

# Capacity Building and the Economic Benefits Of Hydrography

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## INTRODUCTION

- The current requirements of hydrography is becoming more critical vis-a-vis the dynamics of an evolving science, technology and discipline.
- Hydrographic Instrumentation and Sonar technology:  
Complex, sophisticated and advanced technologies and devices- hardware and software i.e. MBES, DGPS, SSS, AUV, ROV, UUV, UWC, ADCP, SVP, LIDAR, HYPACK, PDS2000, etc.
- Consequent upon the availability of swath mapping and seafloor imagery systems, the density and types of data available has significantly changed leading to measurements of spatial quantities being faster, more accurate and precise.

## CAPACITY BUILDING

- Capacity building is a training process of building capabilities in individuals, groups, institutions, organizations and societies.
- Education by its nature is a long term process and involves acquainting personnel with *how and why* tasks are performed involving the theoretical and practical application applied to solving technical, operational and project related problems.
- Human Resource Development = Capacity Building = Training = Education

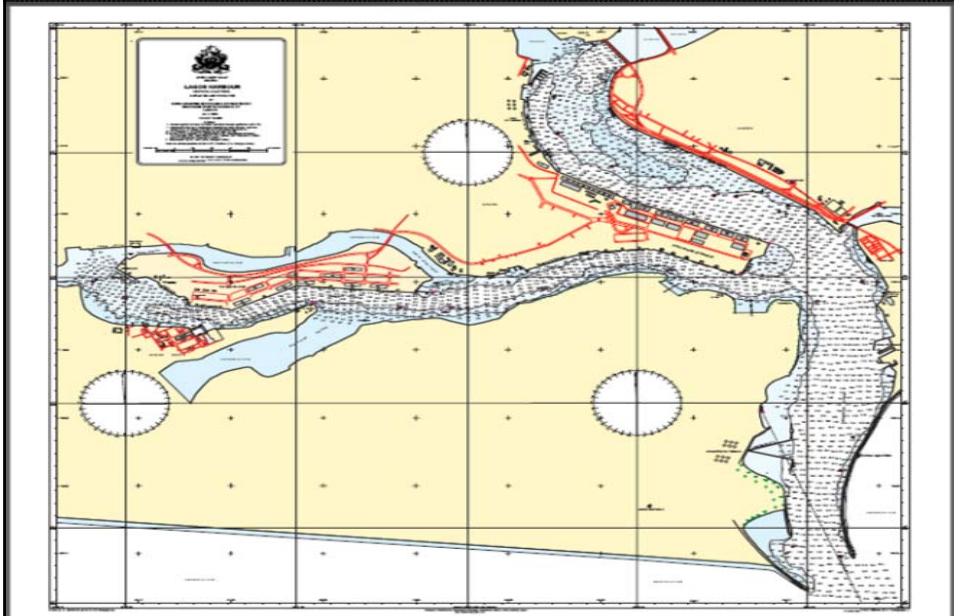
## Types of Capacity Building models adopted:

- Institutional training (Academic/Technical)
- On-the-job training (Practical)
- Partnership and Joint Ventures (PPP-Public Private Partnership)
- Inter - Governmental / Departmental / Organizational Partnerships (co-operation between industry and academic)
- Joint Survey Operations (Cooperative Agreement or Bilateral Agreement (i.e.NPA/NN/USN&NAVOCEANO))

## A TYPICAL MARINE INFRASTRUCTURE



## A TYPICAL NAUTICAL CHART – LAGOS HARBOUR, NIGERIA IN THE WEST COAST OF AFRICA





## HYDROGRAPHIC APPLICATIONS AND DERIVED ECONOMIC BENEFITS :

- Marine transport and shipping
- Coastal Zone Management (CZM)
- Exploitation of Marine resources
- Environmental Protection and Management
- Digital Data Bases (SDI)
- Maritime Boundary delimitation
- National Security and Defense
- Tourism and recreation
- Coastal hazards Mitigation
- Telecoms, pipelines, oil rig movements etc



## Maritime transport and safety of navigation

- Chapter V Regulation 9 of SOLAS Convention
- Wreck salvage
- Charting – ENC/RNC/ECDIS
- Aids to Navigation (AtON)
- VTMISS / AIS
- Dredging – Capital & Maintenance
- Notices to Mariners (NtM)
- NAVAREA – Radio communication
- Scientific Research and Development

A bathymetric map showing ocean depths with a color gradient from light blue (shallow) to dark blue (deep).

## Coastal Zone Management

- New Ports Development – Physical planning- Capital projects i.e. creation of deep sea port in Lagos
- Maintenance and development of existing port facilities
- Dredging operations for depth maintenance
- Dredging Spoil ground for aquatic life breeding
- Management of harbor, channels, wrecks and & AtON
- Exploitation of mineral deposits –Sand mining
- Aquaculture
- Marine pollution prevention/control
- Control of Commerce, Industry etc. (i.e. EEZ, FTZ)

A bathymetric map showing ocean depths with a color gradient from light blue (shallow) to dark blue (deep).

## Exploitation of Marine resources

- Hydrocarbon exploration and exploitation depends on the availability of geo-physical and bathymetric survey data
- The Fishing industry also depends on nautical information for safe deployment of vessels / equipment and detection of fishing breeding grounds
- Charts can help determine patterns in geomorphology, geology, sediment migration and exploitation of resources



## Environmental Protection and Management

- Marine Pollution Control and Environmental Protection (i.e. Oil spill pollution control)
- Scientific research and Development (i.e. Harbour siltation studies, Tidal / Current prediction and modeling, geotechnical investigation and analysis, physical properties of the water column etc all require quality Bathymetric data for validation)
- Dredging monitoring and control



## Digital Databases (Spatial Database Infrastructure -SDI)

- Land and seabed topography, geodesy, geophysics, and meteorology
- Wrecks, coastlines, wetlands, AtONs, etc
- Seafloor Classification
- Geodetic Control Network
- Tidal and Current flow patterns
- GIS Data fusion and Visualization
- Chart / Map Production
- National and International boundaries



## Maritime Boundary delimitation

- UNCLOS
- Consequences of neglecting hydrographic standards and not charting your maritime boundaries and territorial waters regularly
- Cost of litigation, displacement and settlement of citizens
- Loss of precious resources (Nigeria vs Cameroun)
- EEZ extension by law.
- Hydrographic chart/map Archiving
- Chart/Map digitization



## Maritime Security and Defence

- Military and Civilian surveys deployed (i.e. National Navies, marine police, Army, Air force and Coast Guards, Ports, Maritime Safety Administration, Inland waterways etc)
- Port facility security surveys – ISPS code
- Transportation of conventional and nuclear munitions make safe navigation essential.
- Surface and sub-surface mining, submarine, and Air-Sea operations depend on nautical charts and products
- Use of LiDAR surveys and ROVs for tactical operations.



## Tourism and Recreational Boating

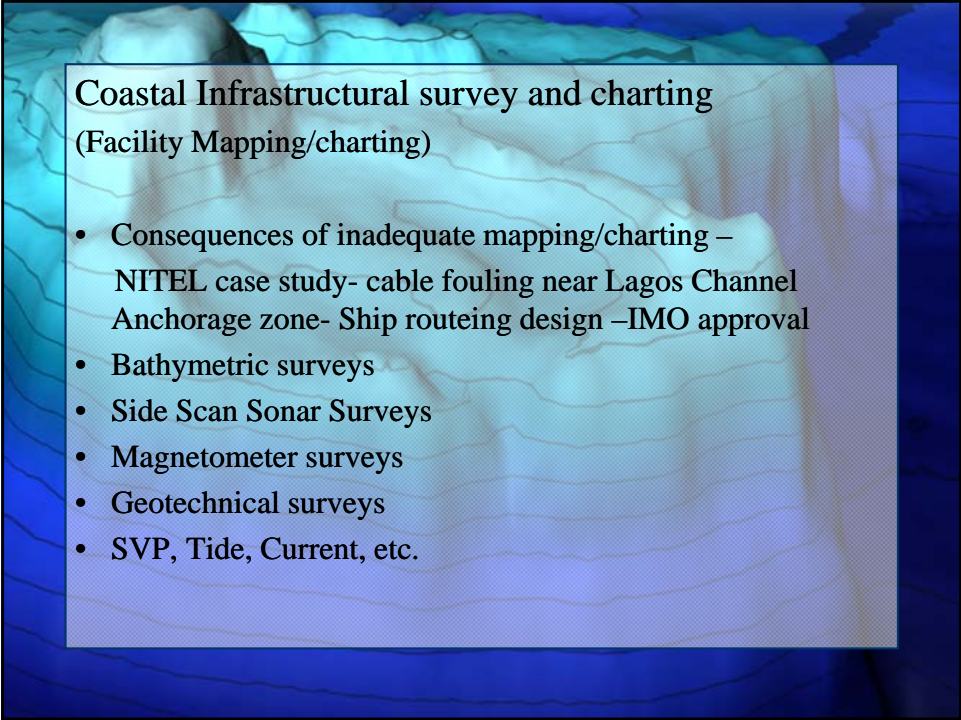
- Recreational vessels (i.e. cruise and yacht ) like other vessels depend on accurate Charts for safe navigation
- The emergence of ENC/ECDIS & Digital charts will give the navigators, recreational boaters, tourists, etc. the confidence to explore more possibilities, increase their stakes and expand their frontiers
- Contribution to the GDP of the Nation will ultimately increase through employment creation and investment returns



## Coastal Hazards Mitigation

- Hurricanes (i.e. Katrina,USA)
- Earthquakes
- Tsunami – SE Asia
- Sea Level Rise
- Multiplier effect of climate change
- Flooding from tide, heavy rains, canal blockade, inadequate drains etc





### Coastal Infrastructural survey and charting (Facility Mapping/charting)

- Consequences of inadequate mapping/charting –  
NITEL case study- cable fouling near Lagos Channel  
Anchorage zone- Ship routeing design –IMO approval
- Bathymetric surveys
- Side Scan Sonar Surveys
- Magnetometer surveys
- Geotechnical surveys
- SVP, Tide, Current, etc.



### Achievements (After IHO WAAT's visit)

- Slightly Improved Capacity
- Slightly Increased Awareness
- Slightly Improved Funding
- Improved digital deliverables i.e. Charts & other  
Nautical products
- Increased co-operation and synergy
- Increased density of geospatial information
- Improved technologies, faster operation and  
reliable data.



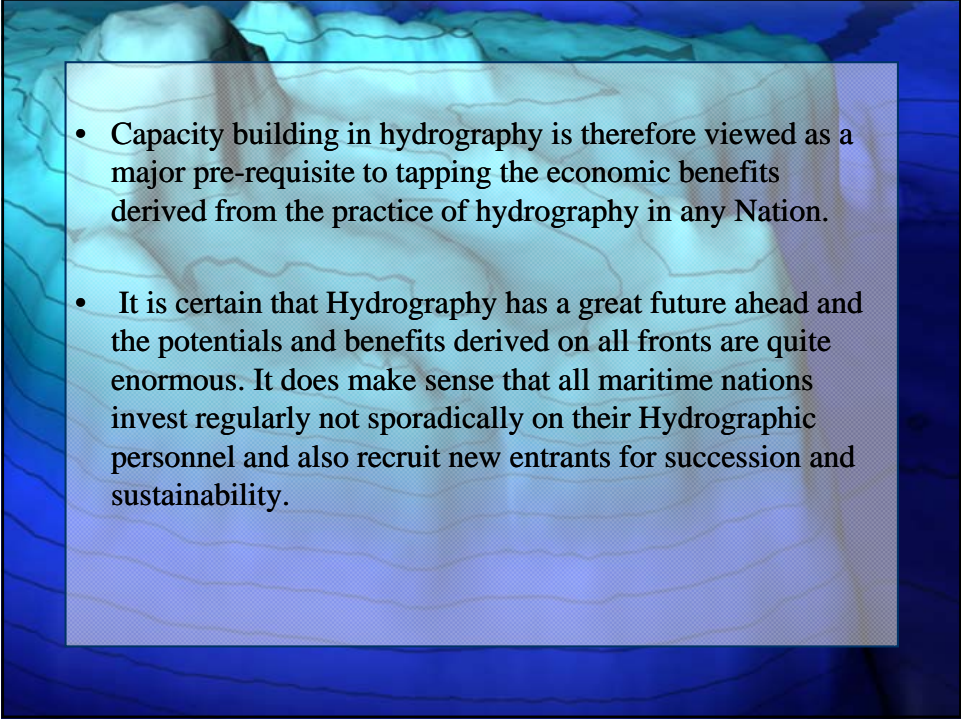
### Challenges:

- Low resource capacity and utilization
- Inadequate institutions for training
- Inconsistent training and Capacity building
- Lack of knowledge and vision
- Inadequate and regular bathymetric survey
- Data management and GIS functionality
- Data fusion with satellite imagery
- Harmony of Control Network/Datum (i.e. Local vs WGS84)



### A Typical Hydrographer's Task/Projects- Author

- Harbor Moles Reconstruction Works
- Harbor Siltation Studies
- Dredging Monitoring and Supervision
- General Management of Navigation Channels
- Wreck Detection, Monitoring and Removal
- Land/Hydrographic Surveys and Nautical Charting
- AtON and Shore Beacon management
- Telecoms, Pipelines, Rig movements, etc
- Control Network Establishment
- Vessel Grounding Investigations/Pilotage Board

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- Capacity building in hydrography is therefore viewed as a major pre-requisite to tapping the economic benefits derived from the practice of hydrography in any Nation.
  - It is certain that Hydrography has a great future ahead and the potentials and benefits derived on all fronts are quite enormous. It does make sense that all maritime nations invest regularly not sporadically on their Hydrographic personnel and also recruit new entrants for succession and sustainability.

**THANK YOU FOR YOUR ATTENTION !!!**

**QUESTIONS ?**