
Slapton Sands, Devon

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Introduction

A shingle barrier beach enclosing a lagoon, the beach ridge at Slapton Sands comprises mainly flint, chert and quartz shingle that extends some 5.6 km from Limpet Rocks, just south of Torcross, to Shiphill Rock at Strete. The beach at Torcross has been artificially strengthened by a wall to protect the hamlet against wave attack notably during north-easterly gales, but otherwise the beach remains little affected by human intervention although the A379 road runs along its crest. The southern 2.2 km separate the lagoon, Slapton Ley, from the sea, whereas to the north the ridge is backed first by an infilled former arm of the lagoon (see (Figure 6.4)) and then by cliffs of Lower Devonian slates and grits. Very little locally derived material is found in the beach sediments. In the English Channel, Slapton Sands is unusual in combining shingle material with an easterly aspect. It has been the focus of considerable research effort (Steers, 1946a; Hails and Carr, 1975; Morey, 1976, 1980, 1983) and is a major site for educational studies.

Description

The barrier beach is predominantly shingle despite the name 'Slapton Sands', and encloses a freshwater lagoon, Slapton Ley. Divided into two parts, the Higher Ley to the north, and the Lower Ley to the south, the lagoon occupies a former marine embayment bounded by degraded cliffs. The Higher Ley is mainly covered by reeds *Phragmites* whereas the Lower Ley is open water. It is up to 500 m wide and has a maximum depth of -4.0 m OD. The beach varies from 100 m to 140 m in width at high tide with a crest that is generally at about $+6.0$ m OD \pm 0.5 m. The gradient of the intertidal beach persists below low-tide level to about -7.5 m OD. It then slopes gently to reach -14.5 m OD at about 600 m offshore. There are barrier beach deposits for about 500 m offshore, according to Kelland (1975), which exceed 5 m in thickness.

Within the lagoon, there are extensive sheets of washover gravels derived from the barrier (Morey, 1983) except in the central part known as 'Ireland Bay'. This is the widest part of the lagoon, and is the mouth of the Start Stream. Morey described the following sedimentary sequence in the lagoon:

1. Light-grey, silty, estuarine muds that may be an extension of the lower bay deposits (Hails, 1975a). The fauna suggests a salinity gradient with restricted water circulation behind a growing barrier or spit. The tidal entrance was not located by Morey (1983), but he suggested that it was probably in the southern part of the Lower Ley.
2. A thin brown organic silt with a sharp lower boundary, but passing upwards into fen peats. The presence of pollen of *Chenopodium* and reeds *Phragmites* has been interpreted by Morey as suggesting a local transition from vestigial saltmarsh to reed swamp.
3. Fen peats about 1.3 m thick. An early reed swamp stage gradually changes to a sedge (*Carex*)-dominated fen community. The top of the peat has been dated at 1813 ± 40 years BP and the base at 2889 ± 50 years BP. A layer of muddy sand, thickening seawards.
4. The upper layer is formed by lacustrine muds of terrigenous detrital origin.

The present-day lake is perched presumably on its own sediments (Morey, 1976), despite the permeability of the shingle barrier.

Interpretation

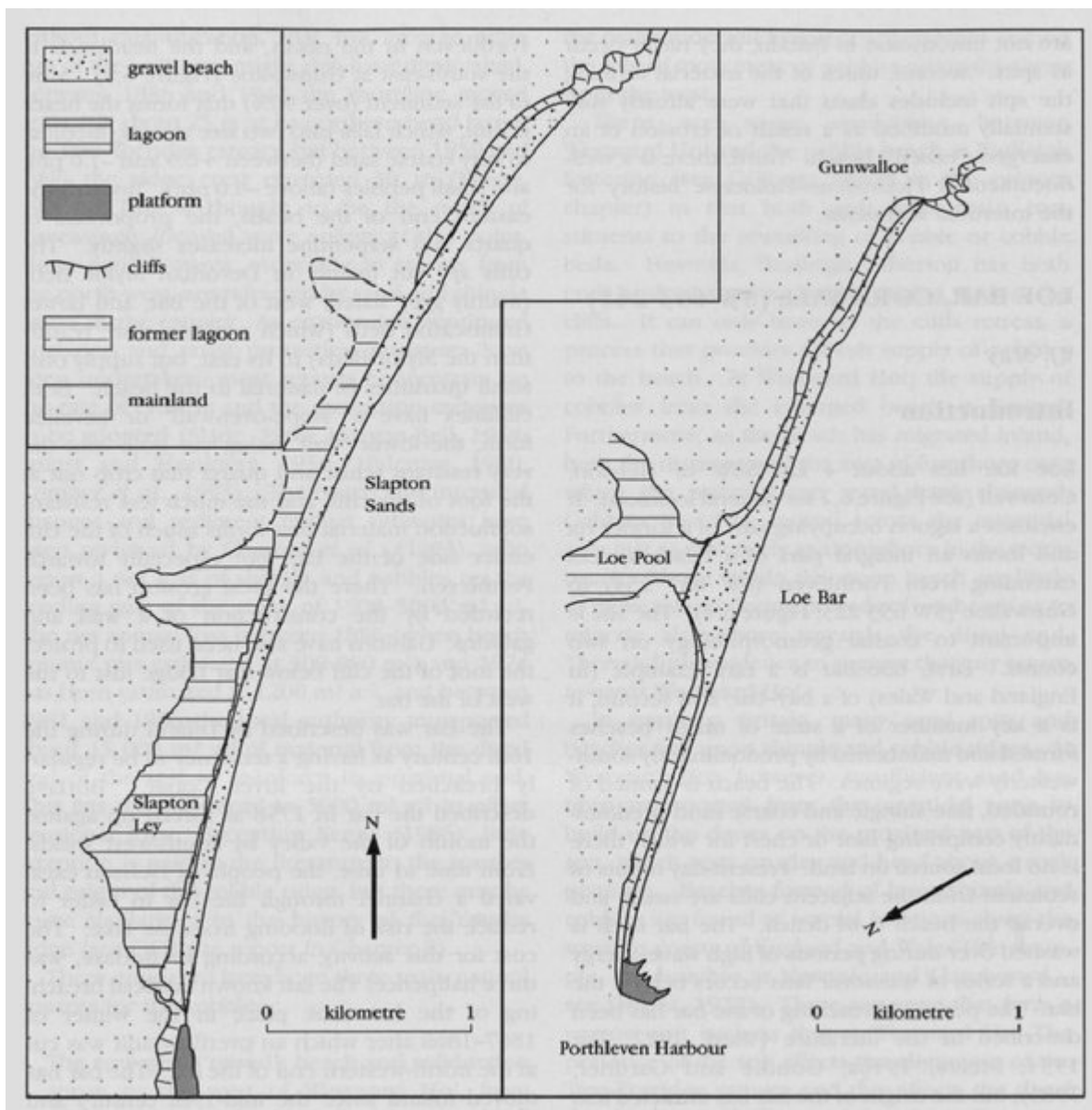
Although Ward (1922) provided an early description of the site, Steers (1946a) was emphatic that there was no very conclusive hypothesis for the origin of the beach. The sedimentary characteristics of Start Bay have been described above, but the development of Slapton Sands and Slapton Ley is based mainly upon Morey's papers (1976, 1980, 1983). During the early Holocene, a transgression shoreline of saltmarshes, estuaries and ephemeral lagoons developed in a macrotidal environment within the shelter of the Skerries Bank. It is thought unlikely that major barriers developed until the shoreline was close to its present-day position about 5000 years BP.

The rate of transgression declined partly as a result of a reduction in the rate of eustatic sea-level rise and the proximity of the coast to a relict pre-Holocene cliffline. Major accumulations of gravel can only occur where bedrock is below modern sea level and where overwashing can spread gravels across submerged infilled Holocene valleys. Without a substantial eustatic rise, there would have been insufficient space for gravels to accumulate except at Beesands and Slapton Sands.

The site was also the location for some detailed observations of the relationships between nearshore sediment dynamics and nearshore motions of the water itself (Huntley and Bowen, 1975a). They observed edge waves with a longshore wavelength of 32 m and with a period twice that of the incident waves. Swash interaction in the narrow surf zone on this steep beach was proposed as the process generating these waves. Nearshore circulation cells were also observed here. On steep beaches (such as this one and other GCR sites, for example, Hurst Castle Spit, the Bar, Porth Neigwl), the short-period edge waves that are observed may be responsible for small-scale topographical features such as beach cusps (Huntley and Bowen, 1973, 1975b).

Conclusions

Slapton Sands is one of the few examples of a bay-bar in Britain. The barrier beach, which encloses a freshwater lagoon, Slapton Ley, is predominantly shingle despite the name 'Slapton Sands'. The locality has been investigated not only as geomorphologically interesting in its own right, but also as part of larger-scale studies of Start Bay as a whole. As a result of the degree of study of the site, a great deal more is known about its dynamics than in many other sites. It contrasts strongly in location with the other major example of this type of landform, Loe Bar, in that it is sheltered from the main Atlantic wave systems. It demonstrates better than many other localities around the British coast the links between seabed features and the shoreline landforms, both in their Holocene history and their effects upon modern-day wave behaviour. Together with Loe Bar, the two sites demonstrate clearly how similar coastal land-forms may develop in different wave conditions.



(Figure 6.4) Comparison of geomorphological form between Slapton Sands and Loe Bar. Slapton Sands encloses a large lagoon, part of which has been infilled by sediment and become a brackish wetland. At the Bar, a cliff-foot beach confined between headlands has blocked off a narrow estuary