



## Working Group 3

**Permanent Committee on GIS Infrastructure for Asia and the Pacific  
(PCGIAP)**

International Workshop

On

# **Administrating the Marine Environment- The Spatial Dimensions**

4-7 May 2004  
Kuala Lumpur, Malaysia

# ***REPORT***

With the Support of  
Department of Surveying and Mapping, Malaysia

# **Report to PCGIAP meeting of Working Group 3 (Cadastre) Workshop on Administering the Marine Environment – The Spatial Dimensions**

4 – 7 May, 2004  
Kuala Lumpur, Malaysia

## **1. Objectives of Workshop**

As part of the WG3 Workplan (2002-4), WG3 organised a four-day workshop (4<sup>th</sup>-7<sup>th</sup> May 2004) on Administering the Marine Environment – The Spatial Dimensions in Asia and Pacific region. The workshop was conducted in Kuala Lumpur, Malaysia and hosted by the Department of Survey and Mapping Malaysia.

The objective of the workshop was to better understand the spatial dimensions of administrating marine environment in the Asian and Pacific region and particularly to facilitate:

- *understanding of the needs of an SDI in the marine context;*
- *better understanding and appreciation of the administration of marine rights, restrictions and responsibilities and to agree on a terminology; and*
- *documentation of issues in establishing a marine dimension as a key component of National SDIs.*

## **2. Agenda of the Workshop**

- a. Welcoming address
- b. Official Opening
- c. Keynote Address by Chairman of Working Group 3 (PCGIAP)
- d. Introduction to Workshop (Aims and Objectives)
- e. Overview of PCGIAP and Working Group 3 (Cadastre), Workplan and Progress Report
- f. Invited Report and Paper Presentations
- g. Country Reports on Marine Activities according to circulated questionnaire
- h. Background Paper – Issues in Developing Marine SDI
- i. Breakout Sessions on Three Main Workshop Objectives
- j. Open Forum and Plenary Session on Breakout Sessions
- k. Technical Visit
- l. Agreement on Workshop Outcomes and Resolutions
- m. Finalisation of Workshop Report to PCGIAP
- n. The way forward
- o. Closing remarks

**Workshop Chair:** Prof Ian Williamson (Australia)

**Workshop Vice-Chair:** Mr Ahmad Fauzi Bin Nordin (Malaysia)

**Workshop Coordinator:** Dr Abbas Rajabifard (Australia)

## **3. Participants**

102 people from 11 countries attended the workshop. The list of countries represented is shown as Attachment 1.

#### **4. The Workshop**

##### **4<sup>th</sup> May 2004**

Workshop registration opened on Tuesday afternoon followed by a pre-workshop reception hosted by the Director General of Survey and Mapping, Malaysia, Mr Dato' Hamid bin Ali at the Renaissance Hotel in Kuala Lumpur, Malaysia.

##### **5th May 2004**

The first day of the workshop included the official opening and presentation of invited reports, papers and country reports.

As part of the official opening ceremony, the Director General of Survey and Mapping, Malaysia Mr Dato' Hamid bin Ali gave the welcoming address to the workshop participants and highlighted some important reasons for developing marine cadastre and administrating marine environment and the role of spatial data in this context (Attachment 2). Dato' Hamid mentioned that much of the world's population today is located around the coastal regions. He emphasised that human activities are exceptionally high in marine and coastal areas and emphasised that these activities does not simply stop at the land-sea interface. He suggested that we need to have a consistent SDI whereby the rights, restrictions and responsibilities are administered and managed effectively in the marine environment in a similar manner to the land environment.

Subsequently, an opening address and official opening was made by the Malaysian Hon. Deputy Minister of Natural Resources and Environment, Mr. S. Sothnathan on behalf of the Hon. Minister of Malaysian Natural Resources and Environment, Dato Sri Hj. Adenan Hj. Satem (Attachment 3). The importance of marine resources and administrating these resources were key points of the opening address. The Hon. Mr S. Sothnathan mentioned that the assessment, administration and management of the marine environment require information about boundaries and rights, restrictions and responsibilities in the marine environment; therefore it is vital to understand the different challenges encountered in the marine environment to appreciate the complexity of marine cadastre.

After the official opening ceremony, the workshop began with a keynote and welcome address by Prof Ian Williamson, the Chair of PCGIAP-WG3 (Cadastral) and the Chair of the workshop. Prof Williamson thanked the Malaysian Government and particularly the Department of Surveying and Mapping, Malaysia for their efforts and significant contributions in organising the Workshop and also thanked all delegates from different countries who supported and participated in the event.

He then explained that the workshop is part of the PCGIAP-WG3 (2002-2004) workplan and was designed following the success of the Cadastral Template Project which was developed through the 16th United Nations Regional Cartographic Conference for Asia-Pacific (UNRCC-AP) in Okinawa, Japan in 2003. He also highlighted the importance of the coastal zone to sustainable development, a critical policy issue that is increasingly recognised by most countries in the region.

Prof Williamson then presented an overview of the workshop aims and objectives. The Chair explained the structure of the workshop, the matters that need to be discussed and the decisions to be made. He also elaborated on the structure of the breakout session with three working groups focussing on the three main objectives of the workshop and proposed a Resolution Working Group to assist in formulating and presenting resolutions to the PCGIAP.

Dr Abbas Rajabifard, the Research Coordinator of PCGIAP-WG3, reviewed and presented the WG3-workplan and progress in the development of the marine country report template followed by future plans to complete the template by all countries in the Asia and Pacific region. He also discussed the strategy for processing and publishing the results followed by an overview of the future plan and activities of WG3.

Two invited reports were then presented on the outcomes of related conferences and meetings held over the past year. Mr Patrick Tan Hock Chuan, Director for Strategic Communication of the Department of Environment, Malaysia presented a report on the outcomes of the International Conference on Sustainable Development of the Seas of East Asia organised by the Partnerships in Environmental Management of the Seas of East Asia (PEMSEA) in Putrajaya, Malaysia, 8-12th December 2003. His presentation concentrated on Conference Resolutions which were put to Ministers of the 12 participating PEMSEA nations.

The next invited report was presented by Mr. Michael Sutherland, from the University of New Brunswick (UNB), Canada and Deputy Chair of the International Federation of Surveyors (FIG) Commission IV, focused on the outcomes of the UNB-FIG meeting on Marine Cadastre in Fredericton, Canada in September 2003.

The first invited paper presentation was by Mr. Darius Bartlett, from the University College Cork, Ireland. Mr. Bartlett's presentation was on "Extending Spatial Data Infrastructures into Marine Environments: A Work in Progress", concentrating on the issues present within Ireland and Europe as a whole followed by an overview of the concept and history of SDI initiatives around the world and the importance of the marine dimension in any such initiative.

Dr. Phillip Collier from the University of Melbourne, Australia then presented the "Current Status and Future Direction of Australian Marine Cadastre Research", concentrating on developments at the University of Melbourne. Dr Collier reported on the current activities and research projects within University of Melbourne followed by some concluding issues for future activities on marine SDI and marine Cadastre research.

The final invited presenter for the morning session was from Ms. Jude Wallace, also from the University of Melbourne, who talked about the Registration of Marine Interests. Ms. Wallace discussed that the primary function of a marine register is as a tool to assist in the management of resources in the marine areas and the administration of interests in these resources. This will in-turn facilitate informed policy making. She highlighted the differences between land and marine registers.

At the end of the morning session there was a short discussion and question session. The main point raised was the difference between marine SDI and marine cadastre.

The afternoon session was allocated to the presentation of Country Reports on marine administration activities by participant countries, based on the WG3 country report template. In this session, 7 countries reported on their marine activities (Australia, Malaysia, Canada, Cambodia, Fiji, Indonesia and Ireland) followed by questions and discussions. Each country identified and reported on the most important issues and challenges affecting their marine activities.

## **6th May 2004**

The second day of the Workshop was allocated to the discussion of the three main objectives of the workshop and the development of possible resolutions and recommendations to the PCGIAP on administering the marine environment.

A background paper discussing the “Issues in Developing Marine SDI” which was prepared by Prof Williamson, Dr Rajabifard and Mr Andrew Binns from Centre for SDIs and Land Administration, Department of Geomatics, University of Melbourne was presented by the Workshop Chair. As part of his presentation, Prof Williamson highlighted the key environmental, social and economic factors and issues driving the development of Marine SDI. He also pointed out that whilst access to spatial data aids in effective decision-making to achieve sustainable development, the majority of SDI initiatives stop at the land-sea interface. This encourages marine data to be held in various formats, at various accuracies within ‘data silos’. He concluded by stressing the need to assess current systems in order to identify technical, legal and institutional arrangements hindering coordination and effective management of the marine environment. This includes understanding the link between land and marine environments (they cannot be treated in isolation) and the need for cooperation between nations as maritime actions transcend national boundaries.

Delegates then broke into the following three Working Groups with each discussing different aims and objectives, and with each group led by a Chair, Vice Chair and Rapporteur (Attachment 4) as follows.

WG1: Issues in administering the marine environment

WG2: Definition of marine SDI and marine cadastre

WG3: Administration of marine rights, restrictions and responsibilities

As a result of the breakout session discussion, each Working Group reported to an open forum and plenary session and rigorous discussion was undertaken on the outcomes and the suggested Resolutions of the session, concentrating on issues in the region and particularly the role of Marine SDI, GIS and Cadastre in aiding more effective marine administration.

Some of the major points highlighted during the discussion session on the outcomes of the WGs included:

- The environmental, social/economic and technical issues for administering marine activities
- Importance of including a marine component within the SDI policies as part of countries obligations to UNCLOS
- SDI and cadastre are different and cadastral data can be a subsets of SDI as well as a process based on SDI
- SDI should facilitate access, management and sharing of spatial data in both the marine and land environments at any jurisdictional/political levels
- The marine cadastre can include components of the land-based cadastre and in addition it must take into consideration the fuzzy nature of boundaries as well as a 3D (volume) and sometimes 4D (temporal) nature of the interests in the marine environment
- Importance of collaboration between FIG, Commission 4 and PCGIAP, Working Group 3 (Cadastre) on issues relating to marine SDI and marine cadastre
- Lack of a single organisation capable of coordinating issues on marine environment
- Importance of institutional reform and capacity building in administering marine rights, restrictions and responsibilities
- The Marine SDI should relate to natural boundaries as well as administrative boundaries.

The afternoon session consisted of a technical visit to the Petroliam Nasional Berhad (PETRONAS) the national petroleum company of Malaysia which owns, manages and adds

value to the petroleum resources of Malaysia. Briefings were given by PETRONAS personnel, including their gas and petroleum exploration and production activities in the sea.

### **7th May 2004**

The final day of the workshop was used to discuss and finalise the workshop outcomes, resolutions and the report to the PCGIAP. Before the start of the discussions, Prof Williamson, Chair of the Workshop made a presentation on the concepts and nature of SDI, Cadastre, relationships between SDI and Land Administration and marine cadastre to facilitate the discussions and clarify concepts.

Each working group gave a final report based on the comments and feedback discussed during the plenary session on Thursday: Attachment 5.

The workshop Chair presented the following five draft Resolutions for discussion and confirmation as the outcomes of the workshop. These resolutions were prepared by the Resolution Working Group comprising Professor Jacob Rais (Indonesia), Professor Ian Williamson (Workshop Chair), Mr Paul Harcombe (Australia) and Mr Teng Chee Boo (Malaysia):

- Resolution 1 – Spatial Dimension of SDI
- Resolution 2 – PCGIAP-FIG Collaboration
- Resolution 3 – Defining the Marine Dimension of SDI
- Resolution 4 – Requirement for Further Development of Guidelines and Tools to Administer the Spatial Dimension of the Marine Environment
- Resolution 5 – Expression of Gratitude to the host Government

The participants discussed and made some suggestions and agreed on the Resolutions in Attachment 6.

The workshop was concluded by Prof Williamson who thanked the Malaysian Government and particularly the Department of Surveying and Mapping Malaysia for their contributions to organisation and support of proceedings and hospitality to participants. He also thanked all participants and delegates from different countries. Particular thanks were given to Mr Ahmad Fauzi bin Nordin, Vice Chair of PCGIAP-WG3 and Dr Abbas Rajabifard, Workshop Coordinator. Mr Ahmad Fauzi bin Nordin officially concluded the workshop on behalf of the Department of Survey and Mapping, Malaysia by thanking all those who attended the workshop and who contributed to its success.

## Attachment 1

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### **Workshop on Administering the Marine Environment, The Spatial Dimensions 4-7 May, 2004, Kuala Lumpur, Malaysia**

#### **Country Participants and Presenter**

Country	Country Report
Australia	*
Brunei Darussalam	
Cambodia	*
Canada #	*
Fiji	*
India	*
Indonesia	*
Ireland #	*
Kiribati	
Malaysia	*
Thailand	

# : Invited participants

## **Attachment 2**

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**International Workshop on Administering the Marine Environment -  
The Spatial Dimensions  
May 4-7, 2004  
Kuala Lumpur, Malaysia**

### **WELCOMING ADDRESS**

**Y. Bhg Dato' Hamid bin Ali  
Director-General of Survey and Mapping  
Department of Survey and Mapping Malaysia  
Kuala Lumpur**

**Yang Berhormat Encik S. Sothinathan**

Deputy Minister of Natural Resources and Environment, Malaysia.

Yang Berhormat Encik Sazmi Bin Miah

Parliamentary Secretary of Ministry of Natural Resources and Environment

Yang Berbahagia Dato' Dr. Isahak bin Yeop Mohd Shar

Secretary General of Ministry of Natural Resources and Environment

Yang Berbahagia Dato' Suboh Bin Mohd Yasin

First Deputy Secretary General of Ministry of Natural Resources and Environment

Yang Berbahagia Datuk Othman Bin Baba

Second Deputy Secretary General of Ministry of Natural Resources and Environment

Professor Ian Williamson

Chairman of Working Group 3 of the PCGIAP (Permanent Committee on GIS Infrastructure for Asia and the Pacific)

**Distinguished Guests, Ladies and Gentlemen, Assalamualaikum** and a very good morning.

**SELAMAT DATANG**, and welcome to the 'International Workshop on Administering the Marine Environment - The Spatial Dimensions'.

On behalf of the Organising Committee for this workshop, allow me to begin by first extending words of thanks and heartiest appreciation to The Honourable Deputy Minister of Natural Resources and Environment, Mr. S. Sothinathan for joining us this morning. His presence to grace this occasion and to officiate the opening of this Workshop on Administering the Marine Environment is indeed very meaningful to everyone of us here. Perhaps it is not too late for us to offer our congratulations to Y B Mr. S. Sothinathan on his appointment as the Deputy Minister of Natural Resources and Environment. We are certain that your vast experience and wisdom will be of great value and asset to the newly-created Ministry. We would also like to thank you for taking time out to join us here today at this workshop jointly organised by DSMM and the University of Melbourne, under the auspices of the United Nations-sponsored 'Permanent Committee on GIS Infrastructure for Asia and the Pacific' or PCGIAP, despite having a very tight and busy schedule as a public figure. Your presence is again an indication of the ever-readiness by the Government especially the Ministry of Natural Resources and Environment in supporting and promoting international collaborations such as this. It is also by itself an encouragement for all of us here to make the present and future cooperation at the international level a success. This is indeed another step forward in turning Malaysia into a nation of excellence, glory and distinction, or in our own words, '*Kearah menjadikan Malaysia sebagai sebuah negara yang Cemerlang, Gemilang dan Terbilang*'.

**Ladies and Gentlemen,**

For many of us who are present here today, this workshop has long been awaited for as part of a three-year Workplan of Working Group 3 of PCGIAP for the year 2002 to 2004. Although there has been a lot of efforts being carried out by PCGIAP, there are still much more tasks yet to be accomplished. After spending so many years on other activities, it is timely for PCGIAP to support programmes such as this in order to improve the understanding on Marine Cadastres in the Asia and Pacific region. As the workshop title indicates, this gathering of experts here for the next 3 days in Kuala Lumpur will focus mainly on the spatial dimensions required for the administration of the marine environment. This workshop will review best practices, establish networks, identify gaps and address other related issues of common concerns. Consequently, it is hoped that the deliberations made during the workshop will enable us to reinforce our understanding on the administration of the marine spaces in a manner to ensure sustainable development in a balanced environment.

**Ladies and Gentlemen,**

Much of the world's population today can be found around the coastal regions. Human activities are exceptionally high in those areas and these activities do not simply stop at the land-sea interface. In recent years, there has been intense concern as to the socio-economic and environmental impacts arising from those marine-related activities. As such, we require an information system that would enable efficient and effective management of marine related activities. On land, we already have a system involving the cadastre and also the Spatial Data Infrastructures or SDI which are in place to facilitate the management of rights, restrictions and responsibilities of land owners. However, on the marine side, the scenario can be quite different. There is generally no such spatial framework available as yet in place in the marine environment. But at the same time, there is an increasing need for use of spatial data in the aforesaid areas, and more often than not, in politics within the marine environment. And all of these, need to be managed in a reasonable and sound manner, before irreparable damage is done to our already delicate environment. So we need to have a consistent SDI whereby the rights, restrictions and responsibilities on land can be continued to be administered and managed effectively in the marine environment.

**Ladies and Gentlemen,**

The 3 days workshop encompasses a wide range of presentations and specialist discussions. It is hoped that through this workshop, findings which should be useful to the whole of the Asia and Pacific region will be discovered. In this regards, we may need to look into the current legislative arrangements governing the marine environment with regard to its complexity , ambiguity or presence of loop-holes within the legislation; or laws that might result in criss-crossing of power and enforcement among marine-related authorities at State/Federal levels that may also have to be reviewed .

In addition, we may also need to assess the current methods involved in the collection and dissemination of spatial data. we need to find ways to synergize efforts between various agencies within the same Ministry as well as inter-Ministry so as to avoid overlapping of tasks among agencies. Certainly we would not want different agencies to be collecting the same data.

Issues such as data standards and uniformity for instance, the tidal datum - are we speaking the same 'language'? Do the height data refer to the same vertical reference point? Are the marine spatial data compatible with those data collected from land- and space-based techniques?

**Ladies and Gentlemen,**

There is no doubt that a pressing need for nations to come together and develop a system that can effectively describe the legally defined spatial extent of rights, restrictions and responsibilities in the marine environment, including the management of boundaries and ocean parcels. With such a system, users can then visualize and appreciate the spatial extents of the marine environment. This in turn will help nations facilitate sustainable management objectives as I have mentioned earlier, which is, 'the conservation, preservation and exploitation of the marine environment in a manner to ensure sustainable development in a balanced environment', within each nation's jurisdiction.

**Ladies and Gentlemen,**

The success of any workshop requires the efforts of many. I would like to extend my most sincere thanks and appreciation to all concerned, whose professional and personal efforts have been expended in the preparation and execution of this workshop. I extend my heartfelt gratitude to PCGIAP and all participating countries present here today for making it possible. On a personal note, my thanks and appreciation to Professor Ian Williamson and his Marine Cadastre Research Group at the Department of Geomatics, University of Melbourne. Also to all members of the Organising Committee who worked long hours in fact months , prior to this workshop. To them, Jutaan Terima Kasih.

Finally, on behalf of the Organising Committee, I would like to extend our gratitude and appreciation to The Honourable Deputy Minister of Natural Resources and Environment, Mr. S. Sothnathan for his support and keen interest by his presence with us here this morning. It is only with a clear vision and strong support from Governments that all participating countries could achieve success in future collaboration. If this could be realized, then indeed, an example of a regional unity in reality will only be a matter of time.

Finally, I would like to wish you every success in your deliberations and hope you will find time to interact positively with one another, sharing valuable experiences and not forgetting to experience what Malaysia has to offer before your departure.

Thank you.

## Attachment 3

**Opening Speech by  
The Honourable Deputy Minister of Natural Resources and Environment, Malaysia  
Mr. S. Sothnathan  
at  
The International Workshop on Administering the Marine Environment - The  
Spatial Dimensions  
Hotel Renaissance, 5 May 2004**

Yang Berhormat Encik Sazmi Bin Miah  
Parliamentary Secretary of Ministry of Natural Resources and Environment

Yang Berbahagia Dato' Dr. Isahak bin Yeop Mohd Shar  
Secretary General of Ministry of Natural Resources and Environment

Yang Berbahagia Dato' Suboh Bin Mohd Yasin  
First Deputy Secretary General of Ministry of Natural Resources and Environment

Yang Berbahagia Datuk Othman Bin Baba  
Second Deputy Secretary General of Ministry of Natural Resources and Environment

Yang Berbahagia Dato' Hamid Bin Ali  
Director General of Survey and Mapping

Professor Ian Williamson  
Chairman of Working Group 3 of the PCGIAP (Permanent Committee on GIS Infrastructure for Asia and the Pacific)

### **Distinguished Guests**

#### **Ladies and Gentlemen,**

On behalf of The Honourable Minister of Natural Resources and Environment, it gives me great pleasure to be with you this morning in this wonderful occasion of the opening of the ***International Workshop on Administering the Marine Environment - the Spatial Dimensions***. I would like to thank the organising committee for giving me the honour of delivering this welcoming address and to officiate the opening of this workshop. On behalf of the Government of Malaysia, I would also like to thank the PCGIAP (Permanent Committee on GIS Infrastructure for Asia and the Pacific) and in particular Working Group 3, for giving Malaysia the opportunity to host this important international event.

The choice of Malaysia as the host is indeed very appropriate and timely especially with the introduction of restructured ministries to streamline the function of the newly re-elected government. The newly created Ministry of Natural Resources and Environment, which I am responsible for, comprises of departments that deal with the management of natural resources and the environment. The scope of responsibilities that comes within this ministry would naturally include the administration of marine resources. The Ministry is well positioned to address land related matters with ease; however, matters that concern the seas are relatively new to the Ministry and will require expert's knowledge and experience that can be found in this room.

#### **Ladies and gentlemen,**

Assessment, administration and management of the marine require information about the boundaries and rights, restrictions and responsibilities in the marine environment. Although it is a relatively new field, its objective has certain similarities to the land cadastre, for example, to determine limitation of boundaries and rights of one's parcel. In the context of the seas, the administration of the marine environment clearly requires more comprehensive information, to cater for the complexities in the said area.

It is vital to understand the different challenges encountered in the marine environment to appreciate the complexity of marine cadastre. Most of us can comprehend land-based cadastre since it is conveniently supported by physical placement of marks to indicate limit of boundaries and interests. On the other hand, the ocean is unable to offer such physical delimitation. The situation is further complicated by the ever-changing dynamics of the seas and oceans. However modern and sophisticated land based management system and infrastructur, can be extended to provide solutions towards addressing the complexities of the marine related problems.

On land, the geometric and attribute description of land parcels are recorded in information system and have matured into Spatial Data Infrastructure (SDI). Such SDI is built to offer efficient services and information to organisations involved in land planning, development and many others. Many nations have invested a lot of time and money in setting up their SDI on land, in spite of the fact that 70 percent of the earth's crust is covered by the seas and oceans. The remaining 30 percent of the land has become overpopulated and consequently marine resources are now being recognised as potential source for food, raw materials, energy and even conversion into dry land. Therefore, it is imperative that a good SDI related to marine administration needs to be set up to manage such diverse resources. It should be able to manage challenges such as overlapping issuance of rights over spatially identical location by different authorities.

**Ladies and Gentlemen,**

I understand that many countries in the Asia Pacific region have developed their SDIs. Nevertheless, the majority of them are focused on land-based requirements that are bordered by the coastline. As we all already know, the land does not just stop at the water's edge. It extends seawards from the coastal shelf to the Exclusive Economic Zone (EEZ) and beyond. As such and in this respect, the current SDI of most countries including Malaysia needs to be more comprehensive so as to assist and improve the administration of the marine space for the enjoyment of current and future generations. By this, I mean, the SDI should also be extended to cover the needs of the marine environment.

The development of a comprehensive SDI that continues from the land to the seas is crucial for sustainable development, particularly in the coastal zone. Most countries in the region have at one time or another, dealt with complex marine administrative issues such as fish farming, aquaculture, marine transportation and tourism, indigenous fishing rights and native titles, seabed mining, marine park, pollution, waste disposal, reclamation, easement for cables and pipes and heritage sites of ship wrecks and so on. All these activities require a common spatial framework in order to administer the associated rights, restrictions and responsibilities. As such, I do hope that the initiatives made by PCGIAP through its Working Group 3 would yield a common standard guideline on the establishment and development of marine SDI that could be adopted by member countries.

**Ladies and Gentlemen,**

At the end of last year, Malaysia played host to a very important international forum at the ministerial level that dealt with and touched on matters relevant to the marine issues that we are talking about today. The ministerial forum concluded with recommendations and one of which is to further examine and share national case studies in developing national coastal and marine policies. In line with the recommendations made, it is thus appropriate for this workshop to deliberate on case studies and research that have been conducted by member countries. As I understand the program, the workshop will have a time allocated for experts' presentations on their research findings that would be in support of the ministerial recommendations.

**Ladies and gentlemen,**

Due to the rapid development of the marine environment within the region, such as oil and gas explorations and exploitation in the EEZ, offshore fishing industry, shipping etc., it is inevitable that we should also deal with territorial boundaries. All countries share some form of common boundaries either on land or sea with other country or countries. The exploitation of marine resources in the vicinity of the territorial boundary areas may affect neighbouring waters, for example oil spill and waste discharge could pollute those areas. Therefore there is a need to adhere to International Conventions especially

when administrating these areas. Examples of global catastrophic incidents further signify the importance of marine information sharing in order to be equipped to contain the devastation to both the environment and the marine life. These mishaps in the seas underscore the need for more stringent legislations on the administration of the marine environment.

**Ladies and Gentlemen,**

I trust this forum will consider the various issues of marine SDI and the establishment of necessary administrative and infrastructural framework to manage the marine resources in a sustainable manner. I understand that the objectives of this workshop are to identify problems in the marine environment and to formulate ways and means to overcome them with the aid of a comprehensive SDI that incorporates the spatial dimension as a key component. I hope that the identification of those problems and the ensuing solutions could be expediently conducted with the contribution of the experts and participants, and the results from this workshop will serve as a guiding standard to all countries in this region. The good effort of this committee should be maintained to bring about more cooperation and the sharing of vital information between countries within the Asia Pacific region. I sincerely hope that you would be successful in your endeavour.

**Ladies and Gentlemen,**

I wish that during the sessions, the flow of information will be a two-way communication, with plenty of questions from the floor as well as active discussions between speakers and participants. It is also my wish that the discussions will not be just confined to the formal sessions here in this beautiful hall but will also continue informally during tea-breaks, during meals and even as we relax in the evening or perhaps while enjoying the tropical sunset that KL has to offer.

**Ladies and Gentlemen,**

Finally, I would like to record my utmost appreciation to Working Group 3 of the PCGIAP for choosing Malaysia as the venue of this workshop and to the Department of Surveying and Mapping Malaysia as well as the University of Melbourne, Australia, for organising this workshop. I would also like to thank all those who have contributed in one way or another, to its success. Most important of all, I would like to thank all local and foreign participants, for your support and effort in making this workshop a reality.

On this note, Ladies and Gentlemen, I now declare the International Workshop on Administering the Marine Environment - the Spatial Dimensions officially opened.

Thank you.

**Workshop On Administering the Marine Environment –  
The Spatial Dimension  
*May 4 - 7, 2004 Kuala Lumpur, MALAYSIA***

### **Breakout Sessions**

Delegates will break out into three Working Groups to discuss the three objectives of the Workshop. Each Working Group will be led by a Chair, Vice Chair and a Rapporteur. The results from each working group will be presented, discussed and agreed upon in the Open Forum and Plenary Session. Each Working Group will present the results at their discussions in a PowerPoint presentation and will prepare a written summary suitable for inclusion in the final report at the workshop.

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#### **Working Group 1 – Issues in Administering the Marine Environment**

The objective of this working group is to identify and prepare a summary of the issues and challenges in administering the marine environment presented and discussed at the workshop. Invited keynote presentations and reports, and individual country reports will provide the basis for this working group. In order to facilitate the discussions, the following areas can be used as a guide to classify the issues:

- Environmental
- Economic
- Social
- Technical
- Spatial Data

#### **Working Group 2 – Definition of Marine SDI and Marine Cadastre**

The objective of this working group is to discuss and prepare a proposed working definition and term for the Marine SDI/Marine Cadastre for administering the marine environment. An agreed definition can then be used as a common starting point for the development of marine SDI/marine cadastre by individual countries and organizations. The working group will determine whether one or two definitions are necessary. For example is a marine cadastre different from a marine SDI?

The following published definitions, along with others identified within the course of the workshop, can be used as a guide to facilitate the discussion:

***Definition from Australia (The University of Melbourne, 2002):***

Marine SDI/cadastre is a spatial boundary management tool which describes, visualises and realises legally defined boundaries and associated rights, restrictions and responsibilities in the marine environment, allowing them to be more effectively assessed, administered and managed.

***Definition from Canada (University of New Brunswick, 2000):***

Marine cadastre is a marine information system, encompassing both the nature and spatial extent of interests and property rights, with respect to ownership and various rights and responsibilities in the marine jurisdiction.

***Definition from New Zealand (Robertson, Benwell, and Hoogsteden, 1999):***

A marine cadastre is a system to enable the boundaries of maritime rights and interests to be recorded, spatially managed and physically defined in relationship to the boundaries of other neighbouring or underlying rights and interests. (Robertson et al, 1999).

### **Working Group 3 – Administration of Marine Rights, Restrictions and Responsibilities (RRR)**

The objectives of this working group are firstly to document the influencing factors and current methods used in administering marine rights, restrictions and responsibilities including aspects such as registration of marine interests and management functions. Secondly the working group will determine the basic principles required for the administration of marine RRR. Invited keynote presentations and reports, and individual country reports will provide the basis for this working group. In order to facilitate the discussions, the following areas can be used as a guide to classify the issues:

- Coastal Zone
- Territorial Sea
- Exclusive Economic Zone
- Overall

**Final Report of Breakout Session**

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**Working Group 1  
Issues in Administering the Marine Environment****The context**

Marine and coastal spaces are complex environments, subject to multiple and often conflicting pressures and demands. All nations aspire to economic development and, for most states, the marine environment contains a multitude of actual and potential resources. Exploitation of these resources in the interests of national advancement is a legitimate and natural aspiration. This is especially true of less-developed countries. It may be noted also that traditionally, the world's oceans are seen as a common good, and part of the global heritage of all humanity, including by countries without a coastal zone.

The marine environment also contains complex and crucial ecosystems and habitats. Coastal and continental shelf waters, especially, are vital breeding grounds for many fish and other species, including those exploited for human consumption. Conserving and protecting these environmental resources are other priorities for marine stewardship, particularly within the prevailing ethos of sustainable development, so that present use of environments and resources does not prejudice or preclude access by future generations.

Finally, marine and coastal environments pose threats to many nations, due to the dynamic nature of many marine processes. These threats are exacerbated by the prospect of global climate change and consequent sea-level rise.

Managing the marine environment and balancing the many potentially conflicting demands on ocean spaces while protecting societies against undue risk, requires actions and policies from local to international levels. These policies must be sustainable, holistic and, above all, informed. Much of the required information has an inherent spatial dimension, which offers both potential and challenges for proper synthesis, analysis and management.

Achieving this desired holistic management of marine territories, and the information needed to guide the process, requires issues to be addressed in several sectors.

**Socio-Economic and Policy Issues**

Pressures on marine spaces take place at **multiple scales**, both horizontally (geographically, from the global to the regional, national and sub-national /local levels) and vertically (multiple pressures, operating over various spatial and temporal resolutions, all acting within the same geographic territory). Ocean management requires policies that can take account of these realities but, to date, the majority of our political, corporate and executive structures and frameworks are ill-suited to cater for these complex demands. We therefore require **mechanisms and structures for governance of marine territories** that are sufficiently flexible to allow integration of global and international objectives with those of local communities and interests.

At the international level, the seas and oceans have traditionally been seen as part of the global commons, available to all, and with rights of passage and exploitation limited only in comparatively near-shore areas and in other designated zones. This situation is changing rapidly, but our **capacity for managing resources within an international framework** is still rudimentary and evolving. Even where policies and approaches exist (e.g. the UNCLOS conventions), they may be more aspirational than real. **Ratification and enforcement** of policies and directions within the international sphere are issues and

weak points that need resolution. The **interests of smaller nations** should not be ignored or overruled by those of larger and more powerful (and often more distant) ones.

At national levels, one major issue that emerged from the group's discussions was the **frequent lack of clear mandates**, and division / allocation of obligations and responsibilities, within national governments, for managing marine resources. More usually, these responsibilities are fragmented and divided among multiple ministries and departments, and there is a common lack of integration or coordination between these different bodies.

In many parts of the world, and especially in the Asia-Pacific region, this need to engage multiple stakeholders, at multiple scales, must include **respect for the needs, aspirations and interests of indigenous peoples**. We noted that most management frameworks to date tend towards a "top-down" approach, where these local, indigenous peoples are often the passive recipients of policies, technologies and other instruments that have been formulated or derived elsewhere. Thus, a further important issue is the need for improved methods of two-way communication, and the inclusion of indigenous and other "local" communities of stakeholders in the administration of marine environments that affect them.

At all geographical and organizational scales, coastal zone management tends historically to be reactive, in response to perceived pressures or specific events, rather than prospective and anticipatory. A clear shift in focus towards **more forward-looking** and **longer-perspective management** frameworks is needed.

## Technical Issues

Spatial information technologies for managing coastal / marine information and offering decision support for policy makers or resource managers are now well established and have successfully diffused to most nations. However, while the technologies themselves are increasingly ubiquitous, the **knowledge required to use them appropriately and effectively is not**. There is a clear need in the Asia-Pacific region (and elsewhere) for continued **capacity-building, know-how transfer, education and training** in coastal/ marine geomatics to address this gap.

Even where both technologies and the knowledge to use them exist, obtaining data to fuel them poses major challenges. This may be divided into a number of sub-problems and issues.

a) In many marine and coastal areas, required **data simply may not exist**. There are still many areas where even the most basic reconnaissance surveys have not yet been undertaken. Elsewhere, some data may exist, but may be in incompatible formats, may be severely out-of-date, or may be incomplete. The **costs of ocean survey** and data capture are widely seen as critical issues that restrict the ability of many nations, especially the poorer ones in the region, from effective analysis and management of their marine territories. Since many of the data concerned are required for navigation or other requirements that transcend national interests, greater collaboration at these broader geographic scales is required.

b) Where data do occur, **gaining access** to these may be problematic. In some cases the difficulty may simply be that of discovering what data exist, what their quality and defining characteristics may be, and who holds them. Metadata catalogues, especially where these conform to recognized standards, may assist in overcoming these problems. In other cases, the problem may be one of gaining access to data through reasons of inter-organisational fears and jealousies, and the **lack of a culture of data sharing**; in yet other cases, it may arise through government-imposed **restrictions on grounds of security** and (perceived or real) political sensitivity. Finally, geographic data (including marine data) are often seen as resources with commercial potential for trade and for the addition of value as information commodities. Reconciling these commercial uses of data (and the intellectual property rights and other restrictions they imply) with the use of the same data for the public good, poses many challenges and issues that also may need to be overcome.

c) Technical issues of **interoperability between technologies and between datasets**, as well as incompatibility of data formats, coordinate systems, geodetic parameters and other aspects of data, pose further problems for data sharing and exchange. However these issues are being addressed, at least at the broader international scale, in many forums and initiatives, and the problem may often be more one of finding out what standards and guidelines exist for overcoming them, rather than the technical incompatibilities of data themselves. It is important that **marine data collectors and managers inform themselves of existing and emerging standards** for data capture, storage and exchange, and equally that they adhere to these standards.

## **Working Group 2**

### **Definition of Marine SDI and Marine Cadastre**

As part of the main workshop objectives for day 2, Working Group 2 was formed and tasked with proposing at least one resolution relating to definitions of marine Spatial Data Infrastructure (SDI), and marine cadastre. It was suggested by the Chair, and accepted by the group, that known concepts regarding cadastre and SDI be first presented to the group as an initial reference point for the discussions. The ensuing deliberations produced the following points:

- **SDI and cadastre are different (i.e. they are not synonymous)**

An observation was made that in some instances the terms “cadastre” and “SDI” are being used interchangeably. The group agreed that it was important to stress the fact that these are two different concepts. It was also agreed that cadastre is one the components of SDI (i.e. cadastre is one of the many sub-systems of SDI).

- **SDI**

It was agreed that at any jurisdictional level, SDI facilitates access to, the management of, and the sharing of spatial data among stakeholders in both the marine and land environments. These functions of SDI are made possible by its various components that include (among other things):

- Data (e.g. cadastral, environmental, topography, bathymetry, place names etc.)
- Metadata
- Databases
- Hardware and software
- Physical computer network infrastructures
- Institutional arrangements (e.g. laws, legislation, policies and procedures)
- Standards (technical, institutional, administrative etc.)
- People

- **Marine SDI**

It was agreed in the group discussions that marine SDI is one component of a National SDI. The other is the terrestrial or land SDI.

- **Cadastre**

The term cadastre is not universal across global jurisdictions, and therefore there is confusion among some groups as to its meaning. This is especially true with the term marine cadastre. However, among those familiar with the term as it is used in the land environment it represents a parcel-based system that supports the management and administration of interests, rights, responsibilities, and restrictions relating to land. It was also agreed that a cadastre consists of spatial and textual information that supports fiscal, legal, or multipurpose objectives.

- **Marine Cadastre**

It was agreed that marine cadastre has the same components as the [land-focused] cadastre. However, modeling the spatial extent (to which are attached rights, responsibilities and restrictions) must take into account the obvious nature of marine environment. In other words rights are most likely to be tied to volumes of marine space (3-D). When a temporal component is added, a 4-D spatial description becomes relevant. Also, while some marine boundaries can be defined to degrees of precision, other boundaries (e.g. in the coastal zone) are “fuzzy”. Additionally it was considered that the term ”parcel” might not be appropriate, or may be misleading in describing the marine spatial extent to which rights, responsibilities and restrictions are attached.

- **Proposed Resolutions**

It was made clear that Working Group 2 does not intend to redefine terms such as “cadastre” and “SDI”. However, clarification of the meaning of these terms, especially with regard to the marine environment, is considered essential to promoting a standard understanding among the members of PCGIAP when these terms are used. With this in mind, Working Group 2 proposes the following definitions:

A marine SDI is one component of a National SDI. The other is the land SDI. A marine SDI facilitates **access** to, the **management** of, and the **sharing** of marine spatial data among stakeholders. These functions of a marine SDI are made possible by its various components that include (among other things):

- Data (e.g. cadastral, environmental, bathymetry, etc.)
- Metadata
- Databases
- Information systems
- Computer hardware and software
- Physical computer networks
- Communication infrastructures
- Institutional arrangements (e.g. laws, legislation, policies and procedures)
- Standards (technical, institutional, administrative etc.)
- People

A marine cadastre is one component of a marine SDI. It is a marine information system concerned with the management and administration of marine boundaries and their associated rights, responsibilities, and restrictions. The marine cadastre comprises the same components as a land cadastre. The spatial extent of marine space that is the focus of managed and administered rights, responsibilities, and restrictions is best conceived and modeled as a 3-D (volume) or 4-D entity.

## **Working Group 3**

### **Administration of Marine Rights, Restrictions and Responsibilities (RRR)**

Without a clear statement of purposes, a marine SDI/cadastre is a homeless tool: governments will resist applying resources needed to build it unless they can be convinced that it supports essential functions.

Existing government imperatives include management and ordering of marine activities, small scale and large scale. Agencies need to create order for effective shipping, sustainable aquaculture, fishing and the mélange of marine activities. This pattern of administration shows the same pathologies for all countries in the region.

Existing administrative structures involve interaction between the spatial definitions of the SDI and the administrative component. Typical organized administration is a composite of –

- Government policy
- Implementation path - Agency
- Authorization – Legislation, executive orders and institutional budgets
- Individual licences, leases and arrangements including RRRs on an one-by-one basis
- Records of administrative decisions (registers) and their spatial application (SDI), including the jurisdiction or physical extent of the agency's powers and authorities.

Even in these agencies, existing administrators are equipped with inadequate tools. Some agencies are better off than others; typically oil and gas management is resourced legally, administratively, and well funded. Shipping administration is also relatively well off. However smaller scale activities are not well administered. Indeed, much marine encroachment and activity is not regulated at all. Environmental considerations are struggling for better implementation capacity.

Existing administration and management already uses spatial and administrative tools. For the better off agencies, these are well developed. For the less cohesively administered activities, spatial tools are neither well developed or capable of being used for all necessary functions. In cases where marine activities look like land based activities (marine housing, aquaculture, farming), land administration techniques spill over into the marine environment. Lack of an overall hierarchy of uses leads to conflicts between users and functions in an increasing number of situations, mostly involving disruption of boat and shipping lanes with semi-permanent structures and inability to police illegal activities (sand mining).

Marine administration would be assisted by clear spatial definitions of existing rights, restrictions and responsibilities and a comprehensive structure for managing these spatial definitions: a marine SDI. Focus on existing systems to develop a foundation SDI is useful because it rationalizes scarce government resources and potentially saves governments money by avoiding duplication of efforts and investment in obsolete or isolated systems. On the positive side, it potentially broadens the vision of existing administrations to include emerging technology and creates opportunities for sharing. The greatest advantage of understanding existing systems holistically is the improvement of our ability to convince governments to invest in SDI infrastructure.

Arguments and strategies for moving the SDI forward and improving the capacity for creation and use of multi-functional administrative and spatial infrastructures include –

- Compliance with International Conventions and standards, including UNCLOS, 1982.
- Better arrangements among diverse jurisdictions: local government, regional, provincial and national, then among nations.
- Intelligent building on administrative competencies and designs developed in the land environment.

- Much more information about slippage of land based systems into the marine environment: eg planning controls, taxation collection, land titles and parcels and assessment of their suitability (on first sight, they appear to be).
- Cooperation between marine based agencies, off-shore oil and gas agencies, shipping agencies, coast guard, etc
- More information about the failures to regulate, gaps in structures, and trouble cases.
- Identification of significant and high profile trouble cases: major marine development, illegal sand mining, fish and seaweed ponds in shipping and boat lanes.
- Information relating to loss of public and government resources to unregulated and illegal activities and pollution management.
- Improved capacity for administrative systems to develop sensitivity for informal marine uses and to protect sustainable human/marine relationships.
- More flexible representation of the marine context where natural objects and conditions are often more important than human and administrative interests.

Regional countries particularly in South East Asia experience particular demands on their administration: marine encroachment, environmental losses, spill over effects of marine activities beyond jurisdictional limits, high levels of unregulated activity, intensive informal marine uses, congested marine areas, intense scale hierarchical administrations, and use of land administration systems to fill regulatory gaps. These suggest greater urgency is needed to address the SDI and to develop the associated technical, legal and administrative skills.

Governments will resist establishment of a single comprehensive administrative structure for marine environment, and it is arguable whether this kind of arrangement is suitable. Meanwhile, capacity to share information between existing agencies and to comply with international standards in building an SDI demands effort.

A cooperative or steering arrangement, guided by international and national policy set at highest level and working with the existing agencies of international cooperation and local administrations can continue to develop an SDI vision and assist improving the appreciation of national governments of the need to resource this infrastructure.

**Workshop On Administering the Marine Environment –  
The Spatial Dimension  
May 4 - 7, 2004 Kuala Lumpur, MALAYSIA**

## **RESOLUTIONS**

### **RESOLUTION 1 – SPATIAL DIMENSION OF SDI**

*The Workshop*

*Noting* that most countries within the Asia Pacific region have developed their own National Spatial Data Infrastructure (NSDI) initiatives to facilitate sustainable development,

*Recognising* the importance of sustainable development and the principles agreed by the International Conference on the Sustainable Development of the Seas of East Asia and the Ministerial Forum of the Sustainable Development of the Seas of East Asia (2003) under the GEF/UNDP/IMO Partnerships in Environmental Management for the Seas of East Asia (PEMSEA),

*Further noting* that the vast majority of NSDI initiatives are only related to the land environment,

*Recalling* that most countries in the region have an extensive marine jurisdiction and related administrative responsibilities,

*Further recalling* the essential international dimensions of many marine processes and activities,

*Acknowledging* that the marine environment and particularly the coastal zone are critically important for food production and sustainable development within each country,

*Recommends* that all countries in the Asia-Pacific region with an extensive marine jurisdiction and administrative responsibilities be encouraged to include a marine dimension in their NSDI as part of their obligation to meeting their responsibilities under the United Nations Convention on the Law of the Sea (UNCLOS).

*And further recommends* that they cooperate with other countries to ensure technical, operational and policy consistency in the marine elements of NSDIs developed in the Asia-Pacific region.

## **RESOLUTION 2 – PCGIAP-FIG COLLABORATION**

*The Workshop,*

*Recognising the work program of Working Group 3 (Cadastre) of the PCGIAP on the spatial dimension of administering the marine environment,*

*Further recognising the ongoing work plan of the International Federation of Surveyors (FIG) on marine cadastre and ocean governance through its Commission 4 (Hydrographic Surveying) and Commission 7 (Cadastre and Land Management),*

*Acknowledging the successful co-operation between PCGIAP and the FIG in developing and undertaking the Cadastral Template Project to provide a comparative analysis of the role of cadastral systems in spatial data infrastructures,*

*Recommends that PCGIAP and FIG collaborate through their respective work plans on marine cadastre, marine SDI, marine administration systems and ocean governance and encourages the FIG to participate in the Marine Cadastre Template Project.*

### **RESOLUTION 3 – DEFINING THE SPATIAL DIMENSION OF THE MARINE ENVIRONMENT**

*The Workshop,*

*Recognising* that a range of terms are used to describe the spatial dimension of the administration of the marine environment including marine cadastre, marine SDI, marine GIS and marine administration systems,

*Further recognising* the need for a common terminology in administering the spatial dimensions of the marine environment,

*Noting* that marine cadastre and marine SDI are different with the two being related in so much as cadastre can be a data-set of SDI as well as a component of a marine administration system,

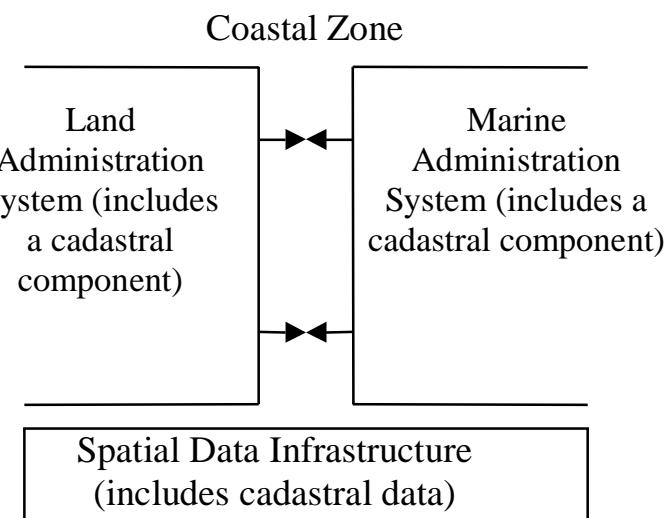
*Further noting* that the marine environment is administered through a hierarchy of levels from local, state, national government to regional and global levels,

*Acknowledging* that the administration of rights, restrictions and responsibilities in the marine environment is based on often overlapping parcels or objects with the boundaries being both natural and geographically defined,

*And further acknowledging* that the SDI concept focuses on management, access and sharing of spatial data in both the marine and terrestrial environments while the cadastral concept focuses on management and identification of the respective rights, restrictions and responsibilities related to parcels or objects, often overlapping with 3D and sometimes with a temporal dimension,

*Recommends* that the term “marine administration system” is adopted for the administration of rights, restrictions and responsibilities in the marine environment, which the spatial dimension facilitated by the Marine SDI,

*And further recommends* that a marine cadastre is defined as a management tool which spatially describes, visualises and realises formally and informally defined boundaries and associated rights, restrictions and responsibilities in the marine environment as a data layer in a marine SDI, allowing them to be more effectively identified, administered and accessed.



**Figure:** Administrating the Marine Environment-The Spatial Dimensions

## **RESOLUTION 4 – REQUIREMENT FOR FURTHER DEVELOPMENT OF GUIDELINES AND TOOLS TO ADMINISTER THE SPATIAL DIMENSION OF THE MARINE ENVIRONMENT**

### *The Workshop*

*Recognising* the Workshop identified the need for a marine component of a spatial data infrastructure and an associated marine administration system in order to support sustainable development and the PEMSEA principles in the marine environment,

*Noting* that while this Workshop clarified the need for a marine component within a spatial data infrastructure and associated marine administration systems, many other issues still need to be investigated and resolved,

*Recommends* that PCGIAP further investigates and develops guidelines and tools for administering the spatial dimension of the marine environment.

## **RESOLUTION 5 – EXPRESSION OF GRATITUDE TO THE HOST GOVERNMENT**

### *The Workshop,*

*Expresses its sincere gratitude* to the Government of Malaysia, the Minister of Natural Resources and Environment and the Director General of the Department of Survey and Mapping Malaysia, for the kind hospitality and gracious support extended to all participants at the International Workshop on Administering the Marine Environment - The Spatial Dimensions, held in Kuala Lumpur.