Coastal dunes and shingle: time and space for change?

The UK Sand Dune and Shingle Network

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CBD Principles of the Ecosystem Approach

• The CBD principles (2000) are elaborated from the ten principles of ecosystem management defined in 1996 at the Sibthorp Seminar in the UK. There are 12 complementary and interlinked principles

• Selected from this list....
  – Conservation of ecosystem structure and functioning, in order to maintain ecosystem services, should be a priority target of the ecosystem approach.
  – The ecosystem approach should be undertaken at the appropriate spatial and temporal scales.
  – Management must recognise that change is inevitable.
Coastal Dunes
Dynamic systems

• As part of the coastal environment, coastal sand dunes and shingle systems are naturally dynamic

• Responsive to climate change and long-term geomorphological trends
  – cf. the higher sea levels of the Holocene Period
Sediment supply

• The early Holocene
  – sea levels were rising rapidly
  – natural supply of sediment was much larger
  – erosion and reworking of sediment was widespread
    » (Hansom 2001)

• Under the more stable sea levels of the late Holocene this supply has declined
Sea-level rise and sediment

- Sea-level rise and climate change are expected to promote erosion and sediment reworking
  
  » (Pye and Saye 2005)
Climate change

• A range of impacts, including:
  – Changing temperature and rainfall patterns may lead to shifts in **distributions of coastal species** (Harrison et al. 2001; Berry et al. 2005)
  – Changing rainfall will have **big impacts on water table dependent habitats**.
  – Changing storm climates will impact on the **rates of erosion** (Lozano et al. 2004), and on the quantity and frequency of sediment exchanges between habitats.
From sand to scrub

Vegetation - relaxation of grazing pressure

• Wide scale abandonment of traditional agricultural grazing practices
• mid 1950s - myxomatosis
  – reduced influence of the most significant grazing animal on British dunes
  ↓
• impacted on development of dune vegetation
• reduced sand mobility within dune systems

• The proportion of early successional habitats in some dune systems has fallen by up to 90% ➔ scrub and grassland have increased
  – (UK NEA 2011)
Some of the ecosystem services provided by coastal habitats

- Sea defence
- Leisure and amenity
- Crops
- Meat and wool
- Biodiversity
- Military use
- Personal space
- Industry use
- Sense of place
- Education
- Health and recreation

Source – UK NEA 2011
Coastal dunes provide a wide range of functions - some of which are recognized for their socio-economic benefits.

Example of the Sefton Coast, north west England.
Formby Point erosion after 5th December 2013  (Formby Civic Society)
Formby Point erosion after 5th December 2013
5th December 2014

The high tide on Formby beach sees the storm damage the boardwalk. Photo by Colin Lane
Five thousand Christmas trees used to help prevent Merseyside sand dune erosion

- Thousand of Christmas trees are being used to help prevent the erosion of Merseyside’s sand dunes.
Five thousand Christmas trees used to help prevent Merseyside sand dune erosion

• Thousand of Christmas trees are being used to help prevent the erosion of Merseyside’s sand dunes.

• The National Trust organises the tree planting every year – using leftover Christmas trees from Homebase – to preserve the dunes on the Formby coast.

• But this year’s consignment of 5,000 trees is the largest ever.

• Teams of staff and volunteers will use the trees to create more than a mile of brush fencing.

• A National Trust spokesman said: “The trees are placed in rows in areas where the dunes are most vulnerable to help catch the sand as the wind blows it over the dunes.

• “The sand builds up around the trees and, once buried, the trees then bind the dune together.”
Sefton Coast Watch fear Formby could experience flooding

- The warning comes in the aftermath of recent extensive flooding in the south of the country.

- Sefton Coast Watch fear Formby could be set for a serious flood if action is not taken soon.

- Former Formby councillor Barry Griffiths told the Times that the group now fear the town could experience serious flooding on a scale with the south west of the country.

- He said that the Formby Point area is being eroded each year by the sea, and not enough is being done to stop it.

- Mr Griffiths, speaking on behalf of SCW, said that Sefton Council, the Environment Agency and Natural England had all agreed upon a consensus policy of managed retreat.

- SCW argue that Formby’s coast should be defended with sand dumping and man made barriers called groynes.
Coastal Dunes
# EU Habitats Directive - Article 17 Reporting - 2007

Dune Habitats – Overall assessment by Biogeographical Region

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<thead>
<tr>
<th>Habitats</th>
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<td>2120 - Shoreline shifting white dunes with Ammophila arenaria</td>
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<td>2180 - Woodyed dunes of the Atlantic, Continental &amp; Boreal reg.</td>
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<td>21A0 - Machairs (* in Ireland)</td>
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<td>2210 - Crucianellion maritimae fixed beach dunes</td>
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<td>2220 - Dunes with Euphorbia terracina</td>
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<td>2230 - Malcolmietalia dune grasslands</td>
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<td>2250* - Coastal dunes with Juniperus spp.</td>
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<td>2320 - Dry sand heaths with Calluna and Empetrum nigrum</td>
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Source: Eionet - European Topic Centre on Biological Diversity

http://biodiversity.eionet.europa.eu/article17/habitatsprogress/?group=ZHVuZXMgaG
FiaXRhdHM%3D&conclusion=conclusion_assessment
Data provided by 25 EU Member States (EU-27 except Bulgaria and Romania that will be included in the next reporting phase in 2013) through their reports under Article 17 of the Habitats Directive. 2008.
Past, present and projected future area of Coastal Margin habitats (excluding Sea Cliffs).
Estimated declines: 1945 to 2010 (16.8%); 2010 to 2060 (8.1%).

Source - Chapter 11 - Coastal Margins
European dunes

• Dunes stand out in European as a *failing* habitat

• Current measures to conserve dunes are not fully effective

• So what are we going to do, and how will we tackle the complex issues?
The aim of the Network is to conserve sand dunes and shingle as dynamic landscapes.

‘Linking Science and Management’
http://coast.hope.ac.uk/
The value of dynamic dunes

- Dynamic dune systems are more sustainable
Coastal Sand Dunes

- A particularly threatened habitat in the European Union
  - A range of conservation challenges

- Achieve overall ‘favourable condition’ for dunes
  - Ambitious considering the issues and uses......

- A step-change in the implementation of urgent action to recover dunes and permit dynamic and adaptable dunes is required
  - Based on evidence and understanding

- Mechanisms such as the Natura 2000 network (protected area) and environment funding (e.g. LIFE) require more momentum

- More attention given to the broader ecosystem services that these habitats provide to society

- Networking and knowledge transfer activity will underpin and sustain success
Paul Rooney

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*Linking science and management*’