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ECONOMIC IMPACT OF HYDROGRAPHIC SURVEYS

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Hydrographic Surveys

- Hydrography is expensive and time-consuming
 - Return on investment is difficult to see
 - However, indirect benefits are estimated to be on the order of \$10 for every \$1
- Often falls into category of “Public Good”
- Hydrography enables all maritime activities and supports protection of the environment



FIG 2010



Making the Case

- Insufficient funding of hydrography
 - Hydrography and nautical charting are “interchangeable” terms
 - Governments are reluctant to invest in long term infrastructure that lacks short term political benefit
- Knowledge, and publicity, of the full benefits of hydrography may increase potential for governmental support of hydrographic efforts



FIG 2010



Hydrography

- More than just charting
- Essential foundation :
 - Marine Transportation and Safety of Navigation
 - Marine Resources
 - Environmental Concerns
 - Maritime Boundaries
 - Law Enforcement and Defense



FIG 2010



Marine Transportation and Safety of Navigation

- 80% of world merchandise trade by volume is being carried by sea
- Annual average growth rate of world seaborne trade is estimated at 3.1%
- United States: 78% of overseas trade by volume and 43.5% by value (including 9M barrels of imported oil daily)
- Australia: 99.9% of overseas trade by volume and 78% by value



FIG 2010



Charting Benefits

- Updated charts:
 - Provide most direct routes between ports
 - Reduce the number of pilots required
 - Decrease the number of groundings
 - Allow deeper draft vessels (i.e. more cargo)
- Accuracy counts:
 - Additional draft = Increased profits



FIG 2010



Inaccurate/Outdated Charts

- Greater risk of accidents or groundings
 - Shipping companies will use a fleet that is older, less efficient and capable, and more likely to be involved in a maritime accident due to the age of the equipment and caliber of the crew
 - Substantial costs for rescue, salvage and clean-up
 - Residual environmental degradation



FIG 2010



“OG Rock”



On 3 March 1970, the Liberian-flagged tanker *Oceanic Grandeur* struck an uncharted rock in Torres Strait while en-route from Dumai, Indonesia, to Brisbane. The *Oceanic Grandeur* was carrying approximately 55,000 tonnes of Sumatran crude oil and a marine pilot to navigate through the Strait. Eight of the 15 oil cargo tanks were ruptured and oil was spilt upon impact. 1100 tonnes of crude oil were spilled.

Marine Resources

- Living Resources
 - Fishing
 - Aquaculture
- Mineral Resources
 - Sand, gravel, oil, and other economically important resources found on, or below, the ocean bottom



FIG 2010



Fishing and Aquaculture

- Safe navigation
- Knowledge of preferred fish habitats
- Locating wrecks and other hazards that can interfere with nets
- Improving the speed and efficiency of onload/offload operations
- Characterization and delineation of fish habitats
- Proper location and extent of aquaculture areas
- Marine sanctuaries, protected areas, and reserves



FIG 2010



Mineral Exploration & Hydrography

- Concurrent collection
 - Both require common data
 - Cost-savings
- National interest
 - Base hydrographic information collected by oil and gas companies added to national archive



FIG 2010



Environmental Concerns

- Environmental monitoring, impact modeling and consequence management
 - Coastal Zone Management
 - Offshore Aquaculture
 - Climate Change, Natural Disasters, Pollution, and Hazard Mitigation



Shen Neng 1



FIG 2010



Coastal Zone Management

- Hydrography provides information essential to proper planning
 - Ensures coastal zones are effectively and sustainably managed.
- Competing Interests:
 - Recreational and commercial fishing, diving, pleasure yachting, navigation, beach access, tourism activities, and marine farming.
 - Archaeological studies, underwater construction and development, pipelines, telecommunication cables, and offshore drilling platforms



FIG 2010



Offshore Aquaculture

- Accurate hydrographic information can provide assistance in the selection of appropriate aquaculture sites
 - Planning of offshore aquaculture zones takes into account not only hydrological and biological factors, but also topographical and hydrographical factors



FIG 2010



Environmental Monitoring

- Marine life impacts
 - High susceptibility to changes in temperature, water chemistry, and pollution
- Sea level changes
 - Modeling allows for early mitigation
- Pollution
 - Agricultural run-off
 - Modeling of extent & movement



Montara Wellhead 2009



FIG 2010



Natural Disasters

- Tsunami, hurricane, earthquake
 - Potential change to bathymetry and shoreline
- Accurate charting pre-event
 - Accelerates relief efforts
 - Allows for change detection
- Haiti Relief
 - Charts 30+ yrs old
 - New ports/piers, reclamation, and infrastructure not updated



FIG 2010



Haiti 2010



FIG 2010



Maritime Boundaries

- Territorial seas, exclusive economic zone (EEZ), and continental shelf
- EEZ extensions claims beyond 200 miles possible based on bathymetry, change in slope of the continental shelf and geology of the seafloor
- National hydrographic offices publish this information to make it readily available



FIG 2010



Law Enforcement and Defense

- “Good order at sea”
- Challenges:
 - Piracy, maritime terrorism, illegal trade of people, arms or drugs, and unregulated pollution of the marine environment
- Knowledge of the environment is a tactical advantage



FIG 2010



Capacity Building

- Developing countries are often limited in hydrographic capacity
- Excellent opportunity for economic assistance
 - Hydrography and Charting
- Investment in Infrastructure
 - Shipping and Tourism



FIG 2010



Conclusion

- Hydrography is often a low priority for funding
 - Improved knowledge of the additional uses of hydrography may influence further investment
- Potential for regional support and cooperation
- Ultimate Goal
 - National governments recognize the value and importance of hydrographic information



FIG 2010



Questions



FIG 2010



Case Study - PNG

■ Re-Vitalisation of Marine Infrastructure

■ Why?

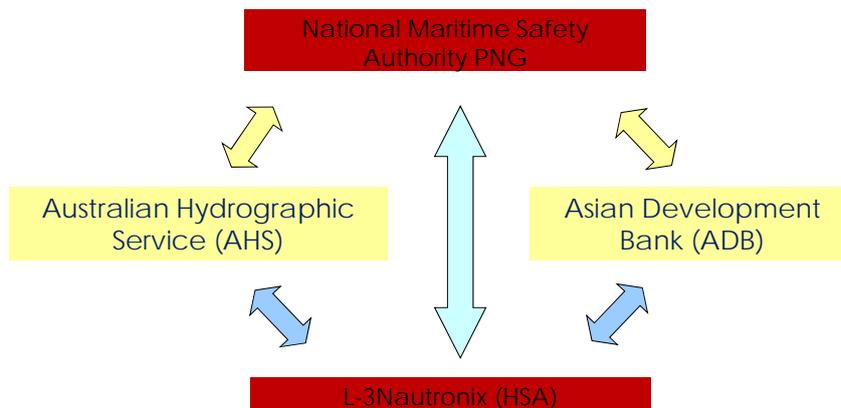
- To improve safety to mariners, trade, tourism and reduce the impacts of shipping on the environment.

■ Lead Project was the Re-establishment & ongoing maintenance of hydrographic navigational infrastructure in PNG

- Asian Development Bank sponsored project.
- Planning commenced in 2002.
- 4 Phase Project completed in 2008.
- 213 functional navigational aids rehabilitated under ADB funding
- Nautical Chart modernisation
- Now managed by NMSA.
- Self funding via Oil/Shipping levies



PNG Chart Modernisation - Stakeholders



PNG Chart Modernisation – Outcomes

- Provision of a modern hydrographic paper chart & ENC portfolio.
 - IHO S57 data sets for 17 existing S57 datasets (remediated and updated)
 - Digital reformat for 39 new metric paper charts
 - IHO S57 data sets for 39 new ENC's
 - Full ENC, Raster Chart and metric paper chart coverage



PNG Chart Modernisation – Other Components

- Governance
 - NMSA was established by parliament.
 - NMSA took over the marine regulatory & operational functions of the Dept of Transport & Civil Aviation.
- Maritime Safety Information
 - Fully functioning & effective network of maritime navigational aids
 - Availability of high-quality, up-to-date navigational charts
 - All vessels to meet safety standards required by PNG & IMO
 - Seafarer competency
 - Coordinate responses to distress calls.
- Hydrographic Survey Capability
 - Training of personnel
 - Basic survey capability established
- Additional Training
 - MSI i.e. radio operators, nav. aids maintenance
 - AIS/LRIT (web enabled)
- Vessel Monitoring Capability
 - Establishment of a national AIS/LRIT infrastructure
- Establishment of SAR & Oil Spill Response capability



PNG Chart Modernisation - Benefits

Improved quality of hydrography and charting which supports the safety of navigation, maritime trade and contributes to the protection of the marine environment.

- Shorter Safer Routes
 - Vessels save time and fuel.
 - Reduced marine accident rate.
 - Improved access/trading routes.
- Increased Economic Activity
 - Nav aids & charts enable more people to fish and travel
 - Increased economic activity is supported by a lively interisland shipping sector.
- Sustainability
 - The NMSA is self funding.
 - Communities are being paid to maintain light houses & safeguard them from vandalism.
 - Charts and ENCs are being maintained by the AHS with information supplied by NMSA.

