**Sustainable Management of Coasts**

Coastal management typically has a number of aims:

* To prevent coastal erosion
* To prevent coastal flooding
* To protect areas of economic value
* To protect communities
* To protect areas of historical value
* To protect and conserve fragile coastal ecosystems
* To protect areas of high scenic value
* To maintain or improve the leisure and amenity use of the coast

Sustainable coastal management must take into account the three key aspects of sustainable development:

* **Environmental sustainability** – conserving coastal ecosystems, reducing coastal pollution, maintaining the aesthetic appeal of the coastline (its ‘look’ and ‘feel’)
* **Economic sustainability** – ensuring the maintenance or improvement of living standards among coastal communities (e.g. those engaged in coastal fisheries, tourism) and protecting valuable economic assets from destruction by coastal erosion or flooding. Cost-benefit analysis (CBA) is a method to determine whether a scheme should go ahead or not (see further below)
* **Social sustainability** – maintaining or improving the vitality and quality of life of coastal communities (e.g. ensuring homeowners do not lose their properties to coastal erosion)

Furthermore, sustainable coastal management must ensure that strategies will work as intended in the long-term and not just the short-term, with affordable costs. Equally, strategies that work in one coastal location must not have detrimental effects on other locations. Unsurprisingly, given the complexity of coastal processes, as well as the uncertainty of how climate change will impact on them, sustainable coastal management is difficult to achieve in practice. Taking a ‘holistic’ approach, where all the physical and human factors are taken into account, is considered by most to be the best way forward. This approach is the basis on which recent **shoreline management plans (SMPs)** in the UK have been developed.

SMPs are an essential step towards **integrated coastal management** by which coastal management strategies can be devised to protect one stretch of coastline without creating an adverse effect on another stretch of coastline further downdrift. They have been drawn up for every stretch of the coastline of England and Wales, and are based on the 11 sediment cells (and their sub-cells) identified by scientists. These form ‘coastal systems’ in which sediment movement is known to be relatively self-contained. Before SMPs were introduced, coastal protection was carried out on a piecemeal basis by local councils without regard for their neighbouring coastal areas. SMPs bring together multiple organisations – local authorities (e.g. District and County Councils), the Environment Agency, conservation groups (e.g. National Trust, English Heritage), the National Farmers’ Union, research bodies, scientists and others to create more sustainable plans for managing the whole coastline within each sediment cell, rather than just individual stretches of coastline.

**There are four options for SMPs:**

1. **No active intervention / Do nothing**…usually the best option if the coastal land is of low economic and environmental value e.g. agricultural land **or** if the erosion rates / flood frequency are very low. This is popular with the taxpayer and the Treasury but is unpopular with coastal residents who risk losing their land and properties in the near future.
2. **Retreat the defence line / Managed realignment / Coastal** realignment…the coast is allowed to be eroded or flooded up to a point. It is usually hoped that nature will restore the equilibrium to prevent further erosion or flooding beyond this point. This is also called **managed retreat** but sceptics also view managed retreat as an excuse to do nothing and save money in the process. It works best on low-lying coastlines where the managed retreat creates saltmarshes which act as a barrier to further erosion and flooding.
3. **Hold on to the defence line**…usually the best option if the coastal land is of high economic or environmental value e.g. city, resort, nature reserve. Sea walls, gabions, revetments, rock armour, groynes and beach rebuilding/nourishment etc. may be used to hold the line. They are maintained and upgraded as necessary over time to ensure the coastline is protected from further erosion and flooding. This is an expensive option, but one which most coastal communities see as essential to maintain livelihoods.
4. **Advance the defence line**…an alternative to 3. that involves building forward e.g. harbours, offshore breakwaters, reclaiming land from the sea. Groynes and beach rebuilding could sometimes achieve this but are better at holding the defence line. A very expensive option and one rarely carried out in the UK due to its existing infrastructure and land area being sufficient.

Where coastal protection is used, the structures can be classified as either **hard engineering structures** or **soft engineering structures**.

**Hard engineering structures** - the use of structures which aim to resist the energy of waves and tides. Theseinclude sea walls, steel/concrete/wooden revetments, gabions, rock armour/rip rap, breakwaters, groynes, drainage pipes, cliff pinning or modification e.g. re-grading, use of geotextile materials etc. To work well they need to protect the cliff-foot and cliff-face.

**Soft engineering structures** - solutions which aim to work with rather than against natural processes and provide a more environmentally friendly approach. These include beach nourishment/rebuilding, stable bays, vegetation planting (e.g. sand dune regeneration), conserving ecosystems, coastal zone management. Managed realignment / managed retreat can also be included as an example of soft engineering.

**Choosing the most appropriate management strategy** – cost-benefit analysis (CBA), environmental impact assessment (EIA), feasibility studies and risk assessment can all be used to inform decision-making on the best strategy.

|  |
| --- |
| ../../../Desktop/Screen%20Shot%202016-01-21%20at%2020.43.01.pn**”Looking on the bright side, we should get fifty quid for selling the lawnmower”** |

**Cost-benefit analysis** (CBA) is a widely used technique to analyse a project. The technique aims to balance the costs of a scheme e.g. the costs of building and maintaining any structures over their expected useful life against the benefits of a scheme e.g. the value of the buildings and infrastructure which would be protected if the project takes place. A project with a CBA ratio of **1:0.8** will not go ahead but one with a CBA ratio of **1:1.5** is more likely to be approved.