

Sand dune inventory of Europe

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Abstract

In November 1991 an inventory of sand dunes in Europe was published (Doody, 1991). This included a general review of the habitat and its conservation and summary descriptions of the status of the sand dunes in most of the countries in Europe. This paper sets out to provide an update of the sand dune resource in Europe as a basis for revising the inventory, which will be published at a later date if support (financial and information) can be obtained.

Keywords: Sand dune; Survey; Inventory; Europe.

Introduction

Almost the first European dune conference was held in Leiden, The Netherlands, in 1987. Following this conference one of the first tasks suggested by the newly established European Union for Dune Conservation [EUDC] was to produce an inventory of coastal dunes throughout Europe (Fig. 1). This was published by the UK Joint Nature Conservation Committee and the European Union for Coastal Conservation (EUCC an expanded EUDC) with funding from the Department of Nature Conservation, Environmental Protection and Wildlife Management in the Dutch Ministry. It was presented at the European Coastal Conservation Conference organized by the Dutch Ministry of Agriculture, Nature Management and Fisheries held in Holland in November 1991.

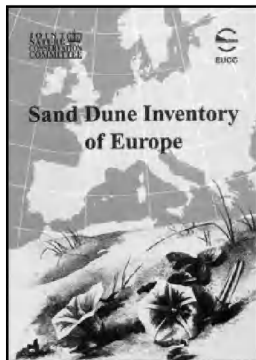


Fig. 1. The original inventory.

The wide ranging nature of the dune landscapes of Europe and the sometimes different perceptions within individual countries of what constituted a sand dune required a very broad definition of the type of dune encompassed within the survey. As a first stage it was decided to adopt the definitions given by Ranwell and Boar (1986) (Fig. 2), which are largely based on a geomorphological classification of dune systems. In addition in order to get some idea of the extent of change, which had taken place, dunes modified by human activities such as

afforestation were included. Wherever possible the dune distribution given for each country represented the maximum extent of blown sand.

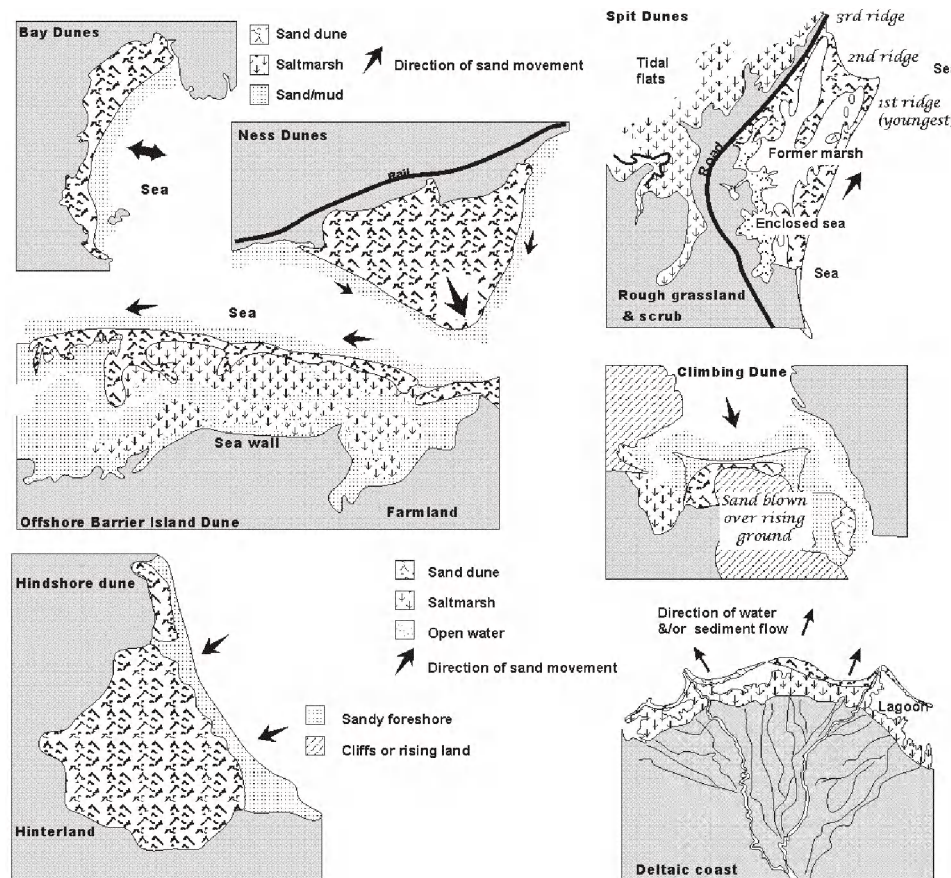


Fig. 2. Seven sand dunes types recognized in the inventory. Note: a map of the sand dunes associated with deltaic coasts was not included in the original figure.

The scope of the inventory required the cooperation of a wide variety of people involved in dune conservation throughout Europe. In the event it proved difficult to obtain detailed information suitable for the inventory for some countries and the best available published information was used. The inventory provided a brief description of the type of dune formation, vegetation, important sites, a comment on conservation issues and a short list of references.

In the 12 years or so since then there has been a considerable amount of activity in the field of sand dune conservation. This paper summarizes some of the areas where more detailed information has been collected. No attempt is made to provide a comprehensive update. The examples are chosen to illustrate developments since 1991.

Country and regional reports

Iceland

An introduction to the sand dunes in Iceland is given in the original inventory but there was no distribution map. A considerable amount of information has been collected on the sand dunes of Iceland since then. The map below is taken from Gneipsson and El-Mayas (1994) (Fig. 3). Key features of sand dunes in Iceland are their volcanic origins, the need for a continuous programme of sand stabilisation and the impact of river dams on sediment delivery to the coast.

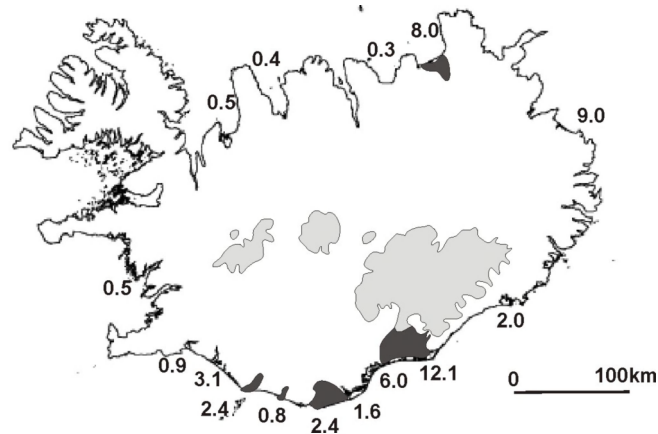


Fig. 3. Distribution of the main sand dune areas of Iceland (black). The main glaciers providing the melt-water to deliver sediment to the sea are shown in grey. The annual amount of sediment in kg is given for each site (after Gneipsson and El-Mayas, 1994).

Great Britain

Surveys of the sand dunes in Great Britain were undertaken in the late 1980s early 1990s. They were based on standard methods of mapping and classification [in accordance with the National Vegetation Classification (Rodwell, 2000)] of the vegetation. The results will be published in three reports: Vol. II Scotland (Dargie, 1993); Vol. I England (Radley, 1994) and Vol. III Wales (Dargie, 1995).

The surveys were designed to facilitate the selection of sites for conservation designation including Natura 2000, identify 'Ecological Zones' and as a basis for monitoring future change. The results highlighted the enormous diversity of coastal sand dune vegetation, with more than 120 distinct types recorded from right across the spectrum of the National Vegetation Classification. They also illustrated the considerable range of variation that exists between different geographical areas.

The close relationship between dune vegetation and physical processes was a recurring theme in the reports, as was the influence of changing patterns of land use. The report identified four main issues in coastal dune management for nature conservation. These are:

- the importance of understanding the role of instability in dune conservation;
- the need for the management of recreational use;
- the methods for managing successional change;
- and the importance of naturalness.

The Scottish survey, which only covered approximately 30% of the resource has been extended and a complete review of all the sand dunes was completed in 1999/2000.

Spain

In the 10 years up to 1993 a survey of natural sites, land use, conservation instruments, problems and options in Spanish coastal dunes and wetlands was undertaken. Regional reports on Huelva, Valencia and Santander were also completed and published in a students report (Joven, 1993).

Turkey

The dunes of Turkey are extensive and in 1990 in many areas relatively unaffected by human activities other than grazing pressures. Since then the situation has changed considerably with the drive for tourist developments continuing apace. Chronicling the dune areas that survive is being undertaken by Turhan Uslu who helped prepare the original report for Turkey. Information as it becomes available is published on his web site <http://www.turhanuslu.net/anasayfa1.htm> (Screen shot shown below Fig. 4.)



Fig. 4. Distribution of sand dunes in Turkey.

Other surveys

Taken together with detailed surveys of sand dunes in Finland (Hellemaa 1998), Denmark (Brandt and Christensen, 1994), Ireland (Curtis, 1991), and the Atlantic coast of France (Favennec, 1998) there is a wealth of information for many European countries.

Additional sources of information on the sand dunes of Europe (and the rest of the world) can be found in two other publications:

- The World's Coasts: Online edited by Eric Bird
<http://reference.kluweronline.com/?xmlid=2222222222> ;
- Dry Coastal Ecosystems, specifically the volume on polar regions and Europe (van der Maarel E. (Ed.), 1993).

The World's Coast Online is based on The World's Coastline hardbound book (Bird and Schwarz, 1985). It includes detailed information for some countries less for others. The Dry Coastal Ecosystems volume also covers coastlines generally but has a wealth of information on sand dunes embedded within it. Other surveys almost certainly exist but are not known to the author.

Conferences and case studies

Conferences

The first two conferences organised by the EUCC The Coastal Union (as it is now called) were largely concerned with sand dunes. The reader is referred to the conference proceedings for further information (van der Meulen *et al.*, 1989; Carter *et al.*, 1992). Subsequent EUCC conferences covered coastlines more generally but relevant information is still to be found on sand dunes in the following volumes resulting from meetings in Greece (Salman and Bonazountas, 1995/6) and Wales (Healy and Doody 1995; Jones *et al.*, 1996).

In addition to the general conferences there have also been several specialist meetings. Tourism and its effects on dune conservation was a major concern and a meeting was held in Holland in 1995 to consider recreation and planning (Drees, 1997). A further meeting was held to consider the special case of the extensive dune landscapes of Denmark (Ovesen, 1998). These meetings further extended our knowledge and understanding of sand dunes and their management.

Case studies

Three case studies serve to illustrate some significant changes to the way sand dunes have been viewed over the last decade or so. Generally there has been a move away from considering eroding sand dunes as a problem, to one where this is seen as a natural and healing force. Two of these examples are LIFE Nature funded projects, dealt with in more detail by Houston (2005).

The Råbjerg Mile, Denmark

For centuries the exploitation of vegetation in the dune areas of Denmark had helped to create massive movements of sand. In many areas these had become a social catastrophe as the sand covered farmland, farms, houses, roads and churches. In 1792, the country adopted its first Sand Drift Act, in an attempt to prevent the massive movement of sand. This and other laws, together with large plantations in dune areas up to and including the 1950's helped bring sand drift under control. Today there is much more focus on the protection of the natural environment.

Even when the Danish dune area was being afforested the big mobile dune of Råbjerg Mile situated to the north of the country was left unplanted. Today it serves as an example of a natural phenomenon and as an aid to understanding sand drift. The dune front moves at a speed of about 15m per year depending on climate conditions and is drifting out of the governmentally owned area. Discussions are underway with the aim of allowing the natural sand movement to continue with compensation being made to private properties, which will be inundated by the sand. The public has free access to the area by foot, which is actively encouraged and helps maintain the moving dune front (Fig. 5).



Fig. 5. Children enjoying the mobile dune of the Råbjerg Mile. The dune is advancing towards the farmstead visible in the middle distance.

Sefton Coast, north west England

In 1978 in response to a growing awareness of erosion and other management problems on the Sefton Coast dunes a voluntary 'management scheme' was agreed as a partnership between the local authorities and other statutory and voluntary organisations. This evolved into the 'Sefton Coast Partnership'. During the 20 years since its inception

the area has become a key site for the development of management practice in coastal dunes.

A research seminar in 1991 helped lay the foundation for understanding the importance of dune dynamics for habitat sustainability (Atkinson and Houston, 1993). In the early stages of the management scheme control of erosion and recreational use was seen as a key conservation requirement. In 1998 a European seminar provided the culmination of an EU LIFE Nature project (Houston *et al.*, 2001). By this time the message from the conference was clear "dunes are dynamic and the sediment budget is a key to their natural functioning".

The "Sands of Time" web site <http://www.sandsoftime.hope.ac.uk/index.htm> and the web site for the "Sefton Coast Partnership" <http://www.seftoncoast.org.uk/> provide valuable information on current thinking about sand dunes, their conservation and management.

Atlantic coast

The dunes of France, especially along the Atlantic coast, have been subject to intensive and extensive stabilisation over many years. Between 1996 and 2001 an EU LIFE Environment project "The Rehabilitation and Sustainable Management of Four French Dunes" was carried out. This sought to provide management solutions for the sites, which had been incorporated into the Natura 2000 network. It was anticipated these would also have relevance for other "mobile" coastal features in Europe. The final report concluded that:

"Beach and dune coasts are mobile by nature. To continue to benefit from the services they provide, we must accept fluctuations, all too often considered as threats. This option does not exclude rational economic use."

It went on to give a number of general recommendations:

- local management must be placed in a wider context (space and time);
- need for multi-disciplinary networks commensurate with the complexity of the systems;
- use flexible techniques, interfering as little as possible with natural processes;
- management should be cost effective;
- leave space so dunes can provide "complimentary functions";
- transfer knowledge;
- have cross-border cooperation (Favennec, 2002).

Further information can be found on the Office National des Forêts website at <http://www.onf.fr/foret/dossier/littoral/li05.htm> (in French).

Conclusions

Dune landscapes have provided places to study ecological succession, areas of considerable nature conservation significance and in some areas protection from storms.

They have clearly been abused in the past to such an extent that in many areas they have either been completely destroyed or no longer fulfil their landscape, wildlife or sea defence function. They have also helped us understand the importance of dynamic management. As Prof. Bill Carter said at one of the early conferences dedicated to dune conservation “these habitats are not sensitive but robust and designed to accommodate the changes in tides, tidal energy and sediment availability”. It is our desire to prevent them from moving that has caused so much damage.

The projects described above have helped reinforce our understanding of the importance of mobility to the functioning and long term sustainability of dune systems. In so doing they have also laid the foundation for a more proactive approach to sand dune conservation. In this context the value of a dynamic dune, not only for nature conservation, but also in relation to sea defence has been recognised. Encompassed within this is the importance that mobile dunes play in dune restoration.

In recent years a new European view has emerged that respects the value of dune systems to society as natural sea defences, wildlife refuges and recreational areas. This has been further enhanced by other studies such as the recommendations from the EUrosion study [Niesing (2005) and <http://euroSION.com>]. This has shown the importance of the interrelations between sand dunes and other sedimentary features. Not least amongst these, is the role of the catchment and factors affecting the sediment delivery and coastal dynamics.

Much has happened to change our understanding of sand dune conservation and management since the publication of the first dune inventory. We now have a much better knowledge of the location of the sand dunes, their vegetation and important sites. A quick trawl through the internet and contact with several of the original contributors to the inventory suggest that much more could be achieved by collating studies carried out over the last 10 years or so. This would help bring the inventory up to date, at least as a baseline for further work. There are also many sites with management and restoration information [see for example <http://members.lycos.co.uk/WoodyPlantEcology/sanddune/> for Sand dune ecology, Copyright © 1999 Pierre Binggeli. All rights reserved]. Adding the additional information on sediments such as that available from Iceland and other sources such as the sand dune section of the Habitat Restoration Guide (Doody and Pamplin, 2003) could form the basis for a major revision of the original inventory.

This paper is as much a plea for offers of help to undertake such a revision, as it is a review of sand dune resource information. If finance, information and collaboration are forthcoming then a revised and expanded inventory is possible. Please contact the author if you can help.

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