, Tanoue 1966, Oozeki et al. 2007): Japanese sand lance (*Ammodytes personatus*) Chicken grunt (*Parapristipoma trilineatum*) Threadfin hakeling（*Laemonema longipes*） Red-eye round herring (*Etrumeus teres*) Japanese meager (*Argyrosomus japonicus*) Japanese anchovy (*Engraulis japonicus*) Swordtip squid (*Loligo edulis*) Blue mackerel (*Scomber australasicus*) Largehead hairtail (*Trichiurus japonicus*) Japanese pufferfish (*Takifugu rubripes*) Bastard halibut (*Paralichthys olivaceus*) Japanese amberjack (*Seriola quinqueradiata*) Japanese jack mackerel (*Trachurus japonicus*) Japanese pilchard (*Sardinops melanostictus*) Marbled flounder (*Pleuronectes yokohamae*) Chub mackerel (*Scomber japonicus*) Red seabream (*Pagrus major*) Bigfin reef squid (*Sepioteuthis lessoniana*) Ocellated octopus (*Amphioctopus fangsiao*) Firefly squid (*Watasenia scintillans*) Spear squid (*Loligo bleekeri*)					
Importance for threatened, endangered or declining species and/or habitats	Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species.			X	
Explanation for ranking					

Three endangered species, great white shark (*Carcharodon carcharias*), leafscale gulper shark (*Centrophorus squamosus*) and Japanese sleeper ray (*Narke japonica*), have been reported from this area (MoEJ, 2015).					
Vulnerability, fragility, sensitivity, or slow recovery	Areas that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery.		X		
Explanation for ranking This area is considered vulnerable to natural events, in particular recent changes in atmospheric and oceanographic conditions due to climate change and regime shifts, as well as degradation by human activity.					
Biological productivity	Area containing species, populations or communities with comparatively higher natural biological productivity.				X
Explanation for ranking This area is highly complex, and the nearshore side of the Kuroshio Current is high in primary productivity and consequent fisheries production (Coastal Oceanography Research Committee, The Oceanographical Society of Japan, 1985; 1990).					
Biological diversity	Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity.				X
Explanation for ranking The oceanographic setting is highly complex, leading to highly diverse habitats (Coastal Oceanography Research Committee, The Oceanographical Society of Japan, 1985; 1990). As such, they can be described as waters with a very high level of biological diversity of marine organisms, even by global standards (Coastal Oceanography Research Committee, 1985, 1990; Ministry of Environment Japan, 2011; Tittensor et al., 2010).Also food web in this area is complex (Sugisaki et al., 2010) that includes the microbial food chain and small zooplankton, fish and squid living at medium depths, small pelagic fish, large migratory fish (Inagaki et al., 2001), sea birds, and cetaceans. The waters on the inner side of the Kuroshio Current, carry a rich nutrient supply exist from the land, and primary production is high. Thus, this area supports abundant sardine and mackerel (Watanabe, 2007).					
Naturalness	Area with a comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or degradation.		X		
Explanation for ranking Active fisheries activities take place in this area (Tokyo Fisheries Promotion Foundation, 2013).					

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Maps and Figures

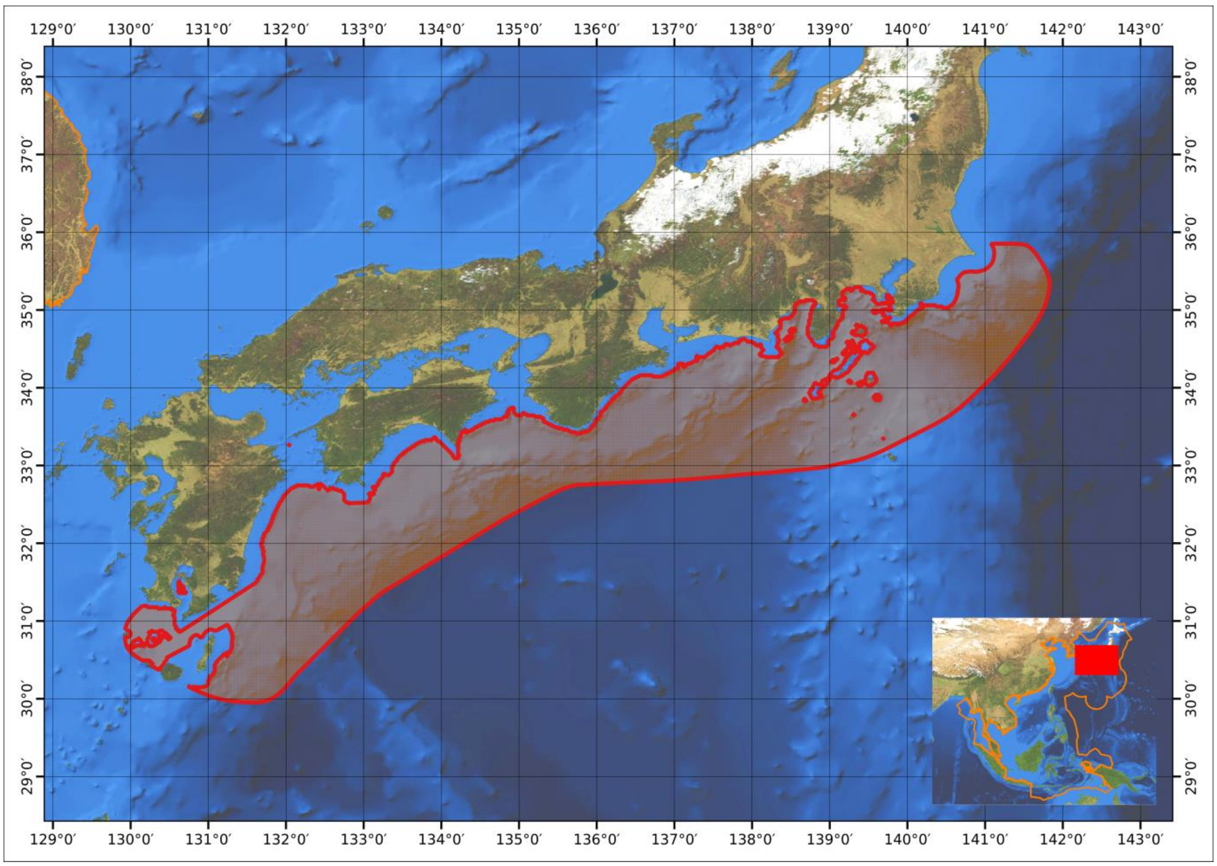

Figure 1. Area meeting the EBSA criteria.

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Area no. 35: Northeastern Honshu

Abstract
Northeastern Honshu is known as a highly productive marine area. The area is influenced by three different types of currents (cold Oyashio and warm Kuroshio and Tsugaru), and the diverse marine biota in this area include both cold-temperature and warm-temperature adapted species. The area consists of various types of coastal habitats including tidal flats, lagoons and rocky intertidal shores in the intertidal zone, and seagrass beds and seaweed beds (dominated by kelps and sargassums) in subtidal waters.

Introduction
The northeastern coast of Honshu Island (i.e., eastern coast of Tohoku region) of Japan is known as a highly productive marine area. The area is influenced by three different types of currents (cold Oyashio, warm Kuroshio and Tsugaru), and the diverse marine biota found here include species adapted to both cold and warm temperatures. The area consists of various types of coastal habitats, including tidal flats, lagoons and rocky intertidal shores in the intertidal zone, and seagrass beds and seaweed beds (dominated by kelps and sargassums) in subtidal waters.

Location
The area covers intertidal and subtidal bottoms of Mutsu Bay coast, the coast of Ogawahara Lagoons, and Sanriku rias coast of Japan. It is located between 38.2°N and 41.6°N latitude, and between 140.6°E and 142.2°E longitude.

Feature description of the proposed area

Intertidal and subtidal bottoms of Mutsu Bay coast. The coast of semi-closed Mutsu Bay is dominated by soft bottoms (sand and mud). Highly diverse and productive benthic communities are created here. Off the west shore, several seagrass species (*Zostera marina*, *Z. japonica*, *Z. caulescens*, and *Z. caespitosa*) occur, with the distribution of *Z. caespitosa* continuing to western Noheji area. The southern part of Mutsu Bay is important in the occurrence of an isolated population of *Halophila ovalis* (Kirihara et al, 2005). In addition, coastal areas of Harabetsu Coast, Ominato, and the Kominato Asadokoro Coast are known to host whooper swan, Brent goose and other migratory birds. Also abundant here are Japanese scallop and bloody clam (Ministry of the Environment, 2001).

Coast of Ogawahara Lagoons. In the area of the mouth of Lake Obuchinuma and the lagoons in its vicinity, saltmarsh dominates, and *Halerpestes kawakamii* is a characteristic plant specific to the Pacific coast of the Tohoku region. While some lagoons have been turned into freshwater bodies by weirs at their mouths, Lake Obuchinuma remains a natural lagoon with abundant benthic species such as clams *Corbicula japonica*, *Potamocorbula amurensis*, *Macoma takahokoensis*, and a cragonid shrimp. The waters of Lake Obuchinuma have been known as a spawning ground for the Pacific herring (Ministry of the Environment, 2001; Aomori Prefecture Red Data Book, 2010; Kato, 1999).

Sanriku rias coast. Consecutive ria inlets are maintained in good condition. The inland bays of the rias (Yamada Bay, Funakoshi Bay, Ohtsuchi Bay, Hirota Bay, Shizugawa Bay and others) are home to expansive seagrass beds where *Zostera marina*, *Z. caulescens*, *Z. asiatica*, *Z. caespitosa* and *Phyllospadix iwatensis* grow (Nakaoka and Aioi 2001). In addition, the inner tidal mud flats in Miyako Bay, Yamada Bay, Kamaishi Bay and others are highly diverse in terms of shallow-water benthos organisms. The ria coasts facing the open sea are highly productive, with mixtures of *Saccharina* kelps, *Undaria* kelps and other seaweed species. A large community of *Sargassum yezoense* is found here as well. The Minamisanriku Coast in the south is visited by Brent goose. The Mangokuura Sea is home to a mixture of seagrass beds and seaweed beds, while threatened red algae *Pyropia tenera* (critically endangered species by IUCN criteria) grows in the inner part of the sea. These waters also are rich in bivalves like Pacific oyster and Japanese littleneck clam. In the mouth of the Kitakami River (Oppa Bay) live Asian clam, Japanese littleneck clam, sand bubbler crab, *Helice tridens* and others. Nagatsura Bay is home to *Helice tridens*, *Deiratonotus cristatus*, and *Batillaria attramentaria* (Ministry of the Environment, 2001). The seaweed beds here are feeding grounds of green turtle in summer (Yamane et al, 2013).

Feature condition and future outlook of the proposed area

The area, especially the Sanriku coast, was severely affected by the mega-earthquake and tsunamis of 2011. The intertidal flats and seagrass beds were more heavily affected than subtidal seaweed beds (Urabe et al. 2013, Nakaoka et al. 2013). After the disaster, ongoing reconstruction of infrastructure has occurred along the coast, such as higher concrete dikes and landfilling to raise the elevation of human residential areas, and they seem to inhibit the natural recovery of coastal ecosystems, especially on intertidal and shallow soft bottoms. Currently many disaster-recovery related studies have been ongoing in Sanriku coast, including annual census of seagrass beds in Funakoshi Bay and Otsuchi Bay, and of seaweed beds in Shizukawa Bay by the Monitoring Sites 1000 project. Mutsu Bay and Ogawara lagoonal areas were less affected by the earthquake and the tsunamis, and they have remained relatively stable over the decades, but less research has been conducted in these areas to monitor quantitative changes in coastal ecosystems.

Assessment of the area against the CBD EBSA Criteria

CBD EBSA Criteria (Annex I to decision IX/20)	**Description** (Annex I to decision IX/20)	**Ranking of criterion relevance** (please mark one column with an X)			
		No information	**Low**	**Medium**	**High**
Uniqueness or rarity	Area contains either (i) unique ("the only one of its kind"), rare (occurs only in few locations) or endemic species, populations or communities, and/or (ii) unique, rare or distinct, habitats or ecosystems; and/or (iii) unique or unusual geomorphological or oceanographic features.				X
Explanation for ranking • Occurrence of some unique mammals, birds, fish, molluscs, and sea anemone *Cribrina japonica* (Ministry of the Environment, in press) • The area is considered to be very unique, with several *Zostera* seagrass species (*Zostera marina*, *Z. japonica*, *Z. caulescens*, and *Z. caespitosa*) within a single site (Nakaoka and Aioi 2001), includng the tallest seagrass (*Z. caulescens*) recorded from Funakoshi Bay, Sanriku Coast (Aioi et al. 1998).					
Special importance for life-history stages of species	Areas that are required for a population to survive and thrive.				X
Explanation for ranking • Breeding sites for various species of seabirds, including *Oceanodroma castro* (Ministry of the Environment, in press)					

• Hotokenuma in Ogawara Lagoonal area is a Wetland of International Importance, as designated under the Ramsar Convention.					
Importance for threatened, endangered or declining species and/or habitats	Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species.				X
Explanation for ranking Endangered marine species (including locally threatened species) of various taxa occur, here including birds, fish, crustaceans, molluscs, polychaetes, seagrass and algae, e.g., *Hydrobates monorhis*, *Cerithidea djadjariensis* and *Pyropia tenera* (Ministry of the Environment,, in press)					
Vulnerability, fragility, sensitivity, or slow recovery	Areas that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery.				X
Explanation for ranking Brackish lagoons in the Ogawara area are considered unstable and vulnerable. In addition, breeding colonies of seabirds such as *Hydrobates monorhis* and *Oceanodroma castro* in nearshore islands (such as Sanganjima Island) are not resilient to disturbance (Ministry of the Environment,, in press)					
Biological productivity	Area containing species, populations or communities with comparatively higher natural biological productivity.				X
Explanation for ranking Affected by the cold Oyashio current and the warm Kuroshio and Tsugaru currents, the sea is very productive, especially in the spring season by the occurrence of a phytoplankton bloom (Furuya et al. 1993). The seagrass beds in the innermost parts of the ria coast are very productive (Nakaoka et al. 2003). The ria coasts facing the open sea are highly productive, with mixtures of *Saccharina* kelps, *Undaria* kelps and other seaweed species (Furuya 2002).					
Biological diversity	Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity.			X	
Explanation for ranking The inland bays of the rias (Yamada Bay, Funakoshi Bay, Ohtsuchi Bay, Hirota Bay, Shizugawa Bay and others) are home to expansive seagrass beds where *Zostera marina*, *Z. caulescens*, *Z. asiatica*, *Z. caespitosa* and *Phyllospadix iwatensis* grow (Nakaoka and Aioi 2001). In addition, the inner tidal mud flats in Miyako Bay, Yamada Bay, Kamaishi Bay and others are highly diverse in terms of shallow-water benthos organisms. However, species diversity of benthic invertebrates is lower compared to southern Japan (Okuda et al. 2004)					
Naturalness	Area with a comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or				X

	degradation.				
Explanation for ranking The presence of pristine natural rocky shore, sea cliff, muddy coast, sand and cobble beach (Ministry of the Environment, 2015). There is a national park along the Sanriku coast.					

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Maps and Figures

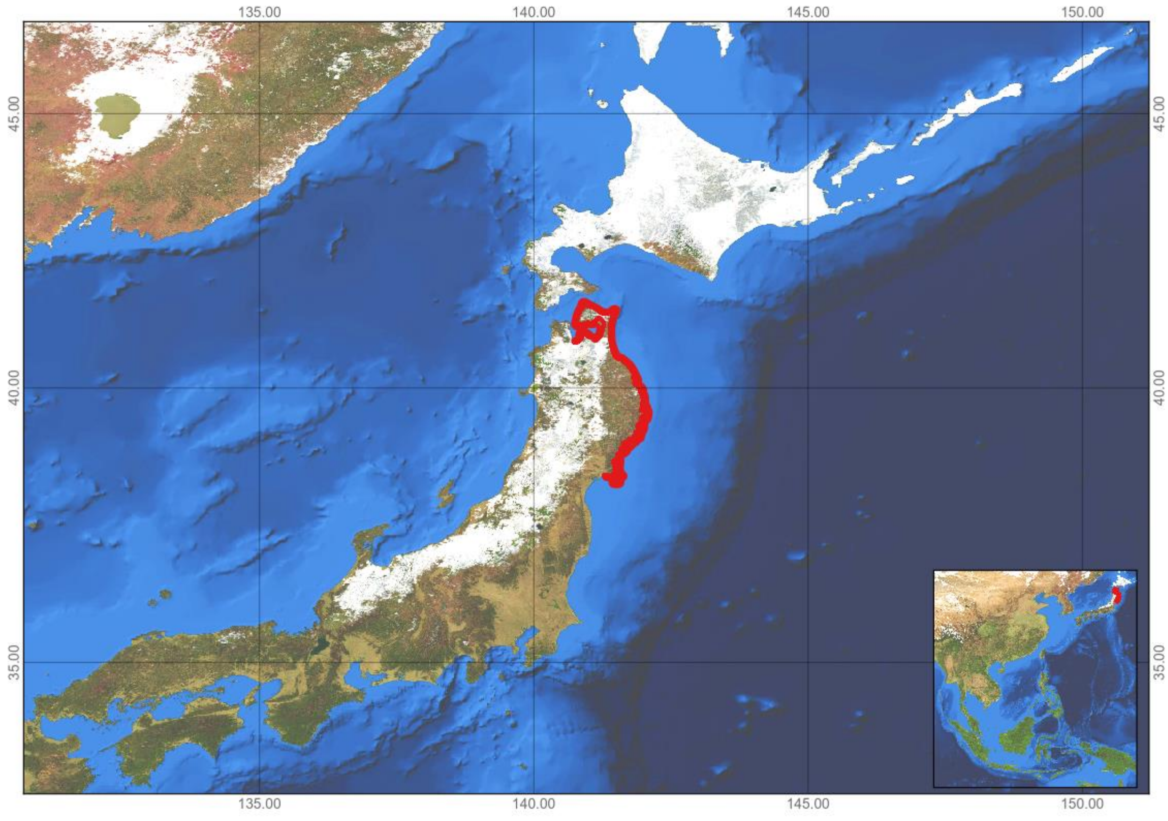

Figure 1. Area meeting the EBSA criteria

Area no. 36: Hydrothermal Vent Community on the Slope of Southwest Islands

Abstract

The Hydrothermal Vent Community on the Slope of Southwest Islands is located on the western side of the Ryukyu Trench in a region of complex tectonic movements. Many chemosynthetic ecosystem sites harbouring both hydrothermal vent and seepage communities have been found in this area. The number of macro- and mega-faunal species in the area is the highest among the several deep-sea chemosynthetic regions. The occurrence of endemic species is also high in this region: 68% of the total number of species are endemic. This area has retained its natural landscape and environment due to its inaccessibility.

Introduction

The slope of the Southwest Islands is the southern flank of the back arc basin in which a large trough formed roughly 2 million years ago as the Eurasia plate spreads due to subduction of Ryukyu Trench, merging with Philippine Plate (Glasby and Notsu 2003). The spreading activity is still high in this area. This high level of geological activity has produced many hydrothermal vents in the area. So far, eight active vent fields have been reported, all of which are located along the edges of the rising slope between 700 and 1,600 m depth (Watanabe et al. 2015). Discovery of new vents continues, and it would take years of research to understand the whole vent system of this area (Takai 2014).

Since their discovery in 1988 (Kimura et al. 1989), the hydrothermal systems in the area have been the subject of an intensive series of geophysical and biological surveys (e.g., Aoki and Nakamura 1989, Hashimoto et al. 1995, Yamamoto et al. 1999, Fujikura et al. 2001, Ohta and Kim 2001, Watanabe et al. 2010, Tokeshi 2011, Kawagucci et al. 2014, Nakajima et al. 2015). Among the benthic animals in the study site, *Shinkaia crosnieri* galatheid crabs, *Alvinocaris longirostris* shrimps, and *Bathymodiolus* mussels are abundant, and the tube-building polychaete worm *Paralvinella hessleri* was found on vent chimneys (Fujikura et al., 2008). In addition, the vesicomyid clams *Calyptogena nankaiensis* and *C. okutanii* are found in association with sediment-hosted vents, scalpellid barnacles (probably *Ashinkailepas seepiophila* and *Leucolepas* sp.) are found (Ohta and Kim 2001), as are *Alaysia* tubeworms.

Location

The area is located on the western slope of the South West Islands, which is on the western side of the Okinawa Trough.

Feature description of the proposed area

There are 82 macro- and mega-faunal species in the area, which is more than any of the other deep-sea chemosynthetic regions around the Japanese archipelago (Nakajima et al. 2014). This high species richness is supported by the high productivity of reduced chemical compounds, such as methane and hydrogen sulfide (Nakajima et al. 2014). The occurrence of endemic species is also high in this area: 68.3% of the total number of species are endemic.

Most of the vent fields in the area are associated with soft, thick sediment (Narita et al. 1990). These sedimented vent sites emulate seep conditions better than rocky ridge crest sites, providing suitable habitats for endo-benthic invertebrates, such as the vesicomyid clams *Calyptogena*, even around hydrothermal vent sites. This allows an inhabitation of both vent and seep communities, forming a unique ecosystem in the area (Tunnicliffe et al. 1998, Watanabe et al., 2010).

Feature condition and future outlook of the proposed area

Due to technological advance, the deep-sea vent habitats on the slopes of the South West Islands face increasing threats from various human activities, including the exploitation of energy and mineral resources, either underway or planned (Nakajima et al. 2015).

Assessment of the area against the CBD EBSA Criteria

CBD EBSA Criteria (Annex I to decision IX/20)	**Description** (Annex I to decision IX/20)	**Ranking of criterion relevance** (please mark one column with an X)			
		No information	**Low**	**Medium**	**High**
Uniqueness or rarity	Area contains either (i) unique ("the only one of its kind"), rare (occurs only in few locations) or endemic species, populations or communities, and/or (ii) unique, rare or distinct, habitats or ecosystems; and/or (iii) unique or unusual geomorphological or oceanographic features.				X
Explanation for ranking The occurrence of endemic species is high in this area: 68.3% of the total number of macro- and mega-faunal species are endemic to this area. This percentage is the highest among the several deep-sea chemosynthetic sites in the region (Nakajima et al. 2014).					
Special importance for life-history stages of species	Areas that are required for a population to survive and thrive.				X
Explanation for ranking From this area, many species depending on the hydrothermal vent system have been discovered, such as *Shinkaia crosnieri* galatheid crabs, *Alvinocaris longirostris* shrimps, and *Bathymodiolus* mussels, and the tube-building polychaete worm *Paralvinella hessleri.* (Fujikura et al., 2008). All these species need the hydrothermal activities existing here as the unique energy source for their life.					
Importance for threatened, endangered or declining species and/or habitats	Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species.	X			
Explanation for ranking There is no information on the threatened, endangered or declining species and/or habitats in this area.					
Vulnerability, fragility, sensitivity, or slow	Areas that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or				X

recovery	by natural events) or with slow recovery.				
Explanation for ranking Many species that depend on hydrothermal vent systems have been discovered in this area, such as *Shinkaia crosnieri* galatheid crabs, *Alvinocaris longirostris* shrimps, *Bathymodiolus* mussels, and the tube-building polychaete worm *Paralvinella hessleri.* (Fujikura et al., 2008). All these species need the hydrothermal activities existing here as the unique energy source for their life, but the activity is not stable (Ishida et al., 2011).					
Biological productivity	Area containing species, populations or communities with comparatively higher natural biological productivity.				X
Explanation for ranking Generally, the net primary productivity of deep-sea chemosynthesis at hydrothermal vents is comparable to that of tropical rain forests or coral reefs (Sarrazin & Juniper, 1999; Nyholm et al., 2008).					
Biological diversity	Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity.				X
Explanation for ranking There are 82 macro- and mega-faunal species in the area, which is more than any of the other deep-sea chemosynthetic regions around the Japanese archipelago (Nakajima et al. 2014).					
Naturalness	Area with a comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or degradation.				X
Explanation for ranking This area retains its natural landscape and environment due to its inaccessibility.					

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Annex VI

SUMMARY OF THE WORKSHOP DISCUSSION ON IDENTIFICATION OF GAPS AND NEEDS FOR FURTHER ELABORATION IN DESCRIBING ECOLOGICALLY OR BIOLOGICALLY SIGNIFICANT MARINE AREAS, INCLUDING THE NEED FOR THE DEVELOPMENT OF SCIENTIFIC CAPACITY AS WELL AS FUTURE SCIENTIFIC COLLABORATION

1. Workshop participants noted a wide disparity in the availability of scientific information/data, technologies for research and monitoring in particular for deep-sea habitats, and human/institutional resources and capabilities, relating to the application of the EBSA criteria in this region. For example, the participants acknowledged the scientific achievements made by the experts from Japan, as sponsored by Japan Ministry of Environment, in their national exercise on the application of the EBSA criteria, which provided the workshop with useful set of scientific information and lessons learned in applying the criteria, in particular in the open-ocean and deep-sea habitats in this region.

2. The habitats considered in this workshop contain a larger proportion of nearshore areas. Nearshore habitats are typically of smaller size than offshore habitats, and their properties are less well represented by remote sensing, global databases and global oceanographic models. Preparatory workshops at the national or sub-regional levels would serve to bring together local experts and access data beyond that available in global datasets. This would include data and reports typically unavailable to the broader scientific community (i.e., grey literature). Depending on the scale of the sub-region, community-level workshops could be also organized to identify local areas meeting EBSA criteria.

3. Information-sharing was generally considered a problem resulting in lack of transparency. An information-sharing platform needs to be developed between governments, academics, NGOs and the public, which can enable better sharing of scientific information and promotion of information exchange with different stakeholders. Overall, participants thought it necessary to consolidate a collaborative culture in the context of regional marine science. A regional scientific data-sharing programme, building on the work of sub-regional groups and using a data portal to store and show the information, could help bring researchers together on this issue.

4. Monitoring and protection/conservation action plans are well developed throughout the region, but more collaboration is needed in order to better share information on how to develop these plans and experiences in their implementation and monitoring. Improved networking among researchers and scientists can be facilitated, including through existing associations of marine professionals (physical, biological and social scientists) working on coastal and marine issues within the region and through sub-regional groups.

5. In some instances, it was challenging for participants to classify areas identified as potential EBSAs as low, medium or high on the EBSA criteria. While recognizing that examples of EBSA criteria were provided at the start of the workshop and in summary brochures, additional background information providing examples of how different regional workshops had applied the EBSA criteria would assist future workshop participants and generate increased consistency between the workshops.

6. For example, the spread of invasive species (ie. cordgrass, *Spartina* sp.) on intertidal areas was noted, but it was not clear from previous information how susceptibility to invasive species would affect ranking of an area on the criterion for vulnerability. For the biological productivity criterion it was not clear with which group of habitats an individual area should be compared: all similar habitats, all habitats at a similar depth and region, all habitats in the region.

7. The complex topography considered by this workshop, with its extensive shorelines, distinctive water bodies and documented migration pathways, emphasized the connectivity between areas described

as meeting the EBSA criteria. The description of Intertidal Areas of East Asian Shallow Seas (area no 6 in appendix to annex V), which comprised many individual small areas linked together by their sequential use during bird migrations, is a good example of this, and led to the description of a multi-area EBSA throughout the region. This approach could be extended to other species groups within the region (e.g., marine mammals and turtles) and can be applied for future regional workshops in other areas. Alternatively, migration pathways where habitat in different areas is critical to the success of individual species or species groups could be potentially described as meeting the EBSA criteria. This might require future workshops that consider whether to link areas previously described by separate workshops.

8. Participants from Cambodia and Timor-Leste highlighted urgent needs for strengthening local scientific expertise and technical capacity as well as securing human/financial resources to sustain monitoring and research activities both in the short- and long-term.

9. Participants identified key scientific gaps in three sub-groups on: (i) intertidal areas; (ii) nearshore areas; and (iii) open-ocean and deep-sea areas.

(i) Intertidal areas

- Updated information on the status and extent of intertidal areas, including the populations of migratory shorebirds using them;
- More information on the distribution, status, species composition and ecological condition of mangrove forests;
- More information on the relationship between mangroves and other coastal vegetation, mudflats, sandflats, beaches and offshore seagrass beds and coral reefs;
- Information on productivity ranges for different ecosystems;
- Information on the status and distribution of invasive alien species, such as new world mangrove species and cordgrass (*Spartina spp*), which can help with the application of the naturalness criterion;
- Monitoring of physico-chemical environmental impacts, caused by various threats including climate change, on the living organisms of tidal flats; and
- information regarding endemic species of coastal areas, in particular for unique regional benthic communities

(ii) Near-shore areas

- Satellite images of *Chlorophyll a* distribution in coastal/nearshore areas;
  More information/knowledge on biological productivity;
  Better understanding of connectivity and resilience of nearshore systems and their interactions with offshore systems;
- Upwelling system of the Sulu-Sulawesi Sea and its influence on the productivity of nearshore ecosystems; and
- Dynamics of canyon heads crossing large shelf areas on the coast.

Site/area-specific needs for nearshore areas were highlighted as follows:

<u>Sulu-Sulawesi Marine Ecoregion (SSME)</u>

- Biological productivity and connectivity (sources and sinks);
- Ecological carrying capacity, especially for ecotourism sites;
- Continuous and long-term studies to examine the extent and condition of the reefs and adjacent coastal habitats and how they change over time (time series);
- migration path/ activity of marine mammals and reptiles; and

- Updated fishery stock assessment

Benham Rise

- Further benthic biodiversity assessment studies, including taxonomy and distribution of benthos of the mesophotic coral reef habitats on the Benham Bank Seamount;
- In-depth biological productivity studies, as well as connectivity studies;
- Vulnerability of mesophotic corals to ocean acidification, climate change impacts (elevated SST, changes in major oceanic currents, etc.), and human-induced threats (fishing/mineral explorations);
- Tuna stocks in the area;
- Phylogeography of Benham Rise region and its implications in unravelling its resilience to climate change;
- Updated fishery stock assessment

Redang Island, Redang archipelago and adjacent area

- Biological productivity studies;
- Larval recruitment and dispersal (further study in adjacent areas, such as Perhentian Island, Kapas Island and Tenggol Island); and
- Ecological connectivity at different levels (e.g., oceanographic, genetic)

Nearshore areas in Cambodia

- Long-term monitoring and research on biodiversity, ecosystem functioning, habitat distribution, community composition, species diversity/composition/ and distribution;
- oceanographic features such as current

Nearshore areas in China

- Habitat surveys, assessment of fish stocks and identification of areas important for life stages in marine waters; and
- Specific studies on some threatened, endangered and declining species (e.g. species that migrate up the Yangtze River such as the Chinese sturgeon (*Acipenser sinensis*) and Reeves shad (*Hilsa reevesi*).

Nearshore areas in Japan

- Information on benthic invertebrates;
- Updated information on distribution of important habitats like coral reefs, seagrass/seaweed beds, species distribution and ecosystem functions, in terms of current status and temporal changes in these habitats

(iii) Open-ocean and deep-sea habitats

- Information on mid- to deep-pelagic layers;
- Detailed studies of seamount ecosystems;
- Biological data for seamounts (e.g., physical and geographical characters used as proxy data for ecological features of seamounts);
- Important areas, migratory patterns and reproductive biology of migratory marine animals, such as whale-sharks and dolphins;
- Genetic sampling and analysis (e.g., populations of 18 dolphin species in the Sulu Sea, in particular to identify whether the populations of these species in the Coral Triangle belong to the same genetic stock; Bryde’s whale in the Gulf of Thailand);
- Deep-sea ecology of Sulu-Celebes-Sulawesi Large Marine Ecosystem;

- Representation of the Northern North Pacific bathyal GOODS province. This distinct biogeographical region, located in the north-eastern part of the geographical scope of the workshop, is likely to meet many of the EBSA criteria, however, no scientific expertise was available at this workshop to consider this area.
- Additional sampling in existing areas to distinguish rare from endemic species;
- Additional sampling to identify characteristic depths of faunal boundaries and the distribution of biological productivity, and species richness with depth.

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