GAANG

Session 2006

ANGLAIS

GROUPE 11

Brevet de Technicien Supérieur

GÉOLOGIE APPLIQUÉE

Durée : 2 heures *Coefficient : 2*

L'usage d'un dictionnaire bilingue est autorisé.

Tout autre matériel est interdit.

Avant de composer, le candidat s'assurera que le sujet comporte bien 3 pages numérotées de 1/3 à 3/3.

<O> <O> <O> <O> <O> <O>

Traiter les deux questions suivantes :

I - Rédiger en anglais un compte-rendu de ce texte (en 250 mots, à ± 10 % près).
(Indiquer le nombre de mots utilisés).

15 points

II - Traduire en français, l'extrait suivant *(lignes 31 à 36)* :

"Understanding how the offshore environment influences coastal erosion is particularly important. These influences include wave energy and wave direction, the distribution of sediments moved by wave scouring and changing sea level. One critical factor is the rate that sediment is moved away from the cliffs and beaches. Coarse materials, such as gravels, may stay put in local beach systems, but finer materials, such as clays and silts, are readily washed offshore and may end up on coasts on the other side of the North Sea."

5 points

DISAPPEARING COASTS

England has some of the fastest-retreating coastlines in Europe. Along some of the coasts in the south and east, the cliffs are made up of soft sediments that are easily eroded. Whole villages have been lost to the sea over the years and many more may be on the brink of joining them.

For local people, erosion is a serious issue. They have become accustomed to watching houses teeter dangerously on the cliff edge. They have seen whole streets topple into the sea. The consequences to the environment, and people's assets and lives can be enormous – especially as home-owners do not usually receive compensation for the loss of their homes and livelihoods.

How can people most effectively plan to live and work in such a changeable environment ? And how will climate change and sea-level rise affect the rate of coastal erosion ? What is the best way to tackle the problem ?

At the British Geological Survey (BGS) we have been studying the process of coastal erosion and cliff retreat as part of our Stability of Cliffed Coasts project. By studying 12 study sites on the 'soft rock' coasts of Dorset, Kent, Sussex, Norfolk and North Yorkshire, we are trying to find out how the nature of the rocks and climate change influence coastal erosion.

Standing on a specific point on the beach, we scan the cliffs and beach with a low-power laser to monitor and measure change along the coast. The laser measures the distance and relative position between our survey point and a set grid of points on the cliff face. We then feed our many thousands of measurements into a computer to generate models of the shape of the cliff face. This shape changes constantly so we repeat the laser scan every year. We can then analyse the results, calculate the rate of cliff retreat and model the way the cliffs collapse.

On fast-retreating coasts it is not just the position of the cliff face that is important. The entire coastal system is complex. We must also look at the on- and offshore environment, the weather and climate, the strength and variability of the rocks and materials making up the coast and the influence of man-made structures such as groynes and sea walls. To do this we survey the coastal sections by geological mapping and aerial photograph analysis. We also test rock samples for strength to try to understand why the cliff is eroding so quickly.

Understanding how the offshore environment influences coastal erosion is particularly important. These influences include wave energy and wave direction, the distribution of sediments moved by wave scouring and changing sea level. One critical factor is the rate that sediment is moved away from the cliffs and beaches. Coarse materials, such as gravels, may stay put in local beach systems, but finer materials, such as clays and silts, are readily washed offshore and may end up on coasts on the other side of the North Sea.

One of the main interests in our research is the mechanism by which the cliffs collapse. Understanding this is essential in both predicting how coasts recede and how they will be affected by climate change and sea-level rise. Coastal slopes fail in a number of ways. Steep-faced slopes can topple and fall once the sea has eroded the base of the cliff back far enough. Other shallower slopes ooze their way down towards the sea as part of a mud or debris flow or slumps. Some coasts comprise very large landslides that slide along a deep spoon-shaped surface.

So far, we have monitored the rate of erosion at Happisburgh on Norfolk's North Sea coast in 2001, 2002 and 2003, using the laser scan system. Where there are defences, the surveys have shown an average erosion rate of approximately 2m per year, but elsewhere in more exposed parts, the erosion rates are 8-10m per year, and about one house a year is disappearing.

So, why is the coast retreating so fast ? It is largely down to the composition and structure of the rocks and deposits that make up the land. The exposed coast at Happisburgh is made up of sands and clays, mostly deposited in glacial conditions about 430,000 to 630,000 years ago. These deposits are highly variable, weak and easily eroded.

There has also been considerable work done to defend parts of the Norfolk coast against the sea. In 1983, about 70% of the East Anglian coastline was defended.

But these defences may have had a detrimental effect on unprotected stretches of coast, such as at Happisburgh, where erosion rates are relatively high. This is because the defences trap sediments, which would normally get washed along the coast and replace those that are eroded. Therefore, in managing erosion, the entire coastal system must be taken into account in order to balance priorities.

***Catherine Poulton**, Planet Earth, Summer 2004*