


Potential for an Irish Marine Aggregates Industry

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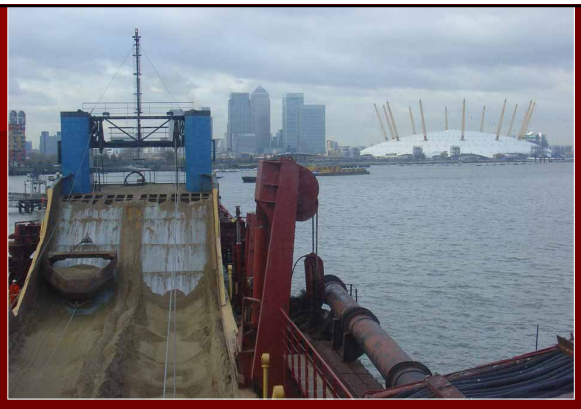
ICONET Conference

University College Cork – April 12 2007


Typical (5-8k tonne) trailer hopper suction dredger in action. Photo courtesy of BMAPA

Outline of the presentation

- Why Marine Aggregate Extraction?
  - issues-pros/cons
- An Irish MA Industry
  - Drivers/Checks
- The IMAGIN Project: Shining more light on development of our offshore sand and gravel resources.
  - Rationale
  - Evolution
  - Outputs
- Next steps



Dredger self discharging at United Marine Aggregates facility in East London. Photo courtesy of BMAPA

Typical (5-8k tonne) trailer hopper suction dredger, drag head raised. Photo courtesy of BMAPA

Why consider marine aggregates ? - the upside

- Essentially same uses as terrestrial- but some subtle differences in technical properties
  - More rounded grains "softer"- better workability
  - Can reduce cement requirement ?
- Reduces demand on terrestrial aggregate resources
- Enables supply where terrestrial sources lacking or constrained
- Reduces competitive pressure on land area for:-
  - Agriculture
  - Environment
  - Hydrology
  - Housing or other development
- Reduction in road transport
  - Potential for landing close to point of end use
- Coastal defence-reclamation (Sea Level Rise-Storminess)
  - Clear advantages- economics, technical, environmental, aesthetic

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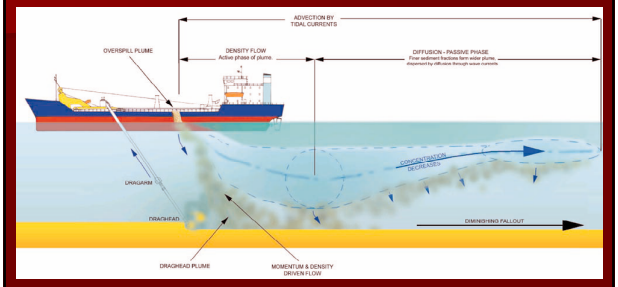
MA Exploitation-the potential downside



Overview of the IMAGIN project

Outline:

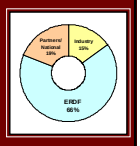
- Evolution
- Outline and overarching objective
- Description of tangible outputs
- Progress to date
- Benefits
- Future

Summary of factors driving potential for development of MA's in Ireland

- Sustained unprecedented demand-30 tonnes pppa
- Exhaustion or loss of financial viability for existing sources of supply
  - Increasing haulage distances
  - Prohibitive cost of development land
- Enforcement of 1999 planning regulations re quarry licensing brings operational pressure
- Potential alleviation or mitigation of environmental pollution factors-
  - traffic, congestion, noise, dust, exhaust CO2
- Direct access by sea to main markets/population centres- consistent with National Spatial Plan

Background and evolution

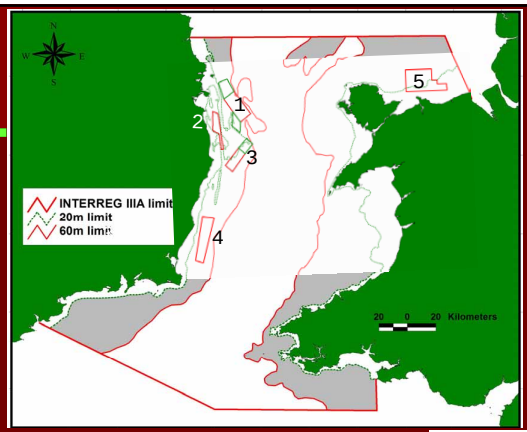
- Research CMRC + others - sector analysis showed:
  - strong potential for development of resource driven by unprecedented demand/limited supply
  - development constrained through knowledge and policy gaps
- Good fit with INTERREG III.A ERDF call
  - Proposal-development phase of 2yrs-CMRC,MI,DCMNR,GSI,WDO
  - Selected for funding 17th Nov 04-(1.1€m)
  - Overall Cost €1.1m-Ireland 707k / Wales 300k
  - Officially started on 4th February 05 runs to Feb 07-
- Future
  - RDF Extension to Feb 08.
  - Follow-on R&D INFOMAR/Seachange/Griffiths



Challenges to development of MA's in Ireland

- No national policy on development of marine aggregates
  - Shyness on advocacy "should we or not"- politically sensitive question
  - Experience to date/precedent : unclear or inconsistent licensing procedures-duration, steps, responsibilities, experience, expertise
  - Uncertainty re EIA content, monitoring
  - Few structures for interdepartmental co-ordination
- Requirement to quantify risk to environment and other marine users but scarcity or lack of background/baseline environmental data:
  - Physical (hydrographic, geological context and resource potential)
  - Environmental (benthos, inshore fisheries)
- Little strategic planning for economic minerals national and local government levels
- High entry costs-exploration/licensing , EIA, infrastructure (plant, landing and storage facilities) and royalties/port-handling costs ????

INVESTMENT IS STYMIED IN SUCH AN UNCERTAIN CLIMATE



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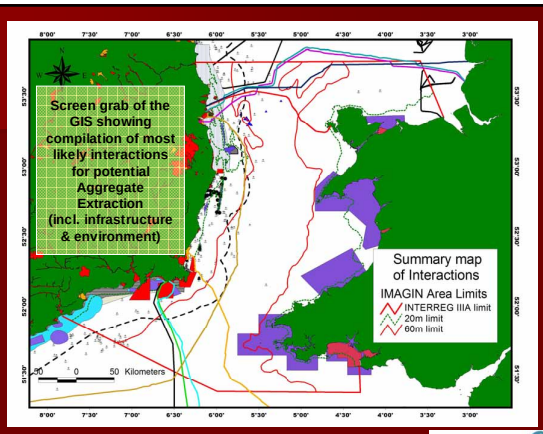
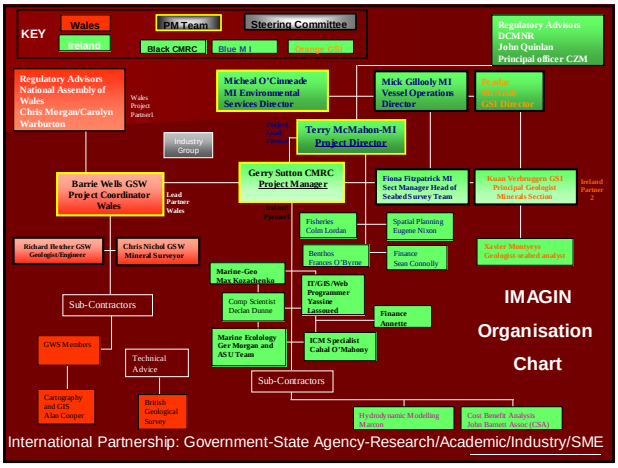
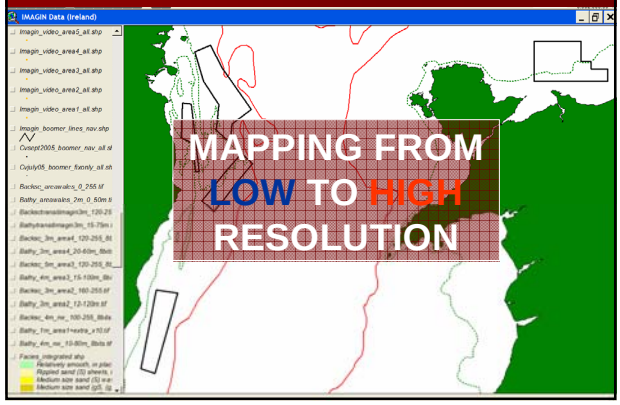
The overall aim of the IMAGIN project:

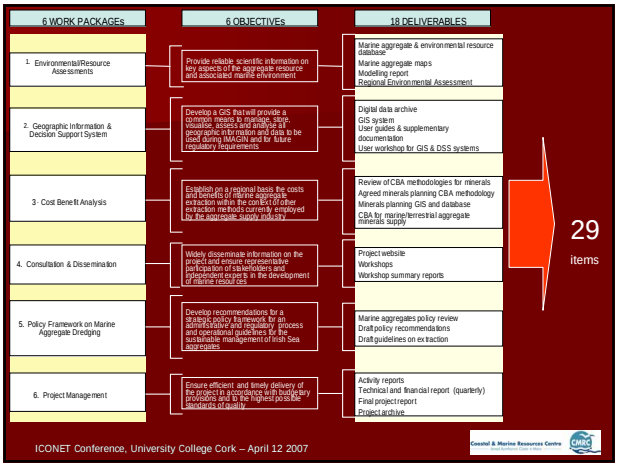
To facilitate the evolution of a strategic framework
within which
development and exploitation of
marine aggregate resources from the Irish Sea
may be sustainably managed
with
minimum risk of impact
on
marine and coastal environments,
ecosystems and
other marine users



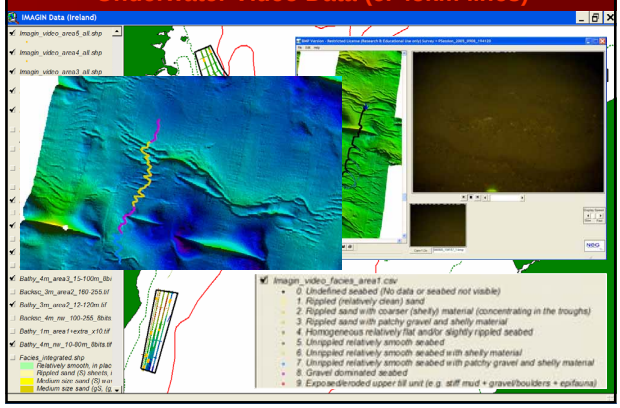


IMAGIN – Overview of Seabed Mapping Process





IMAGIN – Overview of Seabed Mapping Process: Underwater Video Data (c. 45km lines)



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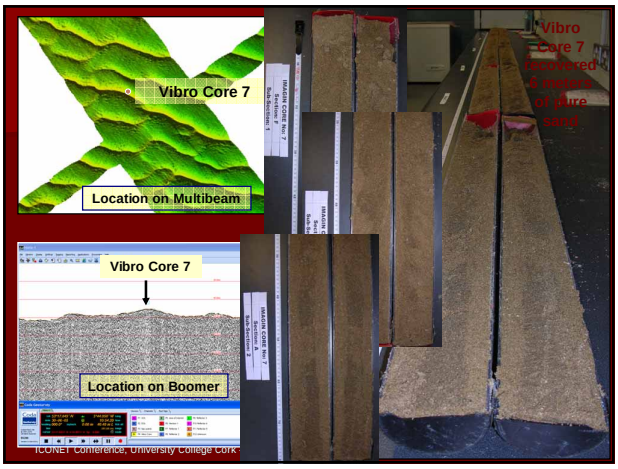
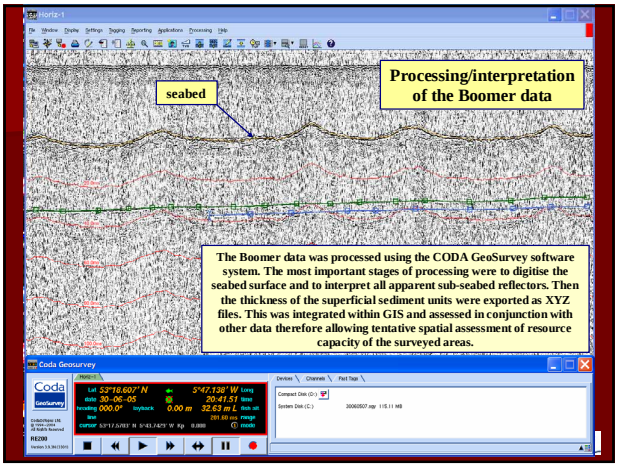
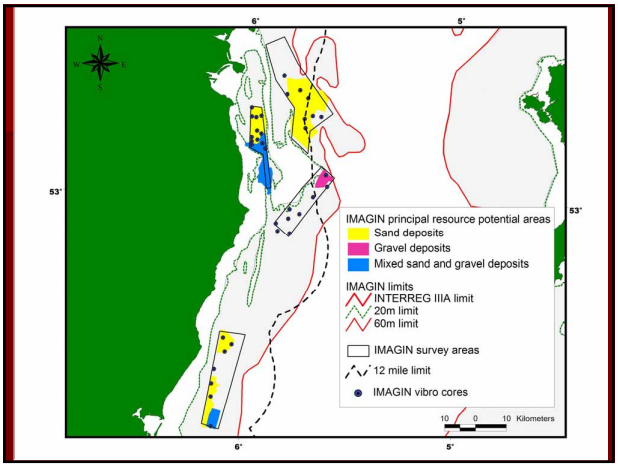
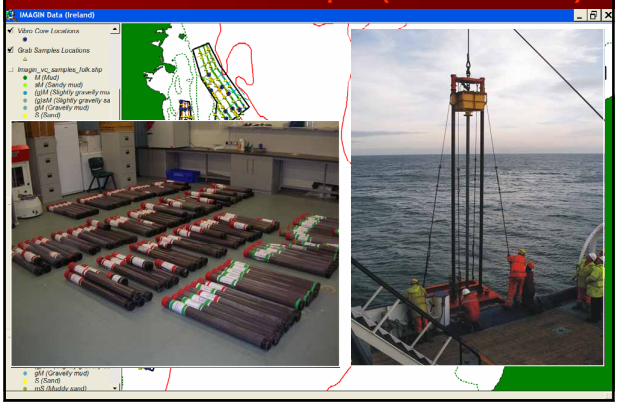
IMAGIN – Overview of Seabed Mapping Process: Grab Sediment Samples (200)







IMAGIN – Overview of Seabed Mapping Process: Vibro Core sediment samples (36 cores = 128m)



Benthic Environmental Assessment Methodology

- 77 Hamon Grabs (0.1m²)
  - Box 1: 22 Grabs
  - Box 2: 9 Grabs
  - Box 3: 14 Grabs
  - Box 4: 17 Grabs
  - Box 5: 15 Grabs
- 16 Beam Trawls and Anchor Dredges
  - Box 1: 4 Trawls
  - Box 2: 2 Trawls
  - Box 3: 3 Anchor Dredges
  - Box 4: 2 Trawls
  - Box 5: 5 Trawls
- Samples processed as per recommended practice

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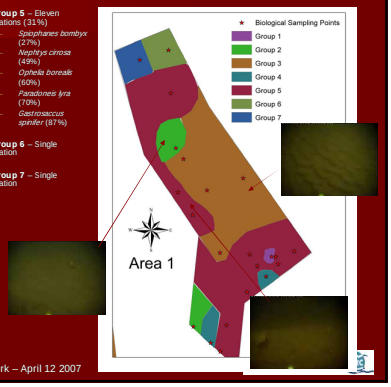
Area 1 – Biological Community Map

- **Group 1** – Single Station
- **Group 2** – Two Station (32%)
  - *Scalibregma inflatum* (28%)
  - *Fabulina fabula* (46%)
  - *Spisula sp.* (62%)
  - *Abra alba* (78%)
  - *Lagis koreni* (84%)
- **Group 3** – Four Stations (29%)
  - *Spiophanes bombyx* (85%)
  - *Magelona mirabilis* (93%)
- **Group 4** – Two Stations (53%)
  - *Spiophanes bombyx* (15%)
  - *Lagis koreni* (26%)
  - *Lanice conchilega* (38%)
  - *Scalibregma inflatum* (48%)
  - *Glycera lapidum* (57%)
- **Group 5** – Eleven Stations (31%)
  - *Spiophanes bombyx* (27%)
  - *Nephtys cirrosa* (49%)
  - *Ophelia borealis* (60%)
  - *Paradoneis lyra* (70%)
  - *Gastrosaccus spinifer* (87%)
- **Group 6** – Single Station
- **Group 7** – Single Station

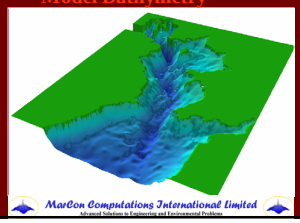


Morphodynamic Modelling

Aims

- predict the dynamics of both the bed sediments and suspended sediments supporting selection of preference zones
- predict the effects on the environment of various dredging scenarios

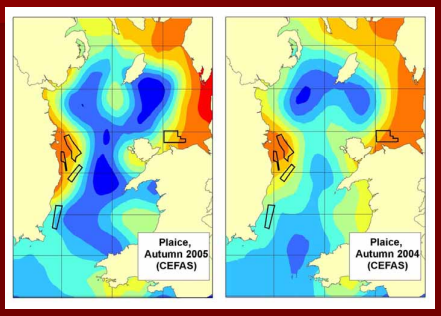
Model Bathymetry



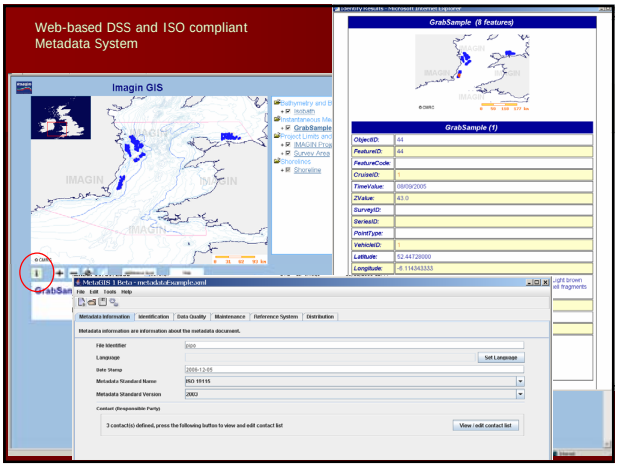
Completed Tasks:

- 3D Hydrodynamic model of Irish Sea developed.
- 3D Hydrodynamic model of Irish Sea calibrated.
- High resolution 3D model domains for Areas 1 to 4 developed.
- 2km Irish Sea sediment transport model executed for 6 months of the 12 month period.
- 500m Eastern Irish Coast sediment transport model executed for 6 months of the 12 month period.
- 500m Eastern Irish Coast model 'beach erosion' simulation executed for 9 months of the 12 month period
- 500m Eastern Irish Coast model 'Arklow Bank' simulation executed for 9 months of the 12 month period
- Preliminary output datasets provided to CMRC for quality checking and integration into IMAGIN DSS application

Fisheries e.g Plaice

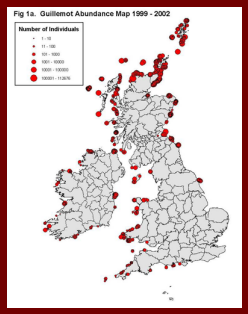


Web-based DSS and ISO compliant Metadata System



Seabirds & Marine Mammals

- The Irish East Coast holds several seabird colonies mainly around Dublin
- There are several haul-out sites for seals along the East Coast
- A number of cetaceans occur frequently in the Irish Sea



Outline of Cost Benefit Analysis

- Review of Existing Studies & Methodologies
  15 international studies reviewed, 4/5 materially significant
- Proposed Scenarios: Ireland
  1. Status Quo: Land based sand and gravel extraction
  2. Progressively Increasing Marine Extraction
     - 5 % Marine : 95 % Land
     - 10 % Marine : 90 % Land
     - 20 % Marine : 80 % Land
- Presentation-Multi Criteria Analysis

Acknowledgements: Peter Kinghan & Tim Paul-JBA Assoc

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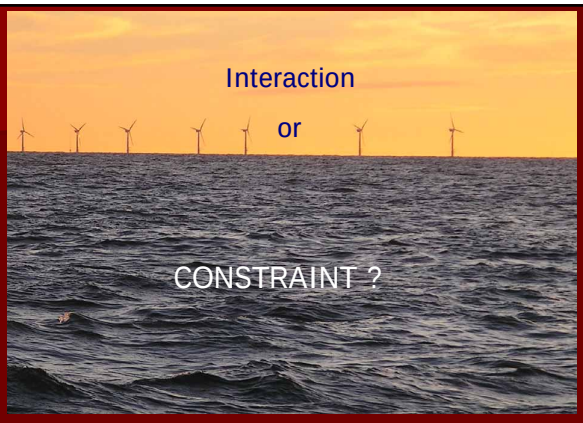
CBA – Supports advantages of marine aggregates

IMAGIN CBA study shows:

- Economic - cost advantages- distance dependant
- Environmental - CO2, Transport
- Emissions from marine dredging operations are less than 50% of those from land based sand & gravel extraction.
- Emissions associated with the transport of marine aggregates are less than 15% of those associated with land based sources.
  - Equivalent road transport, assuming 1 road tonne km has the equivalent impact to 6 water tonne km (UK ESRSA aggregate supply sustainability tool).
  - Employment levels equivalent
  - MA's as safe or safer- accident and death rates (ref HSE, MIAB stats)

–Also from recent POC study:

- Engineering Perspective: Use of marine aggregates improves the ability to deliver large quantities of material in a relatively short time period thus increasing time available for consolidation.
- Financial: The use of marine aggregates will be more cost effective than importation of quarried rock



Broader Project Achievements

- Meetings
  - >20 management, 6 steering group, 4 workshops (>50pp each)
- Promotion e.g. Presentations
  - National-IGI, IQMA, INSS, MSc-UCC, ICF
  - International Presentations, WGEXT, COST, EUMARSAND, EMSAGG
- Articles/Reports
  - IMQS Extractive Review (Jan 07)
  - ICES WGEXT Annual Review 05,06, 07,
  - Academic Papers (2-conference papers, 1 article, 3/4 planned)
- Significant Mapping Programme >500 Km^2
- Developed Reservoir of Specialist Expertise, Tools (metaGIS, UW spatial video)- "in demand" as advisors-consultancy
- Contact Network-good will
- Robust Project Model-Exemplar e.g. multidisciplinary, industry partners, integrated data management

Thank You

To find out more about the activities of IMAGIN please consult the project website *www.imagin-eu.org* or directly contact:

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Next Steps.....

" (we) look forward to reviewing the output of the IMAGIN project, as a key input in the development of Irish policy for this resource area. In this context we anticipate that the process of actual policy development is likely to be completed within a period of 2 years after the closure date of the IMAGIN project in January, 2007".

The main targets for phase II are:

- Focus scientific and technical activities on addressing the challenges that have surfaced in relation to understanding key aspects of the sedimentary environment (including potential impacts of sustained extraction on it), with specific reference to mathematical modelling.
- Develop a much needed training package tailored for the requirements of regulators and potential regulators in Ireland and Wales. This links with planned enhancements in web-based decision support tools.
- Conduct further international consultation and cooperative development of more detailed, refined recommendations for policy development reflecting regional priorities in Irish resources/waters. This will focus particularly on the EU legislation framework addressing the relevant requirements under the evolving EU Marine Strategy and the existing Habitat and Strategic Environmental Assessment (SEA) Directives.
- Organise a fifth public workshop to bring together stakeholders and disseminate information produced.

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