What are Sand Dunes?

Sand dunes are a unique coastal feature as they are wind formed. They can range from stable to shifting and their associated habitats include foreshore, slacks (areas of dune wetland), grassland, heathland, scrub and woodland. There are several basic requirements for their formation, these are:

- A supply of dry sand over a wide beach
- An area of low lying land behind the beach
- Predominantly onshore winds

Dunes normally form at the top of a beach, when the onshore winds blow sand from the lower shore to the top. The sand builds up at the top of the shore, especially around small objects such as strandline material and small mounds form. These mounds may then be colonised by plants tolerant of wind and salt, which help to trap more sand. With increased sand coverage the height of these 'embryo dunes' rises. As they gain height, the sea less frequently covers embryo dunes and subsequently more plant species are able to colonise them. The embryo dunes continue growing, unless they are destroyed by waves or storms.

When the dunes are no longer covered by the highest tides, they are generally known as 'mobile dunes'. Such dunes are less salty than the embryo dunes as rain water washes out some of the salt. Sand continues to be blown from the beach into and over these dunes and the mobile dunes appear to move backwards. Mobile dunes are characterised by areas of sand and a few species of dune building plants. As they get further from the sea the amount of salt in the dunes becomes less and a larger variety of plants can grow. When the dunes are almost totally covered with vegetation they are classed as 'fixed dunes'.

Species Supported

Dune systems which are rich in biodiversity include a good range of foredune, mobile dune and fixed dune types, with transition to other important habitats such as saltmarsh, shingle and low lying dune slacks.

Large sandy areas support carpets of heather and lichens, with many nationally rare plants and invertebrates. Sinah Common on Hayling Island has a rich flora of fixed-dune species and its dune grasses are particularly diverse. It contains the largest and best developed of the Solent's sand dunes at Gunner Point. This supports many local species of plants, and a broad shingle beach with diverse communities characteristic of this habitat.

Sandy Point on Hayling Island is even richer in wildlife. Here low dunes, dune slacks, sandy beach and dune heath habitats grade into species-rich fixed shingle in many locations, with rich acid heath, moss and lichen communities. Sandy shingle adjacent to one of the sand dune areas has extensive spreads of the declining Ray's knotgrass and sea knotgrass.

At East Head the most widely growing plant is marram grass and other plant life includes sea holly, sea spurge, sea bindweed, sea rocket, sea sandwort, lesser centaury, prickly saltwort, yellow horned poppy and the rare sea knotgrass. Additionally, birds like to nest in the dunes and the dune slack. These include the ringed plover, skylark and meadow pipit. Important scarce invertebrates species include the long-winged conehead (cricket), the tumbling flower beetle and the silver spiny digger wasp. Pilsey Island supports similar plant species, and also frosted orache.

St Helen's Duver has rich flora associated with foredunes and fixed-dune grassland, with many nationally scarce plants, including scarce dune grasses, clovers and late flowering autumnal squills. There are long-established clumps of sea buckthorn.

The Value of Sand Dunes in the Solent

Historically the most common use of dunes has been the grazing of domestic stock. Grazing helps to maintain a diverse range of plant life and helps control scrub encroachment; unfortunately this practice is becoming less common resulting in the deterioration of some dune habitats.

Sand dunes systems, such as that at East Head, act as a natural coastal defence protecting the land behind from flooding and erosion. As such they are a great economic

asset to areas, which would otherwise need to be protected by expensive coastal defence schemes, or allowed to flood.

Dunes are a popular recreational asset, with many people enjoying walks through and playing on them and their accompanying sandy beaches. Tourist infrastructure and golf courses are often built in their vicinity such as on Hayling Island. Hayling Island, with its European Blue Flag beaches, brings in £60 million in tourism income to the local community annually (Havant Borough Council).

Where can Sand Dunes be found?

Isle of Wight
Relict sand dune near Ryde Canoe Lake
St Helen's Duver
Bembridge Point
Norton spit
Ladder Chine - an unusual 'perched' dune at the top of a cliff.

Hampshire
Hayling Island
Lepe
Needs Ore Point

West Sussex
East Head
Pilsey Island

East Head is the largest sand dune system in the Solent and is a sand and shingle spit on the eastern side of the entrance to Chichester Harbour. During the eighteenth century it pointed southwest into the Solent. It now points north into the harbour and its shape and direction are still changing. It is a good example of a mobile shifting dune system

The western part of Pilsey Island (Chichester Harbour) is also an example of dune habitat. Recently a new area has formed to the west of the island, demonstrating the textbook development of dunes as described above. This feature continues to expand and mature, and supports some regionally rare plant species.

Black Point is a dune spit extending northward from the western side of the entrance of Chichester Harbour. Much is now defended, and occupied by Hayling Island Sailing Club, but some recognisable dune features remain, along with characteristic plants.

A second important area of vegetated dune and coastal sandy shingle habitat in the Solent, are the remnants of the natural coastal sand dune and fixed shingle habitats that made up the south coast of Hayling Island. This site, of about 110 hectares, is of regional significance because of the rarity of sand dune habitat in this area. It is considered to be nationally important as a matrix of coastal sand and gravel habitat, supporting some of the most unusual and botanically rich parched grassland and associated invertebrates in Britain. The dune heath at Sandy Point is particularly unusual.

Thirdly, there is The Duver at St Helens on the Isle of Wight. This is the most important sand dune habitat on the Island and is one of two mature sand spits that encircle Bembridge Harbour. Although smaller (some 15ha) and heavily used, it demonstrates all the features of a classic dune system and has a rich flora and invertebrate population. An even smaller dune system survives at Norton Spit at the mouth of the Western Yar at Yarmouth.

Other areas of sand dune habitat occur at other scattered locations along the Solent's coast, but most of these are small with limited biodiversity.

Conservation Designations

All of the important sand dune sites in the Solent are designated as Site of Special Scientific Interest (SSSI). Several also lie within local, RSPB or national nature reserves. The extensive shifting dunes at East Head and the small area of accreting sand dunes at Pilsey Island lie within the Solent Maritime Special Area of Conservation.

Issues, Threats and Opportunities

Sand dunes are a continually evolving system and will respond to changes in their local environment. A lack of sediment, storm events and heavy recreational use can all have a significant detrimental impact on this fragile habitat. The points below set out some of the key issues, threats and opportunities facing dune habitats in more detail.

Sediment supply - the health and ongoing development of sand dunes depends on a continuing supply of new sediment, usually from eroding coastlines and river sources further up the coast. Coastal defences can reduce this sediment supply.

Sea defence and stabilisation - unless artificially constrained, the seaward edges of sand dunes can be highly mobile and are rarely stable in the long term. Sea defence works or artificial stabilisation measures (such as sand fencing and marram planting) may be used to prevent sand movement within dune systems and protect urban or holiday developments. Carefully applied dune management measures can help to counteract severe erosion, but engineered defence systems usually reduce the natural dynamism and biodiversity of dune systems and may cause sediment starvation elsewhere along the coast.

Exploitation - sand dunes have been regarded as a convenient source of aggregates, and have been subject to varying degrees of direct extraction. Offshore extraction can also cause sediment starvation of the dune system.

Grazing - sand dunes are traditionally grazed by agricultural livestock. This form of management has now mostly ceased, and can lead to scrub encroachment.

Access, recreation and other uses - sand dune vegetation is sensitive to trampling, walkers and particularly vehicles easily damage it. The use of boardwalks, clear signage and zoning all helps to reduce such damage. Visitors can also disturb nesting birds.

Water table lowering - agricultural and recreational demands for fresh water can change the water table affecting the salinity of the dune system and the species that can survive there.

Climate change - increased sea levels and ferocity of storm events may result in direct damage to dune habitats and loss through 'coastal squeeze'. Dune systems need space to retreat landwards with the predictions of rises in sea levels. Landward development prevents this leading to a loss of habitat.