The Economic Benefits of Hydrography and Ocean Mapping

FIG XXIV Congress,
Sydney Australia, 2010
Commission 4: Hydrography

Gordon Johnston
Venture Geomatics Limited
gordon.johnston1@orange.net

Overview

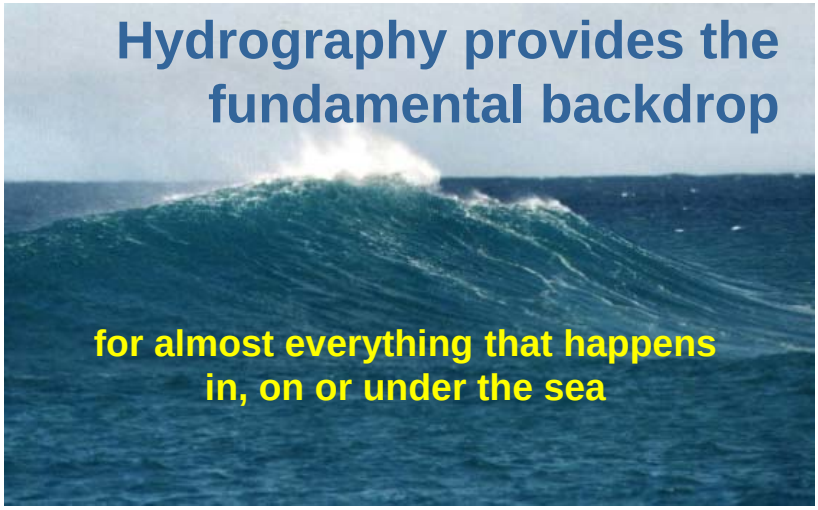
The Economic Benefits of Hydrography:

- **Starting Point: There is no clear case for Hydrography based upon a single User community.**
- **Additional Stakeholders must be identified to increase the benefits and reduce costs.**
- **Building Capacity is possible to support the development needs of Stakeholders including:**
  - **Training, technology, safe navigation for local trade & recreation, fishing, environmental monitoring & expanded international trade.**

This paper aims to demonstrate these points using Ireland as an Example.

2

Hydrography provides the fundamental backdrop



… without hydrography -

- no port is built

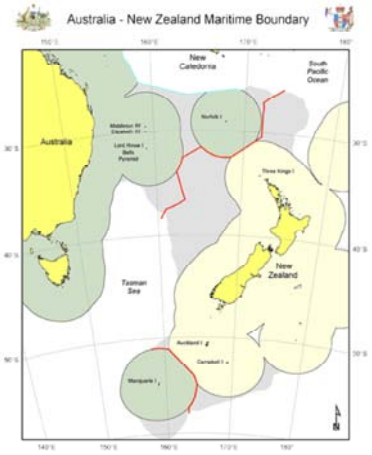
-no offshore infrastructure is developed

- no ship sails

- no shore is protected
- no rescue is attempted
- no environmental plan is implemented

… without hydrography -

- no maritime boundary is delimited



Hydrography Supports:

- Safety of navigation
- Protection of marine environment
- National infrastructure development
- Coastal zone management
- Resource exploitation – minerals, fishing
- Maritime boundary delimitation (UNCLOS, others)
- Maritime defence and security
- Disaster management

Hydrography's Contribution:

what is the value of:

- minimising accidents ?
- safer and more efficient routes?
- operating more and larger ships?
- coordinated mapping programs?
- coordinated resource development?
- increased tourism and leisure activities?

Hydrography is Expensive:

what is the cost of:

- under-developed ports?
- complex and hazardous routes?
- lack of fundamental planning data for the coast and seas?
- imprecise disaster planning models?
- limited sea room for patrol vessels?

Cost versus Benefit Studies

Australia (1992)
Canada (1992)
APEC (2002)

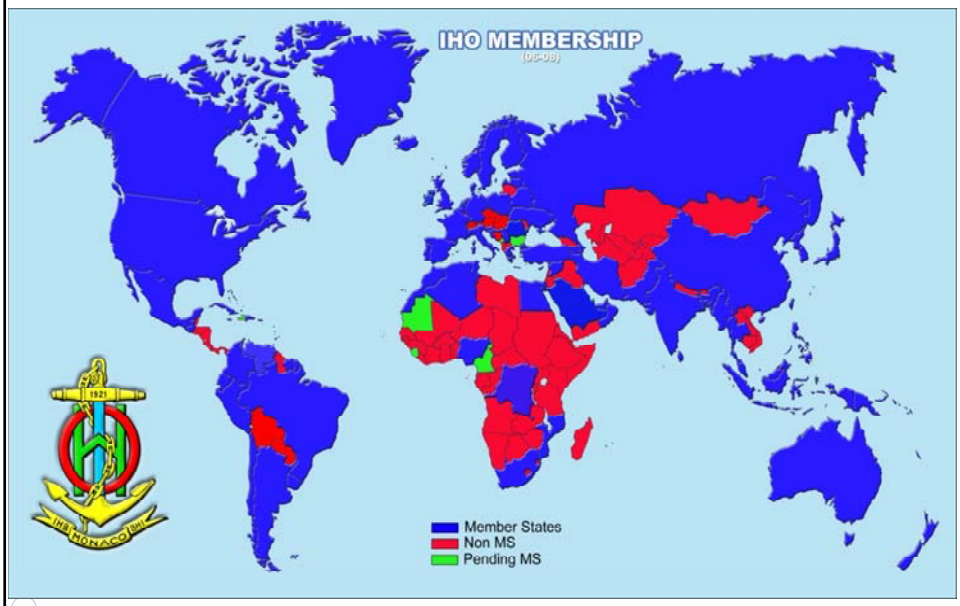
different analysis approaches:

- " *what would happen if the charts weren't there ?*"
- " *what if no further hydrography took place ?*"

Cost vs Benefit ratios greater than1:10

However these studies were limited…….

IHO Member States – January 2009



National Obligations

Convention on the Safety of Life at Sea (SOLAS) Chapter V

SOLAS V/19 – *Carriage requirements for Nav equipment*

SOLAS V/27 – *Nautical charts and nautical publications*

SOLAS V/9 – *provision of hydrographic services*

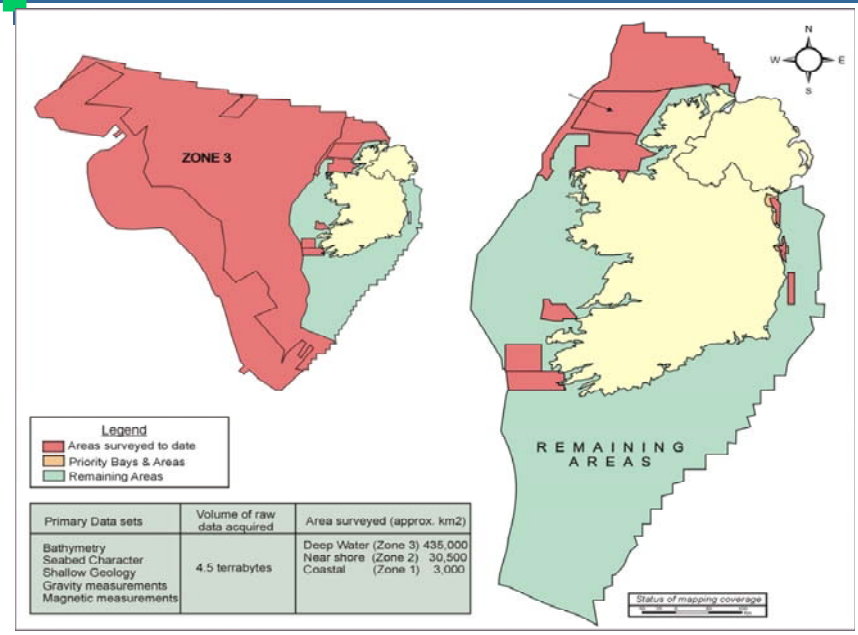
SOLAS V/4 – *navigational warnings*

SOLAS Chapter 5 regulations 9 and 4

This means each State must ensure that :

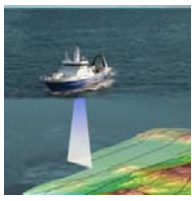
- hydrographic surveys are carried out
- appropriate nautical charts and other nautical publications are available and up to date
- Maritime Safety Information (MSI) is promulgated

A Case Study - Ireland

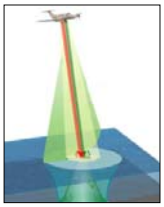


Primary Data sets	Volume of raw data acquired	Area surveyed (approx. km2)
Bathymetry Seabed Character Shallow Geology Gravity measurements Magnetic measurements	4.5 terrabytes	Deep Water (Zone 3) 435,000 Near shore (Zone 2) 30,500 Coastal (Zone 1) 3,000

Stakeholder Investments: National Initiatives - Ireland



Multi/Singlebeam/ Sidescan SoNAR



Airborne LiDAR

Vibrocoring

Grab Sampling

Towed Video

ROV

Box Coring

Gravity Coring

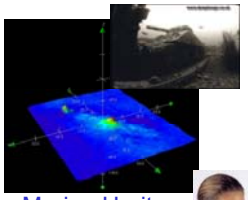
Marine mapping, the Irish Experience Case Study - Costs & Benefits K Verbruggen INFOMAR

14

Charts - the key to infrastructure development....


Transport & Shipping

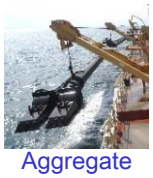

Marine Leisure


Marine Heritage

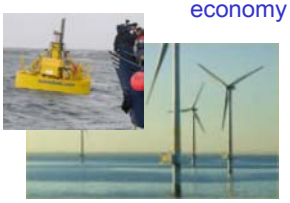

Fisheries


Knowledge economy


Environment


Aggregate Extraction

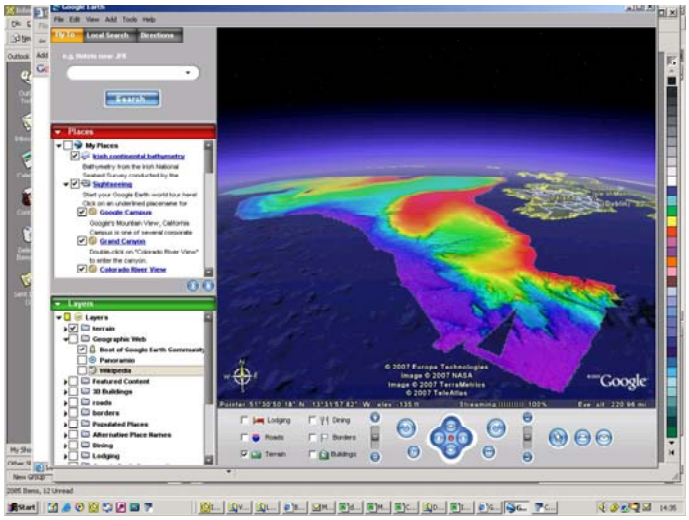

Coastal Protection & Development


Wind & Wave Energy


Aquaculture

Varied products

3D Models as inputs



Appraisal methodology

The methodology for the appraisal comprised both primary and secondary research, including extensive consultation with stakeholders of the INFOMAR.

Research undertaken considered the following:

- Review of Project activities and achievements to date;
- Needs and Objectives & Potential Constraints;
- Identification of Options, including their advantages and disadvantages;
- Risk analysis;
- Cost-Benefit analysis for each Option

17

Summary of Benefits

Across each option, benefits were identified and categorised as follows:

- Commercial/ Resource Benefits
  - **Fishing, Aquaculture, Biodiversity, Energy, Aggregates, Tourism/ Leisure**
- Knowledge Economy
  - **Research Funding – ESONIM, HERMES, IMAGIN and others**
- Legislative requirements and obligations
  - **SOLAS, UNCLOS, MARPOL, WFD, OSPAR Convention, Habitats Directive**
- Environmental Benefits (not quantified)
  - **Protection of marine life, protection of heritage and others**

18

Calculation of Benefits

Summary of commercial benefits

Industry	Benefit
Fishing	Efficiencies Reduction in gear loss Ability to identify and protect fish spawning & nursery areas
Aquaculture	Selection of appropriate sites for cultivation
Biodiversity	Mapping/ identification of commercially exploitable species e.g. Seaweed
Energy	Suitable locations for wind farms Off shore oil industry Tidal energy Wave Energy (still at R&D stage)
Aggregates	Potential commercial value of utilisation of marine aggregates
Tourism/leisure	Development of sailing routes/ angling/diving

19

Estimated value of benefits

- A number of other benefits identified have not been quantified:
  - Environmental benefits
  - Speculative benefits – hydrocarbon find, avoidance of state liability for clean-up of environmental disaster, bio-tech discovery.

Estimated Present NPV and Benefit Cost Ratio calculations include the Shadow Price of Public Funds (SPPF) applied at 125%.

Option	NPV €000	BCR
1 – Do Minimum	43,226	N/A
2 – Priority Areas Only	225,093	5.79
3 – Zones 1 and 2 by 2016	**585,183**	**5.91**
4 – Zones 1 and 2 by 2026	454,266	4.41

20

Lessons learnt

Research/Geoscience may be interesting but infrastructure & (renewable) energy support gets Government Interest and Funding

Standards in everything – Acquisition/Data/Processing

Collaboration is key – No one organisation can do it by themselves!

You can't manage or plan without knowing what you have!

You can't plan a future direction without a current map!

Summary

HYDROGRAPHIC SERVICES are not really self-funding. Studies have indicated that access to new Stakeholders will help.

Most economies have only small numbers of skilled or experienced survey and cartographic personnel. Training IS needed.

BUILDING CAPACITY is possible and can support the sustained wider use of Hydrographic Data.

Ireland is improving the cost effectiveness of its Hydrographic services with technology, shared surveys and web data access.

STAKEHOLDERS do exist and in a competitive world, look for AND OBTAIN, benefits from Hydrographic data and services.

Successful Hydrographic initiatives can be developed to take account of these points and gain ECONOMIC BENEFITS.

22

THE END

Contact	Gordon Johnston
Tel:	+44 (0) 7966 937369
Email:	gordon.johnston1@orange.net

23