
PWLLDU

V.J. May

OS Grid Reference: SS580970–SS570963

Introduction

The coastline of south Wales is characterized by dramatic cliff scenery and some nineteen beach and dune systems between Merthyr Mawr Warren at the mouth of the Ogmore River in the east, and Broomhill Burrows near the mouth of Milford Haven in the west. They fall into three broad categories:

1. large spit and beach systems extending across the mouths of estuaries (for example Laugharne Burrows, Carmarthen Bay)
2. extensive low hindshore dunes that rest upon bedrock (e.g. Broughton Burrows, Carmarthen Bay)
3. small bay-head beaches and dunes, usually with an easterly aspect (e.g. Oxwich Bay, Glamorgan).

Pwll-ddu is the smallest and least well-developed representative of the final category. Its importance arises from its place within this group of sites. It contains a wide variety of coastal forms within a very small area: shore platforms, slope-over-wall cliffs, other cliff forms, and sand and shingle beaches. In addition to this important assemblage of features, the site includes a series of small shingle and sand ridges on the west side of Pwll-ddu Bay that have diverted a small stream to the east (Strahan, 1907; Ward, 1922; George, 1933; Steers, 1946a; Guilcher, 1958; Potts, 1968).

Description

Pwll-ddu (see Figure 8.2 for general location) is among the smallest of the coastal sand accumulations along the Welsh coastline, and, unusually, has not developed any significant dunes (Potts, 1968). There are three main morpho-sedimentological units within the site:

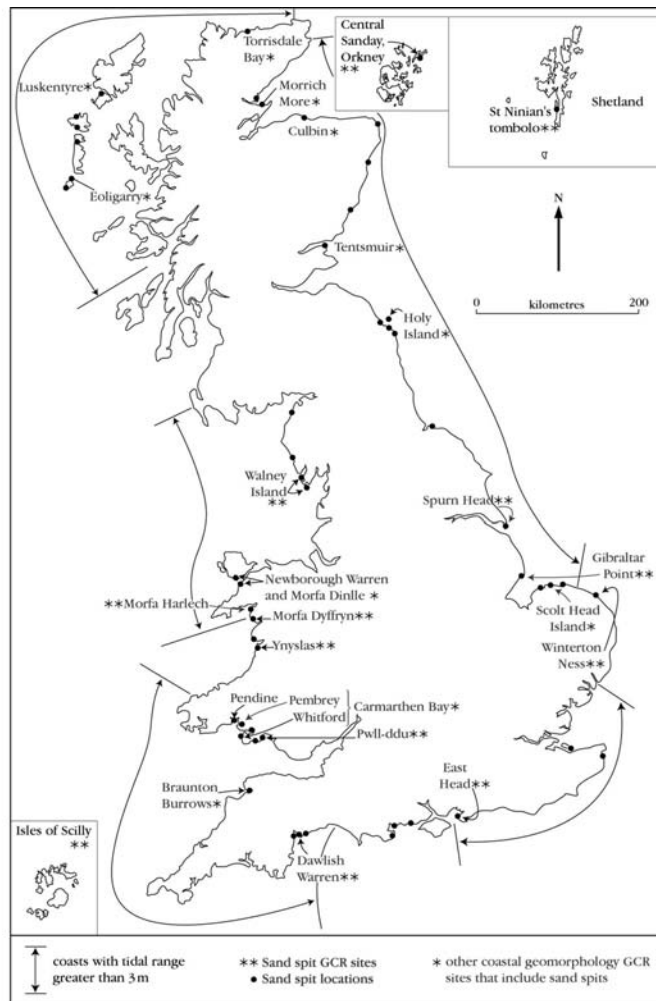


Figure 8.2: The location of sand spits in Great Britain, also indicating other coastal geomorphology GCR sites that contain sand spits in the assemblage. (Modified after Pethick, 1984).

1. former and present-day sea cliffs on the eastern side of the bay,
2. sand and shingle beach and ridges, and
3. slope-over-wall cliffs and shore platforms at several levels on the western side of Pwll-ddu Bay.

The cliffs within this site appear to be receding very slowly, as there are well-preserved remnants of former platforms and slopes that are cloaked with periglacial scree material. On the eastern side of the bay, the foot of the slope has been trimmed, probably by a combination of marine and fluvial erosion. The small stream that flows along the eastern side of the valley appears to have occupied this position throughout the period of progradation that led to the growth of the beach ridges. The most landward (oldest) ridge is aligned SW–NE and successive ridges swing progressively to an alignment closer to the present-day position of the shoreline. The fourth ridge (4a,b on Figure 8.4) is formed of two separate features, the eastern one diverting the stream across the valley. Ridges 1,3 and 5 are the highest and longest ridges (Figures 8.3 and 8.4). They have changed little in appearance since the early part of the 20th century (Strahan, 1907).

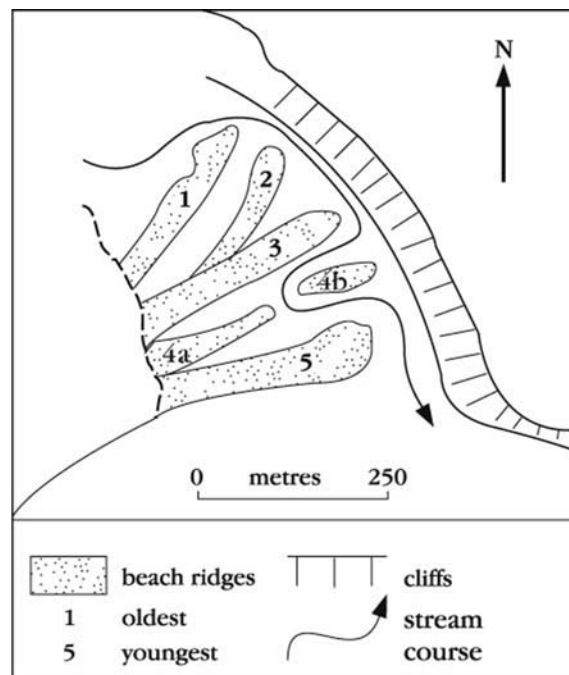


Figure 8.4: The succession of beaches at Pwll-ddu Bay: (1) oldest, (5) youngest (as yet undated). 1, 3 and 5 are the higher ridges that dominate the site.

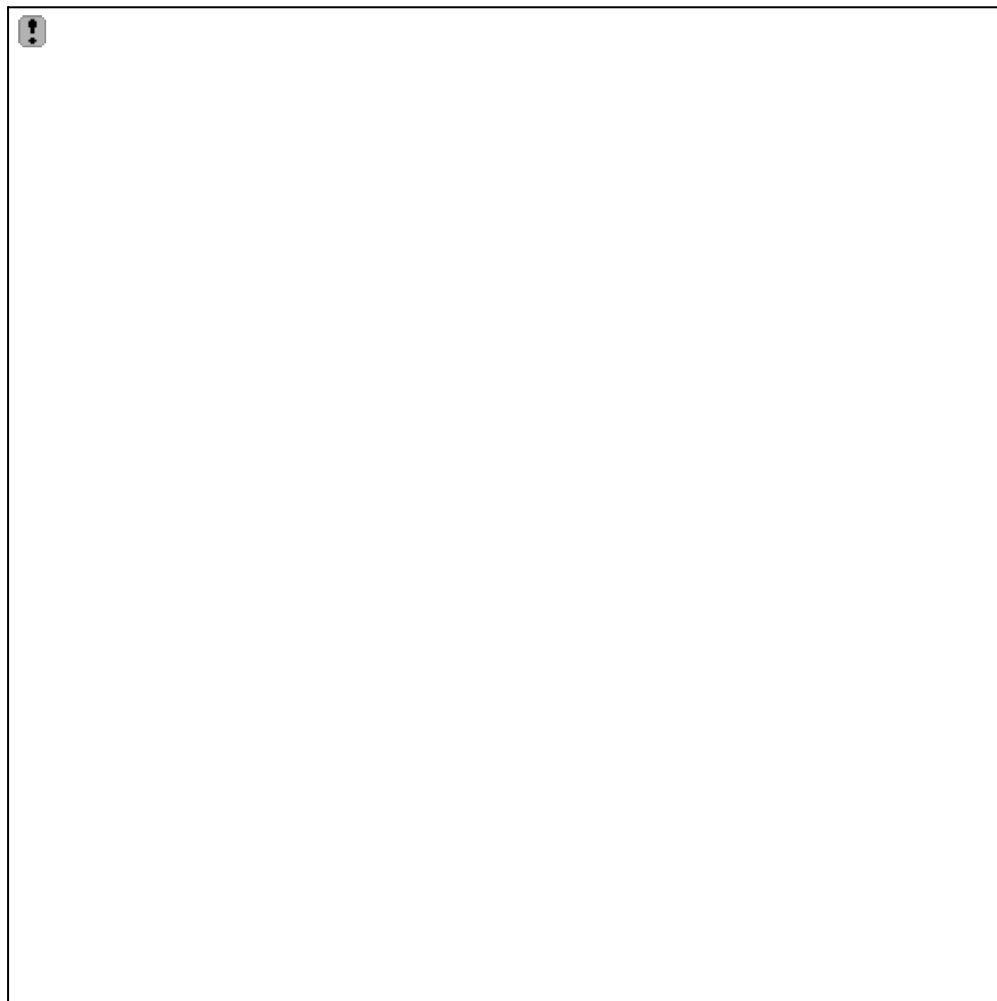


Figure 8.3: Pwll-ddu Bay. See Figure 8.4 for explanation. (Photo: Cambridge University Collection of Aerial Photographs © Countryside Council for Wales.)

Interpretation

Guilcher (1958) suggested that when a beach is prograding, several successive ridges may be left, and he described Pwll-ddu as a very fine example of this. Many dune sites rest upon sand and shingle ridges (e.g. Oxwich Bay and Morfa Harlech GCR sites), but the very limited development of dunes at Pwll-ddu means that this early stage of growth in bay-head beach–dune systems has not been buried by dunes. The site is sheltered from storm waves approaching from the south-west, and is aligned towards the SSE. Apart from waves generated from the south-east or south within the restricted fetch of the Bristol Channel, all other waves are refracted around Pwll-ddu Head. Sediment sources are limited. The stream entering the bay generally carries only fine-grained materials, longshore transport of sand is restricted by both Pwll-ddu Head and the headland to the east, and little is known about possible seabed sources.

The Pwll-ddu valley is possibly an advanced stage of a ria in which the rock floor, which lies below sea level, has been cloaked by infilling assisted by the blocking action of the growing beach ridges. As sand and shingle was deposited in the bay, the ridges appear to have migrated into the valley and aligned more towards the north-east as a result of refraction (Figure 8.4). Later ridges have protected the older ridges, overriding them in some cases. There is no dating of the features, though the order of formation is clear, but they offer an excellent location in which to demonstrate the sequence of non-marshland progradation within the macrotidal coastline of southern Wales (tidal range is about 8.2 m).

Pwll-ddu is one of the few British sites where a series of beach ridges has not been obscured by dune development. At Pwll-ddu the ridges remain clearly visible, probably as the result of a rather restricted sand supply. The small scale of the site will aid studies of the relationship between the shingle ridges and the associated sedimentation that both preceded and followed the growth of each ridge. The sheltered position minimises longshore sediment transport and wave direction is relatively constant. As a result, the site provides an excellent location in which both the past and present-day sedimentation processes and the sediment budgets can be described and, in the latter case, monitored.

Conclusions

Pwll-ddu is important because of its generally unmodified series of small beach ridges. Seen in the context of bay-head beach and dune development on western coasts, it is valuable for comparative purposes, because it represents an early phase in the development of these features. The site, although small, contains a wide range of coastal forms: shore platforms, slope-over-wall cliffs, sand and shingle spits.

Reference list

- George, T.N. (1933) The coast of Gower. Proceedings of the Swansea Scientific and Field Naturalists Society, **1**, 23–48.
- Guilcher, A. (1958) Coastal and Submarine Morphology (translated by B.W. Sparks and R.H.W. Kneese), Methuen, London, 274 pp.
- Potts, E.A. (1968) The geomorphology of the sand dunes of south Wales, with special reference to Gower. Unpublished PhD thesis, University College, Swansea.
- Steers, J.A. (1946a) The Coastline of England and Wales, Cambridge University Press, Cambridge, 644 pp.
- Strahan, A. (1907) Evidence given to Royal Commission on Coastal Erosion and Afforestation (1907–1911). Report and minutes of evidence, 149.
- Ward, E.M. (1922) English Coastal Evolution, Methuen, London, 262 pp.