Excursion ‘The Zwin Dunes and Zwin Polders’
Flemish Nature Reserve

(Knokke-Heist, West-Vlaanderen)

10 September, 2008
1. Short description of the area

1.1. name, municipality

Knokke-Heist (prov. West-Vlaanderen)

1.2. biogeographical region

Flemish Coastal dunes

1.3. management authority

Agency for Nature and Forest, Flemish Regional Authority (since 2002)

1.4. protection status

- NATURA 2000:
  - European ‘Habitat’-directive: SAC ‘BE2500001 Dune-sites including the IJzer-rivermouth and Zwin’
  - European ‘Bird’-directive: SPA BE2501033 Het Zwin’

- Spatial planning: mainly designated as ‘nature area with scientific interest or nature reserve’ and ‘nature area’ on the Town & Country Planning Map Brugge-Oostkust (1977)

- Decree of 14 July 1993 on the protection of coastal dunes: the Swimming Pool site (formerly a recreational area) was designated as a protected dune-site

- Flemish Ecological Network: region number 105 : ‘De Zwinstreek’

- Flemish Regional Nature Reserve (ministerial order of 2 December 2003)

1.5. ecological characteristics

soil type

The site came into being during the 19th Century as a broad tidal beach plain that was part of the sea-inlet of The Zwin, which was itself part of the estuary of the river Schelde. In front of this broad beach-plain foredunes started to develop. From the second half of the 19th Century on a dike isolated the beach-plain from the sea. Nowadays the site consists of dunes and especially a large transitional area between
dunes and polders with gradients from sandy soils to clayish soils and from fresh groundwater to salt groundwater.

**ecological key processes**
Storms, wind, eolian sand-transport, also some areas are influenced by seepage of fresh, lime-rich groundwater.

**historical information**
During the 20th Century a large part of the Zwin Dunes and Zwin Polders is largely influenced by human activities: plantations, parcelling, installation of a golf course and a jumping, installation of an airport, the building of bunkers, concrete roads and other war infrastructure in World War I and II. Parts of the dune-system in the project area are now subjected to invasion by scrubs and grasses that both are superseding grey-dunes and wet dune-slacks. The nature values in a part of the project area also decreased by the too strong fertilization of the meadows on the fossil beach plain in the last decades.

**important nature values**
The human activities in the 20th century have left visible footprints throughout the entire area. Parts of the dune-system in the project area are now subjected to invasion by scrubs and grasses that both are superseding grey-dunes and wet dune-slacks. The nature values in a part of the project area also decreased by the too strong fertilization of the meadows on the fossil beach plain in the last decades.

Still the following target habitats (or remainders of it) are distinguished in the nature reserve:

- Open mobile dune (EU-habitat 2120) with *Ammophila arenaria*, *Festuca juncifolia* or *Carex arenaria* as sand fixating plant species.
- Calcareous moss dune (EU-habitat 2130) with *Phleum arenarium* and *Tortula ruralis* var. *ruraliformis* as characterizing species.
- Dry dune grassland (EU-habitat 2130) with *Galium verum*, *Ranunculus bulbosus*, *Thymus pulegioides*, *Orobanche caryophyllacea*, *Rhinantus minor*, *Vicia lathyroides*...
- Moist dune slacks (EU-habitat 2170) with *Salix repens* var. *argentea*, *Sagina nodosa*, *Gentianella amarella*, *Centaurium littorale*, *Centaurium pulchellum*, *Carex flacca*, *Carex scandinavica* ...
- Wet nutrient poor grasslands (EU-habitat 2190) with e.g. *Carex nigra*, *Carex distans*, *Lychnis flos-cuculi*, *Odontites verna*, *Ophioglossum vulgare*...
- Dune brook with *Mentha aquatica*, *Apium nodiflorum*...
- Dune pool with fresh water and surrounding reed and swamp vegetations. Characeae are oligotrophic water indicating taxa.
- Scrub and fringe vegetation (EU-habitat 2160) with *Hippophae rhamnoides*.
- Dune forest (EU-habitat 2180) with alder, birch and willow trees in the marshy environments and birch and oak trees in dry, mesophytic conditions.
- Salt marsh (EU-habitat 1330) with *Oenanthe lachenalii*, *Scirpus maritimus*, *Glaux maritima*, *Triglochin palustris*...
**important ecological constraints**

- The lowering of the ground water level by the drainage of the building pits of swimming pools, under ground car parks in the neighbouring suburban area,... cause a serious disturbance of the hydrology in the region.
- Scrub expansion, increase of rugged areas and grassing reduce biodiversity.
- The presence and encroachment of alien species reduces biodiversity.
- War-related debris and other unwanted hard structures impede sand-drift.
- The recreational pressure should be lowered, guided and supervised.
- The agricultural background of the area results in separate several parcels, herbicide use by tenants...
- The percolation of water towards the polders and with this the expansion of arid zones, reduces habitat diversity.

**1.6. Ecological objectives for the area**

The measures in the project area are recommended by the “Integral perspective for the Flemish nature reserve “De Zwinduinen en –polders, at Knokke-Heist, with attention for recreative joint use”. It was finished in September 2006 and subsequently translated into a management plan. This management-plan for the Flemish Nature Reserve ‘The Zwin Dunes and Zwin Polders’ was approved by ministerial order in September 2007. Since the moment the Flemish Region acquired this area (2002), the mowing and pasture management was started. Also the suppress of exotic species as the Black Cherry (*Prunus serotina*) and Sycamore maple (*Acer pseudoplatanus*) was started, the maintenance of the pathways with among other things a replacement of an old and bad accessible flagstone path into a boardwalk and shell path. Information boards were placed and last but not least the **old swimming pool was pulled down** and a natural like dune landscape with wet dune slacks and slanted dune slopes was created (Herrier et al., 2005). At the end of 2006 the LIFE-nature project ZENO started. ZENO stands for ‘Zwindunes Ecological Nature Optimisation’ and is running from 31 December 2006 onwards to the end of 2010 (4 years) in the project area the Flemish Nature Reserve ‘The Zwindunes and Zwinpolders’.

The main objective of the **LIFE nature project ZENO** is the restoration and maintenance of the natural habitats that are typical for coastal dunes and their transitions to salt marshes and polders. That concerns the restoration and maintenance of the priority habitat of the annex 1 of the European Habitat Directive ‘2130* Fixed dunes with herbaceous vegetation or grey dunes’ and the other European protected habitats ‘1330 Atlantic salt meadows (Glauco-Puccinellietalia)’, , ‘2190 humid dune slacks’ and ‘3140 Hard oligo-mesotrophic waters with benthic vegetation of Chara formations’. The project also intends to give chances to the European protected species with these habitats, e.g. amphibians like Treefrog (*Hyla arborea*) and Great Crested Newt (*Triturus cristatus*) and birds like the Avocet (*Recurvirostra avosetta*) and Bluethroat (*Luscinia svecica*).
2. Management objectives

(1) Drawing up of a hydrological study in preparation of a possible resalinization and rewetting of the fossil beach plain 'Kleyne Vlakte';

(2) Restoration of the microtopography of the fossil beach plain 'Kleyne Vlakte';

(3) The removal of shrub to restore wet dune-slacks and the removal of shrub and removal of soil to restore and create dune-pools;

(4) The removal of exotic tree species to create an open space in an artificial plantation;

(5) The removal of the surrounding vegetation (exotic trees, shrub, brushwood) and remodelling of the shores of the former hunting ponds;

(6) Demolition of an old jumping;

(7) Removal of old fences and the placement of new fences in order to start extensive grazing;

(8) Installation of permanent information-boards to welcome the visitors of the nature reserve;

(9) Organisation of a public information evening and publishing of an information brochure;

(10) Organisation of an exhibition about the project and the importance of Natura 2000;

(11) An international workshop about the restoration and maintenance of the transition grounds from dunes to polder and from dunes to salt marshes in Europe.
3. Stops during the excursion

1. Start of the excursion at the ‘Groenpleinduinen’, Zwinlaan, Knokke-Heist. Short explanation of the Flemish nature reserve ‘The Zwin Dunes and Zwin Polders’ and the LIFE-nature project ZENO. Walk into the Groenpleinduinen and view on the results of the nature restoration works (January 2008) to create a moist dune slack.

2. Since the moment the Flemish Region acquired this area, different actions were already done before the LIFE-nature project ZENO was started in 2006. For example in 2004, the replacement of an old and bad accessible flagstone path into a boardwalk and shell path. Also the old swimming pool was pulled down and a natural like dune landscape with wet dune slacks and slanted dune slopes was created.

3. The Agency for Nature and Forests will also be busy with the restoration of all of the pathways (for the moment they are in very bad condition) throughout the nature reserve which will allow the general public to make optimal and enjoyable use of all of what this nature area has to offer. On this place the old course of the ‘Paardenmarkt Creek’ with some typical dune plants is still visible in the landscape.

4. Also grazing management is one of the actions of the LIFE-nature project ZENO, the first Northern pasture unit is already ready. Some trees and shrub is removed, pools are restored and Shetland ponies and Dune goats have to maintain and restore the typical dune grasslands.
5. In a LIFE nature project the attention for recreational joint use is just important as the restoration of the biodiversity. On this place there is a ‘foraging zone’ where everybody can walk and play without damaging the nature.

6. In the first week of September 2008 another action of the LIFE nature project will start: the restoration of the natural dune habitats in and around the old sandpits of the area 'Tobruk'. By cutting down a number of exotic trees surrounding the ponds, a half-open landscape and a connection between two dune grasslands will be restored. The sludge will be partially dredged from the sandpits and the angled steep slope of the banks will be smoothed out.

7. In 2009 – 2010 excavations will restore the originally existing landscape in the 'Kleyne Vlakte' with creeks and ditches criss-crossing the land. This will promote the creation of wet habitats, and the 'Kleyne Vlakte' will once again become conducive to, and promote, the growth of rare, water-bound plants and water-dependent animals. In addition to the above, from 2007 till 2009 a hydrological study is being carried out to determine the possibilities and feasibility of the rewetting and the possibilities of a partial re-salinization of the ‘Kleyne Vlakte’.

8. The first action of the LIFE-nature project ZENO was the removal of old infrastructure of a jumping. Now a pool replaces the concrete obstacles, a number of poplars is cut down and the course of the historical 'Paardenmarkt Creek' became visible and identifiable again in the landscape. This action was executed in September 2007 and restored the dune grasslands and the half-open character of the transitional grounds from dunes to polder.