



**Requirement for Hydrographic Surveying and
Nautical Charting for Small Island Developing States
within the South West Pacific Region**

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Overview

- **Welcome**
- **Introduction**
- **Current Situation**
- **Understanding of Requirement**
- **Use of Hydrographic Data**
- **International Organisations & International Conventions**

Overview cont'd

- Status of Maritime Safety Information
- Determination of Maritime Delineation
- Benefits
- Way Ahead
- Conclusion



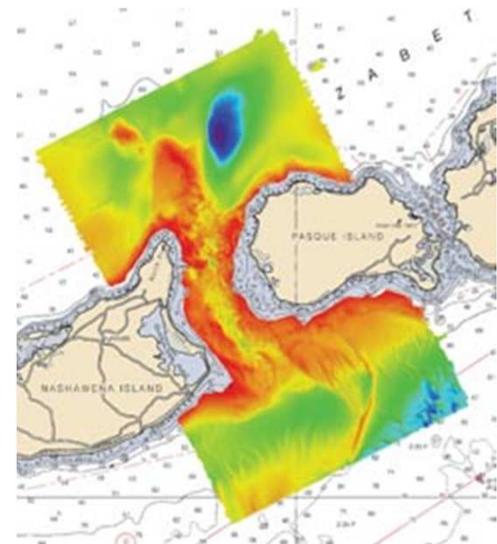
Hydrographic Surveying

■ International Hydrographic Organization definition:

“Hydrography is the branch of applied sciences which deals with the measurement and description of the physical features of oceans, seas, coastal areas, lakes and rivers, as well as with the prediction of their change over time, for the primary purpose of safety of navigation and in support of all other marine activities, including economic development, security and defence, scientific research, and environmental protection.”

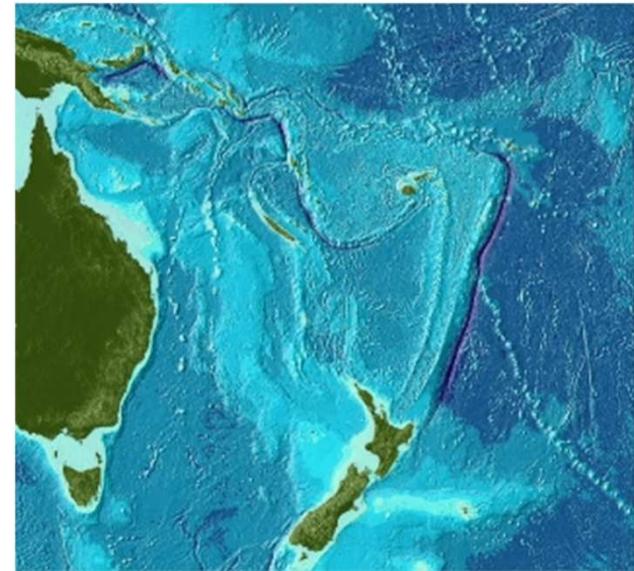
■ Hydrographic Specialisations:

- Nautical Charting
- Industrial Offshore Surveying
- Coastal Zone Management (CZM)
- Military Hydrography



Introduction

- **Strong Hydrographic Services Vital to SW Pacific SIDS**
- **Maritime Transport - Primary Mode of Trade within SW Pacific**
- **Fundamental to SW Pacific SIDS Economies, Marine Environment, SAR, Maritime Safety, Border Control, Fisheries**



The ever increasing demand for better surveys due to increasing ship size and draft!



Current Situation

- **State of Nautical Charting in SW Pacific Region**
- **Reliance on Maritime Transport & Seaborne Tourist Trade**
- **Lack of Hydrographic Surveying Expertise**



Current state of Hydrographic Survey in SW Pacific Region

Depths < 200m	Unsurveyed	Resurvey required to meet modern standards	Unsurveyed & Resurvey
Australia	45%	20%	65%
Fiji	25%	70%	95%
Kiribati	80%	20%	100%
New Caledonia (France)	00%	00%	00%
New Zealand	00%	30%	30%
Papua New Guinea	72%	0%	72%
Solomon Islands	60%	30%	90%
Tonga	00%	90%	90%
Tuvalu	60%	30%	90%
Vanuatu	40%	55%	95%

Coverage of hydrographic surveying at depths <200m for selected SW Pacific countries. (IHO Publication C-55 dated 17 Aug 2011)



Status of Maritime Safety Information

- Lack of in-country focus within many SIDS
- Lack of coordination
- Lack of appropriate & up-to-date charts
- Potential for litigation against SIDS without appropriate hydrographic surveys and nautical charting

CHART ACCURACY

Owing to the age and quality of the source information, some detail on this chart may not be positioned accurately. Particular caution is advised when navigating in the vicinity of dangers, even when using an electronic positioning system such as GPS.

Cost Benefits

- **Hard to quantify, but for most maritime states benefits are significant**
- **90% - 95% internal and external trade by sea for most SIDS**
- **Marine industries**
 - **Fishing industry**
 - **Tourism**
 - **Mineral Resource Exploration (potential)**

Understanding of Requirement

- **Prioritisation of Requirements**

Ojinnaka (1997) stated:

“For a nation to make maximum utilisation of her marine resources, her waters must be properly charted and the charts regularly updated. Unfortunately due to the different disciplines involved, the highly specialised techniques required, the high cost of marine operations and the apparent lack of awareness of the importance of these charts, it has been difficult for most developing nations of the world to pay serious attention to the charting of their waters.”

- **Lack of Equal Focus**

- **Importance of Hydrographic Services**

Use of Hydrographic Data

■ Uses of Data and Products:

- Planning
- Conduct of Operations
- Border Control & Law Enforcement
- Maritime & Coastal Development
- Maritime Safety

■ Capability Development

■ Aid Assistance

■ Use of Independent Advisers

■ Maritime Safety Infrastructure



Use of Hydrographic Products cont'd

There are a myriad of uses of hydrographic data and information:

■ Planning:

- Strategic
- Operational
- Anti-pollution
- Environmental
- Hydrographic Survey
- Shipping Route
- Navigation Aid Positioning
- Maritime Development
- Beach Protection
- Resource Development

■ Conduct of Operations:

- Search and Rescue
- Oil Spill Containment
- Hydrographic Survey
- Protection of Sensitive Areas
- General Navigation
- Oil, gas and mineral exploration

■ Border Control and Law Enforcement:

- Identification and Establishment of Marine Jurisdictional Areas (such as territorial sea baselines, exclusive economic zones, special marine zones, marine park limits, harbour limits, etc.)
- Fisheries
- Immigration
- Crime Prevention (State and International)

Use of Hydrographic Products cont'd

■ Maritime and Coastal Development:

- Marine Research and Development
- Capability Development
- Transport Infrastructure
- Port and Harbour Infrastructure
- Fisheries
- Supplementation of Topographic Mapping

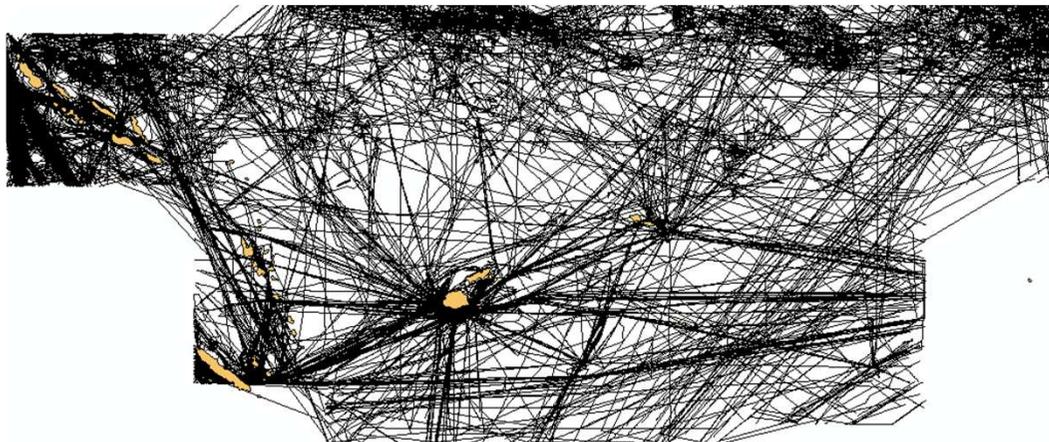
■ Maritime Safety:

- Shipping Operation Safety Analyses
- Nautical Charting
- Notices to Mariners
- Value Adding to Existing Data Sets
- Archiving and Databasing
- Operational Training for Hydrographers and Mariners

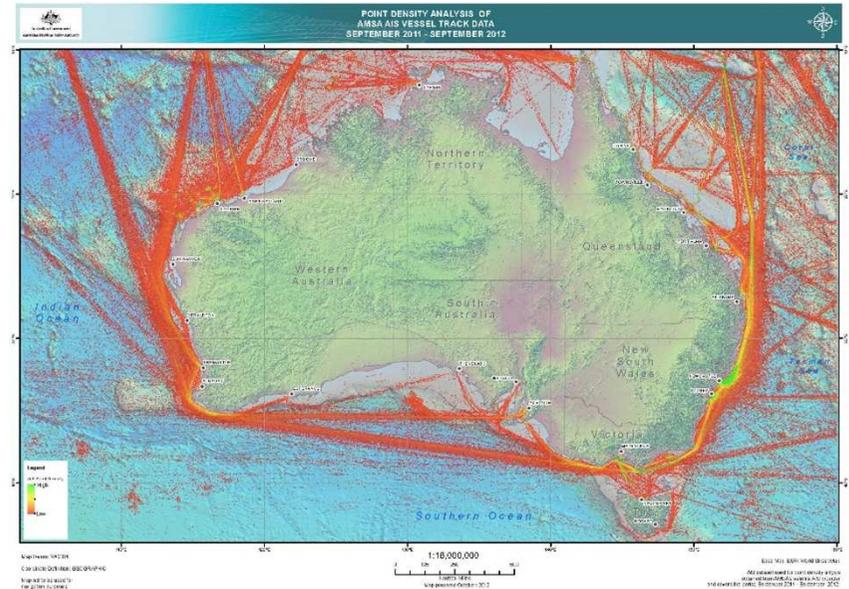
Automatic Identification Systems

*Regulation 19 of SOLAS Chapter V - Carriage requirements for shipborne navigational systems and equipment

Hydrographic services in conjunction with Maritime Safety Authorities can assist in identifying critical shipping routes and areas requiring hydrographic survey and charting



Compliments of Land Information New Zealand
April 2013



Compliments of Australian Maritime Safety Authority
August 2013

International Organisations and International Conventions

- **Membership & Ratification**
- **IMO & IHO**
- **Safety of Life at Sea Convention (SOLAS):**
 - In July 2002, the revised Chapter V of the IMO Safety of Life at Sea (SOLAS) Convention entered into force. Under the new Regulation 9, the Contracting Governments of SOLAS are now required to provide and maintain Hydrographic Services and products.
- **UN Convention on the Law of the Sea (UNCLOS)**

Membership of IMO and IHO – SW Pacific

- SW Pacific countries that are member states of the IMO, include: Australia, Cook Islands, Fiji, France, Kiribati, Marshall Islands, New Zealand, Papua New Guinea, Solomon Islands, Tonga, Tuvalu and Vanuatu.
- SW Pacific countries that are member states of the IHO and the SW Pacific Hydrographic Commission (SWPHC) include: Australia, Fiji, France (New Caledonia), New Zealand, Papua New Guinea and Tonga.
- SW Pacific countries that are associate members of the SWPHC include: Cook Islands, Kiribati, Niue, Palau, Solomon Islands and Vanuatu

Safety of Life at Sea Convention 1974

A State that is a party to the Safety of Life at Sea Convention (SOLAS), is obliged to provide hydrographic services in accordance with Regulations 9 of Chapter V of that Convention as follows:

“Chapter V Regulation 9 - Hydrographic services

1. Contracting Governments undertake to arrange for the collection and compilation of hydrographic data and the publication, dissemination and keeping up to date of all nautical information necessary for safe navigation.

2. In particular, Contracting Governments undertake to co-operate in carrying out, as far as possible, the following nautical and hydrographic services, in the manner most suitable for the purpose of aiding navigation:

2.1. to ensure that hydrographic surveying is carried out, as far as possible, adequate to the requirements of safe navigation;

Safety of Life at Sea Convention 1974

2.2. to prepare and issue nautical charts, sailing directions, lists of lights, tide tables and other nautical publications, where applicable, satisfying the needs of safe navigation;

2.3. to promulgate notices to mariners in order that nautical charts and publications are kept, as far as possible, up to date; and

2.4. to provide data management arrangements to support these services.

3. Contracting Governments undertake to ensure the greatest possible uniformity in charts and nautical publications and to take into account, whenever possible, relevant international resolutions and recommendations.

4. Contracting Governments undertake to co-ordinate their activities to the greatest possible degree in order to ensure that hydrographic and nautical information is made available on a world-wide scale as timely, reliably, and unambiguously as possible.”

United Nations Convention on the Law of the Sea (UNCLOS)

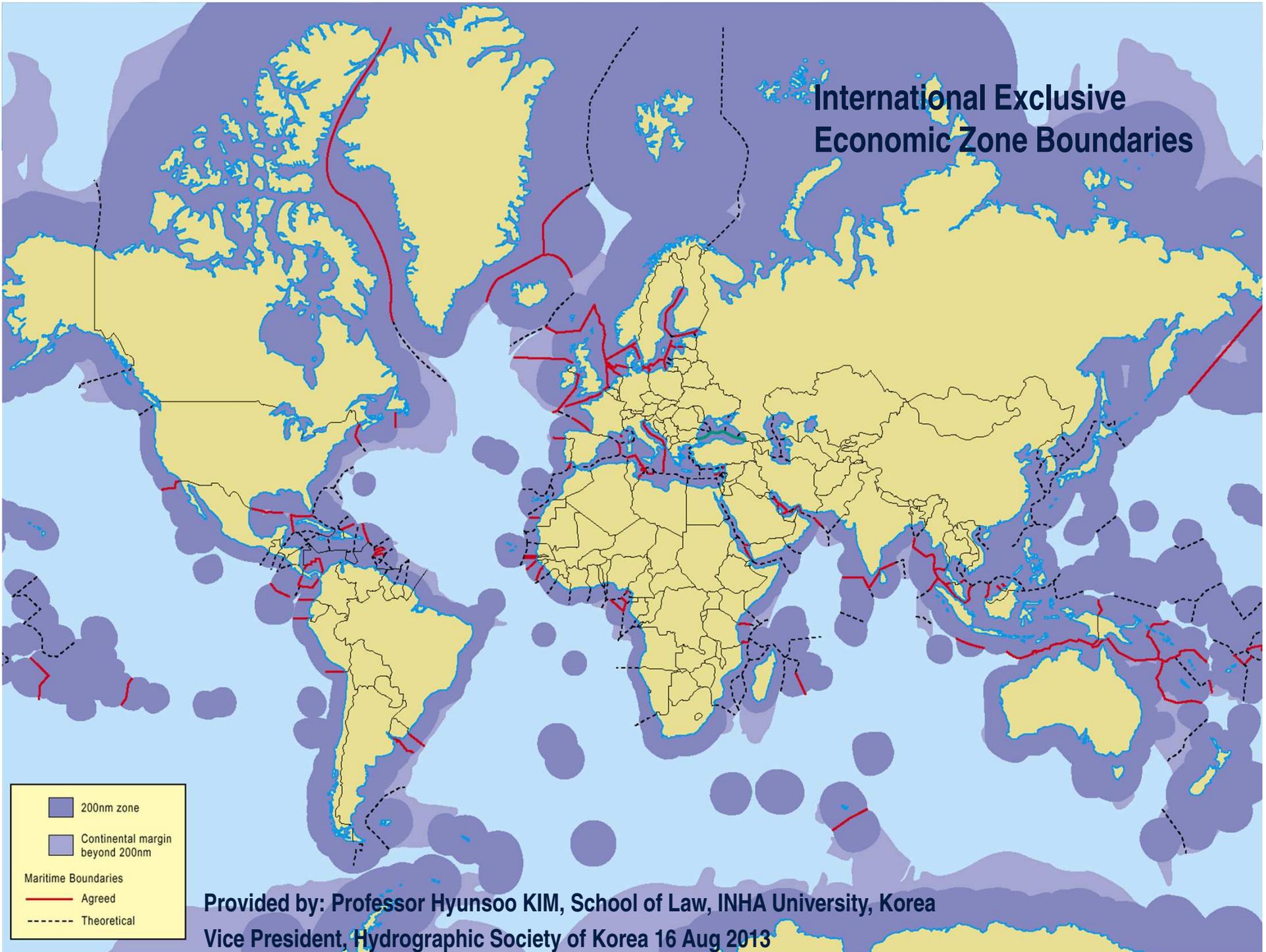


- **Excerpt of Article 24 - Duties of the coastal State:**

“2. The coastal State shall give appropriate publicity to any danger to navigation, of which it has knowledge, within its territorial sea.”

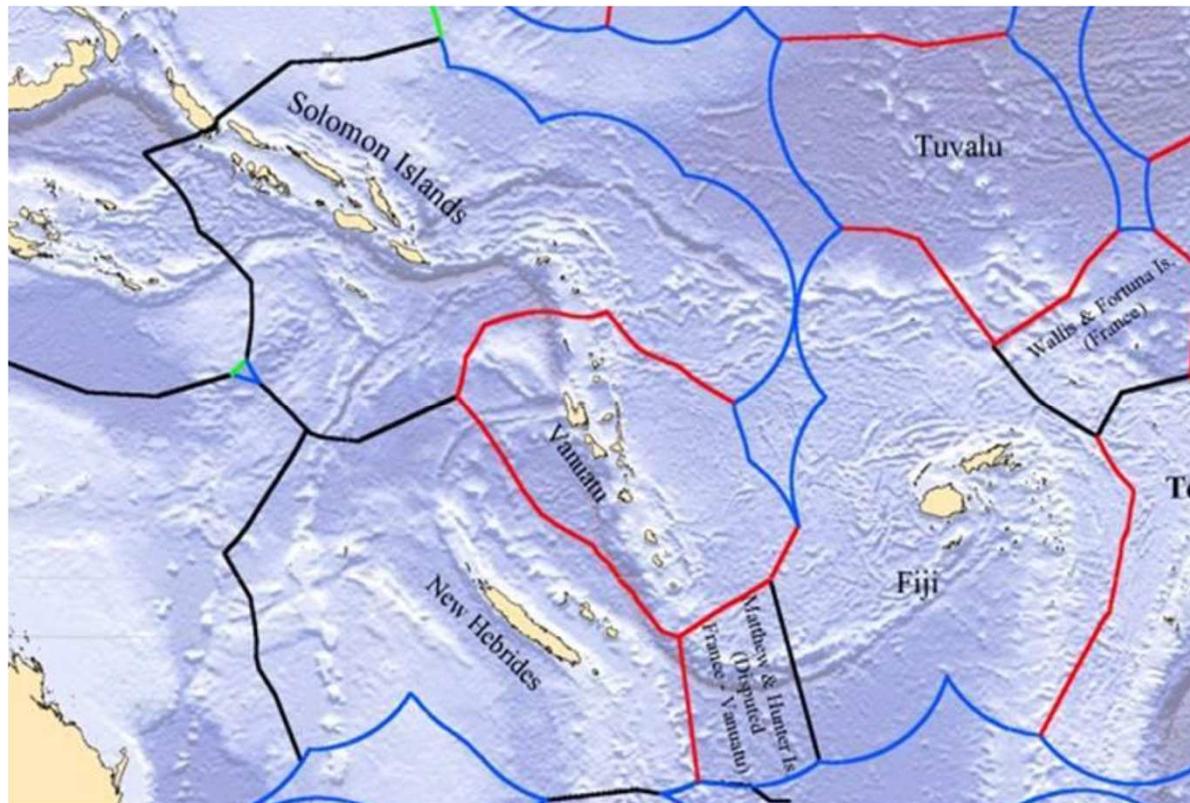
- **Articles 47, 48, 75 and 94 give further requirements regarding the provision of baseline data, geographic positions relating to maritime zones and duties of the Flag State**

International Exclusive Economic Zone Boundaries



Determination of Maritime Delineation

- Some current SW Pacific maritime boundary discussions include:
 - Fiji, France (New Caledonia, Wallis & Fortuna Is.), Solomon Islands, Tonga, Tuvalu, Vanuatu



SW Pacific maritime boundary discussion areas

Boundaries

- Agreed boundaries
- Median lines (not agreed)

Maritime zones

- Exclusive Economic Zones
- Exclusive Fishery Zones

Benefits of Hydrographic Surveys and Nautical Charting

- **Maritime safety provides confidence in navigating the waters within the SW Pacific.**
- **Tourism, especially cruise ship tourism, strongly benefits from hydrographic surveys due to identification of areas of marine and scenic interest and increased maritime safety, bringing greater financial benefits to national and local economies.**
- **National economic development and trade benefits from facilitation of maritime trade, internally, regionally and internationally. Identification of new, efficient and safer shipping routes to promote use of larger more modern vessels.**
- **Support of environmental protection and enable identification of sensitive marine areas, plus identification and formulation of maritime boundaries around such areas.**

Benefits of Hydrographic surveys and nautical charting cont'd

- Enhances maritime security through use of accurate nautical charts and hydrographic information for enforcement operations related to border control encompassing international crime, fisheries, quarantine and immigration.
- Supports humanitarian aid and natural disaster relief operations through accurate charts to assist in recovery effort following cyclones, earthquakes, volcanic eruptions and tsunamis. The hydrographic information and associated charts also assists in pre-planning for relief operations and assessment of potential impact areas.
- Maritime transport infrastructure and development of port facilities and shipping routes highly dependent upon hydrographic surveys and accurate nautical charting to ensure safety of shipping and assist in identification of sites for port facilities.

Way Ahead

- **Government support**
- **IHO assistance**
- **Aid assistance**
- **Maintain engagement with Principal Charting Authorities (e.g. UKHO)**

Recommendations

- **Formal designation of National Hydrographic Authorities responsible for coordination, and ensuring the provision, of appropriate nautical charting services in accordance with the requirements of the International Conventions, and in accordance with the principles established by the IHO.**
- **Allocation of regular funding and travel support for the National Hydrographic Authority to fulfil the duties and representation at appropriate forums, particularly attendance at SWPHC, SPC-SOPAC, and IHO meetings.**
- **Establish Maritime Safety Information (MSI) Coordinator positions to fulfil treaty obligations under SOLAS V/4 - *navigational warnings*.**

Recommendations cont'd

- **Development and execution of National Hydrographic Survey Plan, National Charting Plan, Maritime Safety Information Plan and seek assistance from regional neighbours and from relevant international agencies, including SPC-SOPAC and international funding and aid agencies, to carry out chart improvement surveys and new surveys within significant areas required to facilitate maritime trade and cruise ship operations.**
- **Establishment of basic level in-country capability for hydrographic surveying by training existing government land surveyors in hydrographic surveying**
- **Provision of at least one in-country outfit of portable hydrographic surveying equipment. On-going funding will be required for the regular maintenance of the equipment and for the training and requalification of operators.**

Recommendations cont'd

- Overseas hydrographic advisers should be sought to guide and assist the National Hydrographic Authority and the National Lands Department and survey during the establishment of an in-country hydrographic data gathering capability and to foster close liaison and possible support from recognized national hydrographic authorities in other countries.
- SWP SIDS should apply for membership of the IHO (application details are available in IHO publication M-2 – *The Need for National Hydrographic Services*), including allocating on-going funding for the annual subscription (based on registered flag tonnage) and travel support for National delegates to attend relevant IHO meetings.

Basic Equipment and Software Cost (As at Jan 2013)

Item	Approximate Price USD
Single beam echo sounder - 200khz	7,500
Single beam echo sounder - dual 200 kHz+ 30khz.	9,800
Combined echo sounder and logger - 200 kHz.	13,500
Combined echo sounder and logger – 200 kHz +30khz.	(15800) optional
DGPS service, annually	1,700
Acoustic Tide Gauge	10,500
Post processing for DGPS, single frequency	12,000
Digital side scan sonar	20,000
Hydrographic data processing software	6,500
Ruggedized laptop	5,000
Desktop PC for processing	2,250
Plotters	8,000
Accessories	5,000
Approximate total for equipment (echo sounder, sonar, tide gauge, data logger, GPS, plotter, post-processor)	110K-140K
Training in regional centre (inclusive of travel, etc.)	50,000

Lightweight portable multibeam sonar is now available at approx. USD\$75 000

Conclusion

- **State of hydrographic surveys and nautical charting is generally poor**
- **Lack of understanding of the requirement for hydrographic surveys and nautical charting**
- **Lack of equal focus on the need for hydrographic surveys, including appropriate prioritisation**
- **Without improvement in hydrographic surveys and nautical charting, SW Pacific economies will not grow due to lack of maritime transport infrastructure and maritime safety issues**
- **Without initial and continued hydrographic surveying and nautical charting, the economic wellbeing of a maritime state such as a SIDS cannot be optimised**

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Questions



Biography

- 38 years experience in Royal Australian Navy as hydrographic surveyor, specialising in nautical charting and military geospatial information
- Captain of five Royal Australian Navy hydrographic surveying ships
- Extensive experience in high level hydrographic and maritime policy making, development of mapping & charting standards, international relationship building and strategic planning within Aust Department of Defence & Aust Hydrographic Office
- Inaugural and Past Chair Surveying & Spatial Sciences Institute Hydrography Commission 2005-07
- Project Manager for mapping of Vanuatu, Solomon Islands and Timor Leste 2003-2005

- Certified Professional Hydrographic Surveyor Level 1
- Qualified IHO Category A Hydrographic Surveyor
- Fellow of Surveying & Spatial Sciences Institute
- Masters Degree in Maritime Policy (University of Wollongong)
- Current Chairman, Australasian Hydrographic Society East Australia & SW Pacific Regions, Education Awards Panel
- Member of Australian Institute of Management