



Sand Dune and Shingle Network

Ninth Newsletter, July 2010

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EST.1844

Introduction

Welcome to the ninth newsletter of the Sand Dune and Shingle Network. The focus of the network is on coastal habitats, especially sand dunes and shingle, in the UK. We work closely with the statutory nature conservation agencies in England, Scotland, Wales and Northern Ireland to support the dissemination of information and encourage an exchange of knowledge on coastal habitat conservation.

In this issue we highlight a number of recent publications, ongoing projects and published research. We have established an Occasional Publications series at Liverpool Hope University and have published on-line the reports of the shingle workshop held in North Norfolk in September 2008 and the study tour of North Holland in February 2009. Further reports are in preparation.



In terms of developing a European dune network we have met with the Coastal and Marine Union –EUC in Leiden, the Netherlands, and have agreed to collaborate on a number of projects including setting up a platform for a European Dune Network. Further information is available opposite.

We were pleased to host a visit by Dr Maike Isermann of the University of Bremen who spent eight weeks undertaking field work on the Sefton Coast, Merseyside, to address the question “is biodiversity maintained by scrub removal on coastal dunes?” Maike’s visit was funded by a grant from the German Research Foundation and you can read about the project in the newsletter.

We are looking forward to hosting a visit by Professor Norb Psuty of Rutgers University who has been awarded a Fulbright Scholarship to support international research and networking. We hope that Norb will be with us later this year and also in spring next year.

During a flying visit by Professor Roy Lubke of Rhodes University we discussed an outline for an international touring conference in South Africa perhaps in 2012 or 2013. Roy is keen to hear from anyone who would be interested in participating in such an event. See Page 12 for more information.

Paul Rooney
Director

Network news

By Charlotte Durkin



I was recently awarded an Erasmus mobility grant to visit the Coastal and Marine Union (EUC) offices in Leiden, the Netherlands for personal training and also to develop joint working. Over the next 12 months we will be working more closely with the EUC to develop a focal point for the European Dune Network so the visit helped us identify which aspects of our work could support a European Network and what further actions were needed. For more information please look at the pages on our website (<http://www.hope.ac.uk/coast/international.html>) and on the EUC web-site (http://www.eucc.nl/en/european_dune_network/index.htm) which give an introduction to the aims and objectives of a European Dune Network.

I am continuing to update the website and you will find a new section under ‘resources’ highlighting some good examples of UK Habitat Action Plans for sand dune and shingle we have come across which may help managers’ decision making or inspire the rest of us! In addition I am working on the educational Sands of Time Site (www.sandsoftime.hope.ac.uk) which was set up in 1999 and is heavily used by practitioners and students alike. The photographs, content, structure and layout are all being considered, if you have any photographs which illustrate the points being made please get in contact!

In our references section this issue, we have indicated with a little free symbol those resources which are available freely without an academic subscription. If you have previously skipped this section believing yourself unable to access the papers, think again.

There are more and more papers available freely online these days as universities and other organisations set up their own literature repositories. Simply visit Google Scholar and insert the publication title or search your own key words. Freely available papers will have a short URL on the right hand side accompanied by ‘PDF’.

Hydrology thematic group

A workshop on dune hydrology was held in Southport, North West England in March 2010. Following this meeting a network thematic group has been established with Charlie Stratford of the Centre for Ecology and Hydrology (CEH). Since then, along with Laurence Jones of CEH and Nick Robins of the British Geological Survey (BGS), Charlie has met with Mark Whiteman of the Environment Agency (EA), Peter Jones of the Countryside Council for Wales (CCW) and Graham Weaver of Natural England to identify and prioritise tasks that are both do-able, in the context of available resources, and which help towards a better understanding of coastal dune eco-hydrology. The focus is on collating and interpreting the existing time series water level data and working towards models which will lessen some of the uncertainties in current conceptual groundwater system understanding.



Braunton Burrows ©John Breeds/MOD

One of the key issues identified by delegates at the Southport workshop in March (see report in Newsletter 8) was securing long-term data sets and the need to reform our approach to collecting data. To this end, CEH is working

to establish long term monitoring infrastructure with high frequency water level loggers at Braunton Burrows, South West England, and Whiteford Burrows, South Wales, complete with continuous rainfall monitoring.

CEH is working with various organisations to uncover and access diverse datasets apart from the long-term dip well data sets, such as the 20 year record created and maintained by John Breeds at Braunton Burrows. Charlie is on the trail of long-term botanical records at Whiteford which would be enormously useful coupled with the dip well records to investigate trends in biodiversity and species richness. Whiteford has also been identified as a candidate test case site for an EA led study examining the impact of climate change on wetlands. Being entirely rain fed and discharging to the coast provides a useful contrast to 'typical' inland wetlands and the long-term data sets available make it a robust case for the study.

CEH has also been working with Jeremy Barker, a land management and conservation advisor for Natural England, and Nick Edwards of CCW to develop digital topographic models of slack floors at both Braunton Burrows and Whiteford Burrows. Detailed mapping of the embryo dune and slack at Whiteford is planned for later this year. Digital mapping at a fine scale compliments topographic studies at the site scale to give a better understanding of the hydrological regime, and subsequent repeat mapping will identify small morphological changes. The team has also been working in the laboratory to simulate the impact of different water levels on the soil moisture content of dune soils. This work will go towards understanding the role the depth to water table has on slack vegetation.

See also page 5 which includes details of INSPIRE, a new data management initiative which will be of direct relevance to the aims of the thematic group.

Ecohydrological guidelines for wet dune habitats

The first part of a review of the eco-hydrology of wet dune habitats was published in 2006 as English Nature Research Report 696 on the 'Development of eco-hydrological guidelines for dune habitats-Phase 1'. Now, the Phase 2 report has been published by the Environment Agency. The report Eco-hydrological Guidelines for Wet Dune Habitats: Wet Dunes Phase 2, [GEHO0310BSGV-E-E] has been prepared by A J Davy, K M Hiscock, M L M Jones, R Low, N S Robins and C Stratford and is available as a PDF on the Environment Agency's [website](#) (to find it go to 'publications catalogue', 'catalogue search' and use term 'wet dune slacks').

The report summarises the water, chemical and management requirements of internationally important wet dune slack plant communities in England and Wales, required for impact assessment and site management. It presents a review of the overall hydrological functioning of humid slacks and detailed appraisals and recommendations for the ecohydrology of the British dune slack community types corresponding to Annex I of the EU Habitats Directive (British Plant Community (NVC) types SD13-SD17).

Case studies are given for the important Welsh dune systems at Kenfig, Morfa Dyffryn ad Newborough Warren. Overall the study concludes that the community classification appears to be too subtle and variable to be



Wet slack habitat, Sefton Coast © John Houston

precisely explained by the five recognised water supply mechanisms (described in the Phase 1 report). Longer term monitoring studies will be required to develop more precise guidelines.

England Biodiversity Strategy

Managing for species

The coastal Biodiversity Integration Group is chaired by Tim Collins of Natural England and includes 'champions' representing saltmarsh, sand dunes, shingle, coastal cliff and lagoon habitats. In the new structure for the England Biodiversity Strategy (outlined in Newsletter 8) the Biodiversity Integration Groups lie between national policy and local delivery so they have a role in guiding and encouraging action on the ground in line with regional targets for restoration and expansion.



Biodiversity Integration Group discussing proposed managed realignment site on the Steart Peninsula, Bridgewater Bay with Environment Agency, Wildfowl and Wetlands Trust and Natural England, July 2010

The new approach to biodiversity stresses the need for an integrated approach to the management of habitats and species. The aim of the England Biodiversity Strategy is to recover both habitats and species and the ecosystems services that they underpin. The reasons for this change in approach are;

- Targeted species recovery has worked for a few of the rarest species but the majority of species are not targeted by this approach. Switching to a habitat-led approach should also benefit the more widespread species
- The recent review of the UK Biodiversity Action Plan priority list in 2007 increased the number of targeted species to 1150. It would not be feasible to prepare a plan for each of these species so a habitat-based approach is the only logical option.

Natural England has recently published a report (NERR024) of how species interests can be incorporated into habitat targets. The main report can be found at <http://naturalengland.etraderstores.com/NaturalEnglandShop/NERR024> and an excel spreadsheet shows the species associated with the habitats of the coastal BIG group.

The results of the analysis of habitats and species show that 166 BAP species are associated with the six habitat covered by the coastal Biodiversity Integration Group.

Some species may be associated with more than one broad habitat type and the total number of species by each priority habitat is given as;

Saline lagoons	12
Coastal vegetated shingle	15
Coastal sand dunes	72
Maritime cliff and slopes	61
Intertidal mudflats	3
Coastal saltmarsh	29

For sand dune habitats the study shows that over 60% of the species are associated with early successional habitats. Other important associations include seasonally fluctuating water in the form of dune slacks, scrub, either as a foodplant or for its microclimatic conditions, small scale mosaics of bare ground and shelter from the wind.

The overall study, and the views of species experts, confirmed that factors such as habitat structural variation, habitat mosaics, dynamic processes and disturbances, hydrological processes, shelter and exposure to sunlight are important for supporting most priority species. To conserve these species there needs to be an emphasis on increasing habitat heterogeneity between and within sites and a dynamic approach to managing habitat is also likely to facilitate adaptation to climate change.

Update of progress with the UK Biodiversity Action Plan

The main results of the 2008 UK Biodiversity Action Plan Reporting Round have been published this year (2010) by Joint Nature Conservation Committee on behalf of the UK Biodiversity Partnership. The report is the fourth update on the progress to conserve the species and habitats identified as requiring priority action <http://www.jncc.gov.uk/page-5398> under the UK Biodiversity Action Plan. To allow comparison with the previous reporting round in 2005, the report examines the 45 habitats and 475 species (covered by 391 Species Action Plans) that were on the UK list prior to a review in 2007.

The data behind the report can also be viewed on the Biodiversity Action Plan reporting system.

Websites

- <http://www.jncc.gov.uk/page-1817>
- <http://www.ukbap.org.uk/>
- <http://www.ukbap-reporting.org.uk/>



European Coastal Projects



These projects share a similar theme and indeed CONSCIENCE has built on the work of EUROSION. The European Commission has funded these studies to develop coastal erosion policy recommendations. EUROSION began in 2002 and examined the social, economic and ecological impact of coastal erosion on European coasts to assess the need for adaptation measures. Its output was a GIS database of administrative and marine boundaries, bathymetry, geology, tidal range, river sediment transport and coastal defence works. The GIS layers are available from the website <http://www.euroSION.org/database/index.html>. EUROSION made a number of recommendations about data sharing and the creation of new data sets. It put forward the idea of a Europe-wide map of coastal sediment cells such that local and regional data can be contextualised. The EUROSION project arrived at four key themes; coastal resilience, favourable sediment status, strategic sediment reservoir and the coastal sediment cell. These concepts assist management planning for erosion by steering it towards working with natural processes.

The CONSCIENCE project (<http://www.conscience-eu.net/>) has gone further and set out a framework for this planning for use at a policy making level. An overall strategic objective for a region such as "sustainable management of coastal ecosystems" feeds into a tactical objective which is a more concrete statement of how this will be achieved. For example, DEFRA has defined possible tactical objectives for use in the UK: hold the line, advance the line, managed realignment and no intervention.

The pilot sites in CONSCIENCE defined strategic and tactical objectives in this way and applied the framework through to more detailed considerations of benchmarking, intervention measures and evaluation. Many aspects of the framework require the use of data, for example when comparing the current and desired status of the coast. CONSCIENCE developed Coastal State Indicators (CSIs) to reduce the number of parameters needed to describe a coastal system, allowing complex quantitative analysis to be expressed more simply. For example, the pilot site at Pevensy used barrier width, total barrier volume and barrier crest position as CSIs.

Both projects aim to help coastal stakeholders respond to coastal erosion and despite the use of acronyms and jargon, they have very useful messages which have yet to be fully disseminated.



INSPIRE

One of the problems for the management of the coastal zone is the availability of geophysical datasets to form a base for more specialised datasets. This lack of underpinning data can make comparison of results from similar studies difficult. The availability or lack of this kind of data is dictating the scope of new research and the type and cost of data available could determine the type of research undertaken.

This limiting effect is holding back the science of coastal zone management and a new EU Directive is attempting to resolve these problems.

INSPIRE applies to all spatial data and aims to standardise the collection and publication of data and metadata. Metadata is essentially data about data; explanatory notes pertaining to the administrative and technical details, intended use and even simple information on when and by whom the data was collected. A lack of metadata can hinder research ambitions where datasets are available because these key details inform methods of analysis and application processes which transform data into meaningful information.

Spatial Data Infrastructure (SDI) will be key to implementing INSPIRE. SDI describes a framework used to manage spatial data including metadata, its users and the technologies, procedures and legislation that govern its use. A small number of marine/coastal (SDIs) are already in operation and will be utilised as the Directive is rolled out across the EU. Drafting teams are now working on how the different elements of INSPIRE will operate across Europe through the Implementing Rules, which will eventually become binding law. Their work is supported by Spatial Data Interest Communities, such as the EUCC which represents part of the wider marine community.

A special issue of the EUCC magazine Coastlines features more on INSPIRE available at <http://www.eucc.nl/coastalandmarine/coastline07-34.pdf>

Full information on the INSPIRE Directive can be found at <http://inspire.jrc.ec.europa.eu/>



OURCOAST is an EC-sponsored project aimed at sharing the experiences of ICZM initiatives across Europe. The overall objective is to create an information base which will support the implementation of future ICZM projects with the benefit of lessons from previous projects. A multi-lingual database will give users access to 350 case studies, searchable geographically, thematically, by approach and using key words. Three strategic policy objectives are further split into eight themes.

- Adaptation to risk and the impacts of climate change
- Sustainable use of resources
- Sustainable economic growth

The OURCOAST project will provide key insight into ICZM projects by comparing and analysing each case study and examining typical success or failure factors. There will also be a review of current EU policies and legislation, as well as guidance on ICZM planning.

This database will go live in November 2010 and you can be kept informed of its status or receive the newsletter. Simply contact m.ferreira@eucc.net or visit the website <http://ec.europa.eu/environment/iczm/ourcoast.htm>

Follow all aspects of the EU ICZM initiative on <http://ec.europa.eu/environment/iczm/home.htm>

Around the sites: the managers' perspective

The dune and shingle network is a habitat network and about one third of our members are involved with practical site management on a day to day basis. We want to use the network and the newsletter to help share the experience of our members and so we are always pleased to receive your news and ideas.

Cattle grazing at Kenfig National Nature Reserve, South Wales



Photos © David Carrington

Work last winter at Kenfig continued the programme of embryo dune slack creation using machinery. The site grazier added 20 Highland cows with calves to the herd grazing the northern third of the site last summer to bring the total to 50 cows each with a calf. The standard beef cows and calves were removed in November but the Highlands stayed on the reserve. There was a brief period of a few days in a cold snap when they needed some supplementary food but for the most part they looked after themselves. From the reserve's point of view they were brilliant but the grazier commented that by the end of the winter they had gone a bit too wild and were difficult to round up. He put them in one of his fields for a few weeks for treatment and to remind them that they were domesticated!

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East Lothian scrub clearance



Photos © Duncan Priddle

East Lothian County Council has produced a strategy

for sea buckthorn control and site-by-site assessments are underway to agree the degree and extent of control required. Regenerating suckers at previously cleared areas have been treated with Timbrel and the areas will be sprayed again in September.

The Council is submitting a SRDP (Scotland Rural Development Programme) application to cover a range of coastal grassland and scrub management actions and to pave the way for grazing to commence at several sites. If all goes to plan the infrastructure will be put in place this winter.

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Tentsmuir NNR, eastern Scotland



Tentsmuir NNR © SNH

Tentsmuir's strap-line is "faster than most" and this has certainly been true over the last year. In his regular newsletter Tom Cunningham reports that "the transformation of the foreshore and dunes has again been breathtaking as well as awe-inspiring. In the grand scheme of things over the thirteen years that I have been working here the changes are just incredible. We lost a few metres of dune edge in the north dune edge although the thin finger of dune still builds further into the River Tay. From the middle foreshore area the loss was slightly less. However, the storms and gales blew sand and flotsam some 90 metres inland. In the WWII Command Post (formerly known as the green hut) area the outflow channel changed direction and now flows out to sea further south. As a result the foreshore build up has to be seen to be believed. To the south the dune accretion is monumental; 314 metres from the 1997 high water line".

Site management activity includes grazing with Limousin cattle to help reduce the tree and scrub growth and open up the thicker grassy sward. This is supplemented by hand pulling of pine seedlings on the heath and dunes and an annual herbicide treatment of target species (mainly all tree species, gorse and broom).

A new site leaflet is available on http://www.snh.org.uk/pdfs/publications/designatedareas/tentsmuir_visit.pdf

Dune grasslands in Amsterdam Watersupply Dunes are important sites for butterflies



Caterpillar of Niobe Fritillary (*Argynnis niobe*) © Waternet

The Amsterdam Watersupply Dunes (managed by Waternet) are designated as a Natura 2000 site as part of 'Kennemerland-Zuid' along the Dutch west coast. The 'grey dunes' attract protection under this designation and include typical species such as the Niobe Fritillary (*Argynnis niobe*). Until now not much was known about this species, except for its mobility as an adult and relative rarity. It was uncertain where and on which plant this species was reproducing.

Recent intense fieldwork of two students of the University of Amsterdam has discovered caterpillars of Niobe Fritillary in dune grasslands in the Amsterdam Watersupply Dunes. These appeared to forage mainly on *Viola rupestris*, and in one instance on *Viola curtisii*. The caterpillars also showed that they were able to move very quickly through the mossy vegetation, and to hide in the litter layer and moss layer. This was one of the reasons it was not easy to find the caterpillars!

During last winter Waternet restored grassy vegetation in the Amsterdam Watersupply Dunes by mowing and sod cutting. The aim was to restore original dune grassland vegetation rich in herbs and mosses. Earlier experiments with sod cutting resulted in local return of *Viola rupestris*, so the Niobe Fritillary will certainly profit from the recent management.

Another typical species in the grey dunes is the Grizzled Skipper (*Pyrgus malvae*). This species is regionally declining, but still thriving in the Amsterdam Watersupply Dunes where students are now investigating the places where Grizzled Skippers lay their eggs. It appears the eggs are laid on young leaves of *Rubus caesius*, often in the shelter of Sea Buckthorn shrub. Local sod cutting some years ago has not yet yielded suitable habitat for egg laying as the areas are still too barren, but probably suitability will increase in the years to come.

Antje Ehrenburg and Mark van Til, ecologists, Waternet. antje.ehrenburg@waternet.nl

Beach Management Manual



Beaches play an important role either as the sole barriers to coastal flooding and erosion, or as part of manmade defences. Beach management in the UK has evolved significantly in design and execution over the last 10 years, motivated by increased expenditure on capital schemes aided by guidance from CIRIA's Beach management manual, first published in 1996.

In times of accelerated sea level rise and increasing demands on beaches to provide defence against flood and coastal erosion risk, protect habitats and provide amenity, coastal practitioners need robust and "hands on" guidance on how to manage beaches for these diverse purposes. The focus of the new manual is to address beach management as a whole, recognising its multiple functions, and represents a major shift from previous approaches that focused on engineering interventions to beaches.

This second edition includes the latest information on state-of-art methods, guidance on beach monitoring and maintenance, evaluation of the state and performance of a beach, design, procurement, execution and the after-care of beach improvement schemes. It is divided into four parts and makes use of case studies to illustrate popular management techniques and draw from experience of existing management approaches, reflecting the wealth of experience gained since 1996.

For more information about the publication or to order a copy of the Beach management manual (second edition) (C685), visit: www.ciria.org, email: enquiries@ciria.org, or call 020 7549 3300.

UK National Ecosystem Assessment (NEA)

The NEA <http://uknea.unep-wcmc.org/> is putting together a picture of the state of our coastal margins and the benefits they provide to society – viewed through the framework of 'Ecosystem Services' – see article in previous newsletter No. 8.

The chapter has now gone through the internal and preliminary external review stages. In general, the reviewers are very positive, but a number of areas need improvement. Particular areas where the chapter needs strengthening are information on tourism and amenity use of coastal habitats, and quantification of many of the Services e.g. water abstraction from dune aquifers. Data availability for the coastal margins is a big problem compared with other habitats.

There are a few months left for feedback and improvements, so if you feel you would like to contribute in any way, or provide further feedback, please contact Laurence Jones LJ@ceh.ac.uk (01248 374517) for a copy of the draft chapter and feedback comments also to UNEP/WCMC 'comments on Coastal Margins, Chapter 11' at nea@unep-wcmc.org

Focus on Scotland

The Scottish Natural Heritage website has recently been re-vamped and includes useful sections on coastal habitats with references to published papers, national guidance and other studies. <http://www.snh.gov.uk/about-scotlands-nature/habitats-and-ecosystems/coasts-and-seas/coastal-habitats/>



Beach at Morrich More ©Paul Rooney

The publications section of the website <http://www.snh.org.uk/pubs/default.asp> contains many of the key research reports on Scottish dunes including the first full survey of Scottish beaches and dunes. Beginning in 1969 and ending in 1981, all the sand beaches of Scotland, along with their associated dunes, links and machair areas (thereafter referred to as a beach unit or beach complex), were surveyed for the Countryside Commission for Scotland.

Ritchie, W. and Mather, A.S. (1984). The beaches of Scotland. Commissioned by the Countryside Commission for Scotland 1984. Reprinted 2005 by Scottish Natural Heritage as Commissioned Report No. 109

The overall study is based on a set of 18 regional volumes on beaches also commissioned by the Countryside Commission for Scotland and produced by the Department of Geography, University of Aberdeen. Individual reports are available on the website.

An earlier report had identified the problems associated with uncontrolled recreation pressure on many Scottish beaches leading to dune erosion and landscape damage. This can be found within the archive section of the website.

Ritchie W. and Mather, A. June, 1969. Beaches of Sutherland. Department of Geography, University of Aberdeen, for the Countryside Commission for Scotland. Reprinted 2001 by Scottish Natural Heritage as a Commissioned Report.

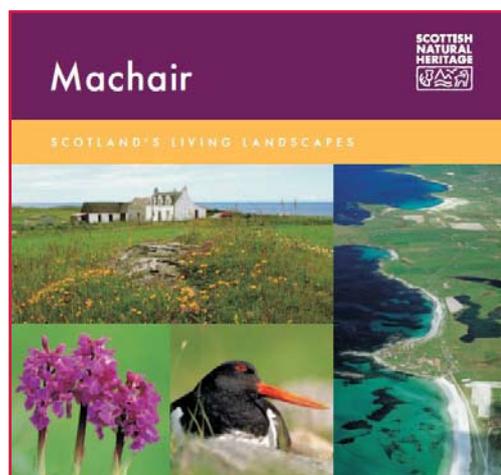
The Sand Dune vegetation of Scotland undertaken by Tom Dargie from 1994 is presented in three volumes (parts 1-3) each for the Western Isles, Orkney, Shetland,

South East, Inner Hebrides, Moray Firth, North West mainland and South West. All the reports are available in PDF version on the website.

Other interesting reports are specific studies on breeding birds of dunes and saltmarsh and beetles on coastal dunes

Craigton Ecological Services (2006). Portencross Coast Site of Special Scientific Interest : breeding bird survey of sand dune and saltmarsh habitat. Scottish Natural Heritage Commissioned Report No. 210 (ROAME No. R06LI01).

Blake, S. (2004). Site condition monitoring: beetles in Turnberry Dunes Site of Special Scientific Interest. Scottish Natural Heritage Commissioned Report No. 040 (ROAME No. F02AC322).



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The general publications also include an introduction to machair <http://www.snh.org.uk/pdfs/publications/living-landscapes/machair.pdf>

Dune slacks and machair are two of the wetland features identified in a new guide to Scottish wetlands. For a copy of the field manual see http://www.sniffer.org.uk/Webcontrol/Secure/ClientSpecific/ResourceManagement/UploadedFiles/SnifferWFD95_FieldSurveyManual_V1.pdf

Is plant biodiversity maintained by scrub removal in coastal dunes?

By Maïke Isermann, University of Bremen (Maïke. isermann@uni-bremen.de)

This three month research project during summer 2010, is funded by a grant of the German Research Foundation (DFG), and represents the cooperation between Liverpool Hope University (Paul Rooney) and Bremen University (Dr. Maïke Isermann).

The Sefton Coast, northwest England, is one of the largest dune systems in Britain. The dunes and dune slacks are often species rich and have a high nature conservation value (Smith 2006).

Sea-Buckthorn (*Hippophaë rhamnoides*) was introduced and planted since the last century to combat erosion and stabilise sand. On the Sefton Coast *H. rhamnoides* has invaded dunes as well as dune slacks since the 1960s because of the decline of rabbits due to myxomatosis (Rooney 1998).

Expansion of introduced shrubs such as *H. rhamnoides* reduces species-richness at different scales (Isermann 2008) and causes loss of habitat for rare dune species (Mulazzani 1998). Invasion of *H. rhamnoides* increases the nutrient status of poor soil conditions, due to nitrogen accumulation. The decline in biodiversity caused by *H. rhamnoides* (Isermann *et al.* 2007) indicates the need for management intervention (Wilson *et al.* 2008).

On the Sefton Coast, *H. rhamnoides* scrub was removed in the mid-1990s (Smith 2006) to reverse vegetation succession, restore open species-rich dune grasslands and to enhance biodiversity in dunes and slacks. Different restoration strategies have been used in combination, such as manual cutting, with cut material either burnt on site or removed, or mechanical uprooting with large machines. Herbicide application was used to control both young short stands of Sea Buckthorn and re-growth from large stands after manual or mechanical removal. Partly, grazing with domestic stock (mostly sheep) has followed treatments to remove Sea Buckthorn.

Sea-Buckthorn starts growth on the yellow dunes with more or less open stands, thus the plant communities are composed of yellow dune species in combination with *H. rhamnoides*.

Dense Sea-Buckthorn scrub, known to reduce species-richness heavily, develops on dry dunes (old yellow to grey dunes) or on the slopes along dune slacks. In comparison to the dry areas, dune slacks are often invaded by a mixture of different woody species. For comparability the project investigates areas, where the development of dense Sea-Buckthorn scrub was or is possible.

The aim of the research project is to study if shrub removal regenerates plant-diversity of coastal dune areas. To assess the success of the management measures, the

project compares phytodiversity at different scales in areas still with *H. rhamnoides* and those where the scrub is removed.



Dense Sea-Buckthorn stands on yellow dunes ©Maïke Isermann



Evidence of Sea Buckthorn removal ©Maïke Isermann

Species diversity depends on scale, thus a hierarchical approach and a stratified-random plot design is used. At the community level, the number of plant species are recorded in 4 m² quadrat-plots in regular distances along random transects. At the next larger scale, random transects will be used to evaluate species turnover along local gradients. Total species richness at the landscape scale will be estimated as accumulated number of species of all

investigated plots. Furthermore, soil conditions will be analysed (C- and N-content, pH) to investigate changes in the nutrition status after scrub removal. Maïke Isermann

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Pedogenesis on the Sefton coastal dunes

By Jennifer Millington, University of Wolverhampton (Jennifer.Millington@wlv.ac.uk)

My PhD study 'Pedogenesis on the Sefton Coastal Dunes, NW England' examines the use of soil properties to identify dune soil system responses to environmental change, based on the development of conceptual soil models. The study is supported by Sefton Council and the University of Wolverhampton. Dune responses to rising sea level are expected to be dynamic and variable, anticipating land encroachment, raised groundwater and natural migration of ecological zones. However, on the Sefton coast, natural migration is prevented by 'coastal squeeze'. This is apparent where the coastal zone is squeezed between landward coniferous plantations and the sea, resulting in direct loss of habitat.

Soils are an integral part of natural habitats, containing evidence of phases of previous landscape stability and instability, along with important information concerning trends and timescales. Therefore, soil responses are critical to establishing cause and effect of coastal change.

Statistically, soil characteristics from bare sand and mobile dune communities are similar, grouping these environments into 'frontal dunes'. Fixed dune communities, pasture, scrub, deciduous woodland and coniferous plantation soils are grouped into 'hind dunes', separating these environments from heath and slack communities. Once National Soil Resources Institute (NSRI) classifications were assigned to each grouped environment, linkages between soil horizon characteristics suggest soil development initiates as raw sand, which progress to sand-pararendzinas through leaching of nutrients. Desalinization and decalcification processes lead to brown earth development, followed by increased acidification resulting in micro-podzol formation. Groundwater gley soils are associated with dune slacks, where drainage is inhibited and anaerobic conditions prevail.

Buried soils and dune sediments: archives for past morpho-dynamics

Once stable soil environment evolution was determined, the effects of coastal change on soil evolution were considered. Frontal dune erosion at Formby Point has re-exposed buried historic soils in dune cliffs and on the upper foreshore, providing a unique opportunity to investigate historic soil environments and to compare them to the contemporary soils. These buried environments provide evidence that the dune system operates in a cyclic nature, with seaward advancements and regressions, interspersed with phases of dune stability and soil development.

A five-stage cyclic model has been proposed; i) ~13th Century transgression of frontal dunes and flattening of dune cliffs; ii) simultaneous soil development and colonization of the seaward advancing shoreline by woodland vegetation; iii) renewed dune formation activity and, subsequent, habitat burial and soil preservation; iv) dynamic,

migrating mobile dune environment with cyclical slack formations and burials; and v) present day truncation of mobile dunes and, subsequent, soil exposure by erosion.

Modelling pedogenesis for future management of the Sefton dunes

Three coastal units have been identified on the Sefton coast, influenced by dune habitat environments, contemporary and historic soils and dune morpho-dynamics.

Unit 1 represents the accreting dune landscape of the northern section of the coast, displaying rapid rates of siltation.

Unit 2 represents the eroding section of coast around Formby Point, displaying rapid rates of acidification and C inputs, as well as exposed historic dune soils on the seaward edge.

Unit 3 represents the dune landscape of the southern part of the Sefton Coast, which is a relatively stable dune system.

The study proposes conceptual soil development models, one for each unit, each accounting for various factors like acidity and distance from frontal/hind dunes. The models simulate the formation and various soil processes by highlighting the impact of geomorphology, soil processes and anthropogenic influences in varying eroding/accreting environments.

Sustainable soil environments and habitats are temporal rather than spatial, and future soil development should be considered as cyclic. This research has established, in the absence of human interference, soil environments can either maintain themselves adequately or develop both laterally and spatially in a recognized sequence, depending on erosional/depositional forces.



A soil profile © Jennifer Millington



Buried soils exposed © Jennifer Millington

Recent research papers of interest to network members

Vegetation

Boyes, L. J. et al. (2010). *Soil nutrients are not responsible for arrested succession in disturbed coastal dune forest*. *Plant Ecology* 208 (2): 293-305
DOI: 10.1007/s11258-009-9706-0

Brantley, S.T. and Young, D.R., 2010. *Shrub expansion stimulates soil C and N storage along a coastal soil chronosequence*. *Global Change Biology* 16 (7): 2052-2061
DOI: 10.1111/j.1365-2486.2009.02129.x

FREE Crutsinger G.M. et al. (2010). *Genetic variation within a dominant shrub species determines plant species colonization in a coastal dune ecosystem*. *Ecology* 91(4):1237-43

Dellafiore, C. M. *The rabbit (Oryctolagus cuniculus) as a seed disperser in a coastal dune system*. *Plant Ecology* 206 (1): 251-261
DOI: 10.1007/s11258-009-9639-7

Hesp, P. et al. (2010). *The effect on coastal vegetation of trampling on a parabolic dune*. *Journal of Aeolian Research In Press*.
DOI:10.1016/j.aeolia.2010.03.001

FREE Miller, T.E. et al. (2010). *Climate and coastal dune vegetation: disturbance, recovery, and succession*. *Plant Ecology* 206 (1):97-104
DOI 10.1007/s11258-009-9626-z

The authors describe a nine year study in Florida attempting to determine the major climatic drivers of vegetation change noting that there is few data available on the subject. They examine the two factors controlling dune formation – the constant action of wind and waves and the periodic disturbance of large storms. There is a tendency for plant communities to undergo succession toward a particular species composition in stable conditions whereas the authors note that larger climatic disturbances push communities away from these deterministic trajectories. Vegetation patterns in different habitats within the dune area are associated with different climatic drivers. Changes in foredune vegetation was significantly correlated with annual and seasonal temperatures and the precipitation associated with summer storms. The interdune species were affected by storm surge while in the backdune, species composition was correlated with precipitation and storm surge.

Coastal Management and Policy

Everard, M. et al. (2010). *Have we neglected the societal importance of sand dunes? An ecosystem services perspective*. *Aquatic Conservation: Marine and Freshwater Ecosystems* 20 (4): 476 – 487.
DOI: 10.1002/aqc.1114

FREE *Journal of Coastal Conservation* Volume 14, Number 2, June, 2010

Special Issue: Changing Perspectives in Coastal Dune Management, Guest Edited by Paul Rooney

This issue contains some of the papers presented at the "Changing perspectives in coastal dune management" conference organised by the network in 2008. There are contributions from the UK, the Netherlands, Germany and Ireland and the subject matter is diverse. There are articles from many network members and one of the articles is freely available online.

Alien Species

FREE Carboni, M. et al. (2010). *Disentangling the relative effects of environmental versus human factors on the abundance of native and alien plant species in Mediterranean sandy shores*. *Diversity and Distributions* 16 (4): 537 – 546
DOI: 10.1111/j.1472-4642.2010.00677.x

Carboni, M. et al. (2010). *Are some communities of the coastal dune zonation more susceptible to alien plant invasion?* *Journal of Plant Ecology* 3 (2):139-147
DOI:10.1093/jpe/rtp037

Maltez-Mouro, S., Maestre, F.T. and Freitas, H., 2010. *Weak effects of the exotic invasive *Carpobrotus edulis* on the structure and composition of Portuguese sand-dune communities*. *Biological Invasions* 12 (7): 2117-2130
DOI: 10.1007/s10530-009-9613-2

Roiloa, S.R. et al. (2010). *Physiological integration increases the survival and growth of the clonal invader *Carpobrotus edulis**. *Biological Invasions* 12 (6): 1815-1823
DOI: 10.1007/s10530-009-9592-3

Geomorphology

Chust, G. et al. (2010). *Regional scenarios of sea level rise and impacts on Basque (Bay of Biscay) coastal habitats, throughout the 21st century*. *Estuarine, Coastal and Shelf Science* 87 (1): 113-124
DOI:10.1016/j.ecss.2009.12.021

Eamer, J.B.R. and Walker, I.J., 2010. *Quantifying sand storage capacity of large woody debris on beaches using LiDAR*. *Geomorphology* 118 (1-2): 33-47.
DOI: 10.1016/j.geomorph.2009.12.006
Lindhorst, S. et al. (2010). *Anatomy and sedimentary model of a hooked spit (Sylt, southern North Sea)*. *Sedimentology* 57 (4): 935-955
DOI: 10.1111/j.1365-3091.2009.01126.x

FREE Lynch, K. et al. (2010). *Coastal foredune topography as a control on secondary airflow regimes under offshore winds*. *Earth Surface Processes and Landforms* 35 (3): 344-353
DOI: 10.1002/esp.1925

Mathew, S. et al. (2010). *Evolution of a beach-dune system following a catastrophic storm overwash event: Greenwich Dunes, Prince Edward Island, 1936-2005*. *Canadian Journal of Earth Sciences* 47 (3): 273-290
DOI: 10.1139/E09-078

Martinho, Caroline T. et al. (2010). *Morphological and temporal variations of transgressive dunefields of the northern and mid-littoral Rio Grande do Sul coast, Southern Brazil*. *Geomorphology* 117 (1-2): 14-32
DOI: 10.1016/j.geomorph.2009.11.002

Monitoring and Mapping

Hanson, H. et al. (2010). *Calculation of beach change under interacting cross-shore and longshore processes*. *Coastal Engineering* 57 (6): 610-619
DOI: 10.1016/j.coastaleng.2010.02.002

Horrillo-Caraballo, J. M. et al. (2010). *An investigation of the performance of a data-driven model on sand and shingle beaches*. *Marine Geology* 274 (1-4): 120-134
DOI:10.1016/j.margeo.2010.03.010

Coastal Policy in the UK

Coastal Planning Guidance for England

In March 2010 the Department for Communities and Local Government published Planning Policy Statement 25 Supplement: Development and Coastal Change. The meaning of 'coastal change' in the PPS is physical change to the shoreline, i.e. erosion, coastal landslip, permanent inundation and coastal accretion.

The guidance sets out the Government objectives for planning for coastal change based on sound knowledge, development control, assessment of risk and long-term planning.

The evidence base for plan-making should be drawn from Shoreline Management Plans (SMPs) and associated maps and data developed by the Environment Agency and local authorities. The local planning approach will be based on the identification of Coastal Change Management Areas (CCMAs). In these CMAAs local authorities will set out the type of development that will be appropriate taking into account the character of the coast including designations and risk

<http://www.defra.gov.uk/environment/flooding/documents/policy/guidance/coastalsqueeze.pdf>

<http://www.communities.gov.uk/publications/planningandbuilding/pps25floodrisk>

PPS25 replaced Planning Policy Guidance 25: Development and Flood Risk (PPG25), published in July 2001. This edition replaces the earlier version of PPS25 published on 7 December 2006. Tables D1 and D2 in Annex D have been revised to clarify the definition of functional floodplain, and to amend how the policy is applied to essential infrastructure, including water treatment works, emergency services facilities, installations requiring hazardous substances consent and wind turbines in flood risk areas.

<http://www.communities.gov.uk/documents/planningandbuilding/pdf/1498576.pdf>

The Planning Policy Statement (PPS) Supplement sets out a planning framework for the continuing economic and social viability of coastal communities. The policy aims to strike the right balance between economic prosperity and reducing the consequences of coastal change on communities.

Forthcoming Events

International Dunes Meeting in southern Africa in 2012?

On a recent visit to North America and Europe in April and May I discussed with colleagues the possibility of holding an international meeting on coastal dunes in southern Africa similar to meetings held in 1989 in Namibia and 1993 in South Africa. I have considered the possible date of August/September 2012 as spring is the best time in SA. Right now we would like to know how many people would be interested. I thought of travelling our coastline to look at dune sites and management problems and experts could present papers on similar problems/research in their countries. From Swakopmund, Namibia down our west coast to Cape Town and then along the south coast and up to Kwa-Zulu Natal there are numerous extensive dune sites and management problems. If there is sufficient interest in a travelling dune excursion/symposium I will carry it further. Please contact me at r.lubke@ru.ac.za and let me know:

I am interested in the dune meeting in SA?

Yes No

I would be willing to help in organisation?

Yes No

I would like to present a paper on my dune studies?

Yes No

The best time for a meeting is?

Aug/Sept 2012

Aug/Sept 2013

Other time?

Prof Roy Lubke
Department of Botany
Rhodes University
Grahamstown,
East Cape
South Africa.



This newsletter has been compiled by John Houston and Charlotte Durkin
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Cover Photo: Parlock Shingle © John Houston

The UK Sand Dune and Shingle Network is based at Liverpool Hope University and is supported by the Higher Education Funding Council for England and Natural England.

