Coastal Development and Restoration in UK

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Coastal Resilience: The Environment, Infrastructure, and Human Systems

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Cefas

- Centre for Environment Fisheries and Aquaculture Science (since 1997)
- UK Government Marine Science Agency
- Executive Agency of Defra
- Advice to support / inform Policy and Regulation
  - Fisheries
  - Marine Environment
  - Aquaculture / Fish Health
Overview

• Introduction
  – Coastal development and pressure
  – Making space for water

• Sustainable solutions: case studies
  – Sediment replacement
    1. Harwich Haven
  – Managed realignment
    2. Wallasea Island
    3. Medmerry

• Benefits
• Way forward
Pressures on coastal area

- **Natural forces**: tides, waves, and surges, extreme events
- **Natural processes**: sediment transport, sedimentation, coastal erosion
- **Climate change**: sea level rise, changing wind patterns, storm events
- **Anthropogenic activities**:
  - Port development, coastal protection and sea defences, infrastructure project etc.
- **Increasing pressure** on shorelines and coastal landscape
- **Highlight need for more Sustainable Development** in order to meet future demands
Making Space for Water

- Storms and seal level rise = unsustainable sea defences
  - Cannot defend everywhere £
  - Focus on properties

- Environment Agency
- Local authorities
- Shoreline management plans
- Flood Coastal Risk Management Strategies
Shoreline management

• Shoreline Management Plans (SMPs)
  - Hold the existing defense line
  - Advance the exiting defense line
  - Managed realignment
  - No active intervention

• Flood Coastal Risk Management Strategies
  - Provide greater detail, how to.
Coastal Development
Environmental considerations

• **Biodiversity 2020**
  ‘halt overall biodiversity loss, support healthy well functioning ecosystems and establish coherent ecological networks, with more and better places for nature for the benefit of wildlife and people’
  – The government has set a combined target for the recreation of saltmarshes and mudflats, of 3,600 hectares (8,895 acres) by 2015

• **Birds and Habitats Directive**
  Where plans and projects have a significant effect on a protected site it can only proceed if:
  – there are no alternative solutions, necessary for imperative reasons of overriding public interest, and
  – compensatory measures are secured to ensure that the overall coherence of Natura 2000 is protected
Case studies

• Sediment replacement
  – Harwich haven

• Managed realignment
  – Wallasea island, Essex
  – Medmerry, West Sussex
Harwich Haven

Site Special Scientific Interest (SSSI)
Special Protection Area (SPA)
Ramsar
Harwich Haven

  - Capital dredge to improve navigation
    - -12.5m CD to -14.5m CD
  - 18Mm$^3$ of material (c.30M we tonnes)
- Subsequent port development projects e.g. Trinity III Terminal, Felixstowe South Redevelopment
Effects of Port Development & Capital Dredging Projects

• Effects on tidal propagation
  – Change in cross sectional area of an estuary system can change the way a tidal wave propagates
  – Increase or decrease in intertidal exposure

• Effects on erosion/accretion rates of intertidal areas
  – Wave reflection
  – Increasing depths of dredged channels
  – Changes to current speed or direction
Sediment Replacement
(mitigation measures)

• **Subtidal placement of fine material**
  – Fine sediments that were dredged during the maintenance dredging campaigns have been placed on the seabed and act as a feed of material into the estuary system

• **Water Column Recharge**
  • to mitigate the predicted increase in the rate of intertidal erosion of approximately 2.5ha per annum

Source: Harwich Haven Authority
Water Column Recharge

- Maintenance dredgings are discharged from the dredger at certain defined locations within the estuary system adjacent to intertidal areas
- Redistribute sediment to provide an increased supply to intertidal areas
- Deposits made under specific tidal conditions that encourage material to disperse over intertidal areas
Sediment as the fundamental component of an engineered solution to coastal management

Source: Harwich Haven Authority
Compensatory Measures

- Compensating for 4ha of unmitigable ‘loss’ of intertidal

- Managed Realignment
  - Creation of 16.5 ha of additional intertidal area

Source: Harwich Haven Authority
Managed Realignment

• Rationale for management realignment (managed retreat)
  • Reduced maintenance costs for coastal defence;
  • Space for sea level rise (addressing coastal squeeze);
  • Creating ‘new’ intertidal habitats;
  • Creating more sustainable shorelines and estuaries

• Extensive practical experience
  • Over 60 projects completed in UK
Wallasea Island (Allfleet’s Marsh)

- New wetland on the North shore of Wallasea Island, Essex 2006
- Compensatory habitat for port developments
- Enhance the coastal protection
- 550,000 m$^3$ of maintenance dredge material to an area of saltmarsh within the realignment site
- Seawall breaches
Wallasea Island Wild Coast project

• Landmark conservation and engineering scheme
• Combat the threats from climate change and coastal flooding
• Transformed from levee-protected farmland into a thriving wetland
• 670 hectares of secure habitat for wildlife
• Regulated tidal exchange
• Fill material from Crossrail project
Wallasea Island Wild coast

Allfleet’s Marsh
Wallasea Island

• Total fill to be 7.5 million m³ when completed
• Scheme will reduce future unmanaged flood prism change of 11 million to managed prism change of 2.1 million
• Crossrail are currently moving 40,000 tonnes per week from London to Wallasea
Wallasea Island Wild Coast (September 2013)
Medmerry managed realignment

• **Environment Agency** built major new sea defences in West Sussex following 2008 flooding

• **The Medmerry scheme's overriding objective**
  – greatly improve the standard of flood protection for over 300 homes in Selsey, for the water treatment works, and for the main road into Selsey

• **Win-Win for communities and the environment**
  – create important new wildlife habitat
  – new footpaths, cycleways and bridleways
Medmerry managed realignment
Medmerry managed realignment
Medmerry managed realignment

• Breach now evolving towards new dynamic equilibrium
• First coastal shingle managed realignment in UK
• Proved its worth in winter storms 2013/14 when shingle was stripped down significantly

• Win Win for local communities and environment
  – Coastal protection
  – create important new wildlife habitat
  – new footpaths, cycleways and bridleways
Wallasea Island Wild Coast Project

Social Value
- Improved access to the coast
- Social and health benefits from new amenities and facilities
- Connecting people with the coastline
- Climate change / Sea-level rise outreach
- Enhanced visual landscape
- Focus for local volunteering

Economic Gain
- Jobs and skills creation in construction
- Future-proofed sustainable coastal defence
- Catastrophic flood risk reduction
- Waste management partnership

Environmental Benefit
- Fish & shellfish habitat
- Carbon sequestration
- Improved water quality
- Landfill alternative
- Maintaining populations of protected terrestrial species
- Coastal feeding and roosting areas for important species
- Internationally protected mudflats and marshes
- High biodiversity habitats restoration

ABPmer
marine environmental research
The way forward

• Working with nature and natural processes
  – Building / Engineering with nature

• Beneficial use
  – Dredged sediment valuable resource
  – Sediment as the fundamental component of an engineered solution to coastal management

• Managed Realignment
  – To meet SMPs aims by 2050 - realignment needs to increase 5-fold from 6km/year to 30km/year
  – Need to promote multifunctional benefits
  – What are the incentives/funds: Other than Habitats Regulations…WFD, Biodiversity offsetting, aquaculture? need to think bigger
The way forward

• Longer term vision
  – Creating more resilient coastlines and delivering ecosystem services and sustainable development
  – Long term solutions will require change
  – Larger projects to help achieve habitat creation/restoration targets, provides services of economic value

• Marine planning
  – Opportunities for regional and local initiatives

• Partnership working

• Communication
  – A challenge for all projects; raising issues such as food security…..need to clarify the multiple benefits.
Thanks you for your attention

Thanks to Colin Scott – ABPmer

The Online Managed Realignment Guide (OMReG)

http://www.abpmer.net/omreg/