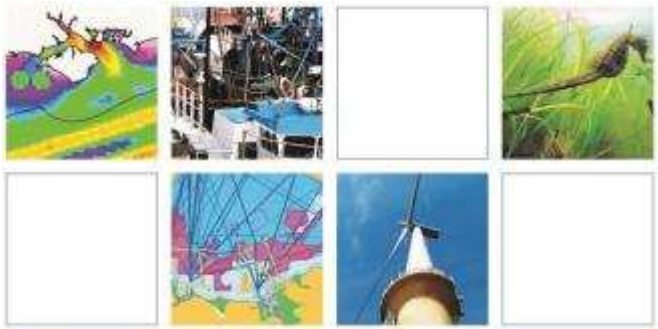
Environmental R&D and Innovation Priorities for Tidal Lagoon Projects

Habitat creation and enhancement

Natalie Frost

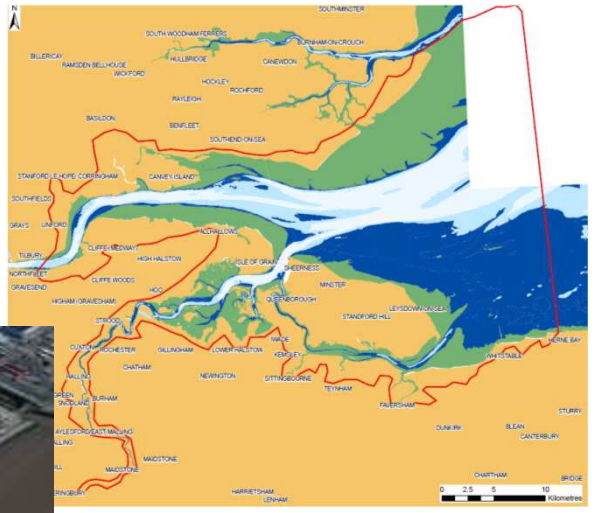


Overview

- Overview
  - Habitat creation/enhancement requirements
  - Examples
  - Lessons learnt
  - Conclusions
  - Going forward

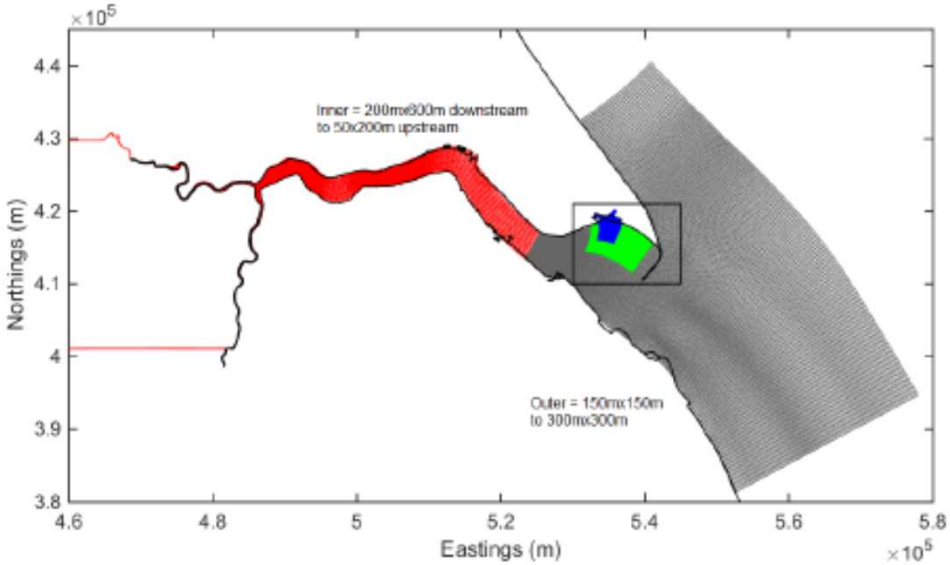
Habitat requirements

- Causes of habitat change/damage/loss
  - Development – individual projects
  - Strategic scale – coastal squeeze/multiple projects
  - Direct
  - Indirect



Habitat requirements

- Understanding scale/types of habitat affected
  - Range of techniques
  - Expert judgement
  - Factoring in uncertainty



Habitat requirements

- Mitigation and compensation measures
- Understanding legal drivers
- Range of guidance exists
  - EU
  - UK
- Case law
- Example precedents
- Feedback from lessons learnt

Example techniques

- Delivery of habitat mitigation and compensation
- Enhancement and creation opportunities
  - Managed Realignment
  - Regulated Tidal Exchange
  - Sediment recharge
  - Manipulation of natural processes
  - Enhancing existing habitats
  - New structures – design features
  - Hybrids

Example techniques

- Managed Realignment
  - Deliberate breaching, or removal, of existing seawalls, embankments or dikes in order to allow adjacent waters to inundate the land behind


November 2001
September 2013
Medmerry, Selsey

Example techniques

- Regulated Tidal Exchange
  - Controlled exchange of estuarine or coastal waters
  - Manage water levels – habitats

Low tide

High tide

Self-regulating tide gate at the Goosemoor RTE (River Clyst, Devon)

West Wittering, Chichester Harbour

Managed Realignment and Regulated Tidal Exchange

Online Marine Registry (OMReg)
www.omreg.net

Approx. 130 projects in Europe

- **74 in UK 'created' 2,500ha**

Example techniques

- Sediment Recharge
  - Dredged sediments placed over or around intertidal
  - Placement in subtidal
  - Create habitat, restore or protect intertidal habitats from ongoing erosion


Lymington, Hampshire

Example techniques

- Manipulation of natural processes
  - Alter the existing sediment regime along a shoreline
  - Introduce obstructions or altering shorelines
  - Brushwood fencing, polders/ sedimentation fields, wave breaks or groynes
  - Structures enhance accretion (if sediment available)

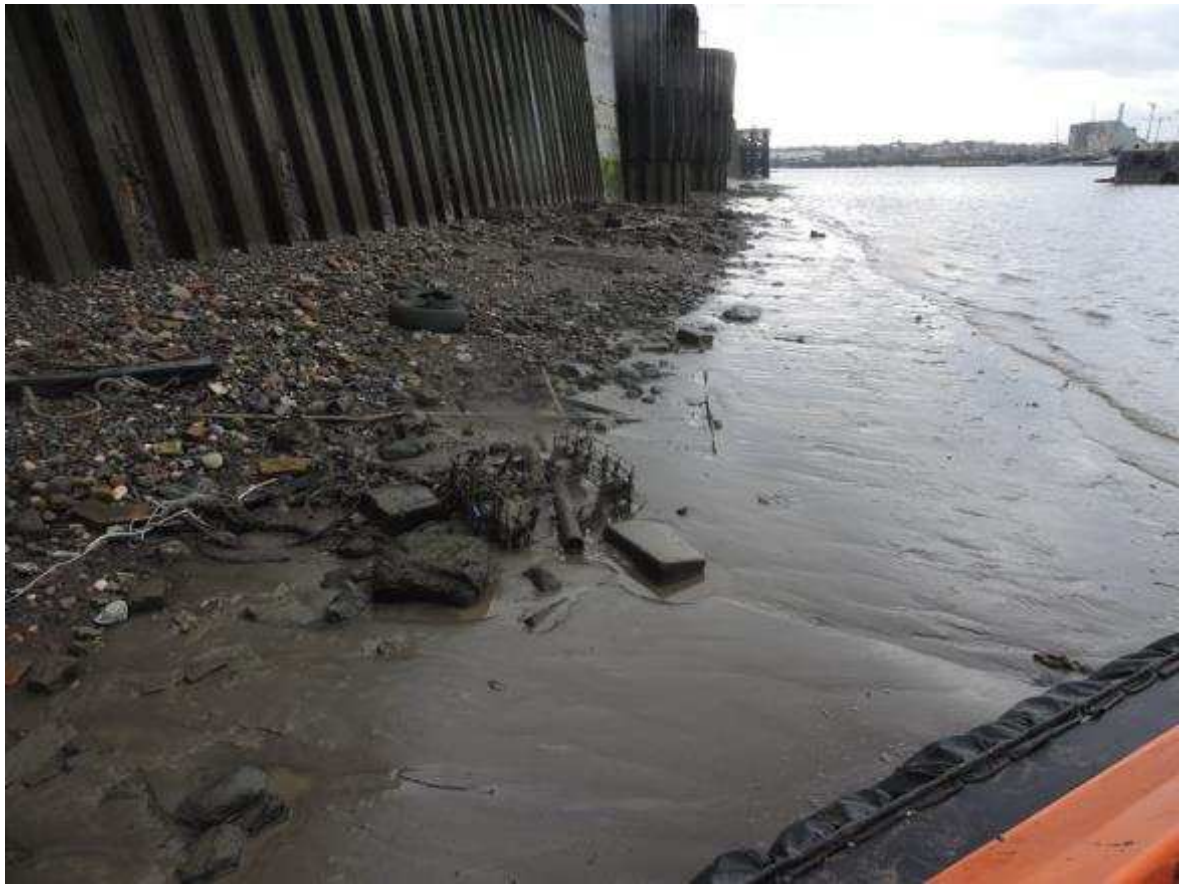
Example techniques

Morecambe Bay

Port of Mostyn

Example techniques

- Clearing of existing habitats



Example techniques

- Structural enhancements
  - Enhance ecological potential
  - Material types
  - Topography

Bioblock, Colwyn Bay, Source: D. Roberts Urbane Website

Arc Consulting Ltd.

Example techniques

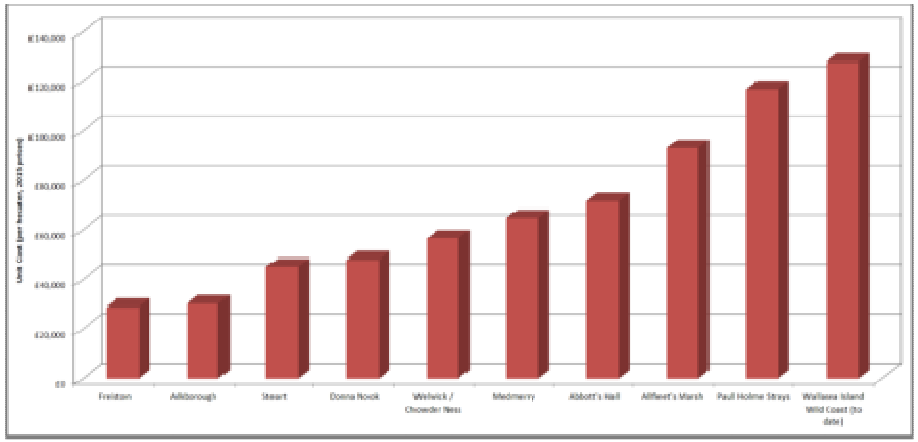
Breakwater at Morecambe, Source Lancaster City Council

Lessons learnt

- Lessons learnt
  - Scheme implementation costs
  - Project management and communication
  - Site selection
  - Design and assessment
  - Wider benefits/enhancements
  - Ecological development and monitoring
  - Sign-off procedures

Lessons learnt

- Scheme implementation costs
  - Largely dependent on technique
  - Now have a much better handle on these
  - Average MR and RTE - £38,000/ha
  - Land purchase, construction, consenting, post implementation

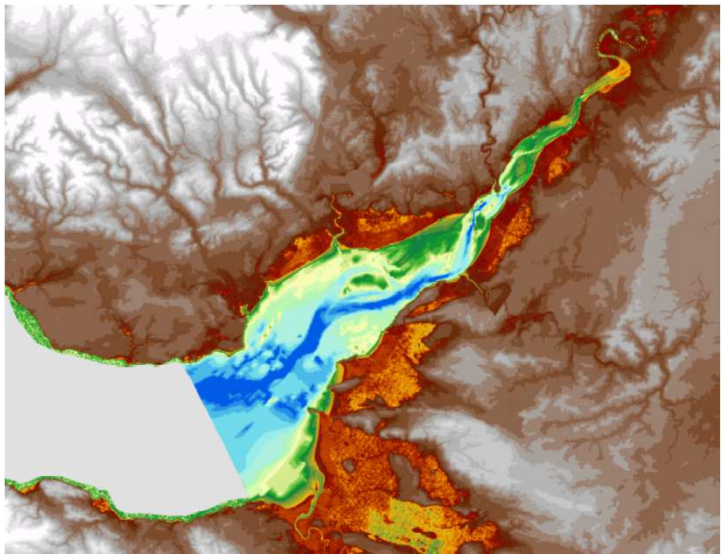


Lessons learnt

- Project management and communication
  - Regulators and wider stakeholders
  - Visualisations
  - Be clear on objectives and wider benefits
  - All project phases

Lessons learnt

- Site selection
  - Does it have potential to deliver requirements?
  - Land ownership
  - Constraints – infrastructure, footpaths, existing designations

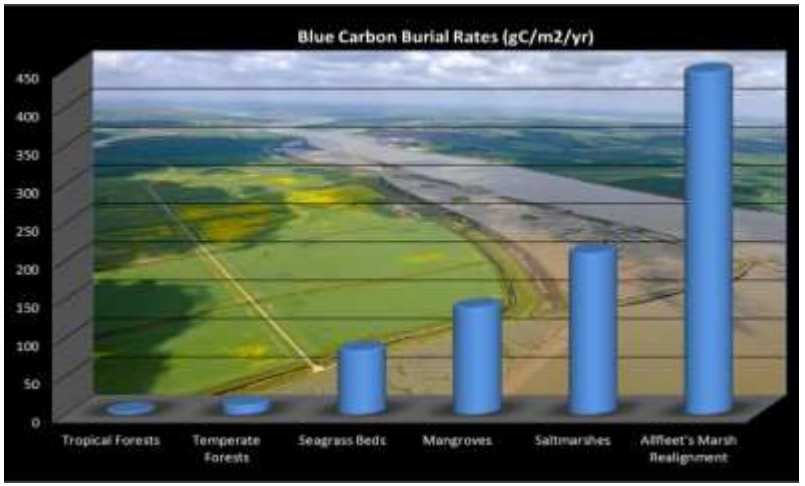


Lessons learnt

- Design and assessment
  - Iterative process
  - Achieve objectives
  - Minimise impacts on existing system
  - Maximise ecological enhancements
  - Range of tools available
  - Informed by lessons learnt, sensitivities and wider benefits
  - Work with nature, don’t over-engineer

Lessons learnt

- Wider benefits/enhancements
  - Flood defences
  - Ecological benefits
  - Tourism
  - Recreational and commercial fisheries
  - Carbon sequestration
  - Water quality



Lessons learnt

- Ecological development and monitoring
  - What is purpose of the monitoring?
  - Are objectives being met?
  - Steering committees
  - Adaptive management
  - Inform future schemes

- Sign-off procedures
  - How and when?
  - Objective setting is key
  - Natural change and variability

The way forward

- Conclusions and going forward
  - Understand requirements and levels of uncertainty
  - Consider full range and combination of techniques
  - Opportunities for partnerships – strategic approach
  - Flexibility in changing political landscape
    - Opportunity to challenge – like for like vs ecosystem functioning – wider ecosystem benefits
  - Continue to build on lessons learnt
  - Trial new techniques
  - Reduce uncertainty

Thank you for your attention

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