Oxwich Bay, Glamorgan

[SS 510 870]

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Introduction

Oxwich Bay, on the south coast of the Gower Peninsula (see (Figure 7.1) for general location) supports a well-developed system of dunes. As at Pwll-ddu, to the east (see GCR site report in Chapter 8), the beach and dunes have diverted a small stream towards the east. Oxwich Bay includes part of the Oxwich Burrows National Nature Reserve (NNR), a wetland site behind the dunes, but its main geomorphological interest lies in the association of the dunes with bounding cliffs which restrict the transport of sediment into and out of the bay and modify the behaviour of waves within the bay. Research has concentrated mainly on the Quaternary deposits that rest at the foot of the coastal slopes and cliffs (Campbell and Bowen, 1989), and demonstrates that this cliff is mainly a Pleistocene relict feature variously reworked along its foot during the Holocene Epoch.

Description

The site lies between Great Tor [SS 530 876] in the east and Oxwich Point [SS 513 850] in the west. The re-entrant form of the bay is controlled by a syncline in Namurian strata aligned north-west—south-east. There are three main landforms (Figure 7.12).

1. An area of dunes that rests against slope-over-wall cliffs in Nicholaston Burrows and between Little Tor and Great Tor. At the extreme eastern end of the site the cliffs, over 60 m in height, fall directly to an active beach.
2. A single major dune system, Oxwich Burrows, and an intertidal sandy beach, backed by scrub and saltmarsh.
3. Cliffs, mainly of slope-over-wall type, between Oxwich Point and Oxwich Castle. Only the lower part of the cliff, the 'wall' and shore platforms have been included in the site.

Largely sheltered from the main energy of waves approaching the Gower Peninsula from the south-west, the beach in Oxwich Bay swings from a east–south-easterly aspect at its southern end to a southerly aspect at its more exposed eastern end. The beach extends eastwards beyond Great Tor at low tide into Three Cliffs Bay. The dunes are crossed by a small stream, Nicholaston Pill, which drains marshland behind the dunes. It is likely that sand moves out of the bay towards the east at low tide, especially when wave energy is high. Since the dunes remain, this implies that there is a balancing supply from offshore. The shallowness of the bay (mainly less than 10 m in depth), and the unidirectional wave energy at the beach also serves to enhance the sand supply to Oxwich Bay.

Interpretation

The generally accepted history of the site (Ratcliffe, 1977) suggests that the main beach ridge developed about 2500 years BP enclosing a brackish lagoon. This was land-claimed during the 16th century and, subsequently, fish-ponds were dug in the wetlands behind the dunes. Since the formation of the ridge, the dunes appear to have been stable, even growing in extent. Sufficient sand has accreted to fill the area of Nicholaston Burrows on the eastern side of Oxwich Bay, most of which was probably a rocky coast when the ridge was first formed. To the west of this site, the 60 m coastal platform is truncated seawards by a relict cliff which is partially buried by superficial deposits (Campbell and Bowen, 1989). A shore platform cut in Carboniferous Limestone at about 10 m OD forms the lower part of the slope. At Nicholaston Burrows, the slopes have a similar upper form, but the lower slopes are masked by the dunes banked against them. This is the only substantial length of former cuffed coast on the southern side of the Gower Peninsula that is protected in this way by dunes.

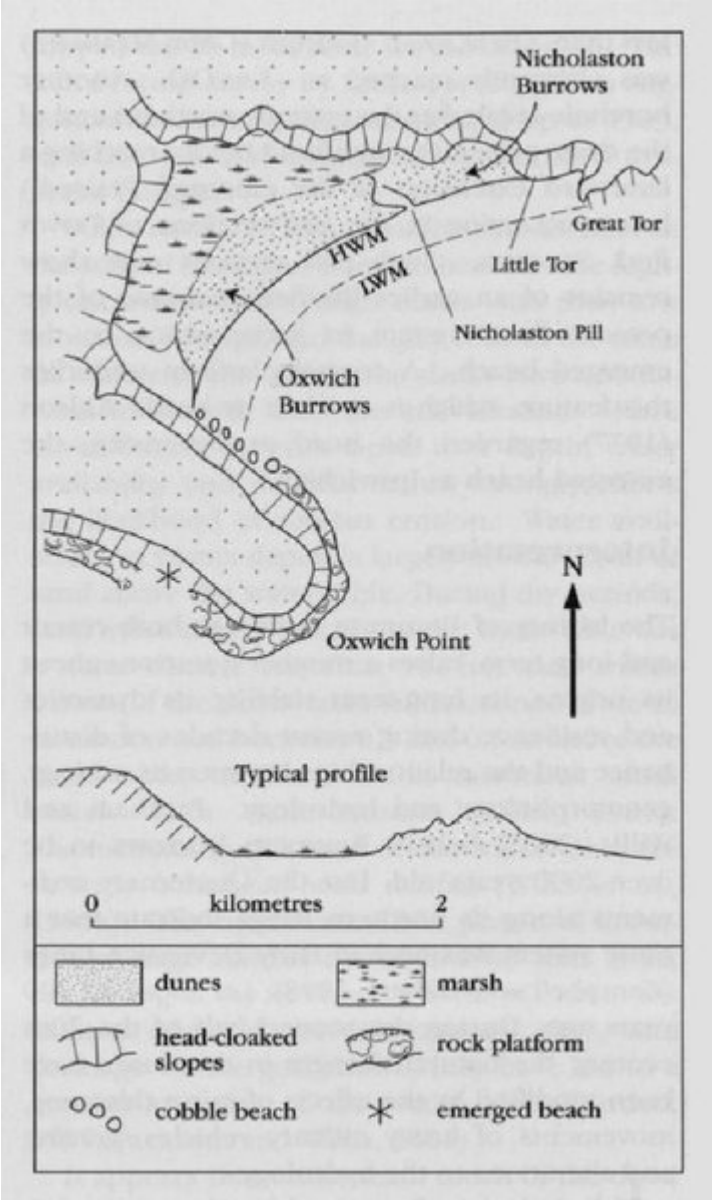
This is undoubtedly a beach that has had a positive sediment budget until recently. The increased recreational use of the dunes during the last three decades has brought about much localized erosion, associated with trampling and blowthroughs. The erosion of the frontal dunes might suggest that the whole site is in deficit or at least is trending towards such a state. However, a brief consideration of the sediment budget of the site suggests that this is not likely, when the whole bay is considered. First, there is only a limited possibility for longshore transport of sediment out of the beach. Second, sand is transferred within the site, either by wind or by waves so that erosion in part of the beach and dune area appears to be balanced by deposition elsewhere. Third, this beach could be expected to act like other bay-head beaches that lie in locations where waves are strongly refracted during their approach towards them.

Unfortunately, the most vulnerable part of the shoreline is the main point of access to the beach. Most trampling occurs at the most likely point for erosion. Sand is transferred mainly from beach to dunes and *vice versa,* but because the total volume of sand is limited the dunes have been constrained both in height and in their growth seawards. Equally there has been no tendency for the dunes to migrate inland since they are largely stable.

Conclusions

Oxwich Bay is a structurally controlled bay within which nationally important dunes have developed despite restricted longshore sediment sources. It had, until very recently, a positive sediment budget, unlike many beaches worldwide. Trampling of the dunes by visitors appears to have lcd to instability, hence its current tendency for erosion at its western end. Its sheltered, low-energy, environment has allowed the growth of low — but nationally important — dunes, despite a restricted sediment input. The combination of a low-energy beach in a macro-tidal setting, relict cliffs against which it is banked, its bay-head location and the biologically important but restricted dunes make this a nationally important site. It is an important member of the national GCR network of bay-head beaches.

(Figure 7.1) Great Britain sandy beaches and coastal dunes, also indicating the location of GCR machair–dune sites (see chapter 9) and other coastal geomorphology GCR sites that contain dunes in the assemblage.



(Figure 7.12) Key geomorphological features of Oxwich Bay, together with a typical profile.