How can coasts be protected from the effects of natural resources?

Coastal environments are one of the most dynamic and fragile environments on earth. Consequently managing them requires a detailed understanding of both natural and human influences. With over 4 billion people living worldwide living within 40km of the coast, an ever-increasing demand for coastal leisure activities and the threat of increasing sea levels, the challenge is to find sustainable ways of managing the frontier between land and sea which offers protection from the forces of nature whilst being sensitive to the needs of the environment.

How is the coastline managed in the United Kingdom

- DEFRA has overall responsibility for the protection of the coastline from erosion and flooding.

- Coastline is split up into 11 sediment cells. Each of the cells is divided into sub-cells. In order to fully understand and manage a sub-cell, a Shoreline Management Plan (SMP) is developed.

Shoreline Management Plan

- Examines the risks associated with coastal processes and presents a policy to manage those risks. It considers 'risks' to local people as well as the built and natural environment.

- Published SMP for each sub-cell will:
    1. Divide the sub-cell into appropriate management units
    2. For each management unit:
        - Identify the economic and environmental assets that would be affected by flooding
        - Assess the issues and conflicts associated with the management of the unit
        - Propose a coastal defence plan for the next hundred years, divided into three time periods: 'present day' (next 20yrs), 'medium term' (next 20-50years) and 'long term' (50-100 years)

    3. Use DEFRA criteria for management which is:

    - Hold the line: maintain existing defences

    - Advance the line: build new defences seaward of the existing line of defence

    - Managed realignment: allow the land to flood with careful monitoring and management further inland.

    - No active intervention: no investment in providing any management

- ICZM (Integrated Coastal Zone Management): method of managing not only the shoreline but the whole coastal zone.

Why do some coastlines need to be managed?

- Residential areas
- Building material (sands and gravels)
- Salt marshes, coral reefs and mangroves
- Rising sea levels
- Industrial areas (heavy industry and ports)
- Tourism
- Fishing industry

Coastal management

- Hard engineering focuses on reducing wave energy by putting large structures in place between land and sea.
- Soft engineering work with the existing natural processes rather than attempting to control them.
- Managed retreat allows existing sea defences to be breached and areas to flood up to their natural level.
- Before any method is put in place cost-benefit analysis and environmental impact assessments are carried out in order to assess their economic and environmental costs.

Hard engineering

- **Sea walls**: curved, straight or stepped reinforced structures
- **Groynes**: wooden or concrete structures designed to break waves and slow down longshore drift
- **Cliff drainage**: piped drainage in cliffs to prevent landslides
- **Rock bund**: a row of rocks along the beach
- **Rock armour (rip rap)**: large rocks placed at the foot of sea walls to absorb wave energy
- **Gabions**: steel mesh cages filled with small rocks
- **Revetements**: wooden or concrete structures designed to absorb wave energy but still allow a flow of sediment.
- **Offshore bars**: rows of boulders built up offshore to break waves before they reach the beach

Soft engineering

- **Beach replenishment**: pumping sand or shingle back onto the beach to replace eroded material
- **Building bars**: underwater bars reduce wave energy
- **Beach reprofiling**: changing the shape of the beach so that it absorbs more energy and reduces erosion
- **Fencing/hedging**: preserves the beach by reducing the amount of sand being blown inland
- **Replanting vegetation**: planting grasses or salt-resistant plants helps to stabilise low-lying areas
- **Beach recycling**: moving material from one end of a beach to the other to counteract longshore drift