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**ZENO,**  
the Little Egret at work in the Zwin Dunes  
and Zwin Polders Flemish Nature Reserve

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Four LIFE nature projects ('ICCI', 'FEYDRA', 'Salt meadows on the Flemish coast' and 'The Uitkerkse polder') have already played an important role in the implementation of the European Natura 2000 network along the short Flemish coastline. Through scientific preparation and a sustained public support campaign were essential to these successes. In addition to their original aims, these projects also had a favourable impact on the conservation policy of the Flemish government and encouraged dialogue between conservationists, local authorities and other interest groups.

Given the experience and results of these successful LIFE nature projects, the time was felt to be right for a fifth one, ZENO (Zwin dunes Ecological Nature Optimisation), a LIFE nature project of the Flemish government's Agency for Nature and Forests.

The project area is the Zwin Dunes and Zwin Polders Flemish nature reserve at Knokke-Heist.

A large part of this area was negatively impacted by human activities to a great degree during the 20th century and grey dunes and wet slacks are now being invaded by scrubs and grasses. The nature values of dune meadows have also decreased, due to over fertilization in the past.

The legally approved management plan for the nature reserve is the basis of this LIFE project. The main objective is the restoration and maintenance of the natural habitats of coastal dunes and their transitions to polders.

## PROJECT AREA

Zwin Dunes and Zwin Polders nature reserve covers an area of 222 hectares of dunes, woodlands and meadows. It is situated between the town of Knokke and the Zwin proper.

Zwin Dunes and Zwin Polders nature reserve is a part of the European Natura 2000 network, because it is situated in the **Special Protection Area BE2501033 'Het Zwin'** in application of **European Birds Directive 79/409/EEC** and, within the framework of **European Habitat Directive 92/43/EEC**, in the **Special Protected Area BE2500001 – Dunes including Yzer river mouth and Zwin**.

Zwin Dunes and Zwin Polders nature reserve consists mainly of rather low coastal dunes and a large fossil beach plain, which was cut off from marine influence in the second half of the 19th century. Before the Zwin Dunes and Zwin Polders were granted protected status as a nature reserve, the area was impacted by human activities such as plantations, the construction of a golf course, a show-jumping arena, an airfield, bunkers, concrete roads and other war-related infrastructure going back to World Wars I and II. This has left visible marks throughout the area. Parts of the dune system in the project area are now being invaded by scrubs and grasses, both of which are superseding grey dunes and wet dune slacks. The nature values in part of the project area have also decreased, because of over-fertilization of the meadows on the fossil beach plain in the last few decades.



Figure 1. Overgrown pond



Figure 2. Show-jumping event called 'Concours Hippique' held annually until 1960

Mindful of the good results and experience of the earlier LIFE nature projects on the Flemish coast and the possibility LIFE projects provide to implement a lot of nature restoration actions in a relatively short period, the Agency for Nature and Forests submitted a new project proposal to the European Commission in 2005. The proposal was approved in the autumn of 2006.

Called ZENO, the LIFE nature project runs **from 31 December 2006 to the end of 2010 (four years)**.

As already stated, ZENO stands for 'Zwin dunes Ecological Nature Optimisation'. This is not a random name: Zeno is the protagonist in 'The Abyss', a novel by Marguerite Yourcenar, which is partly set in the dunes near the Zwin. The mascot of the Zwin Dunes and Zwin Polders has not been chosen randomly either: the Little Egret loves to roam the creeks and forage for food in the brackish marshlands and polder fields, and feels completely at home in the Zwin region. The project budget is €2,537,060. Fifty percent of this budget will be paid by the Agency for Nature and Forests, the other half by the European Union.



Figure 3. Little Egret



Figure 4. ZENO logo

## II OBJECTIVES OF THE ZENO LIFE NATURE PROJECT

The main objective of the project is the restoration and maintenance of the natural habitats typical of coastal dunes and their transitions to salt marshes and polders. These are the priority habitat of Annex 1 of the Habitats Directive 2130\* 'Fixed dunes with herbaceous vegetation (grey dunes)' and the other EU-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 improve the prospects of EU-protected species in these habitats, e.g. amphibians such as Tree Frog (*Hyla arborea*) and Great Crested Newt (*Triturus cristatus*), and birds such as Avocet (*Recurvirostra avosetta*) and Bluethroat (*Luscinia svecica*).

The measures in the project area are recommended in the "Integral perspective and management plan for the Zwin Dunes and Zwin Polders Flemish nature reserve" at Knokke-Heist, with attention for recreational joint use". This provides a detailed description of the methodologies to be used to remedy the damage inflicted on the natural environment, ensure its maintenance after restoration and enable recreation in the area without inflicting further damage.



Figure 5. Tree frog (*Hyla arborea*)



Figure 6. 2190 Humid dune slacks

The second objective of the project is communicating with the general public, sharing information and experience with regard to the restoration and maintenance of dune to polder and dune to salt marsh transition zones in Europe.



# CONCRETE ACTIONS OF THE ZENO LIFE NATURE PROJECT



Figure 7. Planning of restoration work during the ZENO LIFE nature project

## RESTORATION OF WET DUNE SLACKS AND POOLS

In the past few years, most of the pools and wet dune slacks have been invaded by shrubs and grasses. The shrub will be cleared, existing pools will be re-profiled and some new dune pools will be dug to create an attractive landscape for felworts, orchids, tree frog, crested newt, natterjack toad etc.



*Figure 8. Restoration of wet dune slacks in the western corner of nature reserve (Far West) (December 2009)*



*Figure 9. Cutting sods of grass in the western corner*



*Figure 10. Restoration of a dune pool of the northern part*

## RESTORATION OF THE NATURAL DUNE HABITATS IN AND AROUND THE OLD SANDPITS

During the past century, exotic tree species, mainly pine (*Pinus pinaster*) were planted and sandpits dug in the part of the Nature Reserve called Tobruk. As a result of these human activities, the indigenous dune vegetation was overwhelmed and biodiversity in the area was consequently greatly reduced. Cutting down a number of trees surrounding the ponds will restore a half-open landscape and the connection between two dune grasslands. The sludge will be partially dredged from the sandpits and the angled steep slope of the banks will be smoothed out. This will allow the ponds to receive more light, contributing to much improved water quality. This will all benefit the local fauna and flora.



**Figure 11.** Restored area in and around the old Tobruk sandpits



## RESTORATION OF THE MICRO TOPOGRAPHY OF THE KLEYNE VLAKTE

The southern part of The Zwin Dunes and Zwin Polders used to be a tidal shore plain with salt marshes separated from the sea by a dyke since the 19th century (the International Dyke was constructed in 1872). The eastern part of this region known as the Kleyne Vlakte was levelled in the 20th century for the construction of an airfield. The last plane landed in 1959 in the Kleyne Vlakte, which is now essentially made up of (early fertilized) meadows. A hydrological study was conducted in 2007-09 to determine the options and feasibility of rewetting the Kleyne Vlakte. Restoration work began at the end of 2009 and will be completed at the end of 2010.



*Figure 12. Kleyne Vlakte before the work*



*Figure 13. After the work (April 2010)*

Excavation will restore the original landscape in the Kleyne Vlakte of creeks and ditches crisscrossing the land. This will facilitate the creation of wet habitats, so the Kleyne Vlakte will once again sustain the growth of rare water-bound plants and water-dependent animals.

## REMOVAL OF OLD INFRASTRUCTURE

A show-jumping arena was built in the Kleyne Vlakte in 1929-30. The Concours Hippique, a famous event, was held every summer until the 1960s. Some old infrastructure was still visible in the landscape. As part of the ZENO LIFE nature project, in September 2007 the concrete obstacles were replaced by a pool, a number of poplars were felled and the route of the historical 'Paardenmarkt Creek' became visible once again in the landscape. This restored the dune grasslands and the half-open character of the dune to polder transition zones.



*Figure 14. Show-jumping arena before the work*



*Figure 15. Show-jumping arena after the work (October 2007)*

## GRAZING MANAGEMENT

Livestock (cows, goats, horses, donkeys and sheep) used to graze the dunes. Grasses and scrubs started to invade the grey dunes, the dune grasslands, and the wet dune slacks as a result of the absence of such grazing since the middle of the 20th century. That problem has now been tackled by digging out soil, felling trees and shrubs, mowing, and introducing efficient grazers such as Scottish Highland cattle, Shetland ponies and Konik horses. Grazing management with these grazers has had positive results in other dunes along the Flemish coast (restoration of species rich grassland, creation of a mosaic landscape) (Hoffman et al. 2005).

A typical Belgian breed, the Dune Goat is another grazer that has been reintroduced into the Zwin Dunes and Zwin Polders for the first time since the World War I. In this endeavour the Agency for Nature and Forests is working with the Living Heritage Foundation, a non-profit organization working for the maintenance of original stocks of goats, sheep, cattle etc, which are typically very rare now. The Agency also works with the Living Heritage Foundation to introduce sheep in the Kleyne Vlakte. Such methods enable the typical biotopes in the coastal dunes and dune to polder transition zones to be maintained or where necessary restored to a sustainable condition. There will be five grazing units by the end of the ZENO LIFE nature project.



*Figure 16. Dune Goat*



*Figure 17. Scottish Highland cattle*

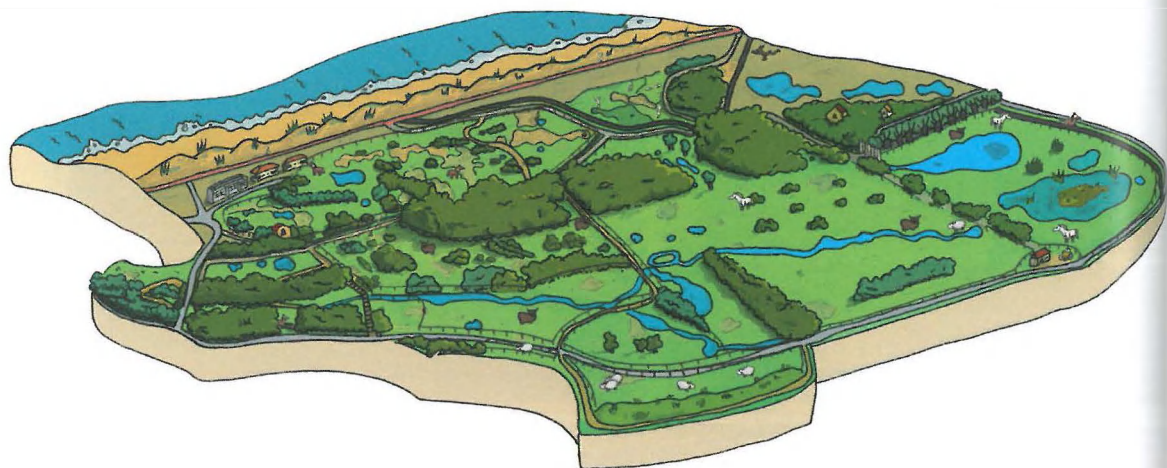
## SHARING INFORMATION

Information boards have been erected at appropriate locations during work to inform visitors about current accessibility and alternative routes. They also provide an explanation of the work methodologies and the rationale behind the work. The general public was informed about ZENO at an evening information session on 29 January 2008. Leaflets, a website ([www.lifenatuurzeno.be](http://www.lifenatuurzeno.be)), press releases and conferences, excursions, information signs and an exhibition during the summer of 2010 are other tools to inform the general public, which is thus full aware of what is going on in the Zwin Dunes and Zwin Polders. This international workshop also enables experience of this kind of management to be shared.



## IV CONCLUSION

The five LIFE nature projects on the Flemish coast have had and continue to have effects that exceed their original purpose. They have not only enabled **large-scale nature restoration** in a short time, such as the demolition of the naval bases (ICCI) and the partial deforestation of Hannecartbos (FEYDRA), which would have been very difficult to achieve without EU support. The huge added value of these projects is **the impact they have had and continue to have on the dialogue between conservationists and other actors**. The projects have also boosted Flemish nature management along the coast: the total surface area of coastal nature reserves has increased from 450 hectares in 1996 to 1,213 hectares in 2009.



*Figure 18. Simulation of the Zwin Dunes and Zwin Polders*



ZENO LIFE is almost completed. The initial results of ZENO LIFE are hopeful: revived dialogue with other actors, which has even resulted in a new EU project proposal, great dynamism in the nature reserve, enthusiastic visitors and residents, and fast implementation of the management plan. The first plants typical of dune-polder transitions have already established themselves. A carpet of Seaside Centaury (*Centaureum littorale*) was already present in the Groenplein dunes in the summer after the work. And, most strikingly, on 7 September 2009 a new plant species *Juncus anceps* was found in the Far West, in the zone where sods of grass were excavated (Leten M. et al. 2010). According to Van Landuyt (2006) this plant species had not been found in Belgium since 1924. However, in 1998 Lambinon et al. contradicted this by stating that it had not been found in Knokke since 1983.

The first Tree Frogs (*Hyla arborea*) in a very long time were also heard in the Zwin Dunes and Zwin Polders during the spring of 2010.

The ZENO LIFE nature project has therefore produced some very hopeful results.

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