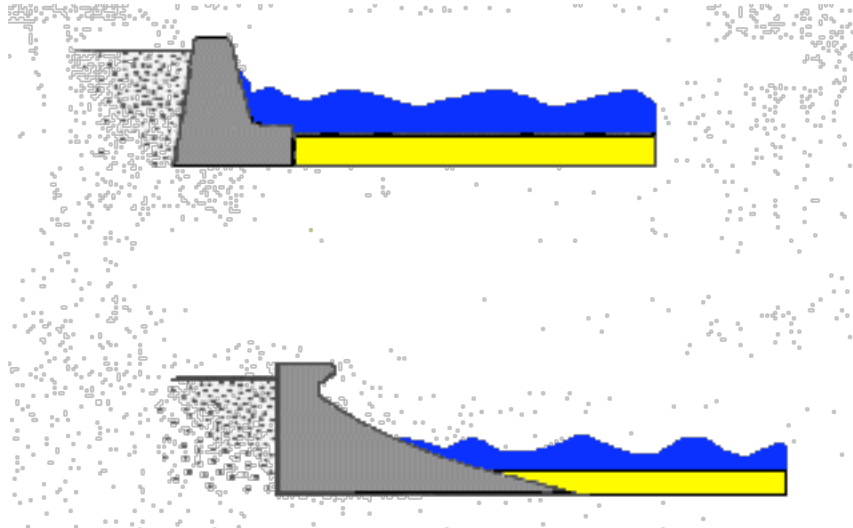


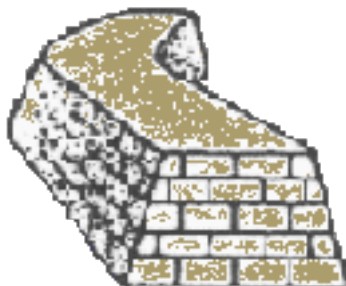
Coastal Management Techniques

Sea Wall



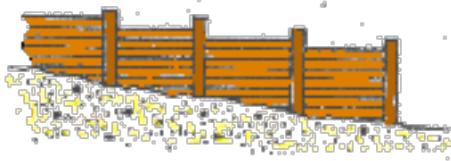
The traditional 'hard' defence is the sea wall. In the past **sea walls** were vertical and deflected the energy of the waves away from the coast. In doing so, however, they suffered a lot of expensive damage in a short period of time. Modern **sea walls** have a slope and curved top which breaks up the energy of the wave and prevents water going over the top of the wall during heavy storms. **Sea walls** are very expensive (£2000-£5000 per metre) but should last 20-30 years.

Breakwater



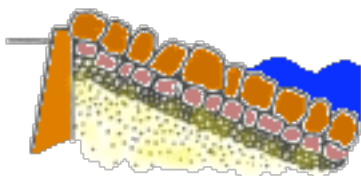
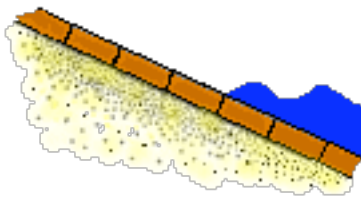
A **breakwater** is often used to protect a harbour but may be used to protect a stretch of coastline. They are usually made of concrete or blocks of stone but recent cheaper alternative suggestions have included oil drums and used tyres. They have to be strong enough to take the full force of the waves. Since they have to be built in deep water they are, like **sea walls**, expensive to build.

Groynes



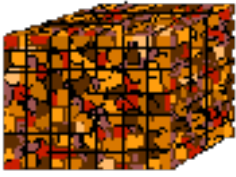
The best form of natural defence is a **beach** which efficiently absorbs the energy of the waves. Along many coasts, however, longshore drift causes the beach to thin out in places and erosion of the land behind becomes a problem. **Groynes** are designed to slow down longshore drift and build up the beach. They are usually made of tropical hardwoods which are more resistant to marine borers and erosion. A few are made of concrete, steel or in more recent times large rocks. They are built at right angles to the shore and spaced about 50-100 metres apart. **Groynes** may have a life of 15-20 years but often have to be replaced rather than repaired.

Revetment



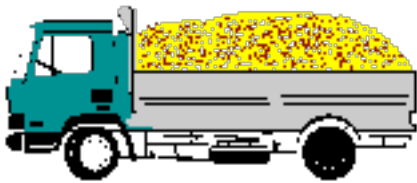
A cheaper alternative to sea walls is the **revetment** (about £1200 per metre). This is a sloping feature which breaks up or absorbs the energy of the waves but may let water and sediment pass through. The older wooden **revetment** consists of posts fixed into the beach with wooden slats between. Modern revetments have concrete or shaped blocks of stone laid on top of a layer of finer material. Rock armour or riprap consists of layers of very hard rock with the largest, often weighing several tonnes, on the top. Riprap has the advantage of good permeability plus it looks more natural.

Gabions



The **gabion** is a metal cage filled with rocks, about 1 metre by 1 metre square. They are stacked to form a simple wall. They are used to protect a cliff or area in the short term only, since they are easily damaged by powerful storm waves and the cages tend to rust quite quickly. **Gabions** have the advantage of ease of use and are relatively cheap but their life span is short.

Beach Nourishment



Where longshore drift is a serious problem and the supply of beach material is poor, it may be necessary to supplement the natural system by adding lorry loads of sand and shingle to the beach. The natural processes will then spread the material along the coast to help build up the natural defences. This is called **beach nourishment**. Sometimes dredgers may be anchored offshore and the sediment sprayed on to the beach using high pressure hoses.