"WODA Experiences with Coastal Resilience"

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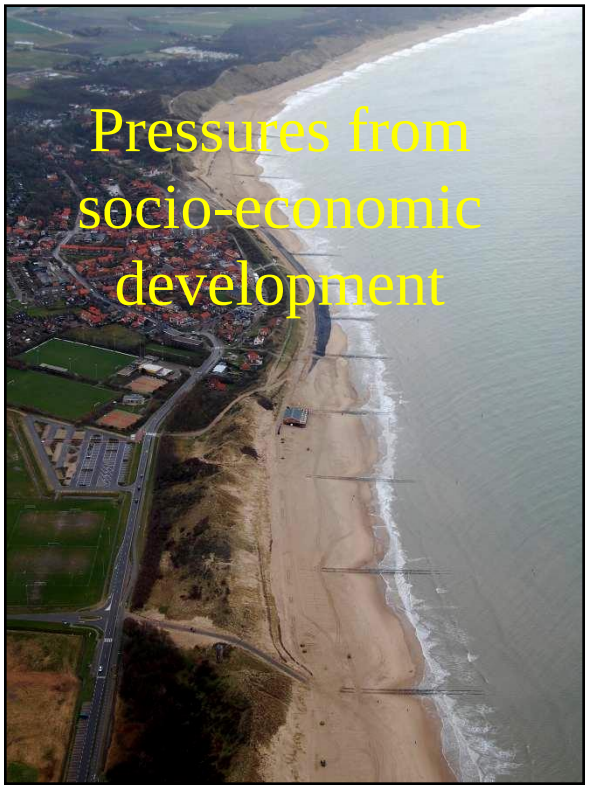
Cefas, UK

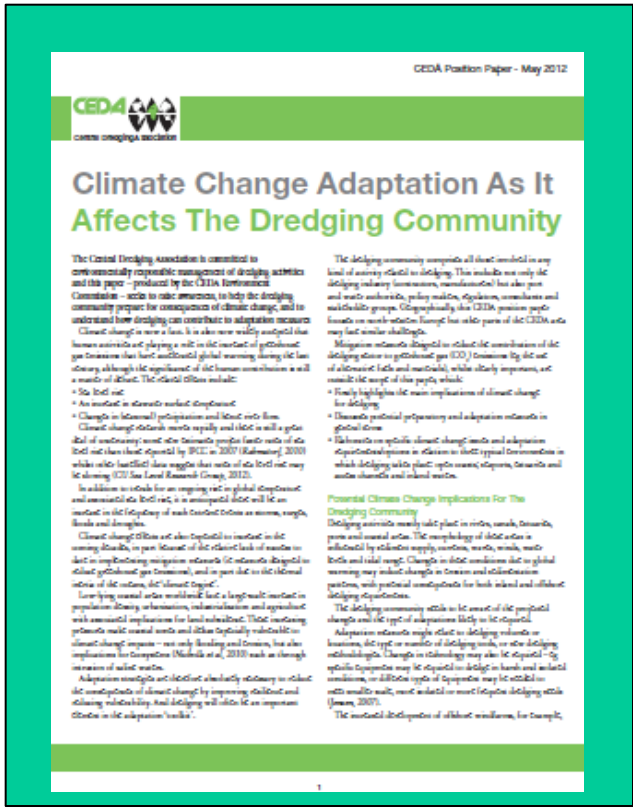
LC/LP SG 37 New Orleans
Science day
'Coastal Resilience'

Consequences of Climate Change



CEDA position paper on climate change adaptation

- To raise awareness of the dredging community to be prepared for climate change;
- How can dredging contribute to adaptation measures?
- What are the implications for the dredging community?
- Focus is on adaptation to consequences of climate change not on causes.


CEDA Position Paper - May 2012

Climate Change Adaptation As It Affects The Dredging Community

Potential climate change implications for dredging community

- Both opportunities and challenges for the dredging community;
- New and innovative solutions required;
- Sustainable solutions will not always involve more (conventional) dredging; (e.g. integrated sediment management)
- Flexibility is vital (uncertainties, extreme events);

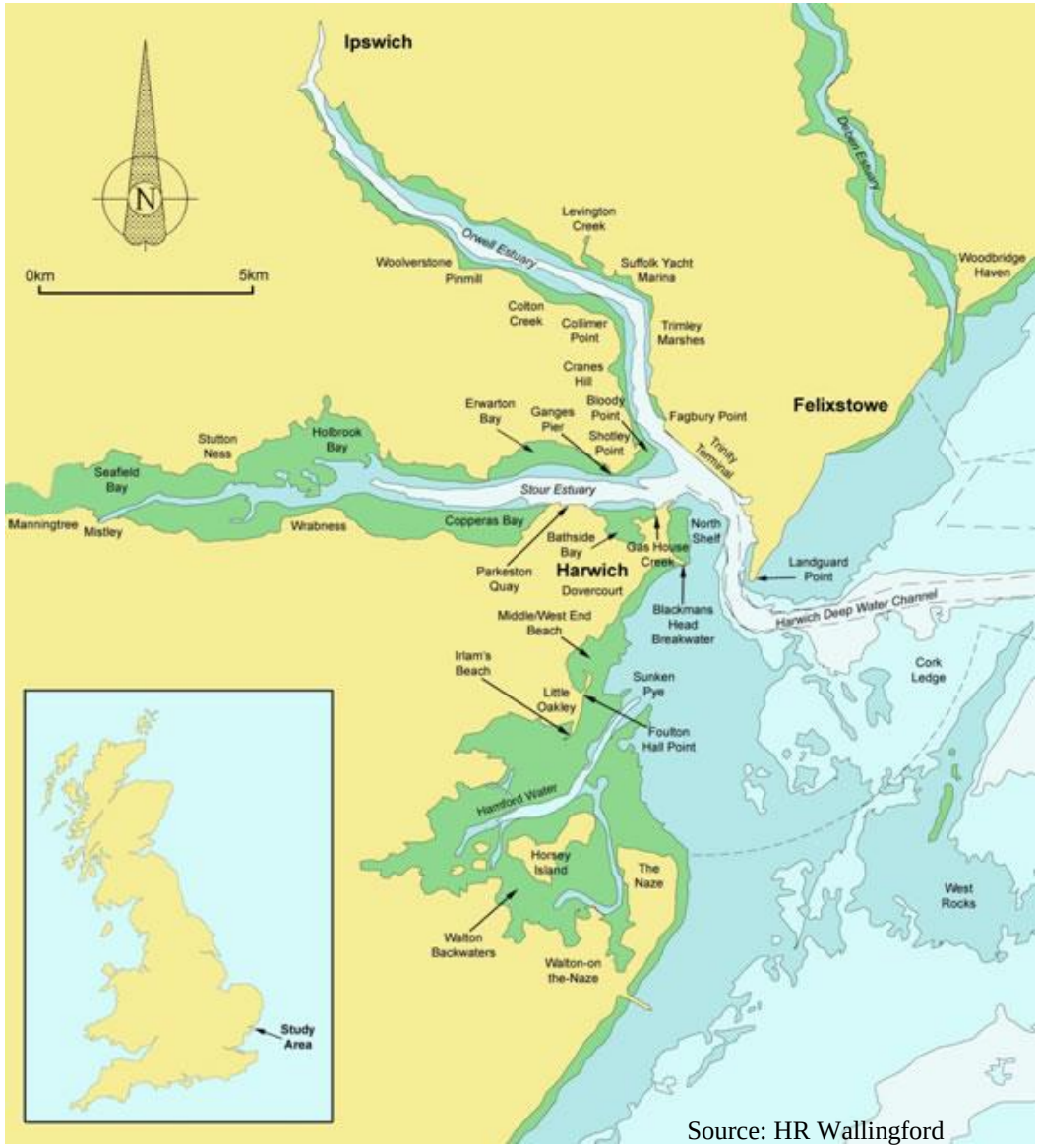
Adaptation measures

- Absolutely necessary to reduce the consequences of climate change by reducing vulnerability and/or improving coastal resilience
- Integrated sustainable approach:
  - safety against flooding,
  - safety of navigation,
  - environmental protection and improvement,
  - economics, stakeholder and societal interests
- Long term: realise adaptation measures (flexibility), (win – win situations)
- Working with nature and natural processes
  - *Building / Engineering with nature*

Case studies

- Sediment replacement
  - Harwich haven, UK
- Managed realignment
  - Wallasea Island, UK
- Beach rehabilitation and flood defense
  - Køge Bay Beach Park, Denmark
  - New Amager Beach Park, Denmark

Harwich Haven



Source: HR Wallingford

Site Special Scientific Interest (SSSI)

Special Protection Area (SPA)

Ramsar

Harwich Haven

- Port of Felixstowe - Approach Channel Deepening (1998-2000)
- 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

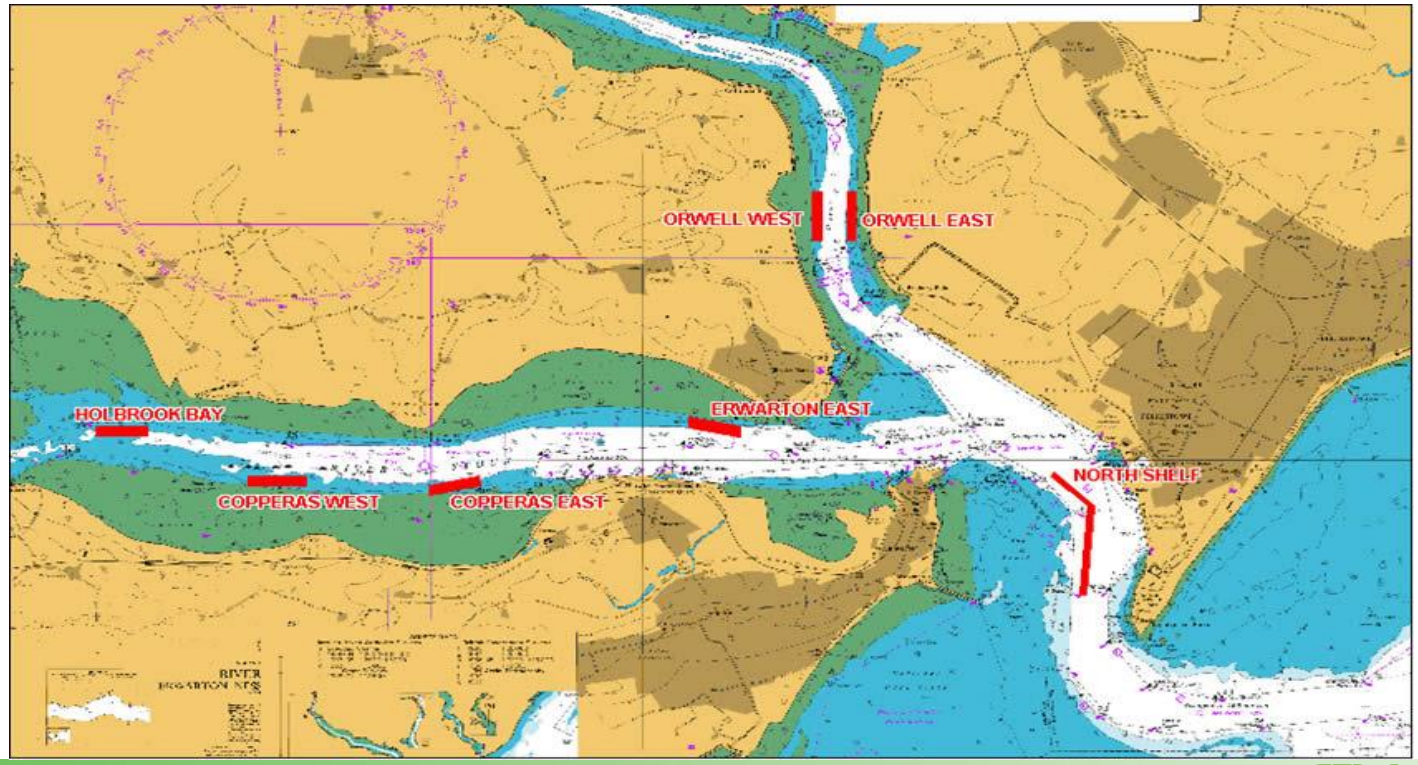
Sediment Replacement
(mitigation measures)

- 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

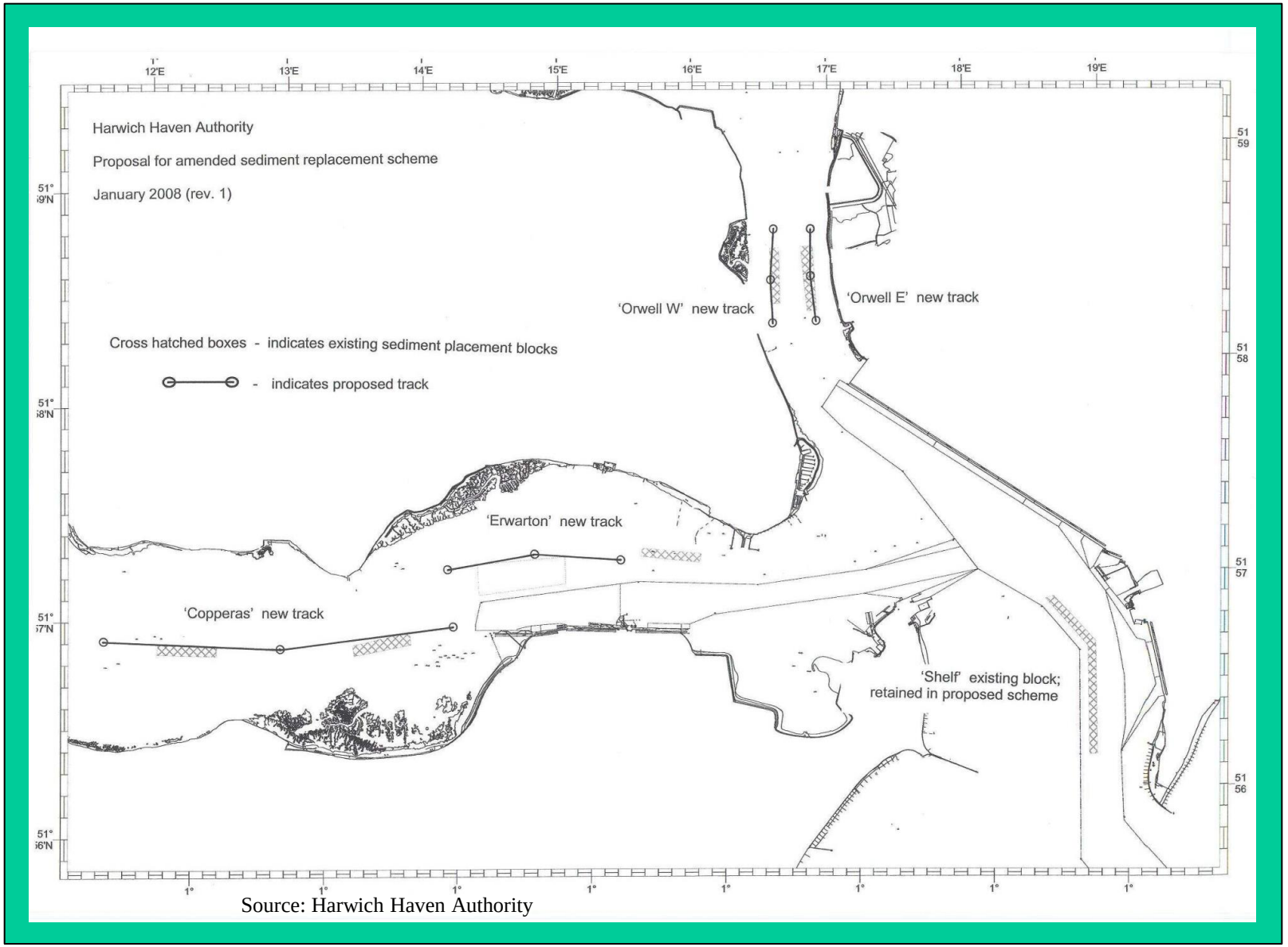
Water Column Recharge

- 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



Source: Harwich Haven Authority

Sediment as the fundamental component of an engineered solution to coastal management



Source: Harwich Haven Authority

Compensatory Measures


Source: Harwich Haven Authority

- Compensating for 4ha of unmitigable 'loss' of intertidal
- Managed Realignment
  - Creation of 16.5 ha of additional intertidal area

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)

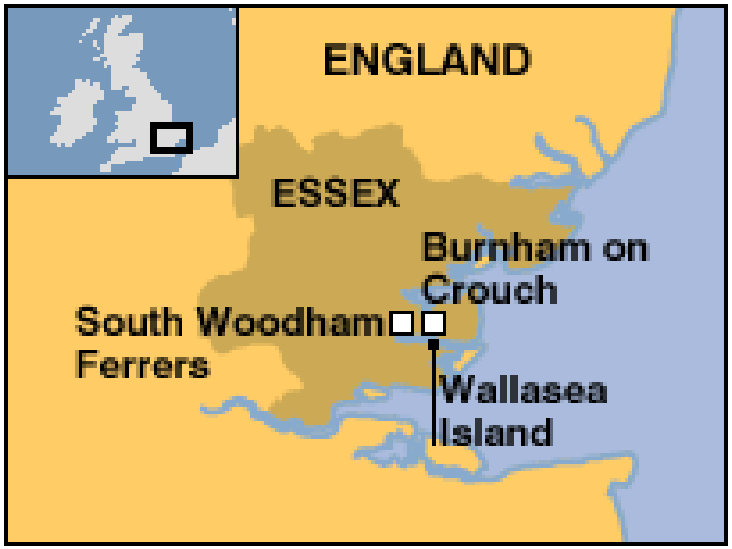
- New wetland on the North shore of Wallasea Island, Essex 2006
- Compensatory habitat for port developments
- Enhance the coastal protection
- 550,000m^3 of maintenance dredge material to an area of saltmarsh within the realignment site
- Seawall breaches

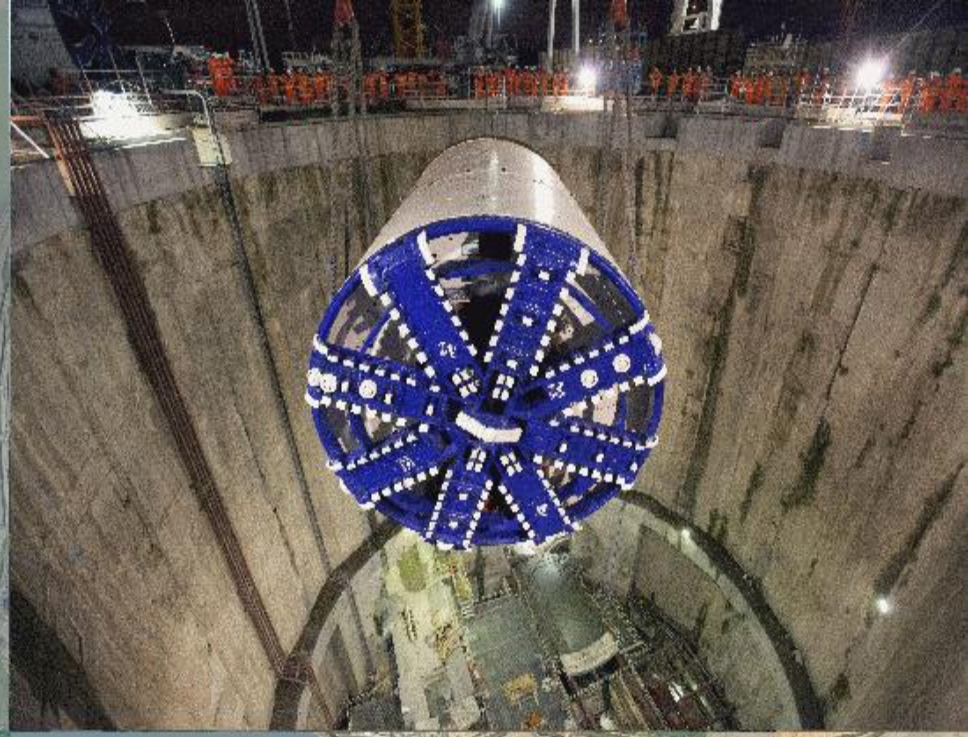

Wallasea Island Wild coast
Allfleet's Marsh
rspb
giving
nature
a home


2007
2008
2009
2010
Allfleet's Marsh (Wallasea)

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





rspb giving nature a home

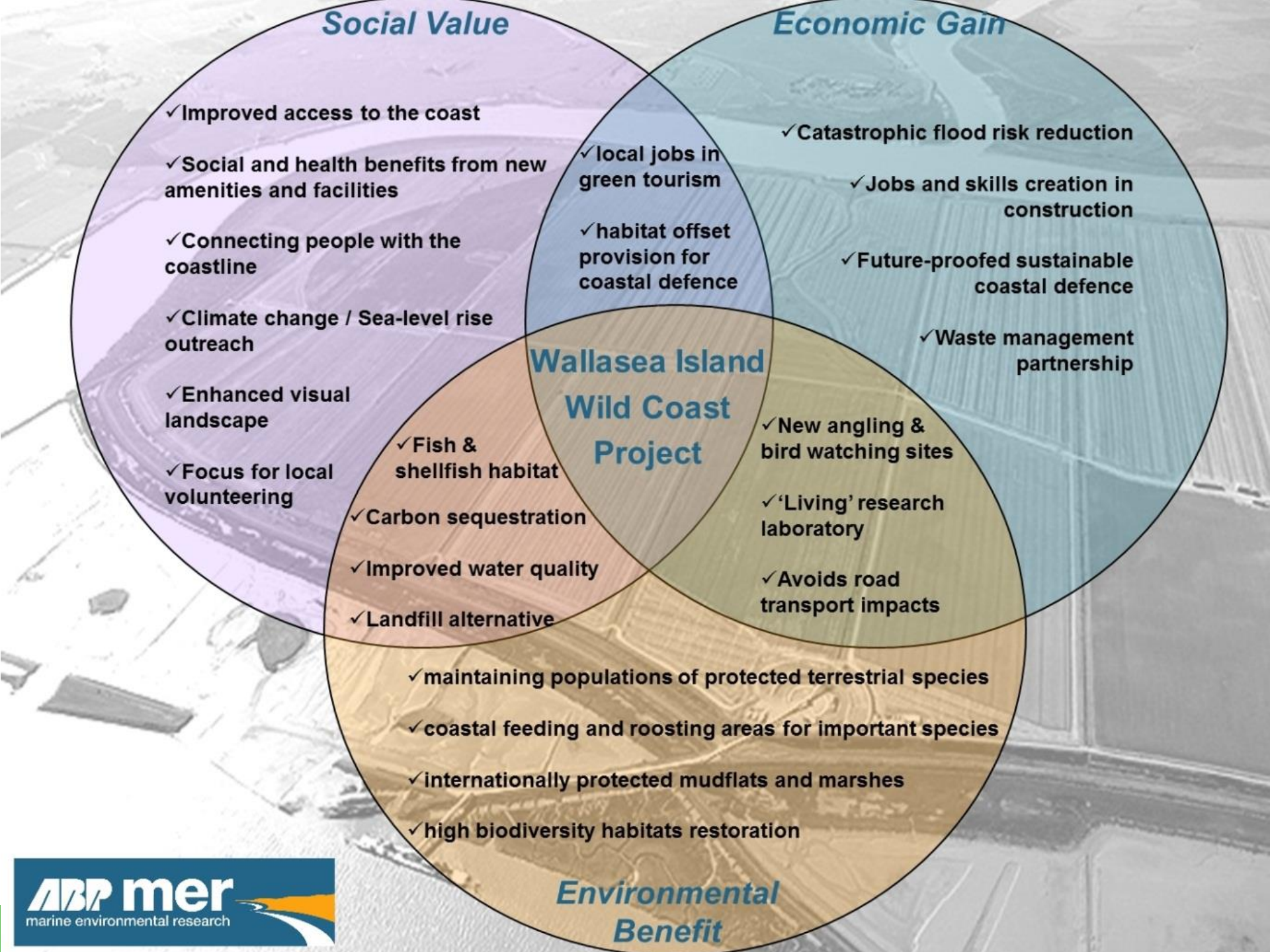
Crossrail

Wallasea Island

- Total fill to be 7.5million m^3 when completed
- Scheme will reduce future unmanaged flood prism change of 11million to managed prism change of 2.1 million
- Crossrail are currently moving 40,000 tonnes per week from London to Wallasea

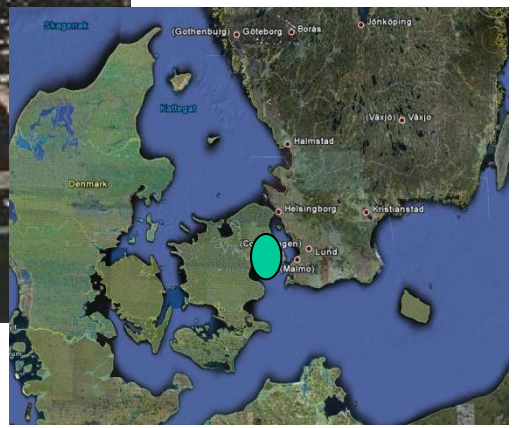
Wallasea Island Wild Coast (September 2013)

rspb giving nature a home



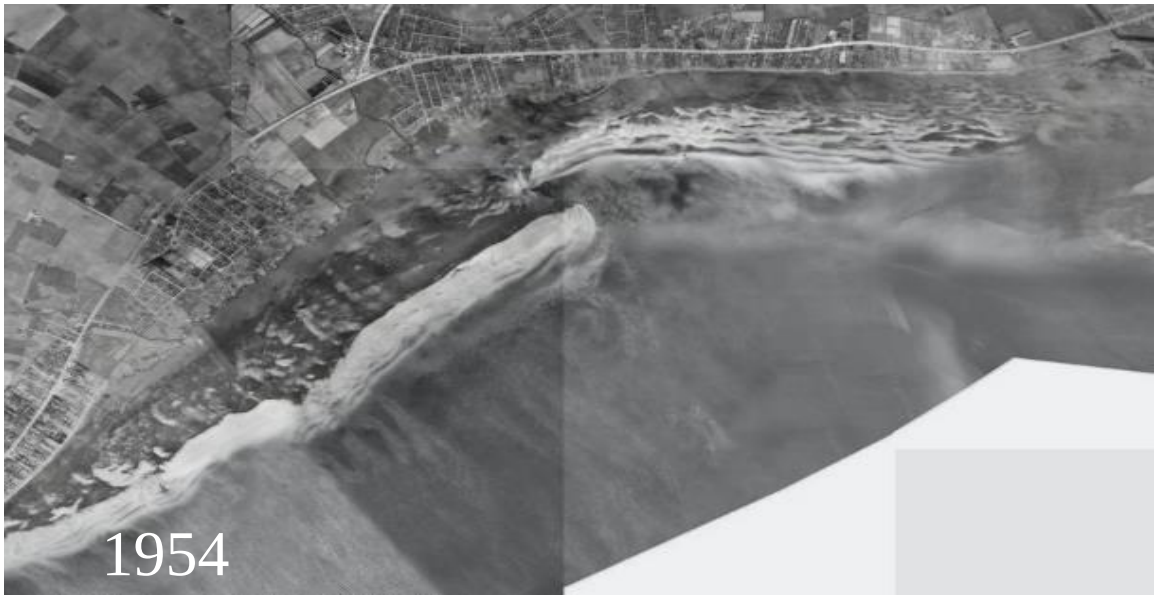
ABP mer
marine environmental research

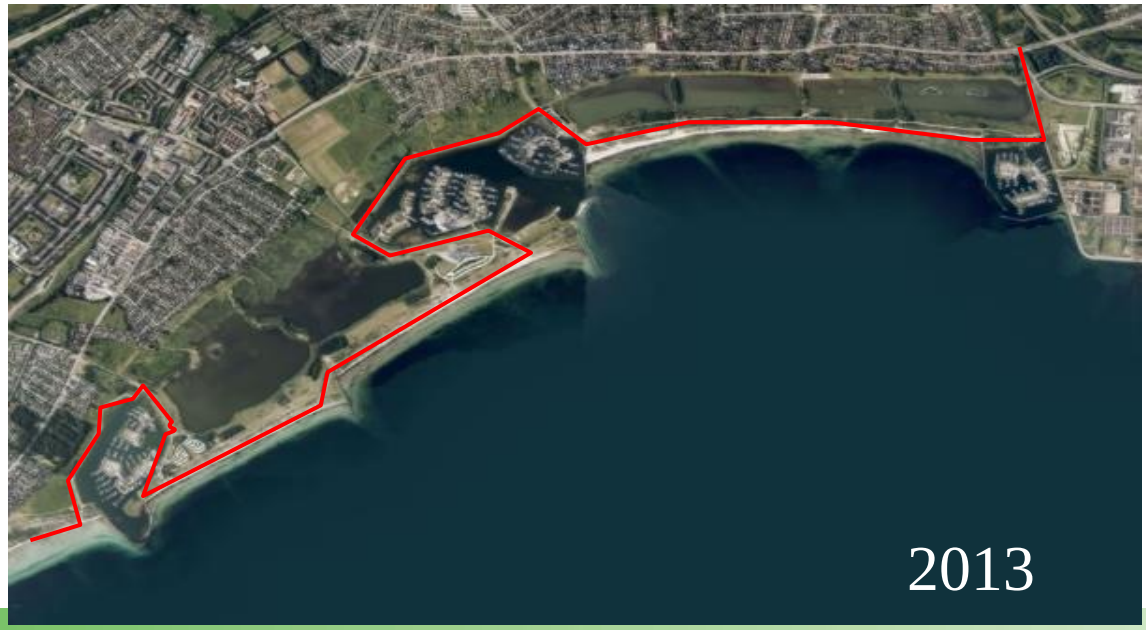
Køge Bay Beach Park, Denmark



Combined beach park and sea defence

Køge Bay Beach Park, Denmark





- Beach Rehabilitation Scheme: New Amager Beach Park, Copenhagen

Data
Sand fill: 1.2 M m^3
Lagoon excavation: 0.6 M m^3
Beach length: 2.2 km
Lagoon area: 350,000 m^2
No refill after 6 years

Conclusions

- Climate change will bring both challenges and opportunities
- More resilient coastline will require both engineered and soultions and those working with nature and natural processes
- The dredging community has an important role to play in promoting integrated solutions for many of the consequences of climate change
- Dredged material is a valuable resource
- Measures will be most effective if based on a well-informed, pro-active and integrated approach that delivers social, environmental ans economic benefits

Thank you for listening