Does management affect coastal processes at walton-on-the-naze?

Business, Management

Walton-on-the-Naze is a small retirement town, located near Colchester via the A133 with a population of 40, 000. Run by tendering local authority it relies mostly on tourism economically, which is one of the reasons they have a coastal management scheme which has recently been extended to the north to protect the luxurious houses situated there.

In the course of this project I will be investigating the ways in which management has been used in Walton-on-the-Naze to prevent and encourage different coastal processes in order to stop the cliff retreating and then comparing this to the unprotected cliffs and beaches in Walton to find out if management truly does affect the coastal processes present there.

Coastal processes affect our lives. Our families pay taxes to go towards coastal protection etc. which is essential for the whole town to function and benefit the whole community.

I have decided to study Walton-on-the-Naze for a number of reasons. Firstly it is the nearest place along the coast to Southend which has unprotected cliffs as well as protected ones. At Walton the geology is the same and the processes are very similar along with the protection. Also Walton is subjected to much more energy from the sea than Southend.

There are various ways the coast can be managed, firstly I will explain how the cliffs can be protected.

Cliffs are protected in two places, the cliff face and the cliff foot. Energy from the sea in the form of destructive waves can undercut the cliff over time, this causes a cliff collapse because the weight cannot be supported now

undercutting has taken place. To combat this, at the cliff foot a sea wall may be built to act like a natural barrier against the sea, along with a revetment to further decrease the energy of the waves. Or groynes could be put in place to encourage a build up of sand and create a " beach."

This is why beaches are usually sloping towards the sea to make the waves break and decreases the energy they have. The incoming destructive waves break on the sand and cause a weak swash upthe beachfollowed by a strong backwash which has more energy than the swash and 'drags' sand back down the beach, although this is partly complicated by prevailing winds and LSD which I will go on to explain further later on in this project. Also as waves undercut the cliff rubble collects at the foot of the cliff and acts like a natural barrier in some places, this can also be recreated by man by placing massive rocks and boulders at the foot of the cliffs to protect them, this is usually called rip-rap and is the cheapest and easiest method of management.

On the cliff face Gabions can be put on which are basically mesh boxes to keep the rock in place and catch any loose rocks. Cliff 'pinning' is another way the rock can be kept in place. Vegetation may also be planted there to hold together the rock and prevent erosion, along with sculpturing and draining of the cliff face.

It is very important that these two areas are integrated, for you cannot only protect the cliff face and not the cliff foot and you cannot only protect the cliff foot and not the cliff face!

These types of management are put into two categories - hard engineering and soft engineering. Hard engineering is physically building something e. g. a Sea wall. Whereas soft engineering e. g. planting is a far more natural management process.

We as humans can only militate the worst effects of flooding, that is to say that floods are always going to happen, we cannot stop them. Instead sea walls and tidal barriers are put in place to reduce the energy of the destructive waves produced crashing against the cliffs. If this management was not put in place coasts would be forever retreating causing chaos and destruction that would not be tolerable in today's society.

Now I will go on to describe the coastal processes involved.

There are 4 main types of coastal processes that affect the cliffs and coast at Walton-on-the-Naze, these are:

1. Destructive Waves (erosion)

2. Long shore Drift

3. Slumping

4. Deposition

Some of these processes must be encouraged and some must be discouraged in order for management to be successful. Destructive waves and erosion along with long shore drift and slumping must be discouraged whereas deposition must be encouraged, next I will go on to explain what

each of these processes is, does to the coast and why they must be either encouraged or discouraged.

The coast is a narrow contact zone between land and sea. The effects of land, air and marine processes are constantly changing it. But on most coastlines the dominant process results from the action of waves. Although destructive waves are usually resultant from storms out at sea and have much more energy than 'common' constructive waves and usually do a lot more damage. Waves are usually created by the transfer of energy from wind blowing over the surface of the sea. It is true to say that the larger the wave the more energy it contains and the largest waves are formed when very strong winds blow for lengthy periods and cross large expanses of water. The maximum distance of water over which winds can blow is called the fetch. 'In the case of South-West England the fetch is from the South-West. This also coincides with the direction of the prevailing, or most frequent, wind. In Eastern England the fetch is generally from the East.'

As you can see from the diagram on the previous page water particles move in a circular orbit. Each single particle, or a floating object, tends to move vertically up and down, it is only the shape of the wave and its energy that is transferred horizontally towards the coast. But as a wave reaches shallow water the velocity at its base is slowed due to friction with the sea bed, and the once circular orbit changes to that of an elliptical orbit as shown in the diagram. The top of the wave, unaffected by this friction, becomes taller and steeper until it finally breaks. Only at this point does the remnant of the

wave, called the swash, actually move forwards. The swash transfers energy up the beach. The backwash returns energy down the beach.

Constructive Waves have limited energy. Most of this is used by the swash to transport material up the beach.

Destructive waves have much more energy. Most of this is used by the backwash to transport material back down the beach.

Erosion

Waves, like rivers, can erode the land by a number of different processes, these are:

Corrasion (abrasion) - is caused when large waves hurl beach material against a cliff.

Attrition - is when waves cause rocks and boulders to break up by bumping into each other on a beach, into small particles.

Corrosion (solution) - is when salts and acids in the seawater slowly dissolve the cliff.

Hydraulic Action - is the force of waves compressing air in cracks in the cliff.

Longshore Drift

Although waves do carry material up and down the beach they do not necessarily carry it up and down vertically, the major movement is along the coast by a process called longshore drift. Waves rarely approach a beach at

right angles, instead they tend to approach the beach from a direction similar to that of which the wind is blowing. When a wave breaks, the swash carries material up the beach at the same angle at which the wave approached the shore; then the backwash returns material straight down the beach at right-angles to the water, by gravity.

The outcome is that material is slowly moved along the beach in a zigzag course. The effect of longshore drift or LSD can be best seen where groynes have been built to prevent this material from being moved along the beach and so there is a build up of sand on one side of the groyne in each case. There are many examples of this in Walton-on-the-Naze (see photos section.)

Slumping

Slumping is the movement of unconsolidated material (moraine) under gravity. The rock particles in the cliff are held together by frictional forces which are overcome by a build up of 'pore water pressure' owing to saturation by prolonged rain. That is to say that when water infiltrates the cliff it causes the rock to 'slump' or slide over each other. Of course a wave-cut notch will have already formed at the rock foot, causing the immense pressure above, see diagram overleaf.

Deposition

Shingle and sand being transported along the coast by longshore drift will, in time, reach an area where the water is sheltered and the waves have no energy, e. g. a bay. The material may be temporarily deposited because

there is no longer any energy left to carry them, this could then form a beach.