Workshop Participants

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ANNEXES

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1. OPENING OF THE WORKSHOP

1.1 Words of welcome by the Host

Prof. Shaohua Lin welcomed all participants from the region to the workshop. She then invited Dr Suixiang Shi (Deputy Director-General of NMDIS) to address the workshop.

Dr Shi recalled that the Ocean Data and Information Network for the Western Pacific Region (ODINWESTPAC) pilot project was initiated at the 18th IODE Session in 2003. The primarily objective of the ODINWESTPAC is to provide an effective capacity building framework, to promote regional collaboration in marine data and information and products sharing, to develop cooperation with other ODINs and international and regional projects/programs, and to provide data and information services mainly for the WESTPAC member states and other users. As from 2008, ODINWESTPAC has been coordinated by China immediately after the 7th WESTPAC Meeting. As the host centre of ODINWESTPAC, NMDIS has been endeavouring to promote the data and information exchange and collaboration between WESTPAC member states. A comprehensive website has been developed to provide various oceanographic and marine meteorological data and products, as well as the marine information services.

Dr Shi noted that this workshop provides a chance for participants and member states to communicate and cooperate in the area of marine data and information service and management, which will facilitate the development of ODINWESTPAC. NMDIS will enhance the cooperation with neighbour countries and international organizations continuously, promoting the development of marine science and marine protection.

Dr Shi expressed his pleasure of hosting the ODINWESTPAC workshop by NMDIS in Tianjin, China. He expressed his gratitude to the IODE representative, Mr Peter Pissierssens and all participants.

Dr Shi ended by noting that Tianjin is a famous historical city in China with over 600 years of history. It plays an important role in development of industrial and business in the northern part of China and it has a prosperous culture and unique food style with long tradition.

The agenda of the meeting is attached as Annex I.

1.2 Words of welcome by WESTPAC Chair

Dr Somkiat Khokiatwiwong, WESTPAC Co-Chair addressed the meeting. He thanked the Government of China for hosting and co-sponsoring the meeting. Dr Khokiatwiwong recalled that capacity development is one of the important tasks of UNESCO-IOC, assisting Member States to develop, coordinate and promote marine scientific research, observations and data and information management. The IODE programme is an excellent programme of UNESCO-IOC, providing capacity building to support member states developing their ocean data and information management and exchange. The establishment of a regional ODIN for the WESTPAC region will strengthen the capacity of the region and promote close cooperation between the member states and with the wider IOC/IODE community. Dr Khokiatwiwong closed by reiterating his earnest hope that the workshop would successfully accomplish all of its objectives and provide the impetus for an enhanced and more dynamic partnership in regional and global network of ocean data and information among the member states.
1.3 Words of welcome by IOC representative

Mr Peter Pissierssens, IODE programme coordinator and Head of the IOC Project Office for IODE, briefly addressed the meeting. He recalled that IODE is a cross-cutting programme in IOC: there can be no coastal management, tsunami warning and mitigation or marine research without data and information management and exchange. There can be no climate change research without regional and global data and information exchange. It is for this reason that IODE has been promoting the development of regional ocean data and information networks (ODINs) in various regions. The past 20 years have taught us that this is not an easy task. In many cases institutions within the region remain hesitant about sharing data even nationally. It is therefore necessary to promote good communication within the countries and within the region. Mr Pissierssens expressed IOC’s gratitude to the Government of China for sponsoring the meeting, bringing together 9 WESTPAC member states. He called on the participants to ensure that the work plan and timetable that would be developed during the workshop will be fully and timely implemented.

1.4 Introduction of NMDIS/SOA

Dr Lin Mu provided an overview of NMDIS. The presentation is available from the IODE web page http://www.iode.org/index.php?option=com_oe&task=viewEventAgenda&eventID=1381

1.5 Introductions

All participants were invited to introduce themselves. The list of participants is attached as Annex II.

2. INTRODUCTORY PRESENTATIONS

2.1 Activities of the IOC in the WESTPAC region

This agenda item was introduced by Dr Somkiat Khokiattiwong, WESTPAC Chair. His presentation is available from the workshop web page http://www.iode.org/index.php?option=com_oe&task=viewEventAgenda&eventID=1381

2.2 Presentation on IODE and its capacity development activities

This agenda item was introduced by Mr Peter Pissierssens. His presentation is available from the workshop web page http://www.iode.org/index.php?option=com_oe&task=viewEventAgenda&eventID=1381
2.3 Presentation on the IODE Ocean Data Portal, OceanDocs and OceanExpert

This agenda item was introduced by P. Pissiersssens. His presentation is available from the workshop web page

2.4 Presentation of the IODE Quality Management Framework (QMF)

Mr Greg Reed, IODE Past-Chair, reported on the IODE Quality Management Framework for National Oceanographic Data Centres. He recalled that the IODE Committee had long held the view of a need for a quality management framework to ensure that NODCs are established and operate according to defined principles, including adherence to agreed standards and the requirements of the IOC Oceanographic Data Exchange Policy and to ensure NODCs can provide data of known quality to meet the requirements of a broad community of users. In addition, IODE has been accepted as a network member of the ICSU World Data System (WDS) and, as a contributing member of WDS, NODCs are required to demonstrate their capability to meet WDS certification criteria.

The IODE Committee, at its 22nd Session (Ensenada, Mexico, 11-15 March 2013), adopted Recommendation IODE-XXII.18 (Establishment of the IODE Quality Management Framework Project). As part of that Recommendation, the Committee established the Steering Group for the IODE Quality Management Framework (SG-QMF).

The IODE Quality Management Framework (IODE-QMF) provides the overall strategy, advice and guidance for NODCs to develop and implement quality management systems (QMS) for the successful delivery of oceanographic and related data, products and services. To ensure an NODC is able to provide quality data to meet the requirements of a broad and varied community of users, an accreditation process has been implemented based on compliance to a set of requirements that can be translated into quantitative indicators which will be part of a regular review of an NODC. In order to obtain and maintain accreditation, an NODC will need to fulfil a minimum set of requirements to ensure compliance with IODE standards and to establish a mechanism to regularly monitor and assess the quality of data and service. These accreditation criteria are given in the IODE Quality Management Framework for National Oceanographic Data Centres document (IOC Manuals and Guides No 67). IODE capacity development, centred on OceanTeacher, will focus on providing the necessary training so that all NODCs can achieve full accreditation. Quality management will be included in the OceanTeacher training programme.

Mr Reed suggested that there was an opportunity for ODINWESTPAC to promote the implementation IODE QMF in the region and NODCs could work towards attaining the status of Accredited National Oceanographic Data Centre. Those NODC that have implemented a Quality Management System or have already received ISO 9001 certification should be able to meet the IODE accreditation requirements. The concept of the "twinning partnerships" approach, where an accredited NODC operating a well-developed QMS would provide assistance to an NODC currently planning or developing a QMS, was suggested as a way to further develop the IODE QMF in the region. This way ODINWESTPAC could take the lead in the implementation of IODE QMF.
Mr Reed explained that a Steering Group for the IODE QMF has been established and it is now waiting for applications for accreditation.

NMDIS noted that it has been certified by ISO (ISO-9000 series). JODC has prepared documents for QMF but they are in Japanese. Do they need to be translated? Mr Reed explained that a quality manual needs to be prepared in English. Other documents can remain in local languages.

ADUs can also go through the accreditation process.

The presentation is available from the workshop web page http://www.iode.org/index.php?option=com_oe&task=viewEventAgenda&eventID=1381

### 2.5 ODINWESTPAC - history and status report

Prof Shaohua Lin invited Dr Yu Ting (Julia) to make this presentation. Prof Lin also referred to the additional working document “Proposal of Framework for ODINWESTPAC Capacity Building (draft). She recalled that a sessional working group meeting on ODINWESTPAC was held during the 2013 IOC Assembly Session. As a follow-up to that meeting Prof Lin prepared the aforementioned working document.

The presentation is available from the workshop web page http://www.iode.org/index.php?option=com_oe&task=viewEventAgenda&eventID=1381

Prof Lin recalled that it has taken very long to get the countries together. She invited countries to participate in the visualization platform developed by China. The platform could e.g. show where experts in OceanExpert are located. Similarly the same could be done for OceanDocs publications etc.

Prof Lin recalled that NMDIS had set up an ODP node serving Chinese data. Mr Joon-Soo Lee expressed concern about data duplication. Mr Pissierssens reminded the workshop that there are 2 ways of serving data through ODP: by establishing an ODP node or by my using the Light Data Provider service hosted by the IOC Project Office in Oostende, Belgium.

### 3. NATIONAL PRESENTATIONS

#### 3.1 Australia (by Greg Reed)

Mr Reed’s presentation is available from the IODE web site on http://www.iode.org/index.php?option=com_oe&task=viewEventAgenda&eventID=1381. The full marine country profile survey report is available in Annex III - Australia.

#### 3.2 China (by Yu Ting)

Ms. Yu Ting’s presentation is available from the IODE web site on http://www.iode.org/index.php?option=com_oe&task=viewEventAgenda&eventID=1381 The full marine country profile survey report is available in Annex III - China.
3.3 Indonesia (by S. Susilohadi)

Mr Susilohadi’s presentation is available from the IODE web site on http://www.iode.org/index.php?option=com_oe&task=viewEventAgenda&eventID=1381
The full marine country profile survey report is available in Annex III - Indonesia.

3.4 Japan (by Akihiro Seta)

Mr Seta’s presentation is available from the IODE web site on http://www.iode.org/index.php?option=com_oe&task=viewEventAgenda&eventID=1381
The full marine country profile survey report is available in Annex III - Japan.

3.5 Korea (by Joonsoo Lee)

Mr Lee’s presentation is available from the IODE web site on http://www.iode.org/index.php?option=com_oe&task=viewEventAgenda&eventID=1381
The full marine country profile survey report is available in Annex III – Republic of Korea.

3.6 Malaysia (by N. Fatin Binti Mohd Ikhsan)

Ms Ikhsan’s presentation is available from the IODE web site on http://www.iode.org/index.php?option=com_oe&task=viewEventAgenda&eventID=1381
The full marine country profile survey report is available in Annex III - Malaysia.

3.7 New Zealand (by Kevin Mackay)

Mr Mackay’s presentation is available from the IODE web site on http://www.iode.org/index.php?option=com_oe&task=viewEventAgenda&eventID=1381
The full marine country profile survey report is available in Annex III – New Zealand.

3.8 Thailand (by S. Khokiattiwong)

Mr Khokiattiwong’s presentation is available from the IODE web site on http://www.iode.org/index.php?option=com_oe&task=viewEventAgenda&eventID=1381
The full marine country profile survey report is available in Annex III - Thailand.

3.9 Viet Nam (by Mr Long Hong Bui)

Mr Nui’s presentation is available from the IODE web site on http://www.iode.org/index.php?option=com_oe&task=viewEventAgenda&eventID=1381
The full marine country profile survey report is available in Annex III - Vietnam.
4. OCEAN DATA AND INFORMATION PRODUCT AND SERVICE NEEDS

This agenda item was introduced by Mr Khokkiaitiwong. He referred to the sections of the survey that inquired about data and information product and service needs. He first reported on the state of data centres in the region:

Vietnam: no official NODC designated
- NVOD National Vietnam Oceanographic Database (Hanoi) (Ministry of Natural Resources and Environment)
- VODC (Vietnam Oceanographic Data Centre) (Nha Trang) (this is the candidate to become official NODC)
- Oceanographic Data Centre (Hanoi)

New Zealand: no official NODC designated
- National Institute of Water and Atmospheric Research (to become NODC)
- Service: Australian Ocean Data Network

Australia
- Australian Oceanographic Data Centre Joint Facility (official NODC)
- Service: Australian Ocean Data Network

Malaysia
- Malaysia National Oceanographic Data Centre (MyNODC) – (official NODC)
- Malaysian Geospatial Data Infrastructure - MyGDI (under Ministry Natural Resources and Environment: it covers land area of Malaysia. In terms of coastal zone this is under NODC)

Japan
- Japan Oceanographic Data Centre (JODC) which has Data on-line service system (J-DOSS) (official NODC)
- Japan Regional OBIS node (J-RON) which hosts the Biological Information System for Marine Life (BISMAL) operated by JAMSTEC

Korea
- Korea Oceanographic Data centre (KODC) = NODC of Korea (operated by NFRDI)
- Korea Ocean Observing and Forecast System (KOOFS) operated by KHOA (Korea Hydrographic and Oceanographic Administration)

China
- National Marine Data and Information Service (NMDIS) operated by SOA (State Oceanic Administration)

Indonesia: no official NODC designated.
- Ministry of Marine Affairs and Fisheries
- Agency for Geospatial Information
- Indonesian Institute of Sciences (LIPI)

Thailand: no official NODC designated
- Phuket Marine Biological Centre (PMBC)
  It was recommended for PMBC to establish an ADU.
The meeting noted that out of the 9 Member States present only 5 have formally established an NODC. *The meeting recommended that all other countries make the necessary steps to establish an NODC or ADU as soon as possible* (see also further).

Mr Khokatiwong then summarized the product and service needs as listed in the survey. The meeting identified 4 major groups of products/services:

1. national and regional integrated data and information services (including also data publication, digital library)
2. application of GIS and other data visualization
3. data assimilation, re-analysis and modelling
4. national data policy / national quality management framework/ formal establishment of data centres (NODC, ADU)

Mr Reed then recalled that he had invited Member States to answer the following questions:

(i) does your data centre have a metadata catalogue
(ii) what standard is being used
(iii) what is the URL
(iv) what software is being used
(v) does your data centre have a data portal
(vi) is the portal public
(vii) what is the URL
(viii) does your country have an e-repository
(ix) what is the software
(x) does your data centre have a QMF

This resulted in the following table:

<table>
<thead>
<tr>
<th>Country</th>
<th>Catalogue</th>
<th>Standard</th>
<th>Software</th>
<th>URL</th>
<th>Portal</th>
<th>Public</th>
<th>URL</th>
<th>Repository</th>
<th>Public</th>
<th>QMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>Y</td>
<td>ODAS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>N</td>
<td>TRS Databases Server</td>
<td>YES; ISO certified</td>
</tr>
<tr>
<td>Indonesia</td>
<td>Y</td>
<td>SNI 7335 (FGDC)</td>
<td>ESRI</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Japan</td>
<td>Y</td>
<td>ISO19115</td>
<td></td>
<td><a href="http://www.mich.go.jp">www.mich.go.jp</a> (Japanese)</td>
<td>Y</td>
<td>Y</td>
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<tr>
<td>Korea</td>
<td>Y</td>
<td>internal</td>
<td>in Korean</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>N</td>
<td>Y</td>
<td>Not formal</td>
</tr>
<tr>
<td>Malaysia</td>
<td>N</td>
<td>MIDAS in development</td>
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<tr>
<td>Thailand</td>
<td>NO</td>
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<td>-</td>
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<td><a href="http://www.dmcr.go.th">www.dmcr.go.th</a></td>
<td>N</td>
</tr>
<tr>
<td>Viet Nam</td>
<td>YES</td>
<td>PDF, XLS</td>
<td></td>
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<tr>
<td>PICES</td>
<td>YES</td>
<td>ISO19115</td>
<td>GeoNetwork</td>
<td><a href="http://67.212.128.197/geonetwork/">http://67.212.128.197/geonetwork/</a></td>
<td>Y</td>
<td>Y</td>
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<tr>
<td>PACIFICA Data and Products</td>
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</tbody>
</table>
Malaysia currently does not have a metadata catalogue. However in the framework of a planned project (MyDAS) such a catalogue is planned. Thailand does not have a metadata catalogue.

Mr Reed then expanded on e-repositories. He referred to the IOC repository http://www.oceandocs.net. It was recommended to create a “WESTPAC” community in OceanDocs. Use could be made of the repository available from the IOC Project Office for IODE in Oostende, Belgium.

Mr Reed recalled that several countries in the region have not established an NODC. He noted that IODE-XXII has established the new ADU data centre type and he invited countries that do not have an NODC yet to consider establishing an ADU. Full information is available from http://www.iode.org/adu. From this page the application form can also be downloaded.

Mr Reed then identified some steps forward:

   **Metadata catalogue:** first step to establish a data portal. It should be standard-based so it can be harvested. Each NODC/ADU could set up a data catalogue in their own institution and this can be harvested to a central metadata catalogue. This has been done in Australia (AODN GeoNetwork portal). Each agency is then responsible for each own metadata.

   **Data portal:** through the data portal data can be made available. If the country does not want to make the data available then the just the metadata can be made available. Another option is to, through the portal, make the data available through a web service as WMS (image).

   **e-repository:** it was noted that only one librarian participated in the workshop. Other librarians should be involved in ODINWESTPAC. As mentioned a WESTPAC community can be established and librarians can add records.

   **Quality management system:** so far only China has an accredited QMS. Assistance may be needed to implement QMS in the other countries. It was noted that China could be the first NODC to be accredited according to the new IODE QMF.

The meeting then split into groups, each one dealing with one of the 4 major groups of products/services described above. The work plan of each group then corresponded with a work package.

**Group 1: national and regional integrated data and information services (including also data publication, digital library)**

The group noted that it would not be possible to share metadata catalogues if these are maintained in national/local languages only. The group considered the need to use English as the language required for international cooperation. It was noted that it would not be realistic to translate all fields. There was some discussion on the feasibility of translating records and the time/expertise required. It was noted that for new records this should not be a problem. However for historical records it will be a considerable task. It was noted also that data producers may not be able or willing to make the translations. The translations would need to be made at the data centre. The group recommended that we focus on new records. For “historical” records translation may be carried out if and when possible.
Metadata elements should answer the following questions:

- “Does a dataset on a specific topic exist (‘what’)?”
- “For a specific place (‘where’)?”
- “For a specific date or period (‘when’)?” and
- “A point of contact to learn more about or order the dataset (‘who’)?”

Mandatory metadata fields are: dataset title, dataset date, abstract, language, metadata point of contact, metadata date, dataset topic category. Other elements that are considered to be mandatory under certain conditions are: metadata language, metadata character set, geographic location, dataset character set. Reference should be made to the ISO 19115 standard

**Decisions taken by the workshop:**

- **Metadata:** ODINWESTPAC regional data products to be in common language (English). GeoNetwork and ISO-19115 recommended as regional metadata catalogue. There is an issue with the use of local languages for national metadata catalogues. As a proof of concept for the ODINWESTAC regional catalogue, each country will provide 20 metadata records in English, describing deep-ocean or regional datasets. New Zealand has open source software to convert from ESRI to ISO-19115 which can be made available. A Regional catalogue will be hosted by China (NMDIS). The language auto detection feature in GeoNetwork needs to be further investigated.

  **Timeframe:** Each member state should provide 20 records by the end of December 2014; NMDIS will establish/host a regional GeoNetwork catalogue; It was noted that some training may be required on metadata/GeoNetwork. This will be discussed under agenda item 5.

- **Data portal:** A metadata catalogue is the first step to creating a data portal. It was noted that the software of the AODN portal is available free of charge. JODC, KODC and NMDIS use Oracle 10 for their data system. Reference was made also made to ODP. A course was held in Korea in 2009. China hosted a node for some time. It is now planned to restart the node in April (ODP V2), when ODP Partnership Centre experts will visit Tianjin. Korea has expressed interest in setting up a node. China re-iterated its offer to host the regional node. Reference was made also to CKAN (open source, http://ckan.org), a data portal software. It was recommended that national data portals should provide OGC compliant web services (eg WMS, WFS).

  **Timeframe:** taking into account the need to build the metadata catalogue it was noted that the regional portal (to be hosted by China) establishment would probably be established after December 2015. Further advice is requested from the ODP partnership centre and ODP manager on how to establish distributed ODP nodes in the region and on the overall regional architecture. Korea plans to establish a national ODP node linked to the central ODP in Oostende. Aim is to have all ODP national nodes established by June 2016.

- **E-Repository:** it was noted that within the OceanDocs repository (http://www.oceandocs.org) a community “WESTPAC” has been set up. In that community individual sub-communities have already been created for each country in the region. Participants from Thailand, China, New Zealand, Korea, Japan, Vietnam reported that their
institution has a marine library. Indonesia and Malaysia reported that a library does not exist yet. It was recommended to find out whether the librarians of the existing libraries have experience with e-repositories. It was noted further that specific training for entries into OceanDocs may be required (see agenda item 5). It was noted that OceanDocs should be used for scientific papers, conference proceedings, theses, etc. Intellectual property rights could be an issue for uploading documents to a repository. Such documents should not be uploaded into OceanDocs. Another issue is the metadata language. This requires further advice from the IODE Steering Group for OceanDocs. It was noted that New Zealand is already contributing to Aquatic Commons. Timeframe: it was recommended to organize a OceanDocs training course from marine librarians from the participating countries before the end of 2014 (see agenda item 5). All countries should then enter not less than 50 records by June 2015. It was noted that the WESTPAC Symposium 2014 would have approx. 350-400 papers (of which approx. 50 will be full papers). It was recommended that these should be made available through OceanDocs (preferably papers submitted by an expert from a certain country should be entered in OceanDocs under the sub-community of that country). The meeting asked Mr Khokiatwiwong to consult on this issue with the Symposium committee. It was noted that OceanDocs records should include the full paper. Reference was made to the new IODE Clearing House Service for Data / Information Management which is intended to make available useful manuals, guidelines and other useful technical documentation.

- **Quality Management framework:** All countries in the region should aim for accreditation. China has received certification under ISO 9000. So it should be easy for China to become the first IODE accredited NODC. WESTPAC data centres are invited to study the QMS documentation (M&G 67) and consider starting the accreditation process. Some training may be required for implementing quality management systems and to meet the accreditation requirements. The meeting requested NMDIS China to consider submitting an application for accreditation based on the fact that the institute already has ISO 9000 certification, which meets the IODE QMF requirements. Timeframe: for NMDIS to apply for accreditation: by December 2014. Other NODCs to review M&G 67 and determine if training is required to establish QMS: by end of 2014. In this regard it was noted that IODE-XXIII will take place in March 2015.

- **Documenting and Harmonizing data management procedures:** it was recommended to document all technical procedures that are currently used for quality control and other data processing in the WESTPAC data centres. Timeframe: survey of procedures used by end 2014.

**Group 2: application of GIS and other data visualization**

The group identified the current needs for GIS and/or visualization services system to improve the user experience. It was decided to share the information on the current status. They first reviewed open software and tools used in the region:

- Korea: GRASS, GMT, Ferret, GRADS
• Japan: OpenLayers (free maps for the web), ArcGIS (commercial)
• China: Skyline, World Wind (NASA)
• Malaysia: ArcGIS (commercial software)

A few public service web sites were mentioned:
• Korea: www.khoa.gov.kr/koofs
• Japan: www.kaiyoudaichou.go.jp
• China: www.iocean.net.cn
• Malaysia: www.mynodc.gov.my

Open source security was recognized as an issue. Nevertheless open source software is allowed to be used to establish web sites. Each open source has its own security risk.

The group then discussed the needs:
• The needs for a regional visualization system to provide the data and information service is not that strong, but ODINWESTPAC will welcome the contribution of establishing such a system.
• A regional visualization platform is probably the future direction.
• Low sensitivity cooperation would be recommended.
  – Data and information sharing in GIS format
  – Common standards for metadata and data
  – Share best practices
  – QC & QA

No actions were recommended.

Mr Mackay explained briefly about http://www.niwa.co.nz/quantum-map-0. NIWA Quantum Map is a free, open source, desktop mapping tool based on the popular Quantum GIS application. It is simpler for new users to learn as it has had some GIS functionality hidden or removed to be less confusing. It also has a custom plugin added to provide easy access to NIWA map data over the internet.

**Group 3: data assimilation, re-analysis and modelling**

The Group started by defining Data assimilation as the process by which observations are incorporated into a computer model of a real system, using the data fitting skills. They defined re-analysis as a scientific method for objectively combining high-quality observations from multi-sources and a state-of-art dynamic model using an advanced data assimilation technology to generate a synthesized estimate of the state of ocean/climate with a high temporal and spatial resolution. In oceanography and meteorology, hindcasting usually refers to a numerical model integration of a historical period where no observations have been assimilated. This distinguishes a hindcast run from a re-analysis. The group then considered existing re-analysis datasets:

**Global**
• Simple Ocean Data Assimilation (SODA): http://www.atmos.umd.edu/~ocean/
• Estimating the Circulation &Climate of the ocean (ECCO): http://www.ecco-group.org/
• NCEP/NCAR reanalysis: http://www.esrl.noaa.gov/psd/data/gridded/data.ncep.reanalysis.html

**Regional**
• China Ocean Reanalysis(CORA): http://www.cmoc-china.cn/Access%20to%20Data%20and%20Products.html
In addition there are some forecasting services at the national level:

- **Korea**
  - KODC: [http://kodc.nfrdi.re.kr](http://kodc.nfrdi.re.kr)
  - KMA: [http://www.kma.go.kr](http://www.kma.go.kr)

- **China**

- **Malaysia**
  - JMM (Met Office): [www.jmm.gov.my](http://www.jmm.gov.my) (wave, wind, swell, tsunami, sea level)

They then identified regional needs in the WESTPAC region:

- Data assimilation technology would be very useful for numerical modeling (forecasting, nowcasting, hindcasting)
- ODINWESTPAC so far should focus on providing high-quality QC data to users
- The needs for the regional reanalysis is suitable for the region
- There is a need for training on data assimilation and re-analysis

In terms of a work plan the following work plan was agreed upon:

- Survey the needs for marine data and information products (atlas and data reanalysis dataset, etc.)
  - By ODINWESTPAC Member States, end of 2014
  - This should be analyzed and reported on
- To create a new webpage on the ODINWESTPAC website linking URL data center/institution/agency in each member state on available data services. It was noted that also metadata records should be created for all these.
  - By NMDIS, end of 2014
- Provisional: training course on data assimilation and re-analysis

**Group 4: national data policy / national quality management framework/ formal establishment of data centres (NODC, ADU)**

**Data policy**

The meeting checked which countries have a national data policy.

- **Malaysia:** There is a draft national ocean policy. One of the topics is data management but this has not been finalized yet. The policy will apply the IOC data policy.
- **Korea:** we follow the IOC data policy
- **China:** we follow the IOC data policy but there is also national data management regulation.
- **Australia:** we follow the IOC data policy
- **Thailand:** we do not have a policy. It is unclear whether one will be developed
- **Indonesia:** we do not have a policy. There are some rules between government research agencies
- **Japan:** we follow the IOC data policy
- **New Zealand:** we have an open government information and data work programme. This is not a policy but moving towards policy.
- **Vietnam:** we have a national regulation, not a policy. There is a draft.
It was considered whether any assistance is needed to establish a data policy. It was recalled that the IOC policy is available through [http://www.iode.org/policy](http://www.iode.org/policy). Several participants were not aware of the policy.

It was recommended that participants share the IOC data policy with their Government with the objective of developing a national policy that as closely as possible resembles the IOC data policy.

**National quality management framework**

This was covered previously. Taking into account that IODE-XXIII will take place in March 2015 it is hoped that at least a few countries from the WESTPAC region will have applied for accreditation. China will possibly be the first country from the region to apply based on their already existing ISO certification. It was noted that the most recent version of IOC M&G 5 on the establishment of an NODC does not mention the QMF yet.

**Formal establishment of data centres**

Referring to previous discussions it was recalled that 4 countries in the region have not yet formally established an NODC or ADU: Vietnam, Indonesia, New Zealand and Thailand. The meeting recalled that information on ADUs can be found on [www.iode.org/adu](http://www.iode.org/adu). This page provides information on the terms of reference of an IODE Associate Data Unit (ADU) as well as on the application procedure. The necessary application form can be downloaded from the web page. So far (March 2014) five ADUs have been formally established. Several other applications (mainly for OBIS nodes) are in the pipeline.

- **Thailand**: it was suggested to establish an ADU at Phuket Marine Biological Center, Phuket.
- **Vietnam**: they would like to establish an ADU at the Institute of Oceanography, Nha Trang
- **Indonesia**: there is a plan to establish an NODC in the near future. It was noted that in the case of lack of agreement between national organizations the ADU may be a suitable alternative
- **New Zealand**: there will be an application by NIWA to establish an NODC (before the end of 2014)

It was recommended that countries that have NODCs also promote the establishment of ADUs to other national projects, programmes, institutions or organizations that deal with marine data, taking into account that NODCs may not be able to manage all data that are produced in a timely fashion.

It was recommended that institutions that manage marine biogeographic data should consider establishing an ADU for OBIS.

It was recommended that we should contact PICES, NOWPAP as they may be willing to establish an ADU. The meeting invited participants who have working relationships with these, to approach them informally to inquire about interest.

It was noted that new ADUs may require data/information management training. These requests should be channelled through the OceanTeacher Global Academy and can be dealt with at the regional level through the relevant OceanTeacher Global Academy Regional Training Centre(s).
5. CAPACITY DEVELOPMENT NEEDS RELATED TO OCEANOGRAPHIC DATA AND INFORMATION MANAGEMENT AND EXCHANGE

Based upon the discussions and recommendations under agenda item 4 the following capacity development actions were recommended (WP=work package):

1. WP 1: Training on metadata/GeoNetwork (Introduction to ISO 19115 Metadata and GeoNetwork) (before the end of 2014);
2. WP 1: Training on data entry for e-repositories (data entry) (before the end of 2014);
3. WP 1: Advice and possibly assistance from the ODP partnership on the establishment of an ODP node or use of the Light Data Provider software (before December 2015)
4. WP 3: Possibly: training course on data assimilation and re-analysis (2015);
5. WP 4: Possibly: training on implementing a quality management system to meet NODC accreditation (preferably in 2014);

Data policy training can be achieved through national and institutional data policy workshop organized at the national level.

Group 2 did not identify training requirements

6. DEVELOPMENT OF AN ODINWESTPAC STRATEGY AND WORK PLAN

6.1 ODINWESTPAC project management arrangements

The meeting discussed briefly the desired project management arrangements for ODINWESTPAC:

1- ODINWESTPAC coordinator: the meeting invited NMDIS (Prof. Shaohua Lin) to continue its role as project coordinator.

2- ODINWESTPAC work package coordinators: The meeting agreed on the following work package coordinators (based upon the 4 groups):

WP1: Ms Yu Ting, China
WP3: Mr Toru Suzuki, Japan
WP4: Mr Greg Reed, Australia
6.2 ODINWESTPAC Work plan for 2014-2015

Based upon the discussions in previous agenda items the following work plan and timetable was adopted:

<table>
<thead>
<tr>
<th>Dates</th>
<th>Item</th>
<th>Action by</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; end of 2014</td>
<td>WP1: Training on metadata/GeoNetwork</td>
<td>IODE Secretariat/Host</td>
<td>$30000-50000</td>
</tr>
<tr>
<td>&lt; end of 2014</td>
<td>WP1: Training on e-repositories (data entry)</td>
<td>IODE Secretariat/Host</td>
<td>$30000-50000</td>
</tr>
<tr>
<td>As soon as possible</td>
<td>WP1: find out whether marine librarians of the region have experience with e-repositories</td>
<td>WP1 coordinator</td>
<td>n/a</td>
</tr>
<tr>
<td>Immediately (and before 17 March 2014)</td>
<td>WP1: seek advice from the SG-OceanDocs about language of metadata in e-repositories</td>
<td>P. Pissierssens</td>
<td>n/a</td>
</tr>
<tr>
<td>October 2014</td>
<td>WP1: NMDIS to establish regional GeoNetwork catalogue</td>
<td>NMDIS</td>
<td>n/a</td>
</tr>
<tr>
<td>&lt; end of 2014</td>
<td>WP1: Each member state to provide 20 records by end of December 2014;</td>
<td>All Member States</td>
<td>n/a</td>
</tr>
<tr>
<td>&lt; end of 2014</td>
<td>WP1: NMDIS to apply for accreditation.</td>
<td>NMDIS</td>
<td>n/a</td>
</tr>
<tr>
<td>&lt; end of 2014</td>
<td>WP1: NODCs (and ADUs as relevant) to review M&amp;G 67 and determine if training is required to establish QMS</td>
<td>All Member States</td>
<td>n/a</td>
</tr>
<tr>
<td>&lt; end of 2014</td>
<td>WP1: Survey of technical procedures (quality control, vocabularies,…)</td>
<td>IODE Secretariat/Member States</td>
<td>n/a</td>
</tr>
<tr>
<td>&lt; end of 2014</td>
<td>WP1: Training on IODE QMF (provisional)</td>
<td>Relevant Member States</td>
<td>$30000-50000</td>
</tr>
<tr>
<td>&lt; end of 2014</td>
<td>WP3: To create a new webpage on the ODINWESTPAC website linking URL data center/institution/agency in each member state on available data services</td>
<td>All Member States/ NMDIS</td>
<td>n/a</td>
</tr>
<tr>
<td>&lt; end of 2014</td>
<td>WP3: Survey the needs for marine data and information products (atlas and data reanalysis dataset, etc.) (design survey, send out survey, analyze survey results)</td>
<td>Member States/ T. Suzuki</td>
<td>n/a</td>
</tr>
<tr>
<td>&lt; end of 2014</td>
<td>WP 4: NIWA to apply for NODC status</td>
<td>NIWA</td>
<td>n/a</td>
</tr>
<tr>
<td>2014-2015-2016</td>
<td>WP 4: Data/information management training for new NODCs/ADUs</td>
<td>OceanTeacher Global Academy/ Member States</td>
<td>$30000-50000</td>
</tr>
<tr>
<td>Date</td>
<td>WP3: Training course on data assimilation and re-analysis (dependent on outcome survey)</td>
<td>IODE Secretariat/ Host</td>
<td>$30000-50000</td>
</tr>
<tr>
<td>------------</td>
<td>--------------------------------------------------------------------------------------</td>
<td>------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>&lt; March 2015</td>
<td>WP4: Countries to make the necessary steps to establish an NODC or ADU as soon as possible</td>
<td>All Member States</td>
<td>n/a</td>
</tr>
<tr>
<td>16-20 March 2015</td>
<td>23rd Session of the IODE Committee, Bruges, Belgium</td>
<td>All Member States</td>
<td>n/a</td>
</tr>
<tr>
<td>March/April 2015</td>
<td>1st Session of the IODE Steering Group for ODINWESTPAC (Phuket, Thailand, March/April 2015)</td>
<td>All Member States</td>
<td>To be decided</td>
</tr>
<tr>
<td>June 2015</td>
<td>WP1: Enter not less than 50 records in OceanDocs.</td>
<td>All Member States</td>
<td>n/a</td>
</tr>
<tr>
<td>December 2015</td>
<td>WP1: Enter approx.. 50 WESTPAC symposium papers in OceanDocs (after further discussions by S. Khokiatiwong with symposium committee)</td>
<td>All Member States (each member state responsible for entry of papers of their country)</td>
<td>n/a</td>
</tr>
<tr>
<td>&lt; end of 2015</td>
<td>WP1: Advice and possibly assistance from the ODP partnership on the establishment of an ODP node or use of the Light Data Provider software</td>
<td>ODP Partnership Centre</td>
<td>0-$5000/ country</td>
</tr>
<tr>
<td>&gt; December 2015</td>
<td>WP1: Regional ODP node established in China</td>
<td>NMDIS China</td>
<td>n/a</td>
</tr>
<tr>
<td>June 2016</td>
<td>WP1: ODP national nodes established</td>
<td>All Member States</td>
<td>n/a</td>
</tr>
<tr>
<td>No date/ as soon as possible</td>
<td>WP4: It was recommended that participants share the IOC data policy with their Government with the objective of developing a national a policy that as closely as possible resembles the IOC data policy.</td>
<td>All Member States</td>
<td>n/a</td>
</tr>
<tr>
<td>No date/ as soon as possible</td>
<td>Thailand: it was suggested to establish an ADU at Phuket Marine Biological Center, Phuket.</td>
<td>Thailand/ IODE Secretariat</td>
<td>n/a</td>
</tr>
<tr>
<td>No date/ as soon as possible</td>
<td>Vietnam: they would like to establish an ADU at the Institute of Oceanography, Nha Trang</td>
<td>Vietnam/ IODE Secretariat</td>
<td>n/a</td>
</tr>
<tr>
<td>No date/ as soon as possible</td>
<td>It was recommended that countries that have NODCs also promote the establishment of ADUs to other national projects, programmes, institutions or organizations that deal with marine data, taking into account that NODCs may not be able to manage all data that are produced in a timely fashion.</td>
<td>All Member States</td>
<td>n/a</td>
</tr>
</tbody>
</table>
It was recommended that institutions that manage marine biogeographic data should consider establishing an ADU for OBIS.

It was recommended that we should contact PICES, NOWPAP as they may be willing to establish an ADU. The meeting invited participants who have working relationships with these, to approach them informally to inquire about interest.

The meeting agreed that ODINWESTPAC steering group meetings should be organized back-to-back or during WESTPAC Sessions. In this regard it was noted that the next WESTPAC Session is planned to take place early 2015. It was requested to avoid overlap with IODE-XXIII (16-20 March 2015).

7. CLOSING OF THE WORKSHOP

In her closing words Prof Lin thanked all Member States for attending the meeting and for the active discussions. She also welcomed the activities identified and looked forward to their successful implementation. She called on Member States to ensure the implementation of the work plan. She also thanked Dr Khokriottiwong for attending despite his busy schedule. She ended by thanking Peter Pissierssens for attending the meeting and for his efforts to connect with the Member States. As coordinator for ODINWESTPAC Prof Lin noted that it had taken a long time to plan and implement the workshop. He expressed the hope that implementation would go smoothly now that we have managed to establish an active group. She expressed the NMDIS commitment to effectively coordinate ODINWESTPAC.

Dr Khokriottiwong briefly addressed the meeting. He recalled that the meeting had been planned for many years. It was encouraging that the meeting could take place this week. He expressed the hope that the work plan adopted today would be implemented fully and efficiently. He looked forward to meeting many experts at the 2015 WESTPAC Session.

Mr Pissierssens noted that initiatives like ODINWESTPAC can only be successful with the active participation and commitment of Member States. In this regard he stressed that Member State participation in IOC activities is based on voluntary contributions of staff time and funding by Member States. He recognized that while in times of budget reductions in national institutions there is increasing pressure on experts to do more with less and to focus on national needs, oceanographic research and management and addressing the challenges of climate change cannot be successful without international cooperation. He expressed the hope that Member States will continue to collaborate in IOC activities in general, and in ODINWESTPAC in particular by making staff time available for the work plan implementation and by providing funding for participation in meetings or training related to ODINWESTPAC.

Prof Lin declared the Planning Meeting for the ODINWESTPAC closed at 12h30.
ANNEX I

AGENDA OF THE MEETING

1. OPENING OF THE WORKSHOP
   1.1. Words of welcome by the Host
   1.2. Words of welcome by WESTPAC Co-Chair
   1.3. Words of welcome by IOC representative
   1.4. Introduction of NMDIS/SOA
   1.5. Introductions

2. INTRODUCTORY PRESENTATIONS
   2.1. Activities of the IOC in the WESTPAC region
   2.2. Presentation on IODE and its capacity development activities
   2.3. Presentation on the IODE Ocean Data Portal, OceanDocs and OceanExpert
   2.4. Presentation on the IODE Quality Management Framework (QMF)
   2.5. ODINWESTPAC - history and status report

3. NATIONAL PRESENTATIONS
   3.1. Australia
   3.2. China
   3.3. Indonesia
   3.4. Japan
   3.5. Korea
   3.6. Malaysia
   3.7. New Zealand
   3.8. Thailand
   3.9. Viet Nam

4. OCEAN DATA AND INFORMATION PRODUCT AND SERVICE NEEDS

5. CAPACITY DEVELOPMENT NEEDS RELATED TO OCEANOGRAPHIC DATA AND INFORMATION MANAGEMENT AND EXCHANGE

6. DEVELOPMENT OF AN ODINWESTPAC STRATEGY AND WORK PLAN

7. CLOSING OF THE WORKSHOP
ANNEX II

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ANNEX III

MARINE COUNTRY PROFILE SURVEYS

III.1. AUSTRALIA

Your name: Greg Reed
Your position: Executive Officer
Your institution: Australian Ocean Data Centre Joint Facility
Your address:
Your email: greg@metoc.gov.au

1. GENERAL BACKGROUND INFORMATION

1.1. Geographical framework. Island continent (7,682,300 sq km)
1.2 Demography. 23,130,900 (June 2013)
1.3 Economy. GDP of US$1.57 trillion
1.4 Coastal Resources Utilization and Development

1.4.1 Fisheries and Aquaculture. World’s third largest fishing zone, extending up to 200 nautical miles. Commercial fishing and aquaculture industry is worth over $2 billion annually and employs around 11,600 people.

1.4.2 Manufacturing industries. Manufacturing industry employed approximately 921,400 people (2013) and contributed approximately $105 billion to the economy.

1.4.3 Ports and Harbours.

1.4.4 Energy production. Total domestic energy production was estimated at 17,282 petajoules, including black coal (57%), uranium (19%), natural gas (12%) and crude oil (5%).

1.4.5 Hydrocarbon Exploration and Exploitation. About 95 per cent of Australia’s petroleum production comes from offshore sedimentary basins. Australia exported $8.8 billion of crude oil, $10.1 billion of LNG and $1.0 billion of LPG.

1.4.6 Mines and quarries. Mining includes coal, iron ore, gold, uranium, copper and diamonds. Minerals industry is Australia’s largest export earner with mineral exports accounting for 50-60 per cent of the annual total exports.

1.4.7 Recreational industry and Tourism. Tourism contributes more than $34 billion a year to the economy. The tourism industry directly employs more than 500,000 people.

1.4.8 Marine Parks and Reserves. Australia has the world’s largest network of marine reserves covering over 3.1 million square kilometres.

2. POLICIES AND INSTITUTIONAL FRAMEWORK

2.1 Institutional framework (Governmental structure). Federal system under a parliamentary democracy, comprising three levels of government: Commonwealth, States/Territories and local government. The policy oversight for Australia’s coastal marine environment is the responsibility of all levels of government.

2.2 National Policies related to the marine/coastal environment. Australia’s Ocean Policy

2.3 National marine data policy or other marine data policies being use. IOC Oceanographic Data Exchange Policy, WMO Resolution 40
2.4 International agreements and conventions undersigned by the Government.

3. NATIONAL CAPABILITIES

3.1 National institutions of higher education and training related to marine/coastal research and management.


3.3 Current operational relationships between the national organizations (diagram)

3.4 Current human resources involved in marine/coastal research and management, as well as the management and archival of related data and information (by sector). Not known

3.5 Current available national data systems related to marine/coastal research and management, as well as the management and archival of related data and information (by sector). Australian Ocean Data Network, Australian Ocean Data Centre Joint Facility.

3.6 Current available national libraries related to marine/coastal research and management, as well as the management and archival of related data and information (by sector). Australian Institute of Marine Science, Great Barrier Reef Marine Park Authority, CSIRO Marine Library (excludes State based institutions).

4. NATIONAL NEEDS

Describe all national needs (organizational, educational, infrastructural) related to items 3.1-3.7 as well as any other. None identified.

III.2. CHINA

1. GENERAL BACKGROUND INFORMATION

1.1 Geographical framework

1.2 Demography

1.3 Economy

A nation’s economy has been described as a mechanical engine comprised of interconnected, moving parts. In China, the ocean economy is now seen as a critical component of that engine. Marine Economy is the summation of various types of industrial activities for developing, utilizing and protecting the ocean as well as the activities associated with there. In 2011, the gross ocean product of national marine economy reaches 4,549.6 billion yuan (RMB), 9.89% up from the previous year, its proportion in the GDP and the Gross Regional Product being 9.62% and 15.7% respectively. The number of people employed by the ocean related sectors throughout the country amounts to 34,217 million, 0.709 million more than that in the previous year.

The marine economy will create 2.6 million new jobs and contribute 10 percent of GDP by 2015, according to China’s 12th Five-Year Plan (2011-15) for the sector, released by the State Council.

1.4 Coastal Resources Utilization and Development

1.4.1. Fisheries and Aquaculture
The marine fishery is a vital component of China's ocean economy. It provides a high proportion of protein for Chinese people. It also provides employment for the highest number of persons working in the Chinese marine economy, often in rural locations where few other employment opportunities exist. In 2011, the marine fishery production in the coastal region keeps stable, the output of marine aquatic products grows steadily and the integrated strength of deep-sea fishing is constantly improved. the yield of marine aquatic products reaches 29.08 million tons, 4.0% up from the previous year, among which, the output of mariculture is 15.513 million tons, 4.7% up from the previous year; the production of marine fishing 12.419 million tons, 3.2% up from the previous year and that of deep-sea fishing 1.148 million tons, 29.3% up from the previous year. In 2012, the full-year marine fishery achieve an added value of 365.2 billion Chinese Yuan, which is calculated at the comparable price, increasing by 6.4% as compared with that in the previous year.

1.4.2 Manufacturing industries

Marine shipbuilding industry is a comprehensive industry providing equipment for water transport, ocean development and national defense construction, with a long developing history. In recent years, marine shipbuilding industry has grown rapidly, following the development of manufacturing industries in China. The three primary index (the completed quantity of ships built the number of nearly received shipbuilding orders and handling orders) of Chinese shipbuilding industry, exceed that of Korea Rep., played a leading role in the world for the first time in 2010. But affected by the world financial crisis, Chinese marine shipbuilding industry encountered major difficulties and challenges, such as depressed global transportation market, unfavourable financial environment, and high shipbuilding cost, etc. The three primary index of Chinese shipbuilding industry has descended from 2011, all registered a decrease in 2012, but still standing the first one in the world. Chinese marine shipbuilding industry is going to boost stronger industry, and China will change from a big shipbuilding country to a powerful one, through the period of accelerating transformation and upgrading, rapid development of marine engineering architecture industry, and slowly favourable trend of the world economic status.

1.4.3 Ports and Harbours

1.4.4 Energy production

Marine power industry is an emerging Industry industry of marine economy, including offshore wind power and marine energy. With the increasingly serious energy situation, marine power industry has increasingly received more and more attention. The state has promulgated the "long-term renewable energy development plan", "National ocean science and technology development plan for the Twelfth Five Year Plan", "Renewable energy of the Twelfth Five Year Plan", "Special planning of wind power generation of technology development during the Twelfth Five Year Plan", "The Twelfth Five Year Plan of wind power development" to promote marine power industry. Shanghai, Jiangsu, Zhejiang, Shandong, Fujian and other areas has applied for a large number of offshore wind power projects, including Shanghai Donghai Bridge ten thousands kw upwind power projects, Jiangsu Dafeng 20 million kw upwind power projects, Zhejiang Zhoushan Putuo number six offshore wind power 2 district projects, Shandong Long Island offshore wind farm demonstration project, Fujian Putian flat bay five thousands kw upwind power projects. In recent years, to maintain a rapid...
growth, between the year 2006 and 2012, the average annual growth rate of marine power industry added value has reached to 58.99 percent, but the industry is still relatively small. In 2012, the added value of marine power industry has reached to 7.026 billion Chinese Yuan, compared with the last year's growth of 18.74%.

1.4.5 Hydrocarbon Exploration and Exploitation

The offshore oil and gas industry is also a very important component of the ocean economy in China. In 2010, marine oil and gas output initially exceeded 50 million tons of oil equivalents, which make China one of the world's major marine oil and gas producers. China's offshore exploration platforms are distributed both on coastal waters and in its deepwater territorial seas which increases the risk of ocean environmental pollution of the coastal area. In 2009 the industry has experienced a sharp drop in the value in line with global trends, which is due to the decline in international oil prices caused by the financial crisis. Unfortunately the situation is not improved recently. According to the newest statistics, the added value of oil and gas industry of China in 2012 is 157 billion Chinese Yuan, 8.7% less than the last year.

1.4.6 Mines and Quarries

Marine mining industry is a small industry in China; including sea beach placer, which is mostly used in engineering construction. The output of marine mining industry has grown steadily recent years; the average annual growth rate From 2006 to 2012 is up to 28.8%. The added value in 2012 reached 61 billion Chinese Yuan.

1.4.7 Recreational Industry and Tourism

Coastal tourism was the largest contributor to China's ocean economy. Coastal tourism includes hotels and lodging places, coastal tourism services, amusements and recreation, and coastal tourism and cultural services. The coastal tourism sector had been achieving growth rates of over 16% almost every year throughout the past five years, greatly boosting the development of China's marine economy. For China's coastal tourism, 2003 was a significant year due to the outbreak of the SARS virus. Total tourism output had decreased dramatically in the first half of the year, and in the whole of 2003, the added value created by coastal tourism was $13.37 billion, down 27.39% compared to 2002. By the time that the World Health Organization lifted its two-month advisory warning against non-essential travel to China in late June 2003, the outbreak had cost China's travel and tourism industry sectors an estimated US$20.4bn. The tourism sector bounced back strongly in 2004 due in part to a rescue package from the government that included tax rebates, employment and training measures and financial aid. Also domestic and pan-Asian tourism boards put in place action plans to revitalize the stricken sector.

In 2012, With the backing of the local resource of coastal tourism, the coastal regions plan for the development of coastal tourist industry, support the launching of coastal tourist projects, pay attention to the perfection of coastal tourist facilities, strengthen the innovation of coastal tourist products and actively create and atmosphere of good development, as a result of which the coastal tourism effects a full-year added value of 697.17 billion Yuan, 9.5% up from the previous year.

1.4.8 Marine Parks and Reserves
2. POLICIES AND INSTITUTIONAL FRAMEWORK

2.1 Institutional framework (Governmental structure)
At present, the marine governmental structure in China is nation-region and nation-local area combined. State Oceanic Administration (SOA) is the competent administrative department of marine management in China. North China Sea Branch of SOA, East China Sea Branch of SOA, and South China Sea of SOA are in charge of Bohai and Huanghai Sea, Donghai Sea, and Nanhai Sea respectively. Coastal provinces and counties establish its own marine governmental structure, with responsibility for local marine management. Beside SOA, National Development and Reform Commission, Ministry of Foreign Affairs, Ministry of Land and Resources, Ministry of Environmental Protection, Ministry of Science and Technology, Ministry of Transport, Ministry of Agriculture, the Ministry of Water Resources, China National Tourism Administration, General Administration of Customs and some other departments are involved in marine management.

2.2 National Policies related to the marine/coastal environment
The Environmental Protection Law of the People’s Republic of China (1982), Regulations of the People’s Republic of China on Control Overdumping of Wastes in the Ocean (1985), Measures for the management of Marine Protected Areas (1995), Law of the People’s Republic of China on the Administration of Sea Areas (2001), Measures for the management of Special Marine Protected Areas (2005), Sea Islands Protection Law of the People’s Republic of China (2009), Regulations on Administration of Prevention and Control of Pollution to the Marine Environment by Vessels (2009), and some other laws relative to marine environment protection have been enacted successively. General Plan of Environment Protection of Bohai (2008-2020), National Marine Functional Zoning (2011-2020), and National Sea Islands Protection Plan (2011-2020) were released, providing scientific foundation for marine environment and sea use management. Up to May 2011, 33 national marine protected areas, 7 national marine parks, and 21 national special marine protected areas were established. We strengthen the capacity-building for marine environment protection and management all the time. National marine environment observation system composed of satellite observation system, aerial remote sensing observation system, auto-measuring system on the sea and by-hand measurement network was established, forming efficient capacity of coastal and marine environment monitoring and evaluation and forecasting. Recently, we promote actively to establish marine ecological civilization, calling on respecting nature, complying nature and protecting nature.

2.3 National marine data policy or other marine data policies being used
As the member of ICSU/WDS, NMDIS involves in the international data exchange, management and service. NMDIS also participates into NEAR-GOOS Regional cooperation project and data exchange, and ODP cooperation as IODE/ODP WESTPAC unit. NMDIS as the China National Centre for the Aquatic Science and Fisheries Abstracts (ASFA) (ASFIS), takes the responsibility of inputting national literature records into the ASFA databases every year, and monitoring more than 50 journals and periodicals related with marine and aquaria in China.

2.4 International agreements and conventions undersigned by the Government
IOC Ocean Data Policy

3. NATIONAL CAPABILITIES

3.1 National institutions of higher education and training related to marine/coastal research and management
International Ocean Institute (IOI) China Regional Center for WESTPAC
In the spirit of mutual understanding and cooperation, the State Oceanic Administration of China (SOA) and the International Ocean Institute (IOI) signed a Memorandum of Understanding to establish an IOI China Operational Center (IOI China) in the National Marine Data and Information Service, Tianjin, China, on 14 October 1994. It was agreed that the IOI China Operational Center should carry out the research and training programs agreed upon by both parties, making mutual contribution to the training of marine personnel for the developing countries. Through many negotiations between the International Ocean Institute and the Department of International Cooperation of SOA, in order to expand the influence of SOA in the Western Pacific region, International Ocean Institute - China Regional Center for the Western Pacific Region was established on the basis of IOI China Operational Center on 2010. IOI-China Regional Center was in charge of the research, training, and other activities in the Western Pacific Region as agreed upon by the parties.

3.2 National organizations involved in marine/coastal research and management (by sector)

- National Marine Environmental Forecasting Center
- National Ocean Satellite Application Center (NSOAS)
- National Marine Hazard Mitigation Center
- China Institute for Marine Affairs
- National Marine Data and Information Service
- National Ocean Technology Center (NOTC)
- National Center for Ocean Standards and Metrology (NCOSM)
- The Institute of Seawater Desalination and Multipurpose Utilization
- Polar Research Institute of China
- The First Institute of Oceanography, SOA
- The Second Institute Oceanography, SOA
- The Third Institute Oceanography, SOA
- East China Sea Branch, SOA
- North China Sea Branch, SOA
- South China Sea Branch, SOA
- South China Sea Institute of Oceanology, Chinese Academy of Science
- Institute of Oceanology, Chinese Academy of Science

3.3 Current operational relationships between the national organizations (diagram)

3.4 Current human resources involved in marine/coastal research and management, as well as the management and archival of related data and information (by sector)

National Marine Data and Information Service (NMDIS) is a government funded public institution under the State Oceanic Administration (SOA) of China, responsible for the management of national marine data and information resources, providing guidance and coordination for the information organization work of national marine data and information; providing information and technical support for the development of marine economy, marine management, public service and maritime security. Now, there are many marine data management systems: 19 marine variable datasets, 7 project database, and 4 discipline database.

3.5 Current available national libraries related to marine/coastal research and management, as well as the management and archival of related data and information (by sector)

The Library of NMDIS is one of the largest comprehensive libraries in marine science in China, the national centre for marine literature collection and service and the leading agency of Marine Literature Information Coordination Committee and act as a national level focal point for marine scientific and technological inquiry service: performs the functions and tasks of the China National Centre for the Aquatic
Science and Fisheries Information System (ASFIS) and the China National Documents Depository Centre of the UNESCO's Intergovernmental Oceanographic Commission (IOC). The Library's holds over 100,000 volumes of books, more than 2,000 kinds of periodicals in Chinese and foreign languages and over 40 million records in the literature databases. The Library has established exchange relationships with all the international ocean-related organizations in the world and over 73 institutions in 27 countries and region. Now, marine digital library is being established and maintained in the Library. The library also compiles and publishes several journals, such as 《Marine Science Bulletin》, 《Marine Information》, etc.

4. NATIONAL NEEDS

Describe all national needs (organizational, educational, infrastructural) related to items 3.1-3.7 as well as any other.

- Advanced oceanographic and marine meteorological data processing and quality control method and technique
- Coordinated quality control technology for historic data (such as temperature and salinity)
- New marine instruments data processing
- Data assimilation and data reanalysis technique and products development
- Marine forecasting and warning
- Digital Ocean technology
- Marine Digital Library establishment and service

III.3. INDONESIA

1. GENERAL BACKGROUND

1.1 Geographical framework

The Republic of Indonesia is located between Asia and Australia. There are five major islands: Sumatra, Java, Kalimantan, Sulawesi and Irian Jaya or Papua, bordering with Papua New Guinea. Two remaining groups of islands are Maluku and Nusa Tenggara, running from Sulawesi to Papua in the north and from Bali to Timor in the south. Other islands are small and mostly uninhabited. Indonesia’s climate is tropical with two seasons, the dry season (May to October) and the rainy season (November to April).

A national team of geographic toponame has conducted a geographic surveys from 2007 to 2010, and found that Indonesia has 13,466 islands, rather than 17,508 islands as previously referred by many institutes. This difference is mainly due to the implementation of the UN definition on islands (UNCLOS 82, art. 121), islands that were previously regarded as island during low tide only are now uncounted. This survey result has been submitted to United Nations Groups of Experts on Geographical Names (UNEGGN) in 2012. The survey has also indicated that the land area on Indonesia is 1,910,000 km$^2$ and area of waters is 6,279,000 km$^2$.

Administratively, Indonesia consists of 34 provinces (Fig. 1 & Table 1), five of which have special status. Each province has its own legislature and governor. The provinces of Aceh, Jakarta, Yogyakarta, Papua, and West Papua have greater legislative privileges and a higher degree of autonomy from the central government than the other provinces. Yogyakarta was granted the status of Special Region in recognition of its pivotal role in
supporting Indonesian Republicans during the Indonesian Revolution and its willingness to join Indonesia as a republic. Papua, formerly known as Irian Jaya, was granted special autonomy status in 2001 and was split into Papua and West Papua in February 2003. Jakarta is the country’s special capital region.

Figure 1. Provinces of the Republic of Indonesia, numbers correspond to name of provinces in Table 1.

Table 1. Name of provinces and their capital cities.

<table>
<thead>
<tr>
<th>No.</th>
<th>Province</th>
<th>Capital City</th>
<th>No.</th>
<th>Province</th>
<th>Capital City</th>
<th>No.</th>
<th>Province</th>
<th>Capital City</th>
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<td>Serang*</td>
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<td>26</td>
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<td>Mamuju*</td>
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<td>Samarinda</td>
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</tr>
</tbody>
</table>

* newly developed provinces

1.2 Demography

Latest census indicates that by 2010 Indonesia had a population of 237,641,326, population growth rate is about 1.52%. Most of the population is concentrated in Java Island, which comprises of DKI Jakarta, Jawa Barat, Jawa Tengah, DI Yogyakarta, Jawa Timur, Banten (Table 2).
Table 2. Citizen population of each provinces since 1971.

<table>
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<td>Papua</td>
<td>923 440</td>
<td>1 173 875</td>
<td>1 648 708</td>
<td>1 942 627</td>
<td>2 220 934</td>
<td>2 833 381</td>
</tr>
</tbody>
</table>

| INDONESIA         | 119 208 229 | 147 490 298 | 179 378 946 | 194 754 808 | 206 264 595 | 237 641 326 |

1.3 Economy

Indonesia proclaimed independence from several centuries of colonial rule on 17 August 1945. Since then, the country has experienced several profound political developments. Indonesia’s founder president, Dr Soekarno, was succeeded by President Soeharto in 1966. A new order government was established, oriented towards directed overall development. A period of uninterrupted economic growth was experienced from 1968 to 1996, when the per capita income increased sharply from about US$ 50 to US$ 385 in 1986, and to US$ 1124 in 1996, as the national economy expanded at an
annual average rate of nearly 5%. This experience was abruptly reversed by the economic crisis that affected South-East Asia in 1997.


Historic presidential elections took place in October 2004, direct for the first time, when the current president, HE Susilo Bambang Yudhoyono, came to office. Since 2000, the economy has been growing at an annual rate ranging between 4% and 6%. Health and education have received more attention, as reflected in the increasing national budgets for these sectors.

### Table 3. National export and import values by Month, Year 2013.

<table>
<thead>
<tr>
<th>Month</th>
<th>Export Value (US $)</th>
<th>Export Weight (KG)</th>
<th>Import Value (US $)</th>
<th>Import Weight (KG)</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>15 375 487 902</td>
<td>55 661 972 692</td>
<td>15 450 235 320</td>
<td>11 925 159 622</td>
</tr>
<tr>
<td>February</td>
<td>15 015 627 735</td>
<td>53 861 770 156</td>
<td>15 313 286 233</td>
<td>10 904 690 188</td>
</tr>
<tr>
<td>March</td>
<td>15 024 577 683</td>
<td>59 776 509 210</td>
<td>14 887 075 645</td>
<td>11 018 318 050</td>
</tr>
<tr>
<td>April</td>
<td>14 760 892 129</td>
<td>58 887 635 554</td>
<td>16 483 468 844</td>
<td>12 210 318 911</td>
</tr>
<tr>
<td>May</td>
<td>16 133 358 194</td>
<td>61 440 502 451</td>
<td>16 660 559 292</td>
<td>12 610 027 739</td>
</tr>
<tr>
<td>June</td>
<td>14 758 819 151</td>
<td>54 121 878 206</td>
<td>15 636 019 963</td>
<td>11 925 604 333</td>
</tr>
<tr>
<td>July</td>
<td>15 087 863 565</td>
<td>56 087 989 989</td>
<td>17 416 991 671</td>
<td>13 229 872 058</td>
</tr>
<tr>
<td>August</td>
<td>13 083 707 039</td>
<td>53 046 541 725</td>
<td>13 012 045 835</td>
<td>9 897 645 784</td>
</tr>
<tr>
<td>September</td>
<td>14 706 775 080</td>
<td>55 867 989 989</td>
<td>15 509 774 940</td>
<td>11 291 921 789</td>
</tr>
<tr>
<td>October</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>November</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>December</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>133 947 108 478</strong></td>
<td><strong>508 748 527 679</strong></td>
<td><strong>140 349 457 743</strong></td>
<td><strong>105 013 558 474</strong></td>
</tr>
</tbody>
</table>

Figure 2. Indonesia inflation rates 2008 – 2012, left axis in %.
Table 4. GDP Per Capita, GNP Per Capita and National Income Per Capita, 2000-2012 (in Rupiah).

<table>
<thead>
<tr>
<th>Measure</th>
<th>Tahun</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011*</th>
<th>2012**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Based on current prices</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GDP</td>
<td></td>
<td>21,013,538.84</td>
<td>23,647,682.56</td>
<td>26,786,768.35</td>
<td>30,424,351.68</td>
<td>33,338,986.87</td>
</tr>
<tr>
<td>GNP</td>
<td></td>
<td>20,266,765.27</td>
<td>22,820,003.44</td>
<td>26,034,839.86</td>
<td>29,556,683.81</td>
<td>32,371,459.18</td>
</tr>
<tr>
<td>NIP</td>
<td></td>
<td>18,774,283.37</td>
<td>20,731,425.57</td>
<td>23,759,818.77</td>
<td>27,298,811.57</td>
<td>30,516,670.73</td>
</tr>
<tr>
<td>Based on constant price 2000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GDP</td>
<td></td>
<td>8,842,701.15</td>
<td>9,190,669.38</td>
<td>9,616,611.75</td>
<td>10,102,168.25</td>
<td>10,590,578.20</td>
</tr>
<tr>
<td>GNP</td>
<td></td>
<td>8,432,529.13</td>
<td>8,727,437.66</td>
<td>9,230,228.55</td>
<td>9,706,805.16</td>
<td>10,183,417.30</td>
</tr>
<tr>
<td>NIP</td>
<td></td>
<td>7,797,691.36</td>
<td>7,916,021.37</td>
<td>8,412,617.54</td>
<td>9,025,532.92</td>
<td>9,490,533.09</td>
</tr>
</tbody>
</table>

*; ** unconfirmed

1.4 Coastal Resources Utilization and Development

1.4.1 Fisheries and Aquaculture

According to the Ministerial Decree No. PER. 01/MEN/2009 on Fisheries Management Area of Republic of Indonesia, there are 11 Fishery Management Area (FMA) (Fig. 3).

Figure 3. Fishery Management Area in Indonesia.

FMA 571 : Malaka Strait –Andaman Sea
FMA 572 : Indian Ocean (West of Sumatera) –Sunda Strait
FMA 573 : Indian Ocean (South of Java) –South of Nusa Tenggara –Sawu Sea –West of Timor Sea
FMA 711 : Karimata Strait –Natuna Island –South China Sea
FMA 712 : Java Sea
FMA 713 : Makassar Strait –Bone Bay –Flores Sea –Bali Sea
FMA 714 : Tolo Bay –Bunda Sea
FMA 715 : Tomini Bay –Maluku Sea –Halmahera Sea –Seram Sea –Berau Bay
FMA 716 : Sulawesi Sea –North of Halmahera
FMA 717 : Cendrawasih Bay –Pasific Ocean
FMA 718 : Aru Sea –Arafura Sea –East of Timor Sea
The potential capacity of capture fish production in Indonesia estimated from yearly production (Table 5) may be more than 6.0 million tons per year. Pelagic fish play an important role in Indonesian fisheries, it constitutes about 74.1% of total fish stock, or 4,771,020 ton/year. The potency includes large pelagic 18.1% (Euthynnus spp., or coastal tuna/frigate tuna) and small pelagic 56% (Selar crumenopthalmus/bigeye scad, Rastreliger kanagurta/striped mackerel, Scromberomenu comersonii/barred Spanish mackerel).

The large pelagic is mostly from FMA 572 and 573, and small pelagic is mostly from FMA 711. Another potential capture fish is demersal fish which consists of 21.2% of total fish stock or 1,365,090 ton/year. Demersal fish is a fish that feeds on or near the bottom of the ocean or a deep lake in the demersal zone. Such fish includes some species of catfish, snapper, eel, grouper and bass. Shrimp is almost over exploited in all FMA by 2004, but since 2009 could be explored again in FMA 711. Lobster and squid contribute 0.1% and 0.4% of total live stock.

Aquaculture in Indonesia is carried out on fresh, brackish and marine water using a variety of species, production facilities and methods. The common freshwater aquaculture species' are common carp (Cyprinus carpio), catfish (Clarias spp., Pangasius spp.) and Nile tilapia (Oreochromis niloticus). In 1978, brackish water pond areas increased significantly with the successful development of the eyestalk ablation technique and the rapid growth of shrimp hatcheries. In South Sumatra and Lampung Provinces brackish water pond areas were expanded by the private sector to develop large-scale pond culture using the Nucleus Estate System. Penaeid shrimps and milkfish (Chanos chanos) are the common commodities. Marine culture has only developed in the last ten years, and is dominated by the grouper species such as humpback grouper (Cromileptes altivelis) and brown-marbled grouper (Epinephelus fuscoguttatus) as well as seaweeds (Eucheuma spp. and Gracilaria spp.). Aquaculture contributed 20.6 percent of the country's total fish production. Table 6 shows the production of aquacultures according to provinces.

### Table 5. Production of capture fisheries according to provinces up to 2011, in tons.

<table>
<thead>
<tr>
<th>Provinces</th>
<th>Weight in tons</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2005</td>
</tr>
<tr>
<td>----------------------------</td>
<td>------</td>
</tr>
<tr>
<td>1 Nangroe Aceh Darussalam</td>
<td>82,482</td>
</tr>
<tr>
<td>2 Sumatera Utara</td>
<td>338,007</td>
</tr>
<tr>
<td>3 Sumatera Barat</td>
<td>116,912</td>
</tr>
<tr>
<td>4 Riau</td>
<td>122,476</td>
</tr>
<tr>
<td>5 Jambi</td>
<td>48,675</td>
</tr>
<tr>
<td>6 Sumatera Selatan</td>
<td>71,019</td>
</tr>
<tr>
<td>7 Bengkulu</td>
<td>39,203</td>
</tr>
<tr>
<td>8 Lampung</td>
<td>145,028</td>
</tr>
<tr>
<td>9 Bangka Belitung</td>
<td>119,845</td>
</tr>
<tr>
<td>10 Kepulauan Riau</td>
<td>181,118</td>
</tr>
<tr>
<td>11 DKI Jakarta</td>
<td>132,024</td>
</tr>
<tr>
<td>12 Jawa Barat</td>
<td>162,018</td>
</tr>
<tr>
<td>13 Jawa Tengah</td>
<td>208,763</td>
</tr>
<tr>
<td>14 D.I Yogyakarta</td>
<td>3,028</td>
</tr>
<tr>
<td>15 Jawa Timur</td>
<td>334,163</td>
</tr>
<tr>
<td>Province</td>
<td>16</td>
</tr>
<tr>
<td>-------------------------</td>
<td>------</td>
</tr>
<tr>
<td>Banten</td>
<td>59,248</td>
</tr>
<tr>
<td>Bali</td>
<td>79,293</td>
</tr>
<tr>
<td>Nusa Tenggara Barat</td>
<td>84,461</td>
</tr>
<tr>
<td>Nusa Tenggara Timur</td>
<td>124,872</td>
</tr>
<tr>
<td>Kalimantan Barat</td>
<td>74,102</td>
</tr>
<tr>
<td>Kalimantan Tengah</td>
<td>73,500</td>
</tr>
<tr>
<td>Kalimantan Selatan</td>
<td>186,133</td>
</tr>
<tr>
<td>Kalimantan Timur</td>
<td>130,285</td>
</tr>
<tr>
<td>Nusa Tenggara Barat</td>
<td>192,911</td>
</tr>
<tr>
<td>Sulawesi Barat</td>
<td>287,393</td>
</tr>
<tr>
<td>Sulawesi Tengah</td>
<td>217,600</td>
</tr>
<tr>
<td>Sulawesi Selatan</td>
<td>37,896</td>
</tr>
<tr>
<td>Gorontalo</td>
<td>39,096</td>
</tr>
<tr>
<td>Sulawesi Barat</td>
<td>482,058</td>
</tr>
<tr>
<td>Maluku</td>
<td>107,000</td>
</tr>
<tr>
<td>Maluku Utara</td>
<td>100,498</td>
</tr>
<tr>
<td>Papua Barat</td>
<td>221,587</td>
</tr>
<tr>
<td>Papua</td>
<td>217,600</td>
</tr>
<tr>
<td>Total</td>
<td>4,705,869</td>
</tr>
</tbody>
</table>
Table 6. Production of aquacultures according to provinces up to 2011 in tons.

<table>
<thead>
<tr>
<th>Provinces</th>
<th>Budidaya Laut (Sea culture)</th>
<th>Tambaik (Brackish pond cultivation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Nangroe Aceh Darussalam</td>
<td>-</td>
<td>17</td>
</tr>
<tr>
<td>2 Sumatera Utara</td>
<td>548</td>
<td>-</td>
</tr>
<tr>
<td>3 Sumatera Barat</td>
<td>126</td>
<td>40</td>
</tr>
<tr>
<td>4 Riau</td>
<td>26</td>
<td>59</td>
</tr>
<tr>
<td>5 Jambi</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>6 Sumatera Selatan</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>7 Bengkulu</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>8 Lampung</td>
<td>821</td>
<td>1.69</td>
</tr>
<tr>
<td>9 Bangka Belitung</td>
<td>24</td>
<td>31</td>
</tr>
<tr>
<td>10 Kepulauan Riau</td>
<td>4.85</td>
<td>903</td>
</tr>
<tr>
<td>11 DKI Jakarta</td>
<td>190</td>
<td>1.45</td>
</tr>
<tr>
<td>12 Jawa Barat</td>
<td>10.0</td>
<td>1.93</td>
</tr>
<tr>
<td>13 Jawa Tengah</td>
<td>89</td>
<td>37</td>
</tr>
<tr>
<td>14 D.I Yogyakarta</td>
<td>25.9</td>
<td>2.53</td>
</tr>
<tr>
<td>15 Jawa Timur</td>
<td>36.4</td>
<td>60.6</td>
</tr>
<tr>
<td>16 Bali</td>
<td>25</td>
<td>91</td>
</tr>
<tr>
<td>17 Nusa Tenggara Barat</td>
<td>271</td>
<td>481</td>
</tr>
<tr>
<td>18 Nusa Tenggara Timur</td>
<td>880</td>
<td>123</td>
</tr>
<tr>
<td>19 Kalimantan Barat</td>
<td>9.04</td>
<td>7</td>
</tr>
<tr>
<td>20 Kalimantan Timur</td>
<td>-</td>
<td>36</td>
</tr>
<tr>
<td>21 Kalimantan Tengah</td>
<td>2.42</td>
<td>6.06</td>
</tr>
<tr>
<td>22 Kalimantan Selatan</td>
<td>1.74</td>
<td>18.4</td>
</tr>
<tr>
<td>23 Kalimantan Barat</td>
<td>81</td>
<td>3</td>
</tr>
<tr>
<td>24 Sulawesi Utara</td>
<td>7.73</td>
<td>6.63</td>
</tr>
<tr>
<td>25 Sulawesi Tenggara</td>
<td>124</td>
<td>170</td>
</tr>
<tr>
<td>26 Sulawesi Selatan</td>
<td>252</td>
<td>275</td>
</tr>
<tr>
<td>27 Tenggara</td>
<td>201</td>
<td>406</td>
</tr>
<tr>
<td>28 Gorontalo</td>
<td>12.3</td>
<td>26.0</td>
</tr>
<tr>
<td>29 Sulawesi</td>
<td>59</td>
<td>76</td>
</tr>
<tr>
<td>30 Maluku</td>
<td>265</td>
<td>3.35</td>
</tr>
<tr>
<td>31 Maluku Utara</td>
<td>834</td>
<td>714</td>
</tr>
<tr>
<td>32 Papua Barat</td>
<td>3.46</td>
<td>7</td>
</tr>
<tr>
<td>33 Papua</td>
<td>-</td>
<td>77</td>
</tr>
</tbody>
</table>
About 90 percent of the country's total fish production is consumed domestically. Fish consumption per capita was about 24.67 kg/year in 2003. About 56% of fish production is consumed fresh. There are severe limits to the supply of ice and availability of refrigerated storage and transport facilities, so the balance is processed and consumed as dried and salted (18%), smoked or fermented. Less than 2% of the catch is canned. The canneries utilize pelagic, mostly oil sardines and skipjack. Processing of fishmeal has still not yet developed and takes place mostly in conjunction with canning operations. About 16% of total production is frozen for export, mostly shrimp and tuna. The prospect of domestic marketing of fishery product is very good.

1.4.2 Manufacturing industries
The industrial sector currently contributes most to Indonesia’s annual GDP growth. The two most important sub-sectors of industry are mining and manufacturing, both being major pillars of the nation’s economy since the 1970s, thus being engines of economic change and development during Suharto’s New Order regime. Although the manufacturing sub-sector has lost its momentum after the Asian Crisis of the late 1990s, it still constitutes the most popular sub-sector of Indonesia in terms of foreign direct investment (FDI), followed by the mining sub-sector.

![Figure 4. The growth of industrial sectors in Indonesia.](image)

1.4.3 Ports, Harbours, Fishing gears and boats
Generally, fish landing places in Indonesia are classified into three categories, based on their capacity and facilities available. The first
category is the Oceanic Fishing Harbour (Type A fishing harbour), which is able to provide daily shelter for at least 100 fishing vessels of more than 60 GRT each, especially those fishing in the waters of the Indonesian EEZ. Additionally, Type A harbours are able to support annual landings of 18 000 to 120 000 tons.

The second category is the Nusantara Fishing Harbour (Type B fishing harbour), that are able to provide daily servicing of 75 fishing vessels of 15–60 GRT each, fishing in Indonesian home waters and the EEZ. The Type B harbours are able to support annual landings of 7 200–18 000 tons. The third category is the Coastal Fishing Harbour (Type C fishing harbour), capable of daily harbouring 50 fishing vessels of 5–15 GRT and supporting annual landings of 3 000–7 200 tons. Harbour types A, B and C are managed by the Ministry of Marine Affairs and Fisheries. In addition, there is a Type D, namely fish landing centres, which are under the management of Provincial governments. Three-quarters of these fisheries harbours are in the western part of Indonesia.

The number of registered marine fishing gear units in 2004 was 1 354 516 units. Marine fishing gear types that increased between years included portable traps, guiding barrier, beach seine, boat liftnet, set gillnet, encircling gillnet, troll lines and skipjack, pole and line. The main gear operated in the West Sumatra area were troll lines, set gillnets and drift gillnets. In the South Java area, most used were drift longline (other than tuna longline), muroami and cast net. The main gear in the Malacca Strait area were cast net, drift longline (other than tuna longline) and trammel nets. The main gear in the East Sumatra area were shell fish gear and hand lines. The main gear in the North Java area were bottom Danish seine and scoop net. The main gear in the Bali-Nusatenggara area were purse seine, other lift nets and guiding barrier. Stationary lift nets, stow nets and encircling gillnets were most operated in South-West Kalimantan. Other traps, guiding barriers and set longlines were most operated in East Kalimantan. Other lines, boat or raft lift nets and cast nets were most operated in South Sulawesi. Hand lines and harpoons were most used in North Sulawesi. Portable traps, beach seines and drift longlines (other than tuna longline) were most used in Maluku-Papua.

The number of fishing boats in 2004 was 729 682, showing steady increase since 1998. This increase was largely caused by the increase in the number of outboard motor craft. In 2004, the number of marine fishing boats was 549 100 units: 15.76% in North Java, 13.76% in Maluku-Papua, 12.49% in South Sulawesi, 11.83% in North Sulawesi, 11.62% in Bali-Nusatenggara, 9.37% in East Sumatra, and 25.17% for all the rest, including West Sumatra, South-West Kalimantan, East Kalimantan and South Java. Most non-powered boats were found in the Maluku-Papua area (25.46% of all marine unpowered craft), with significant numbers in South Sulawesi, North Sulawesi and Bali-Nusatenggara. Most outboard motor powered vessels were found in North Java (39.24% of all marine outboard motor powered vessels. The greatest number of inboard motor vessels were in East Sumatra (21.13% of all marine inboard motor vessels). In the East Sumatra area, most (75.32%) inboard motors are in vessels <5 GRT. Most marine fishing boats in number terms are unpowered, at 256 830 units in 2004. Of those, 52.49% were dugouts, 27.17% small, plank-built boats, 16.74% medium, plank-built boat and 3.60% large, plank-built boats. At the same time,
outboard powered and inboard powered vessels 30.11% and 23.12%, respectively, of the fleet.

Table 8. Number of fishing boat up to 2011.

<table>
<thead>
<tr>
<th>Year</th>
<th>Marine</th>
<th>Inland</th>
<th>Sub Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>460,298</td>
<td>134,670</td>
<td>594,968</td>
</tr>
<tr>
<td>2003</td>
<td>528,717</td>
<td>173,517</td>
<td>702,234</td>
</tr>
<tr>
<td>2004</td>
<td>549,100</td>
<td>180,582</td>
<td>729,682</td>
</tr>
<tr>
<td>2005</td>
<td>555,581</td>
<td>198,400</td>
<td>753,981</td>
</tr>
<tr>
<td>2006</td>
<td>590,317</td>
<td>193,308</td>
<td>783,625</td>
</tr>
<tr>
<td>2007</td>
<td>590,314</td>
<td>198,534</td>
<td>788,848</td>
</tr>
<tr>
<td>2008</td>
<td>596,184</td>
<td>192,004</td>
<td>788,188</td>
</tr>
<tr>
<td>2009</td>
<td>590,352</td>
<td>185,437</td>
<td>775,789</td>
</tr>
<tr>
<td>2010</td>
<td>570,827</td>
<td>171,542</td>
<td>742,369</td>
</tr>
<tr>
<td>2011</td>
<td>581,845</td>
<td>185,342</td>
<td>767,187</td>
</tr>
</tbody>
</table>

1.4.4 Energy production

Energy production of Indonesia is inform mostly of primary energy, i.e. Petroleum (crude oil, natural gas liquids, and oil from non conventional sources), natural gas, solid fuels (coal, lignite, and other derived fuels), and renewable (geothermal, solar & wind) and waste (Figure 4).

![Figure 4. Energy production and its projection up to 2024.](image)
1.4.5 Hydrocarbon Exploration and Exploitation

The oil reserve in Indonesia is generally in West Indonesia such as National Oil Field, Duri, and Cepu. Here, the exploitation has been done since 1950s and reached its peak in 1975 up to 1976 when became the biggest donator of national production of 1,5 million barrel per day. Since then, the production keeps on decreasing and now only produces about 70 million barrel per day. The decrease of national oil is covered by the reserve depletion in Duri, starting around 1980s, by its production level approximately 400 million barrel per day and made national oil production reached its peak in 1995 – 1996, by its production about 1, 6 million barrel per day. Next, the production of Duri Field continuously decreases along with the decreasing of remaining reserves. Now both National Oil Field and Duri only produce about 370 million barrel per day.

The other oil field discoveries are smaller. Otherwise, the latest exploration intensively conducted in East Indonesia produce large amount of gas reserve discoveries, not oil, such as Tangguh, area deepwater Makassar Strait (Gandang, Gendalo, Gehem, etc), Masela (Laut Timor), and the last by Genting Oil in Bintuni. By the fact, the proven national oil reserves keep on decreasing in the last 10 years, from 4, 3 billion barrel to 3, 9 billion barrel. Meanwhile, our gas reserves are still high, more than 104 trillion cubic feet.

1.4.6 Mines and quarries

Indonesia is currently a major producer of coal, copper, gold, tin and nickel. The country remains the leading global exporter of thermal coal. But apart from coal mining, investments in the mining sector have been limited in recent years mainly due to regulatory uncertainty which hurts the investment climate. In January 2009 a new law "Mining Law No. 4 2009" came into force with the aim of providing a conducive mining investment climate which is more environmentally friendly, foresees a larger role for domestic stakeholders and aims for more value-added processing within the country. As it also led to an increase in exports of raw minerals the government is making legal incentives to stimulate value-added
processing industries, including a possible ban on the export of raw minerals from 2014 onwards. The mining industry provides substantial export earnings, employment opportunities and other economic activities. In 2011 the mining sector contributed around 12 percent to Indonesia's GDP. Table 9 shows statistics of mining productions.

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1.4.7 Recreational industry and Tourism

Indonesia contains great potential in the tourism sector, both in the travel industry and the tourism services industry. Indonesia's Tourism contributes about four percent to Indonesia's GDP growth, up half a percentage point from 2011. However, considering the beauty and variety of Indonesia's natural scenery, its diverse cultures, tropical climate and a metropolitan capital city, this figure should resemble the situation in Thailand where the tourism sector contributes about 6.5 percent to the country's GDP. Moreover, a rise in importance of the tourism sector towards the economy will have a positive impact on much-needed job creation in Indonesia as tourism boosts demand for local goods and services.

Compared to its neighbouring countries, Indonesia attracts fewer foreign visitors. In 2012, Indonesia managed to attract a little over eight million foreign visitors, a number which is in contrast with Singapore (about 14 million), Malaysia (about 25 million) or Thailand (about 22 million). As each foreign tourist is estimated to spend over US $1000 on average per
visit (for food, shelter, travel expenses, souvenirs, tourist attractions), it is a lucrative foreign exchange earner that can stimulate Indonesia's local economies. The table below shows a steady increase in foreign visitor arrivals in Indonesia in recent years.

Table 10. Number visitors according to country of origin

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1.4.8 Marine Parks and Reserves

Until 2007 Government of Indonesia has issued four National Legislations related to marine protected areas' (MPA) establishment and management. The Government Regulation No. 60/2007 on Conservation of Fisheries Resources has designated MPA categories, i.e.: “Suaka Alam Perairan” (Marine Wildlife Reserve), “Taman Nasional Perairan” (Marine National Park), “Taman Wisata Perairan” (Marine Recreational Park) and “Suaka Perikanan” (Fisheries Refuge). The MPA may be managed by local government, Ministry of Marine Affairs and Fisheries, or Ministry of Forestry. The following figure shows the locations of marine protected areas.
2. POLICIES AND INSTITUTIONAL FRAMEWORK

2.1 Institutional framework (Governmental structure)

According to the State Constitution (UUD 1945), there are six organs of state. Sovereignty in Indonesia is vested in the people, who exercise their will through the People's Consultative Assembly (MPR). Full executive authority is vested in the president, who is elected by and responsible to the MPR. Legislative power is shared with the House of People's Representatives (DPR). The president is advised by the Supreme Advisory Council, whereas the State Audit Board exercises financial oversight. At the apex of the judicial system is the Supreme Court.

The Indonesian cabinet consists of 4 coordinating ministers:
- Coordinating Minister for Legal, Political and Security Affairs
- Coordinating Minister for the Economy
- Coordinating Minister for People’s Welfare
- State Secretary
There are 29 ministerial led by ministers, four of them are given an authority to rule marine affairs at certain circumstances or to erect maritime related research institutes, i.e.:

- Minister of Energy and Mineral Resources
- Minister of Forestry
- Minister of Marine Affairs and Fisheries
- Minister of Research and Technology

2.2 National Policies related to the marine/coastal environment

On 6 July 1986 Indonesia has accepted the UNESCO Convention Concerning the Protection of the World Cultural and Natural Heritage. A number of laws concerning fisheries and other marine resources along with regulations have been established and provide some legal basis for government institutions to manage coastal and marine fisheries resources. These are:

- Law No 1/1973 on Indonesian Continental Shelf, continental shelf of Indonesia 200 nautical miles include exploration and exploitation of seabed and prevention of pollution
- Law No 5/1983 on Indonesian EEZ, 200 miles of the economic exclusive zone include the exploitation and preservation of its resources
- Law No. 5/1990 on Conservation and Ecosystem of Natural Resources
- Law No 6/1996 on Indonesian Territorial Water, 12 nautical miles of the territorial waters of Indonesia including innocent passages and conservation
- Government Regulation No. 15/1984 on management on Fisheries Resources in Indonesia’s EEZ, which includes:
  a) Cooperation with foreign companies and issuance of licenses for resource use,
  b) Ministry of Agriculture established total allowable catch (TAC), fishing allocation, numbers of fishing vessels and fishing gear, and Fishing Fees
- Ministry of Agriculture Decree No. 607/1976 concerning fish zoning;
- Ministry of Agriculture Decree No. 51/1997 concerning payous use and installations; and
- Ministry of Agriculture Decree No. 8056/1995 and Ministry of Marine Affairs and Fisheries Decree No. 1/2013 concerning the use of fish transport vessels and monitoring.
- Ministry of Marine Affairs and Fisheries Decree No. 10/2013 on the monitoring system of fishing vessels.
- Ministry of Marine Affairs and Fisheries Decree No. 13/2012 & 7/2013 on certification of sea grass and fishing products.

Regarding resource access for small-scale fishermen, the government has established the following policies:

- Ministry of Agriculture Decree No. 607/1976 on fishing grounds. This regulation is intended to protect the fishing grounds of small-scale fishers. Large-scale fishers are prohibited from entering the fishing
- Ministry of Marine Affairs and Fisheries Decree No. 4/2013 regarding manual on the development of small-scale business;
- Ministry of Agriculture Decree No. 509/1975 on partnership fisheries management.
Ministry of Agriculture Decree No. 51/1997 on fish aggregating device, installation and use;

It should be noted that most of ministerial regulations dated before 1999 were issued by the Ministry of Agriculture or before the establishment of the Ministry of Marine Affairs and Fisheries. The newer laws and regulation that may relate to marine areas, coastal zones and small islands are:

- Law No 32/2004 on Autonomy, devolution of power from central government to local government including the authority to manage marine resources 4 nautical miles for municipal level and 12 miles for provincial level
- Law No 26/2007 on Spatial Planning, zoning and spatial planning including coastal areas
- Law No.27/2007 on coastal zones and small islands management
- Law No 32/2009 on Management and Protection of Environment
- Presidential Regulation No.78/2005 on management of small islands
- Presidential Instruction No.02/2002 on marine sand mining control
- Presidential Regulation No.85/2007 on national spatial data network
- Presidential Regulation No.94/2011 on the establishment of the national spatial data agency
- Ministry of Marine Affairs and Fisheries Decree No.12/2013 regarding supervision of coastal zones and small islands management
- Ministry of Marine Affairs and Fisheries Decree No. 17/2013 regarding reclamation permit on coastal zone and small islands

Most of ministerial level technical rules and policies are prepared by Directorate General for Marine Affairs, Coastal Areas and Small Islands, Ministry of Marine Affairs and Fisheries. Technical rules and policies related to coastal (including coral reef) conservation are also issued by Directorate General of Forest Protection and Nature Conservation, Ministry of Forestry. This authority was inherited since 1970 – 1995, when Ministry of Marine Affairs and Fisheries has not been established. Since 2004, Ministry of Marine Affairs and Fisheries was also given a responsibility in the development and management of MPAs with main objective to sustain marine capture fisheries. The main difference of both is that the Ministry of Forestry seem to be centralistic in managing MPAs, with minimum involvement of local government and stakeholders. Regional governments do not have mandate to manage coastal fishery resources. They cannot directly take the necessary actions to deal with problems. In reality, the regional governments do engage in coastal and marine fishery regulation, but such actions have led to legal and technical constraints. In contrast, MPAs managed under Ministry of Marine Affairs and Fisheries has the opportunity to involve more and wider stakeholders.

Another instrument of importance for the protection of natural parks and reserves in the Southeast Asian region is the ASEAN Declaration on Heritage Parks and Reserves (Bangkok, 29 November 1984). This Declaration made under the auspices of the Association of Southeast-Asian Nations (ASEAN) The declaration concerns with the necessity to preserve and protect national parks and nature reserves of the ASEAN member countries. There is no specific reference to marine parks and reserves, but the general endorsement provided for protected areas in this instrument is equally applicable to both terrestrial and marine environments.
Other national institutes working on marine affairs are mostly mapping agencies, and research and development institutes, these are:

- Agency for Geospatial Information (BIG), formerly National Coordinating Agency for Survey and Mapping (BAKOSURTANAL).
- Agency for Meteorological, Climatology and Geophysics Institute of Indonesia (BMKG).
- Agency for the Assessment and Application of Technology (BPPT).
- Indonesian Navy Hydrographic and Oceanographic Service (DISHIDROS TNIAL).
- Agency for Marine and Fisheries Research (Balitbang KP-KKP), Ministry of Marine Affairs and Fisheries.
- Research Centre for Oceanography, Indonesian Institute of Sciences (P2O-LIPI).

2.3 National marine data policy or other marine data policies being used

Marine data and information in Indonesia may be categorized into 3 groups:

- Data and information kept by national research institutions, mainly to support their tasks or roles at a specific sector.
- Data and information kept by local institutions, mainly the ones with coastal and sea territories to support their development, such as local coastal management and exploitation of marine resources.
- Data kept by private users such industries.

These groups of data may also have spatial attributes, and due to the complexity of the data and infrastructures, each government body which is in charge for a specific sector is responsible for the development of their own data infrastructure, acquisition, quality, archival and dissemination of data and information. This situation, of course, has created many difficulties among data users, and for this reason in mid 2000’s two concepts were proposed as an umbrella for legal data policy, they are:

- Academic manuscript on marine data exchange policy (Naskah Akademik Kebijakan Pertukaran Data Kelautan) and
- Institutional manuscript on national spatial data infrastructure (Naskah Kelembagaan Infrastruktur Data Spasial Nasional, IDSN).

The marine data exchange policy manuscript is the result of an assessment by the IOC National Commission coordinated by LIPI (Indonesian Institute of Sciences). The national spatial data infrastructure manuscript is the result of IDSN coordination meeting with the SURTANAS (National Survey and Mapping) forum, coordinated by BIG (Badan Informasi Geospasial, Agency for Geospatial Information, formerly Bakosurtanal). The Presidential Regulation No. 85/2007 has then accommodated these concepts. Under this regulation, every government body which hold its own sector may be regarded as a node within national spatial data network, and BIG has been appointed as a connecting agency of the network.

Since the last 2 years there has been an initiation of One Map Policy, which was in response to the discrepancy of land cover map produced by the Ministry of Forestry and the Ministry of Environment. One Map Policy was firstly implemented by generating Map of Moratorium on New Licenses in Primary Natural Forests and Peat Lands. The Geospatial Information Law No. 4/2011 has pointed the BIG to conduct One Map Policy.
2.4 International agreements and conventions undersigned by the Indonesian Government

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<td>International Convention on Standards of Training, Certification &amp; Watch Keeping for Seafarers, 1978</td>
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Notes: KEPRES = Presidential Decision; Undang-undang = Law or Act.

3. NATIONAL CAPABILITIES

3.1 National institutions of higher education and training related to marine/coastal research and management

Educational institutes equivalent to university with an interest in fisheries include:

- Faculty of Fishery and Marine, Bogor Agriculture Institute, Bogor.
- Faculty of Marine and Fishery, Diponegoro University, Semarang.
Faculty of Marine and Fishery, Hasanuddin University, Ujung Pandang.
Faculty of Marine and Fishery, Samratulangi University, Manado.
Faculty of Fishery and Marine, Pattimura University, Ambon.
Faculty of Fisheries and Marine, Riau University.
Faculty of Fisheries, Brawijaya University, Malang.
Diponegoro University, Semarang.
Andalas University, Padang
Fishery University, Jakarta.
Pajajaran University, Bandung.

Educational institutes equivalent to High School include:
Fishery High School in Tegal, Central Java Province.
Fishery High School in Pariman, West Sumatra Province.
Fishery High School in Banda Aceh, Aceh Province.
Fishery High School in Belawan, North Sumatra Province.
Fishery High School in Pontianak, West Kalimantan Province.
Fishery High School in Aertembaga, North Sulawesi Province.
Fishery High School in Ujung Pandang, South Sulawesi Province.
Fishery High School in Ambon, Maluku Province.
Fishery High School in Sorong, West Papua Province.
Fishery High School in Singaraja, Bali Province.

3.2 National organizations involved in marine/coastal research and management (by sector)
Fisheries and Aquaculture managed by Ministry of Marine Affairs and Fisheries
Manufacturing industries managed by Ministry of Industry
Ports and Harbours managed by Ministry of Transportation
Fishing Ports and Harbours managed by Ministry of Marine Affairs and Fisheries
Energy production managed by Ministry of Energy and Mineral Resources
Hydrocarbon Exploration and Exploitation managed by Ministry of Energy and Mineral Resources
Recreational industry and Tourism managed by Ministry of Tourism and Creative Economy
Marine Parks and Reserves managed by Ministry of Marine Affairs and Fisheries and Ministry of Forestry

3.3 Current operational relationships between the national organizations
Before 1999 there was no specific legislation concerning marine and coastal resource management. Marine and coastal management was sectoral in approach. The regulation regarding marine management and coastal areas is based primarily on Law no 9/1985 on fisheries, Law no 5/1990 on conservation of living natural resources; and Law no 23/1997 on environment management. The enactment Law no 31/2004 (supersedes Law no. 9/1985) and Law no 27/2007 (on coastal zones and small island management) imply that most of marine affairs, fisheries and coastal management is under the responsibility of the Ministry of Marine Affairs and Fisheries. However, a part of this responsibility has to be shared with local government under Law No 32/2004 on governmental autonomy. The lack of capacity of local government level, unfortunately, has hampered the management of coastal zones, despite the long standing interest in improving national capacity for the development of the vast marine and coastal resources of the Indonesian archipelago.
3.4 Current national arrangements for the management and archival of data and information related to marine/coastal research and management

As stated on 2.3, each government body within its own sector is responsible for the development of their own data infrastructure, acquisition, quality, archival and dissemination of data and information. Every ministerial has its own centre of data and information, which usually called *Pusat Data dan Informasi* (Pusdatin).

The Article 46 of the Fisheries law No 31/2004 states that Indonesian government, i.e. Ministry of Marine Affairs and Fisheries, has to arrange and develop information system and fishery statistics, and to conduct data acquisition, processing, keeping, presentation and dissemination of data on potencies, infrastructures, productions, handling, processing and marketing of fishery products, and also social and economic data related to the management of fishery resource and its business development. This means that the Ministry of Marine Affairs and Fisheries appears to be the management of Indonesia’s fisheries, including marine, fresh and brackish-water fisheries, as well as aquaculture. These tasks include research, fishery management, ports, fishing vessels, business and investment issues, aquaculture infrastructure, hatcheries and fish health, fish processing and marketing (including fish product standards), as well as the monitoring and control of fishing activities.

3.5 Current human resources involved in marine/coastal research and management, as well as the management and archival of related data and information

Since the Ministry of Marine Affairs and Fisheries has to manage fisheries and marine affairs, including coastal areas and small islands, the following government bodies and persons of echelon levels I and II have to manage sub-sectors within the ministry.

**EXPERT STAFF:**
- Expert Staff of Society and Institutional Relation
- Expert Staff of Ecology and Marine Resources
- Expert Staff of Public Policy
- Expert Staff of Economy, Social, and Culture

**SECRETARY GENERAL:**
- Bureau of Finance
- Bureau of Personnel
- Bureau of Planning
- Legal and Institutional Affairs
- General Affairs Bureau
- Data Statistics and Information Center
- Center of Analysis for International and Institutional Cooperation

**DIRECTORATE GENERAL OF CAPTURE FISHERIES:**
- Directorate Fishing Port
- Directorate Fishing Vessel and Gear
- Directorate Fishing Business Development
- Directorate Fishing Business Service
- Directorate Fisheries Resources

**DIRECTORATE GENERAL OF AQUACULTURE:**
3.6 Current available national data systems related to marine/coastal research and management, as well as the management and archival of related data and information. Every directorate general (echelon I) in the Ministry of Marine Affairs and Fisheries has duty to record and update data related to its own sub-sector. The data is then flown to the Data Statistics and Information Center (Pusdatin), which
is responsible for archival and public related data services. Spatial data related to coastal area and small island is managed by Directorate General Marine, Coastal, and Small Islands and is still under development with BIG (Agency for Geospatial Information). The following are web sites related to the national data systems on marine, coastal area and small islands:
http://statistik.kkp.go.id/
http://www.ppk-kp3k.kkp.go.id/
http://maps.ina-sdi.or.id/home/index.html

3.7 Current available national libraries related to marine/coastal research and management, as well as the management and archival of related data and information

Physical library is usually available on each structural level on the ministry in Indonesia. At this level of library, collection is limited to the field of its sector or sub-sector, usually concerning reports of sectoral research. A national library related to marine and coastal research and management is managed by the Ministry of Marine Affairs and Fisheries. Even though the library of open to the public, the membership of this library is limited to staffs of the ministerial. These are web sites of the Ministry of Marine Affairs and Fisheries Library:

http://perpustakaan.kkp.go.id
http://perpustakaan.kkp.go.id/union

4. NATIONAL NEEDS

Under the Law No 32/2004 on Autonomy, decentralization has created significant challenges for fishery management. There is a need to move away from the structural command and control view to a new system where each level of government improves the functional aspects, particularly in services, to the country and community. Therefore very broad capacity building is still needed, especially for the lower of level governments such as district and provincial levels.

From a resource management perspective the capacity building should:
   a. improve the knowledge of resources,
   b. help develop management approaches for those resources and help implement the management.

There is also a need to improve institutional professionalism at district and provincial levels since additional technical responsibilities devolved to these level of governments, new professional staff need to be recruited and trained accordingly.

As the other technical ministerial in Indonesia, the Ministry of Marine Affairs and Fisheries do manages a training centre which is conducted by the Agency for Marine and Fisheries Human Resources (http://www.bpsdmkp.kkp.go.id/). The agency manages 3 fishery academies, 8 senior high schools of fishery, and 6 training centres of fisheries in some cities in Indonesia. However, their program priority is limited on the education and training skills on aquacultures, handling the products and small scale businesses. None of them are dedicated to train specifically on marine/coastal research and management, as well as the management and archival of related data and information.

A training programs for higher education that link a gap between resource assessment and management is also needed. Such gap may be due to institutional and coordinative issues. Therefore such training should focus on alternate views of fishery management
that incorporate concepts of ecosystem based management, the role of protected areas, the consideration of climate fluctuations, and interspecies relationships.

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http://www.gbgindonesia.com  
http://www.indonesia-investments.com  
http://www.kkp.go.id/  
http://www.bps.go.id/

NOTES

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1. GENERAL BACKGROUND INFORMATION

1.1 Geographical framework.  
Japan is an island nation located off the eastern seaboard of the Eurasian continent. The Japanese archipelago stretches over 3,200 kilometers. Situated in
the northern hemisphere, between approximately 20 degrees to 45 degrees north latitude stretching from north-east to south-west, it comprises the main islands of Hokkaido, Honshu, Shikoku, Kyushu and Okinawa, and more than 6,800 smaller islands of varying sizes. Its surface area totals 377,960 square kilometers, a figure equivalent to 0.3 percent of the global land mass. Mountains and hilly terrain account for 66.3 percent of the nation’s land area, plateau 13.0 percent, lowlands 17.2 percent, and inland bodies of water 3.5 percent.

1.2 Demography.
In 2012, Japan had a total population of 127 million. Japan’s population in 2012 was the tenth largest in the world, equivalent to 1.8 percent of the global total. Its population density measured 341.9 persons per square kilometer, for a ranking of ninth among countries with a population of 10 million or more. Average life expectancy in Japan climbed sharply after World War II, and is today the highest of any country worldwide. In 2012, life expectancy for women was 86.41 year, compared to 79.94 years for men.

1.3 Economy.
GDP in Japan was worth 5,960 billion US dollars in 2012.

1.4 Coastal Resources Utilization and Development
1.4.1 Fisheries and Aquaculture.
Gross fisheries and aquaculture production was 5.31 million tons in 2010, which was equivalent to 148.26 billion US dollars.
The number of people engaged in fishing industries in 2010: 203,000
1.4.2 Manufacturing industries.
New ships built in 2011 were 19.37 million gross tons, which was the third largest in the world, equivalent to 19.0 % of the global total.
1.4.3 Ports and Harbours.
The number of ports/harbours: 996 (as of 1 April 2012)
The number of fishing ports: 2,914 (as of 1 October 2011)
1.4.4 Energy production.
Not identified.
1.4.5 Hydrocarbon Exploration and Exploitation.
The resources that are used for generating energy comprise fossil resources such as crude oil, natural gas, and coal, as well as uranium used as fuel for nuclear power generation. About 96 % of the energy resources supplied in Japan are imported from overseas. These energy resources are called primary energy.
Oil accounts for about 47 % of the primary energy supplied to Japan. Although this percentage has been declining from 77 % in the peak year of 1973, the share is still the largest of all energy resources. Japan has progressively made efforts to secure independently developed crude oil resources for which Japan owns the right to explore or develop oil fields, and so forth. As a result, the ratio of crude oil resources independently developed by Japan improved gradually from about 8 % in FY 1973 to about 15 % in FY 2013, but is still far behind other countries. For this reason, the government is promoting the technological development for the commercial production before any other country in the world for the purpose of using the methane hydrate as one of the future energy resources alternative to oil.
1.4.6 Mines and quarries.
Not identified.
1.4.7 Recreational industry and Tourism.
The number of pleasure boats including yachts: 303,516 (as of 2009)
Small-boat captain’s license holder: About 3.27 million people (as of 2011)

1.4.8 Marine Parks and Reserves.
Total area of marine parks and reserves was 1,994.4 hectares, the sum of 68 sites in 32 districts in 15 quasi-national parks.

2. POLICIES AND INSTITUTIONAL FRAMEWORK

2.1 Institutional framework (Governmental structure).

2.2 National Policies related to the marine/coastal environment.
- Basic Act on Ocean Policy [Effective July 2007]
  Main Objectives: With regard to the oceans, to stipulate the basic principles as well as to formulate the basic plan with regard to the oceans and other basic matters with regard to the measures on the oceans in order to promote measures with regard to the oceans comprehensively and systematically.
- Basic Plan on Ocean Policy [Effective March 2008]
  Main Objectives: 1) To take lead role in addressing global challenges of the ocean. 2) To lay the foundation of sustainable utilization of abundant marine resources and marine space. 3) To contribute in the filed of marine-related activities to the realization of a secure and safe life of the people.

2.3 National marine data policy or other marine data policies being used.
International Oceanographic Data and Information Exchange (IODE) Policy.

2.4 International agreements and conventions undersigned by the Government.
UNCLOS, MARPOL, London Convention, OPRC, OPRC-HNS Protocol, Convention on Biological Diversity, etc.

1. NATIONAL CAPABILITIES

3.1 National institutions of higher education and training related to marine/coastal research and management.
1 Major national universities providing courses related to marine sciences for undergraduate and graduate students:
  Univ. of Tokyo, Hokkaido Univ., Tohoku Univ., Tokyo Univ. of Marine Science and Technology, Tokyo Univ. of Agriculture and Technology, Nagoya Univ., Kyoto Univ., Kobe Univ., Hiroshima Univ., Ehime Univ., Kyushu Univ., Nagasaki Univ., Kagoshima Univ., Kyushu Univ., and many other universities having lectures and/or laboratories.
2 Major private universities:
  Kitasato Univ., Tokai Univ., Tokyo Univ. of Agriculture, and some others
3 Research Institutes in educational sectors:
   - Atmosphere and Ocean Research Institute of The University of Tokyo (AORI/U Tokyo), Center for Marine Environmental Studies of Ehime Univ., Research Institute for Applied Mechanics of Kyushu Univ., and some others

3.2 National organizations involved in marine/coastal research and management (by sector):
   - Japan Agency for Marine-Earth Science and Technology (JAMSTEC)
   - Japan Oil, Gas and Metals National Corporation (JOGMEC)
   - Japan Aerospace Exploration Agency (JAXA)
   - Japan Meteorological Agency (JMA)
   - National Research Institute of Fisheries Science, Fisheries Research Agency
   - National Institute of Polar Research (NIPR)
   - National Museum of Nature and Science
   - Japan Hydrographic and Oceanographic Department (JHOD)

3.3 Current operational relationships between the national organizations (diagram). Same as the above item 2.1.
   * Note: IOC-related issues are taken care of by Ministry of Education, Culture, Sports, Science and Technology.

3.4 Current national arrangements for the management and archival of data and information related to marine/coastal research and management (by sector).
   Japan Oceanographic Data Center (JODC) has been acting as the national node for oceanographic data and information exchange in the framework of the IOC since mid-1960s, under close collaborations with national agencies and research institutes related to marine science in Japan. Marine Information Research Center (MIRC) of Japan Hydrographic Association has been playing a role in technical supports for oceanographic data management since mid-1990s. Marine Information Clearing House (MICH) was established and has been operated as one of the actions required by the national basic plans of ocean policy.

3.5 Current human resources involved in marine/coastal research and management, as well as the management and archival of related data and information (by sector).
   As some sort of possible estimation, there are approximately 2000 members and 3500 members in the Oceanographic Society of Japan (OSJ) and Japan Society for Fisheries Sciences (JSFS), respectively. The former is mainly for basic research in marine science and oceanography, while the latter, probably rather unique situation of Japan, is for fisheries sciences. Some of the scientists register both. With regard to data and information management, about 100 technical staff members in total are responsible for them in related agencies including JODC, Japan Meteorological Agency, Fisheries Agency, JAMSTEC, and other.

3.6 Current available national data systems related to marine/coastal research and management, as well as the management and archival of related data and information (by sector).
   - The Biological Information System for Marine Life (BISMal) operated by JAMSTEC
     - [http://www.godac.jamstec.go.jp/bismal/e/index.html](http://www.godac.jamstec.go.jp/bismal/e/index.html)
   - JODC Data On-line Service System (J-DOSS) operated by JODC.
The above two websites can be accessed via "Marine Information Clearinghouse (MICH)"

3.7 Current available national libraries related to marine/coastal research and management, as well as the management and archival of related data and information (by sector). Libraries in universities listed in the section 3.1 archive books and documents related to marine science. JODC and JAMSTEC have both been appointed as Japan's national repository center for IOC-related documents.

4. NATIONAL NEEDS
Describe all national needs (organizational, educational, infrastructural) related to items 3.1-3.7 as well as any other.
N/A.

III.5. REPUBLIC OF KOREA

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1. GENERAL BACKGROUND INFORMATION

1.1 Geographical framework
Total land area of Republic of Korea is 100,033 sq km (2011), and located in the southern part of the Korean peninsula. The Korean Peninsula extends southward from the northeastern part of the Asian continent, between 33~43°N/124~131°E. Korea is surrounded by the Yellow Sea to the west, the East China Sea to the south, and the East Sea to the east.

1.2 Demography
The population of Korea reached 51,034,494 on May 2013. In terms of population density, there are 511 people per 1km². Out of the total population, 10,181,807 people, or roughly 20% of the population, live in Seoul. Other large and economically advanced cities such as Busan (population of 3,536,426), Incheon (2,859,335), Daegu (2,505,083), Daejeon (1,529,085), Gwangju (1,471,801) and Ulsan (1,151,340) have a higher population density than other cities in Korea.
(Source : Ministry of security and public administration of Korea (www.mospa.go.kr))

1.3 Economy
Per Capita GNI: US$ 22,708 (2012)
GDP Growth Rate: 2.0% (2012)
Exports: US$ 548 billion (2012)
Imports: US$ 520 billion (2012)
(Source: http://www.korea.net/)

1.4 Coastal Resources Utilization and Development
1.4.1 Fisheries and Aquaculture

The total fisheries production in 2009 was 3.182 million metric tonnes. The value of the fisheries production in 2009 was KRW 6.92 trillion (Fig. 1). The total catches from coastal and offshore, distant waters, and inland fisheries was 1.87 million MT (valued at KRW 5.078 trillion) in 2009. In coastal and offshore fisheries, the production in 2009 totalled at 1.23 million MT. The major species in coastal and offshore fisheries were anchovy, squid, mackerel, and hairtail. In particular, the catch of anchovy, which accounts for the largest proportion of the total catch, amounted to 203,728 MT in 2009. The production of mackerel was 175,329 MT. The production of squid was 189,160 MT in 2009. In distant water fisheries, production in 2009 totalled 612,000 MT. The area devoted to aquaculture in 2009 was 138,867 hectares. Aquaculture production in 2009 was 1,313,000 MT (KRW 1,846,300 million). The major species in aquaculture are flatfish, jacopever, oyster, short-necked clam, sea mussel, laver, and brown seaweed.

![Graph showing capture and aquaculture production](source)

**Figure 1.** Harvesting and aquaculture production (tonnes)

During the last decade, as part of the effort to build a fisheries management system for sustainable fisheries, the government has introduced the Total Allowable Catch (TAC) system, the Community-based Fisheries Management (CBFM) scheme and relevant policies to recover fish stocks. The TAC system was applied to seven species in 2001 after a trial period of two years. In 2009, the system extended to 11 species. Since the CBFM scheme was implemented in 2001, 758 communities and an estimated 56,000 fishermen have been participating. Fish stock recovery policies, in particular the Fish Stock Rebuilding plan (FSRP), combined with conventional measures were adopted in 2005 with the purposes of maintaining the optimal levels of fish stocks based on the ecosystem and promoting sustainable utilisation of fisheries resources. By 2009, 12 species were included in this stock recovery plan, which so far has had very good results. These efforts have led to an increase of Catch per Unit Effort (CPUE), a stock indicator, since 2000 and the catch per vessel horse power has been recovering since 2003. The single most important species landed in 2008 in terms of value were shellfish and molluscs (21%), followed by tuna (17%), crustaceans (14%), and pelagic (9%). The total export value of fisheries products in 2009 was USD 1.511 billion (652,214 MT). Exports were mainly to Japan, the United States, and China. The total import value of fisheries products was USD 2.895 billion (4,080,425 MT). Imports were mainly from China, Russia, and Vietnam.

The culture-based Fishery Promotion Act was established on 14 January 2002. In accordance with this Act, the government set up a five-year basic plan to promote culture-based fisheries. In addition, the Aquatic Animal Disease Management Act was legislated on December 2007 in order to establish an
efficient response system to cultivated fish diseases and to ensure the safety of imported fishery products. As part of the efforts to promote sustainable and responsible fisheries development and an ecosystem-based aquaculture management, the Korean Government is taking measures to encourage environment-friendly offshore aquaculture as opposed to inland aquaculture. In 2009, the Plans to Promote Eco-Friendly and High Valued Added Offshore Fisheries was developed. It aims to establish six areas for offshore aqua farms (four bluefin tuna farms, two for other species) and to lay the R&D foundation for “complete tuna farming”, which encompasses the entire life cycle of tuna.


1.4.2 Manufacturing industries
Shipbuilding companies in Korea remain first in the world market ranking order (Korea accounted for 35% of all orders in volume) by receiving orders for 75 million CGT ($30 billion) in 2012. And, they tried to diversity their product mix and concentrate on high value added ships.
(Source: energy.korea.com/archives/42677)

1.4.3 Ports and Harbours
Korea has 11 ports throughout the country. The biggest and most well known are Busan and Incheon. The overall traffic of national harbor was recorded 117,111,000 tonnes. This is 10.6% year-over-year(YoY) increase, the amount rose 5.9% from the previous month. Import and export cargo volume of 4.0%, 17.4% YoY respectively and the transshipment cargo volume rose 38.4% YoY. And in July 2011 for domestic traffic in the Port's container TEU 1,892,000, which is the increase of 10.2% YoY in 2011, the cumulative traffic in 2011, in 755,301,000 ton, which is 8.5% YoY. Also, accumulation of domestic port traffic in 2011, TEU 12,424,000 with a YoY rose 11.2%. Below is the status of each port.
(Source: The status and outlook for Korea major port facilities and traffic in 2011, Marine and Shipbuilding Monthly (Special Report), 2012)

1.4.4 Energy production
Korea was the world’s tenth largest energy consumer in 2011. With its lack of domestic reserves, Korea is one of the top energy importers in the world. In 2011, the country was the second largest importer of liquefied natural gas (LNG), the third largest importer of cal, and the fifth largest importer of crude oil. Korea has no international oil or natural gas pipelines, and relies exclusively on tanker shipments of LNG and crude oil. Despite its lack of domestic energy resources, Korea is home to some of the largest and most advanced oil refineries in the world. In an effort to improve the nation's energy security, oil and gas companies are aggressively seeking overseas exploration and production opportunities. Although oil accounted for the largest portion (42%) of Korea's primary energy consumption in 2011, its share has been declining since the mid-1990s, when it reached a peak of 66%. This is attributed to the steady increase in natural gas and nuclear energy consumption.
Korea generated about 485 billion kWh of net electricity in 2011. Of this amount, 69% came from conventional thermal sources, 30% came from nuclear power, and roughly 1% came from renewable sources. Although thermal capacity is dominant in Korea at present, nuclear power is sent to expand over the next decade, along with significant investment in offshore wind farms.
When it comes to the ocean energy production in Korea, the only tidal power plant built so far is Sihwa Tidal Power Plant (TPP) near Incheon, the highest-capacity tidal power plant in the world now. Located about 20 km south of Incheon, the power plant started to operate in 2011. Its capacity of 254MW
surpassed the previous record-holder, the 240 MW Rance Tidal Power Station in France. The Sihwa station is registered as a Clean Development Mechanism project under the United Nations Framework Convention on Climate Change (UNFCCC).


1.4.5 Hydrocarbon Exploration and Exploitation
Korea is surrounded by the Yellow Sea, the East Sea and South with extensive continental shelves (~3,000,000 km²) on which there might be potentials for oil and gas exploration. Since some western oil companies (e.g., Gulf, Shell and Koam corporation) explored the shallow waters between 1972 and 1982, KNOC (Korea National Oil corporation) has begun working on the potential areas, acquiring about 116,549 L-Km of 2D seismic data and 3,192Km² 3D seismic data and drilling 45 wells. In 1998, the KNOC finally discovered a commercially viable gas field in Block 6-1, named Donghae-1 which is referred to as East Sea, offshore Korea. The discovery is located about 60 km southeast of the Ulsan, Korea and its recoverable reserves are estimated to be 186 billion cubic feet of natural gas and 32 mmbbl of condensate. Although not gigantic, the gas field is the first commercial hydrocarbon development in Korea, gaining attention throughout the world. In addition to the gas discovery, therefore, the large area of gently sloping submerged shelves has remained unexplored, including three offshore sedimentary basins (Ulleung Basin, Yellow Basin, and Jeju Basin). While natural gas production from Donghae-1 began in November 2004, oil production did not begin until 2010 after further exploration and discovery. In 2011, KNOC produced 1,000 bbl/d of ultra-light crude (condensates), representing a negligible portion of its 2.2 million bbl/d total petroleum consumption, nearly all of which is imported. South Korea, which has been exploring at depths of less than 500 feet, plans to explore its domestic basins at depths greater than 1,000 feet. KNOC will continue production operations until 2018, when the project will be converted into an offshore storage facility. State-owned Gas Hydrate research & Development has conducted studies of deposits of methane hydrates in the Sea of Japan, and the government has previously announced plans to start extracting methane hydrates from the sea by 2015.

(Source: www.knoc.co.kr/ENG/sub03/sub03_1_1_4.jsp, U.S. Energy Information Administration)

1.4.6 Mines and quarries
The country had limited mineral and energy resources for consumer goods and for its manufacturing sector and depended on imports of the raw materials for the production of processed mineral products. In 2011, the growth rate for mining and quarrying was -4.6%; the manufacture of non-metallic mineral products, 1.9%; the processing of petroleum, coal, and chemicals combined, 4.3%; and the production of metals, 9.6%. the number of persons employed in the mineral industry decreased to 5,900 from 19,000 in 2010, and nominal wages in the mining and quarrying sector increased to 10.3% from 7.3% in 2010 (Bank of Korea, 2012).

1.4.7 Recreational industry and Tourism

The direct contribution of Travel & Tourism to GDP was KRW26,651.8bn (2.1% of total GDP) in 2012, and is forecast to rise by 1.6% in 2013, and to rise by 4.1% pa from 2013-2023, to KRW40,444.5bn in 2023 (in constant 2012 prices). The total contribution of Travel & Tourism to GDP was KRW 75,284.5bn (5.9% of GDP) in 2012, and is forecast to rise by 1.4% in 2013, and to rise by 3.5% pa to KRW107,605.0bn in 2023. In 2012 Travel & Tourism directly supported 617,500 jobs (2.5% of total employment). This is expected to fall by 0.2% in 2013 and rise by 1.2% pa to 691,000 jobs (2.7% of total employment) in 2023. In 2012, the total contribution of Travel & Tourism to employment, including jobs indirectly supported by the industry, was 6.4% of total employment (1,584,000 jobs). This is expected to fall by 0.7% in 2013 to 1,573,500 jobs and rise by 0.3% pa to 1,614,000 jobs in 2023 (6.3% of total). Visitor exports generated KRW23,299.4bn (3.2% of total exports) in 2012. This is forecast to fall by 1.2% in 2013, and grow by 6.1% pa, from 2013-2023, to KRW41,721.3bn in 2023 (2.7% of total). Travel & Tourism investment in 2012 was KRW7,760.4bn, or 2.2% of total investment. It should rise by 3.1% in 2013, and rise by 4.9% pa over the next ten years to KRW12,852.7bn in 2023 (2.3% of total).

(Source: Travel & Tourism Economic Impact 2013 South Korea, World Travel & Tourism Council. 2013)

1.4.8 Marine Parks and Reserves

National parks of Korea are considered as 'the areas that represent the natural ecosystem and cultural scenes of the Republic of Korea. There are four Marine & Coastal national parks. In 1968, Hallyeohaesang National Marine Park was designated as the fourth national marine park in Korea. Hallyeohaesang is a unique marine ecosystem which extends along the 120km shoreline from geoje in gyeongsannam-do province to Yeosu in Jeollanam-do province. Taehaehaesang National Park was designated as the national park in Korea in 1978. There are 26 beaches along the 230km coastline, which encompasses the Taean Peninsula and Anmyeondo. Dadohaehaesang National Park is the largest nation park in Korea, which expands across seven coastal areas in the South and West Sea. It was designated as the 14th national park in Korea in 1981, which spans over 2,321km² with 334.8km² being land and 1,990km² being water. Byeonsanbando National Park is the only peninsula based park in Korea with a mix of mountains and sea. It was designated as the 19th national park in Korea in 1988, with a total area of 154km².

In Korea, research is underway to establish an integrated policy framework for the management of Marine Protected Areas (MPAs) and coastal protected areas. Marine and coastal protected areas (MCPA) can be established through nine different pieces of legislation under four different ministries. There are thus nine designation types: Wetland Protected Areas; Coastal and Marine National Parks; Fisheries Resources Protected Areas; Ecosystem Reserves; Bird Habitats; Uninhabited Island for Special Protection; Natural Heritage; and Underwater Landscape Sites. Nam et al. (2005) list 423 coastal and marine protected areas covering 9,274 km² (including coastal sites that may not have inter-tidal or sub-tidal habitat). An estimated 2.1% of national waters are protected and 13.0% of the territorial sea. Plans are underway to establish a National Management Committee for MCPAs and to develop a national policy to give guidance on harmonizing approaches and methods. In addition, in 2003, the Korea Maritime Institute proposed that a Co-managed MPA System (COMPAS) should be developed for the border area between the Republic of Korea and the Democratic People’s Republic of Korea. This has not yet gone ahead because of political reasons, but initial discussions have been held on the potential for the establishment of a Marine Peace Park between the two Koreas (Nam et al., 2005).

(Source: http://english.knps.or.kr/knp)
2. POLICIES AND INSTITUTIONAL FRAMEWORK

2.1 Institutional framework (Governmental structure)

The Ministry of Oceans and Fisheries (MOF) in Korea assumes responsibility for affairs concerning maritime policies, fisheries, the development of fishery communities and water resources, the distribution of fishery products, shipping and ports, the maritime environment and related research, ocean science and technology R&D, and judging ocean safety (Table 1).

Table 1. Institutional Framework for Ministry of Oceans and Fisheries (Government structure)

<table>
<thead>
<tr>
<th>Planning &amp; Coordination Office</th>
<th>Marine Policy Office</th>
<th>Fisheries Policy Office</th>
<th>Shipping and Logistics Bureau</th>
<th>Maritime Affairs and Safety Policy Bureau</th>
<th>Ports and Harbors Bureau</th>
</tr>
</thead>
<tbody>
<tr>
<td>Policy Planning Bureau</td>
<td>Marine Industry Policy Bureau</td>
<td>Fisheries Policy Bureau</td>
<td>Shipping Policy Division</td>
<td>Maritime Safety Policy Division</td>
<td>Port Policy Division</td>
</tr>
<tr>
<td>General Policy Planning &amp; Budget Division</td>
<td>Marine Policy Division</td>
<td>Fisheries Policy Division</td>
<td>Coastal Shipping Division</td>
<td>Maritime Industry and Technology Division</td>
<td>Port Development Division</td>
</tr>
<tr>
<td>Creative Administration Division</td>
<td>Marine Development Division</td>
<td>Distribution and Processing Management Division</td>
<td>Seafarers Policy Division</td>
<td>Navigation Services Division</td>
<td>Port Investment Cooperation Division</td>
</tr>
<tr>
<td>Regulatory Reform and Legal Affairs Division</td>
<td>Marine Leisure Division</td>
<td>Income and Welfare Division</td>
<td>Port Logistics Planning Division</td>
<td>Maritime Safety Facilities Division</td>
<td>Port Area Development Division</td>
</tr>
<tr>
<td>Information Management Division</td>
<td>Coastal Planning &amp; Management Division</td>
<td></td>
<td>Port Management Division</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emergency Planning Division</td>
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<td></td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Marine Environment Policy Bureau</th>
<th>Fishery Resources Policy Bureau</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marine Environment Policy Division</td>
<td>Fishery Policy Division</td>
</tr>
<tr>
<td>Marine Conservation Division</td>
<td>Fisheries Resources Management Division</td>
</tr>
<tr>
<td>Marine Ecology Division</td>
<td>Guidance and Negotiation Division</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Overseas Fisheries &amp; International Policy Bureau</th>
<th>Fisheries Infrastructure and Aquaculture Policy Bureau</th>
</tr>
</thead>
<tbody>
<tr>
<td>International Cooperation Division</td>
<td>Fisheries Infrastructure &amp; Aquaculture Policy Division</td>
</tr>
</tbody>
</table>
2.2 National Policies related to the marine/coastal environment

There are 4 acts directly related to the marine/coastal environment

1. Framework act of oceans and fisheries development (Act No. 11709)
   - The purpose of this Act is to contribute to the development of the national economy and the improvement of national welfare, by determining the Government's basic policy and its directions for the rational management, preservation, development and utilization of the sea and marine resources, and the fostering of marine industries.

2. Marine environment management act (Act No. 11020)
   - The purpose of this Act is to make clear the obligations of the people and the responsibilities of the State for the preservation and management of the marine environment and prescribe basic matters for the preservation of the marine environment, thereby contributing to elevating the quality of life for the people by preventing harms which may be inflicted by a deteriorating marine environment and marine pollution and creating a clean and safe marine environment.

3. Coastal Management act (Act No. 11020)
   - The purpose of this Act is to prescribe necessary matters concerning the efficient preservation, use, and development of coasts, thereby contributing to enhancing the preservation of the coastal environment, facilitating the sustainable development of coasts, and creating pleasant and affluent coasts as the basis for people's lives.

4. Conservation and management of marine ecosystems act (Act No. 11690)
   - The purpose of this Act is to protect marine ecosystems from artificial damage and conserve or manage marine ecosystems in a comprehensive and systematic manner, such as conserving marine biological diversity and promoting the sustainable use of marine biological resources, thereby improving the quality of national life and protecting marine assets.
2.3 National marine data policy or other marine data policies being used
IOC oceanographic data exchange policy

2.4 International agreements and conventions undersigned by the Government

3. NATIONAL CAPABILITIES

3.1 National institutions of higher education and training related to marine/coastal research and management
- Seoul National University: School of Earth and Environmental sciences, Oceanography Major
- Pusan National University: Department of Oceanography
- Pukyoung National University: College of Environmental and Marine Science and Technology
- Korea Maritime and Ocean University: College of Ocean Science and Technology
- Jeju National University: College of Ocean Science
- Kunsan National University: Department of Oceanography
- Chonnam National University: Department of Oceanography
- Chonnam National University: College of Fisheries and Ocean sciences
- Chungnam National University: Oceanography & Ocean Environmental Sciences
- Gangneung-Wonju National University: College of Life Sciences
- Kyungpook National University: Department of Marine Sciences
- Oceans and Fisheries HRD Institute

3.2 National organizations involved in marine/coastal research and management (by sector)
- National Fisheries Research and Development Institute (NFRDI):
  - Fishery and Ocean Information Division
  - Marine Environment Research Division
  - Marine & Fisheries Environmental Impact Assessment Center
  - East Sea Fisheries Research Institute (ESFRI)
  - Fisheries Resources and Environment Division
- West Sea Fisheries Research Institute (WSFRI)
  - Fisheries Resources and Environment Division
- Southwest Sea Fisheries Research Institute (SSFRI)
  - Fisheries Resources and Environment Division
- Korea Hydrographic and Oceanographic Administration (KHOA)
  - Oceanographic Division
  - Ocean Research Division
  - Hydorgraphic Survey Division
  - Nautical Chart & Hydrographic Division
- Korea Meteorological Administration (KMA)
  - Marine Meteorology Division
- National Institute of Meteorological Research (NIMR)
  - Global Environment System Research Lab.
- Korea Coast Guard (KCG)
  - KCG Research Institute
3.3 Current operational relationships between the national organizations (diagram)

3.4 Current national arrangements for the management and archival of data and information related to marine/coastal research and management (by sector)
National Fisheries Research and Development Institute (NFRDI) operates Korea Oceanographic Data Center (KODC), and acts as NEAR-GOOS Korea National Delayed Mode Database (DMDB). Korea Hydrographic and Oceanographic Administration (KHOA) operates Korea Ocean Observing and Forecasting System (KOOFS), and acts as NEAR-GOOS Korea National Real Time Database (RTDB).

3.5 Current human resources involved in marine/coastal research and management, as well as the management and archival of related data and information (by sector)
   a. NFRDI/KODC (22 persons)
      - Data management: 14 persons
        real-time buoy: 1 person,
        satellite data: 2 persons,
        delayed-mode QC: 2 persons,
        ocean chemistry data: 3 persons,
        marine biology data: 6 persons,
      - IT specialist: 7 persons,
      - Librarian: 1 person,
   b. KHOA (10 persons)
      - Data management:
        operation of ocean information center, metadata management: 1 person
        delayed-mode QC: 1 person
        ocean observation data: 1 person
        sea-level data: 1 person
      - IT specialist: 6 persons

3.6 Current available national data systems related to marine/coastal research and management, as well as the management and archival of related data and information (by sector)
   - Korea Oceanographic Data Center (KODC)
     : operated by National Fisheries Research and Development Institute (NFRDI)
   - Korea Ocean Observing and Forecasting System (KOOFS)
     : operated by Korea Hydrographic and Oceanographic Administration (KHOA)

3.7 Current available national libraries related to marine/coastal research and management, as well as the management and archival of related data and information (by sector)
   - The National Library of Korea
   - National Assembly Library
   - Library of NFRDI: operated by Fishery and Ocean Information Division
   - Library of KHOA: operated by General Service Division
   - Maritime Library of National Maritime Museum
   - Libraries of National Universities

4. NATIONAL NEEDS
Describe all national needs (organizational, educational, infrastructural) related to items 3.1-3.7 as well as any other. n/a
III.6. MALAYSIA

1. GENERAL BACKGROUND INFORMATION

1.1 Geographical framework
Malaysia, located in South East Asia, lies between 1ºN and 7ºN of the equator, and 99.5ºE and 120ºE. It covers an area of approximately 329,750 km2, consisting of Peninsular Malaysia; the states of Sabah and Sarawak; and the Federal Territory of Labuan in the north western coastal area of Borneo Island. The two regions are separated by the South China Sea. Eleven states and two federal territories (Kuala Lumpur and Putrajaya) are located in Peninsular Malaysia.
(Source : Malaysia’s Second National Communication (NC2)

1.2 Demography
Malaysia’s population, as of July 2010, is estimated to be 28,334,000. Of these, 5.72 million Malaysians live in East Malaysia and 22.5 million live in Peninsular Malaysia. According to latest 2010 census, among the three largest Malaysian groups Malays and Bumiputera, Chinese, Indians.
(Source : Department of Statistics Malaysia)

1.3 Coastal Resources Utilization and Development

1.3.1 Fisheries and Aquaculture
Landings of marine fish were 1.3 million tonnes in 2000 compared to 1.4 million tonnes in 2007. The figure includes shellfish collection. Marine fish are caught using various fishing gears. The majority were from trawl nets, seine nets and drift/grill nets.

Aquaculture production in Malaysia increased from 0.17 million tonnes in 2000 to 0.27 million tonnes in 2007. Fresh water aquaculture is carried out in ponds, ex-mining pools, cages, cement tanks and also pen cultures. Brackish water marine aquaculture includes sources from ponds, cages and water tanks in brackish water.
(Source : Malaysia’s Second National Communication (NC2)

1.3.2 Ports and Harbours
1.3.3 Energy production
1.3.4 Hydrocarbon Exploration and Exploitation
1.3.5 Mines and quarries
1.3.6 Recreational industry and Tourism
1.3.7 Marine Parks and Reserves
Malaysia marine parks are governed by a three tiered system which involves:
- Federal Government - Policies are formulated by the Federal Government to govern national development.
- State Government - Has control over land matters of the Marine Park islands where they have the authority to develop and decide on land usage of the islands.
• Local Authority - such as the District and Land Office implements many of the decisions of the State Government and administer amenities of island and in principal manage physical development activities.

<table>
<thead>
<tr>
<th>No.</th>
<th>Location of Marine Parks</th>
<th>Gazettes</th>
<th>No. of Marine Parks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Peninsular Malaysia</td>
<td>Marine Parks Order of 1994 of the Fisheries Act</td>
<td>42 marine parks</td>
</tr>
<tr>
<td>2</td>
<td>Sarawak</td>
<td>The National Park and Reserve Ordinance.</td>
<td>3 marine parks</td>
</tr>
<tr>
<td>3</td>
<td>Sabah</td>
<td>Sabah Parks Enactment, 1984 (amended 2002).</td>
<td>4 marine parks</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td>49 marine parks</td>
</tr>
</tbody>
</table>

Marine Parks of Peninsular Malaysia
• Managed by the Marine Park Department, Ministry of Natural Resources and Environment
• 42 islands declared as marine parks in Peninsular Malaysia are grouped into six Marine Park centres for better administration and management.

Marine Protected Areas in Sarawak
Sarawak has three (3) marine parks gazetted under the National Park and Reserve Ordinance.
• Pulau Talang-Talang - gazetted for the turtle conservation
• Pulau Satang-Satang - gazetted for the turtle conservation
• Miri-Sibuti Marine Park - gazetted for its significant coral reef biodiversity.

Marine Protected Areas in Sabah
Sabah has five (5) marine parks gazetted under Sabah Parks Enactment, 1984 (amended 2002).
• Tunku Abdul Rahman Park
• The Turtle Islands Park
• Pulau Tiga Park
• Tun Sakaran Marine Park
• Tun Mustapha Park
• Pulau Sipadan which is under the authority of National Security Council is now a proposed as an MPA under the management of the Sabah Parks.

2. POLICIES AND INSTITUTIONAL FRAMEWORK

2.1 Institutional framework (Governmental structure)

2.2 National Policies related to the marine/coastal environment
Ministry of Science, Technology and Innovation (MOSTI) through the National Oceanography Directorate (NOD) have initiated the development of Malaysia National Ocean Policy. Currently in draft version, the Policy is expected to promote principles of ecologically-sustainable management and utilisation of marine resources and encourage internationally competitive research-based marine industries, at the same time ensure the protection of marine biological diversity. In short, the Policy shall provide guidance towards responsible ocean governance over the existing ocean management practices both at domestic and international level.

2.3 National marine data policy or other marine data policies being used
2.4 International agreements and conventions undersigned by the Government
4. Ramsar Convention on Wetlands of International Importance - 1971
5. International Convention for the prevention of pollution from ships (MARPOL) - 1 May 1997

3. NATIONAL CAPABILITIES

3.1 National institutions of higher education and training related to marine/coastal research and management

1. Universiti Teknologi Malaysia: Coastal and Offshore Engineering Institute (COEI)
2. National University of Malaysia: Marine Ecosystem Research Centre (EKOMAR)
3. Universiti Putra Malaysia: Bioscience Institute (IBS)
4. Universiti Malaya: Institute of Ocean and Earth Science (IOES)
5. Universiti Science Malaysia: Centre of Marine and Coastal Studies (CEMACS)
6. Universiti Malaysia Terengganu: Institut Oseanografi dan Sekitaran (INOS)
7. International Islamic University of Malaysia: Institute of Oceanography and Maritime Studies (INOCEM)
8. Universiti Malaysia Sarawak: Aquatic Science Department (ASD)
9. Universiti Malaysia Sabah: Borneo Marine Research Institute (BMRI)
10. Universiti Teknologi Mara
11. Universiti Selangor
12. Universiti Malaysia Perlis
13. Universiti Malaysia Pahang
14. Universiti Kuala Lumpur

3.2 National organizations involved in marine/coastal research and management (by sector)
Note: sectors could be those listed under 1.4 above + research

• MINISTRY OF NATURAL RESOURCES AND ENVIRONMENT
  a. Malaysia Geospatial Data and Infrastructure
  b. Department of Environment
  c. Marine Parks Department
  d. Biodiversity Secretariat
  e. Department of Forestry

• MINISTRY OF AGRICULTURE AND AGRO-BASED INDUSTRY
  a. Fisheries Department
  b. Fisheries Development Authority of Malaysia

• PRIME MINISTER DEPARTMENT
  a. Environmental and Natural Resource Economics Division, Economic Planning Unit
  b. Malaysian Maritime Enforcement Agency
  c. National Security Council

• MINISTRY OF TRANSPORT
a. Marine Department  
b. Port Authority  
c. Maritime Institute of Malaysia

- MINISTRY OF AGRICULTURE AND AGRO-BASED INDUSTRY  
a. Department of Fisheries  
b. Department of Fisheries, Sabah  
c. Fisheries Development Authority of Malaysia

- MINISTRY OF DEFENCE  
a. Royal Malaysian Navy  
b. National Hydrographic Centre

- Ministry of Foreign Affairs  
a. Multilateral Diplomacy on Environment Issues  
b. Maritime Department

- MINISTRY OF URBAN WELLBEING, HOUSING AND LOCAL GOVERNMENT  
a. Town Planning Division

- MINISTRY OF COMMUNICATION AND MULTIMEDIA MALAYSIA  
a. National Heritage Department

- MINISTRY OF TOURISM AND CULTURE  
a. Marine and Coastal Tourism

- MINISTRY OF ENERGY, GREEN TECHNOLOGY AND WATER  
a. Marine Renewable Energy

3.3 Current operational relationships between the national organizations (diagram)

3.4 Current national arrangements for the management and archival of data and information related to marine/coastal research and management (by sector)

Segregated marine related database is owned by various Government and Non-Governmental Organisations data providers; each with specific mandate and functions. Different jurisdictions under various data providers have resulted datasets to be distributed and heterogeneous.

Malaysia National Oceanography Data Center (MyNODC) (www.mynodc.gov.my) was launched in July 2010 by National Oceanographic Directorate (NOD), Ministry of Science, Technology and Innovation (MOSTI) to be the central oceanographic database whereby all agencies and organisations may deposit their marine related data to connect information to users. Data sharing between data providers are now being promoted by NOD to make information more widely available that directly benefits marine research, development and commercialisation.

3.5 Current human resources involved in marine/coastal research and management, as well as the management and archival of related data and information (by sector)
3.6 Current available national data systems related to marine/coastal research and management, as well as the management and archival of related data and information (by sector)

<table>
<thead>
<tr>
<th>No.</th>
<th>National Data Systems</th>
<th>Web Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Malaysia National Oceanography Data Center (MyNODC)</td>
<td><a href="http://www.mynodc.gov.my">www.mynodc.gov.my</a></td>
</tr>
<tr>
<td>2.</td>
<td>Malaysian Geospatial Data Infrastructure (MyGDI)</td>
<td><a href="http://www.mygeoportal.gov.my">www.mygeoportal.gov.my</a></td>
</tr>
</tbody>
</table>

3.7 Current available national libraries related to marine/coastal research and management, as well as the management and archival of related data and information (by sector)

4. NATIONAL NEEDS

Describe all national needs (organizational, educational, infrastructural) related to items 3.1-3.7 as well as any other.

1. Absence of a national policy and standard on oceanographic data sharing.
2. Gaining trust of other data providers to share and publish their data in MyNODC.

III.7. NEW ZEALAND

COUNTRY: NEW ZEALAND  
Your name: KEVIN MACKAY  
Your position: MARINE DATA MANAGER  
Your institution: NATIONAL INSTITUE OF WATER & ATMOSPHERIC RESEARCH  
Your address: PRIVATE BAG 14901, KILBIRNE WELLINGTON 6021 NEW ZEALAND  
Your email: k.mackay@niwa.co.nz

1. GENERAL BACKGROUND INFORMATION

1.1 Geographical framework: Island country (268,021 km²)
1.2 Demography: 4,509,461 (Jan 2014)
1.3 Economy: $122.193 billion (2013 estimate)
1.4 Coastal Resources Utilization and Development
   1.4.1 Fisheries and Aquaculture:

   • NZ marine fisheries waters (Exclusive Economic Zone and territorial sea): 4.4m km².
   • NZ coastline: 15,134 km.
   • Species commercially fished: 130
   • Species in Quota Management System: 97
   • Around 50% of fishing quota is owned by Maori.
   • Estimated commercial fish resource value (2009): NZ$ 4.0b
• Total allowable commercial catch (as at December 2011): 630,000 tonnes
• Total landed catch (as at December 2011): 408,000 tonnes
• Total seafood harvest (incl. aquaculture): 625,000 tonnes

1.4.2 Manufacturing industries
In the year ended September 2011, manufacturing sector output accounted for 12.2% of real GDP. The proportion of the labour force employed in manufacturing was around 10.3%.

1.4.3 Ports and Harbours:
There are 13 major ports in New Zealand.

1.4.4 Energy production:
Total domestic energy production was estimated at 816 petajoules, including oil (33.5%), hydro (10.9%), natural gas (21.24%) and geothermal (18.7%).

1.4.5 Hydrocarbon Exploration and Exploitation:
Oil and gas are produced from 21 petroleum licenses / permits, mostly onshore. Exploration for oil and gas reserves is currently being undertaken in offshore sedimentary basins.

1.4.6 Mines and quarries

1.4.7 Recreational industry and Tourism
Tourism is one of New Zealand's largest export industries, second only to the dairy industry in terms of foreign exchange earnings. It directly employs 5.7 per cent of the New Zealand workforce and indirectly employs a further 3.1 per cent.

Tourism's direct contribution to NZ's GDP was $7.3 billion or 3.7%

1.4.8 Marine Parks and Reserves:

- There are over 30 marine reserves in New Zealand's covering 7.6% of the territorial waters
- Other types of marine protected areas include: Marine Parks, Maori (indigenous) fisheries managed areas; marine mammal sanctuaries; and benthic protection areas.

2. POLICIES AND INSTITUTIONAL FRAMEWORK

2.1 Institutional framework (Governmental structure):
Unitary parliamentary constitutional monarchy, comprising of central and local government.

2.2 National Policies related to the marine/coastal environment:
New Zealand Coastal Policy (2010). There is no national oceans policy.

2.3 National marine data policy or other marine data policies being used:
New Zealand Data and Information Management Principles, which aims to:

- make non-personal government-held data and information more widely available and discoverable, easily usable and compliant with open government data principles within the NZ legal context; and
- facilitate agencies’ release of the non-personal government-held data and information that people, communities, and businesses want to use and re-use

2.4 International agreements and conventions undersigned by the Government

3. NATIONAL CAPABILITIES
3.1 National institutions of higher education and training related to marine/coastal research and management
   • University of Otago, Department of Marine Science

3.2 National organizations involved in marine/coastal research and management (by sector)
   Note: sectors could be those listed under 1.4 above + research
   • National Institute of Water and Atmospheric Research
   • Ministry of Primary Industries
   • Ministry of Conservation
   • Ministry for the Environment
   • Land Information New Zealand
   • GNS Science
   • Cawthorn Institute

3.3 Current operational relationships between the national organizations (diagram)

3.4 Current human resources involved in marine/coastal research and management, as well as the management and archival of related data and information (by sector)
   • Not known

3.5 Current available national data systems related to marine/coastal research and management, as well as the management and archival of related data and information (by sector)
   • All fisheries research managed by the National Institute of Water and Atmospheric Research on behalf of the Ministry of Primary Industries
   • Australian Ocean Data Network (in progress)

3.6 Current available national libraries related to marine/coastal research and management, as well as the management and archival of related data and information (by sector)
   • National Library of New Zealand
   • National Institute of Water and Atmospheric Research Library

4. NATIONAL NEEDS

Describe all national needs (organizational, educational, infrastructural) related to items 3.1-3.7 as well as any other.

New Zealand needs a national data system for marine/coastal research and management.

III. 8. THAILAND

COUNTRY: Thailand
Your name: Somkiat Khokiattiwong/ PhD
Your position: Senior officer/Head of Oceanographic Unit
Your institution: Phuket Marine Biological Centre, Department of Marine and Coastal Resources
Your address: 51 Sakdhidej RoAD, Phuket 83000, Thailand
Your email: skhokiattiwong2gmail.com
1. GENERAL BACKGROUND INFORMATION

1.1 Geographical framework
Thailand locates in between of two ocean rimes namely Gulf of Thailand (Pacific Ocean) and Andaman Sea (Indian Ocean). Gulf of Thailand is one the high productivity sea and has strong influence from runoff especially in the upper Gulf. The average of water depth of the Gulf is about 30 m and maximum depth is about 80 m. The shoreline long is approximately 2,055 km and covers 17 provinces. The Andaman Sea of Thai waters has 1,093 km shoreline long, which cover 6 provinces. Andaman Sea could be divided into two part base on its bathymetry and oceanographic feather. First is a northern part of the Andaman Sea (north of Phuket province to Myanmar border). It has narrow continental shelf, which the average depth on the shelf is about 50-80 m and the depth beyond the continental self was from few hundred meter to 2500 m (maximum depth). It gets influence of fresh water from river, which locate in northern part of Thai border and in Myanmar. Second is southern part of Phuket province to Malaysia border has an average depth about 40-50 m and the maximum depth is about 400-500 m in the northern part.

1.2 Demography
The population of Thailand is about 65 million and about 19 million live in 23 province alone the shore (2.2 million and 16.8 million in Andaman Sea and Gulf of Thailand respectively).

1.3 Economy
The main income is from agriculture & fisheries, industry, and tourist etc.

1.4 Coastal Resources Utilization and Development

1.4.1 Fisheries and Aquaculture
Thailand has a high capability on fisheries including marine fieriest and aquaculture that lead Thailand to be one of top seafood exporter in the world. There is the policy of the fisheries development during last few years as following:

- Develop fishery industries both in aquaculture and capture fishery
- Restoration of fishery resources
- Adjust fisheries management structure to balance the potential of resources
- Extend conservation areas for small-scale fisheries
- Promote environmental friendly aquaculture
- Develop deep sea fishing fleet to meet international standards for fishing in international waters
- Seek cooperation for fishing in the foreign waters
- Develop fishery products on safety and quality from upstream to downstream
- Develop inspection process of fishery product to meet the international standards

The Fisheries Department has a goal to maintain the production and secure the food supply for people and economic of country.

- Increasing aquaculture production 2% per year and reach the total production 1,563,000 tonnes in 2016
- At least 80% of fisheries production areas have been approved for safety and quality standards
- Security and sustainability of fisheries productions: its freshwater production reach 210,000 tonnes and marine annual landing of 1.7-2.0 million tonnes comprising at least 80% of economically important species from fishing grounds within the EEZ, and 1.0-1.5 million tonnes from distant water fishing.
The researches have been applied for management measures at least 10%
 Officials and staffs have been developed at least 90% of human resource development plan

1.4.2 Manufacturing industries

1.4.3 Ports and Harbours
It is under Port Authority of Thailand. Its vision is to be the main gate of Thailand to open to the world trade with excellence service and safety and support economic of country, to be able to complete in international level. They have 17 ports over the country which the major ports locate in four sites such as Bangkok, Leam Chabang, Map Ta Phut, and Songkhla. The statistic of Bangkok port show steady increase of number of vessel and inward-outward cargo during last 22 years (1989-2011) from 2,203 to 2,991 vessel/yr, 6 to 10 million tonnes, 0.8 to 7.8 tonnes /yr respectively.

1.4.4 Energy production

1.4.5 Hydrocarbon Exploration and Exploitation
The development of gas and oil exploration has been developing in the Gulf of Thailand during last three decades. There are few hundred platforms operating in the Gulf at the present.
1.4.6 Mines and quarries

1.4.7 Recreational industry and Tourism

Thailand's tourism industry contributes a big chunk to the country's GDP. While about 10 years ago, the industry contributed about 6.5% of Thailand's GDP, lately we can estimate that it contributes between 9 and 10%.

When seeing the number of tourists, and the number of tourist destinations and hotels, one would actually expect an even more substantial portion of GDP. But Thailand's tourism industry, while very visible, brings in less money than other service industries, and certainly less than its manufacturing industry.

Totalling everything, in 2012, tourist revenue amounted to a staggering 983,928 billion Thai baht. This was more than 34 billion U.S. Dollars at the exchange rate at the time. On average, visitors spend about 4,800 Thai baht per day, and stay about 10 days.

Interestingly, the tourism sector does not only depend only on foreign visitors. The number of domestic tourists actually dwarfs the number of foreign tourists. But domestic tourists (mostly Thais) do spend much less per day and their trips are shorter, on average two days and a half. In 2007 there were reportedly more than 83 million in-country travel trips. This created 380 billion baht in revenue.
1.4.8 Marine Park and Reservation

The Marine National Park is under authority of Department of National Park, Ministry of Natural Resources and Environment. The marine park is one of attractive site to tourist. It therefore contributes to a big income of tourism sector in Thailand. There are totally 22 marine parks in Thailand. In the marine park compose of many marine habitat and resources. The assessment of those habitat and resources was carried out under cooperation between Marine National Park and Department of Marine and Coastal resources and also with other academic institutes. Recently IUCN had been supported to develop manual for monitoring marine environment in marine park area for their officer.

<table>
<thead>
<tr>
<th>Name</th>
<th>Province</th>
<th>Area (km²)</th>
<th>Date created</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hat Chao Mai</td>
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<tr>
<td>Hat Nopparathara-Mu Ko Phi Phi</td>
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<td>1993</td>
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<td>Hat Vanakorn</td>
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<td>Khao Laem Ya-Mu Ko Samed</td>
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<td>Khao Lak-Lam Ru</td>
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<tr>
<td>Khao Lam Pee-Hat Thai Muang</td>
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<td>Khao Sam Roi Yot</td>
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<td>Ko Lanta</td>
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<td>134.00</td>
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</tr>
<tr>
<td>Laemson</td>
<td>Ramong</td>
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<tr>
<td>Lam Nam Kraburi</td>
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<td>Mu Ko Chumphon</td>
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<td>Mu Ko Phetra</td>
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<td>Mu Ko Similan</td>
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<td>Mu Ko Surin</td>
<td>Phang Nga</td>
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</tr>
<tr>
<td>Sireum</td>
<td>Phuket</td>
<td>90.00</td>
<td>1981</td>
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<tr>
<td>Tarutao</td>
<td>Satun</td>
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<td>Thaleban</td>
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<td>196.00</td>
<td>1980</td>
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<td>Than Boldkhorani</td>
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<td>1998</td>
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<tr>
<td>Than Sadet-Ko Pha-Ngan</td>
<td>Surat Thani</td>
<td>65.93</td>
<td>1993</td>
</tr>
</tbody>
</table>

2. POLICIES AND INSTITUTIONAL FRAMEWORK

2.1 Institutional framework (Governmental structure)

There are 19 Ministries in Thailand. The Ministries that work most relate to marine and ocean science and policy is Ministry of Natural Resources and Environment (Department of Marine and Coastal Resources, Department of Pollution Control, Department of Policy and Planning, Department of Mineral Resources, and Department of National Park) and follow by Ministry of Defence (Department of Hydrographic under Navy), Ministry of Ministry of Agriculture and Cooperatives (Fisheries Department), Ministry of Information and Communication Technology (Natural Disaster Warning Center), Ministry of Science and Technology (Geo-Informatics and Space Technology Development Agency), and Ministry of Transport (Marine Department)
2.2 National Policies related to the marine/coastal environment

Thailand has a master plan for the country every 5 year. During this period is under the Eleventh National Economic and Social Development Plan (2012-2016). There are main object of the plan which relate to marine and coastal environment such as:

1. To develop efficient and sustainable economy by upgrading production and services based on technology, innovation and creativity with effective regional linkages, improving food and energy security, upgrading eco-friendly production and consumption toward a low-carbon-society.

2. To preserve natural resources and environment to be sufficient for maintaining the ecology and a secure foundation of development.

It needs to use an existing tool such as law, regulation, and policy in-cooperating with the new technology and knowledge to meet the target of the National Economic and Social Development Plan.

**Marine and coastal habitat conservation:**

- **Marine and Coastal Resources Management Act**, drafted by DMCR, is designed to provide an integrated approach to coastal and marine resources management through an Area-Function Participation approach. It would establish coordination mechanisms to help integrate plans and activities and also establish Marine and Coastal Resources Funds (MCRF) at the national and provincial levels. The Act would further establish zoning for marine and coastal resources (preservation, conservation, restoration, and development), promote awareness and education, and ensure effective control of pollution and support for sustainable tourism. Integral to the plan are the establishment of a national committee, provincial and local committees, and "coastal communities."

**Endangered threatened and protected species**

- **National Park Act (1961)**: objectives being to protect, control, and oversee the ecology and natural habitat of plants and animals in national park areas, inc. MPAs.
- **Forest Act (1941)**: Concession of mangroves was stopped in 1990s and all concession activities were ceased in 2003.
- **National Reserved Forest (1964)**: Controls the use and protection of forest areas and resources, including mangroves.
- **Wildlife Conservation and Protection Act (1992)**: revised version of the Wildlife Conservation and Protection (1960) is concerned with wildlife conservation areas, with a view to protecting natural habitats. It lists 15 types (formerly nine types) of rare wildlife. It seeks to improve the Act and make it in harmony with the current situation, in accordance with the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).
- **Fishery Act (1947)**: Governs fishing and aquaculture development through the protection of fishing habitats and nursery grounds, control of fishing gears and fishing methods, registration of fishing boats, protection of marine species, and research and development.
- **Plant Storage Act (1964)**
- **Second Plant Storage Act (2008)**
- **Animal Species Maintenance Act (1966)**
- **Export and Import to the Kingdom Act (1979)**
- **National Environment Enhancement and Conservation Act (1992)**: provides authority to the Minister of Science, Technology and Environment to regulate ministerial regulations for specific vulnerable areas that contain natural ecology and to consider these as environmental protection areas that need particular management and appropriate protection, depending on conditions in the concerned areas.
• Plant Species Protection Act (1999).

Land-based pollution control:
• Building Control Act (1979)
• Public Health Act (1992)
• Municipality Act (1953)
• Sub-District Administrative Organisation Act (1994)
• Royal Irrigation Act (1942)
• Hazardous Substances Act (1992)

Marine-based pollution control:
• The Navigation in Thai Waters Act (1913)

Environmental impacts assessment:
• The Enhancement and Conservation of National Environmental Quality Act (1992); see next.

Environmental standards
• The Enhancement and Conservation of National Environmental Quality Act (1992): Enhance and conserve natural resources and environmental quality through environmental policies and planning. The Act regulates and calls for the creation of Provincial Environmental Management Plans (PEMP), Environmental Impact Assessments (EIA), Environmental Protected Areas (EPAs) and Pollution Control Zones (PCZs), as well as standard setting and monitoring, public participation and environmental education, and an environmental fund for investment.
• Factory Act (1992): Controls factory operations by setting standards and regulating waste disposal

2.3 National marine data policy or other marine data policies being used
Data and Information exchange is well cooperate at National level except for some data and information that relate to security issue. It will be not displayed to public or exchange. There is no clear national marine data policy. The data and information policy depend on the policy on each Ministry or Department. In generally, the Thai’s law is allowing the public to be able to accesses to the government data and information. It is therefore most of the government agencies will provide the data and information to the public through their website.

2.4 International agreements and conventions undersigned by the Government

<table>
<thead>
<tr>
<th>Agreement</th>
<th>Signatures</th>
<th>Ratification (ra)</th>
<th>Acceptance (ac)</th>
<th>Approval (ap)</th>
<th>Accession (a)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Cartagena Protocol on Biosafety</td>
<td>-</td>
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<td></td>
<td>10 November 2005 (a)</td>
</tr>
<tr>
<td>4</td>
<td>Convention on Wetlands of International Importance Especially as Waterfowl Habitat,</td>
<td>-</td>
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<tr>
<td>1972 : Ramsar Convention</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>5</td>
<td>Man and Biosphere Programme : MBA</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Kyoto Protocol</td>
<td>2 February 1999</td>
<td>28 August 2002 (ra)</td>
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<tr>
<td>10</td>
<td>Vienna Convention for the Protection of the Ozone Layer, 1985</td>
<td>-</td>
<td>7 July 1989 (a)</td>
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<tr>
<td>14</td>
<td>International Convention on the Prevention of Marine Pollution by Dumping of Waste and Other Matter, 1972**</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Convention on Migratory Species (CMS)</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. NATIONAL CAPABILITIES

3.1 National institutions of higher education and training related to marine/coastal research and management
There are numerous of school and university provides education and training on marine and coastal research and management in certificate to PhD levels.

3.2 National organizations involved in marine/coastal research and management (by sector)
1. Ministry of Natural Resources and Environment
   - Department of Marine and Coastal Resources,
   - Department of Pollution Control,
   - Department of Policy and Planning,
   - Department of Mineral Resources,
   - Department of National Park
2. Ministry of Defence
   - Department of Hydrographic under Navy
3. Ministry of Ministry of Agriculture and Cooperatives
   - Fisheries Department
4. Ministry of Information and Communication Technology
   - Natural Disaster Warning Center
5. Ministry of Science and Technology
   - Geo-Informatics and Space Technology Development Agency
6. Ministry of Transport
3.3 Current operational relationships between the national organizations (diagram)

3.4 Current human resources involved in marine/coastal research and management, as well as the management and archival of related data and information (by sector)
Department of Marine and Coastal resources:
Research: 95
Management: 120
Data and Information: 25

3.5 Current available national data systems related to marine/coastal research and management, as well as the management and archival of related data and information (by sector)
All the government agencies in 3.2 have their own data and information system.

3.6 Current available national libraries related to marine/coastal research and management, as well as the management and archival of related data and information (by sector)
Thailand do not have national marine/coastal and management related libraries. But most of the academic libraries, which associate with university teaching on related aquaculture, fisheries and marine science, have providing some material related to marine/coastal research and management.
Phuket Marine Biological Center (PMBC), Department of Marine and Coastal Resources, has marine/coastal research libraries. PMBC provide books, journal, education materials which relate to marine/coastal research and management including exchange research bulletin of PMBC with other research institute around the world (over 200 research institutes).

4. NATIONAL NEEDS
Describe all national needs (organizational, educational, infrastructural) related to items 3.1-3.7 as well as any other.
- Need support of some education materials for young researcher and student in university
- Need to increase the capability on data analysis (especially with open software)

III.9. VIETNAM
Your name: Bui Hong Long
Your position: Chairman
Your institution: IOC Vietnam
Your address: 01 Cau Da, Nha Trang, Vietnam
Your email: buihonglongion@gmail.com

1. GENERAL BACKGROUND INFORMATION
1.1 Geographical framework
Vietnam (330,951 km²) is located on the eastern margin of the Indochinese peninsula, borders China to the north, Laos to the northwest, Cambodia to the southwest, and the South China Sea to the east.

1.2 Demography (data from the Vietnam General Statistics Office, 2014)
- Population: 98.71 million
- Natural population increase rate: 1.05%
- Density: 268 pers/km²
- Ethnicity: 54 ethnic minority groups, the dominant Kinh group occupies about 86 % of the population

1.3 Economy (data from the Vietnam General Statistics Office, 2014)
- GDP: 3,584,261 bill. VND, of which agriculture, forestry and fishing sector accounted for 658,981 bill. (18.39%), Industry and construction sector 1,372,928 bill. (38.30%), Service 1,552,352 bill. (43.31%)

1.4 Coastal Resources Utilization and Development

1.4.1 Fisheries and Aquaculture
Catching production: 2,709,000 tons (2013)
Aquaculture production: 3,210,000 tons (2013)

1.4.2 Manufacturing industries
Gross output 2013: 1,808,303 bill. VND

1.4.3 Ports and Harbours
There are 44 ports and Harbours

1.4.4 Energy production
Gross output 2013: 124,114 bill. VND

1.4.5 Hydrocarbon Exploration and Exploitation
Oil cruise: 16700 thousand tones
Natural gases: 9.681 million m³
Liquid hydrocarbon gases: 690 thousand tones

1.4.6 Mines and quarries:
Gross output 2013: 411,673 bill. VND

1.4.7 Recreational industry and Tourism
Gross output 2013: 340,181.7 bill. VND

Marine Parks and Reserves

<table>
<thead>
<tr>
<th>No</th>
<th>Name of MPA/Location</th>
<th>Total area (ha)</th>
<th>Marine area (ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Đảo Trấn/Quảng Ninh</td>
<td>4.200</td>
<td>3900</td>
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<td>2</td>
<td>Cô Tô/Quảng Ninh</td>
<td>7.850</td>
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<td>3</td>
<td>Bạch Long Vĩ/Hải Phòng</td>
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<td>10.900</td>
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<td>5</td>
<td>Hòn Mê/Thanh Hóa</td>
<td>6.700</td>
<td>6200</td>
</tr>
</tbody>
</table>
## 2. POLICIES AND INSTITUTIONAL FRAMEWORK

### 2.1 Institutional framework (Governmental structure)
- Ministry of Science and Technology
  - Vietnam Academy of Science and Technology (VAST)

### 2.2 National Policies related to the marine/coastal environment
- Environmental Protection Act 2005
- Vietnam Sea Law 2013
- Fisheries Law 2003
- Vietnam Maritime Code 2005
- Decree 25/2009/NĐ-CP on the integrated management of natural resources and protection of the marine environment and islands

### 2.3 National marine data policy or other marine data policies being used

### 2.4 International agreements and conventions undersigned by the Government

## 3. NATIONAL CAPABILITIES

### 3.1 National institutions of higher education and training related to marine/coastal research and management
- Institute of Oceanography, Vietnam Academy of Science and Technology (VAST)
- Institute of Marine Environment and Resources, Vietnam Academy of Science and Technology (VAST)
- Institute of Marine Geology and Geophysics, Vietnam Academy of Science and Technology (VAST)
- Institute of Mechanics, Vietnam Academy of Science and Technology (VAST)
- Research Institute for Marine Fisheries, Ministry of Agriculture and Rural Development (MARD).
- Hanoi University of Science.
- University of Science, Ho Chi Minh City.
- Nha Trang University.

### 3.2 National organizations involved in marine/coastal research and management (by sector)
- Ministry of Science and Technology
- Ministry of Foreign Affairs
- Vietnam administrator of seas and islands, ministry of natural resources and environment (MONRE).
- Vietnam institute of meteorology, hydrology and environment, ministry of natural resources and environment (MONRE).
- Institute of Oceanography, Vietnam Academy of Science and Technology (VAST)
- Institute of Marine Environment and Resources, Vietnam Academy of Science and Technology (VAST)
- Institute of Marine Geology and Geophysics, Vietnam Academy of Science and Technology (VAST)
- Institute of Mechanics, Vietnam Academy of Science and Technology (VAST)
- Research Institute for Marine Fisheries, Ministry of Agriculture and Rural Development (MARD).
- Hanoi University of Science.
- University of Science, Ho Chi Minh City.
- Nha Trang University.
- Vietnam-Russia Tropical Centre (Ministry of National Defense)

3.3 Current operational relationships between the national organizations (diagram)

3.4 Current human resources involved in marine/coastal research and management, as well as the management and archival of related data and information (by sector)

3.5 Current available national data systems related to marine/coastal research and management, as well as the management and archival of related data and information (by sector)
- NVOD (National Vietnam Oceanographic Database)

3.6 Current available national libraries related to marine/coastal research and management, as well as the management and archival of related data and information (by sector)

4. NATIONAL NEEDS

Describe all national needs (organizational, educational, infrastructural) related to items 3.1-3.7 as well as any other.
- A united system to manage oceanographic and meteorology data.
- New and advanced instruments to collect data.
- Technique and instrument to access data quality and calibration.
- Data simulation/model to forecast or early warning.
- Apply remote sensing and GIS to marine application (technique and infrastructure).
- Data publication and data product.
- Marine digital library.

[end]