

## **Monitoring dune dynamics in 'De Kerf' (NL) 1997-2003**

Hans Elger Wondergem

Staatsbosbeheer Directie-West,  
PO Box 58174, 1040 HD Amsterdam, the Netherlands  
E-mail: h.wondergem@staatsbosbeheer.nl

### **Abstract**

In the Netherlands 'De Kerf' was initiated as a pilot project for dynamic coastal management. Within this pilot project five years of monitoring and evaluation was applied. The monitoring of the geomorphological development and of the vegetation and flora was sufficient for recording significant changes in ecotopes. The monitoring of macrofungi and Carabidae confirmed these results. The monitoring of reptiles and birds gave only qualitative information.

Keywords: Monitoring; Evaluation; Coastal dunes; Restoration; Management.

### **Introduction**

'De Kerf' is located in 'de Schoorlse Duinen' in the northern part of the mainland coast of Holland and is managed by Staatsbosbeheer. It was here that in 1997 a notch was created in the foredune. Vegetation and topsoil were removed from the dune slack behind and active management was stopped. These measures were part of a pilot project within a bigger program for dynamic coastal management from the Dutch government. The general objective of the programme was a more natural coastal defence and the return of landscape forming processes, which characterize dune ecosystems. Marine influence, active sand transport and deflation of dune slacks till groundwater level, lead to gradients in the landscape and to a larger diversity of ecotopes. This pilot project became well known as 'De Kerf'. Part of the pilot was a monitoring programme and an evaluation after five years of the processes and development of the abiotic and biotic-environment of 'De Kerf' (Staatsbosbeheer, 1997).

### **Monitoring**

The geomorphological development was monitored. Parts of the dune slack are stabilised by vegetation after five years. However, because of the notch in the foredunes, sand was blown from the beach and transported inland, resulting in the deposition and the development of small dunes. The supply of fresh beach sand and occasional flooding, in combination with a high recreation pressure, prevented stabilisation. Another effect of

fresh beach sand was the input of carbonates in a more acid ecosystem, resulting in a greater biodiversity (Arens, 2003).

The development of vegetation and flora have a direct relation with the degree of dynamics in the area. During the first years the inundations had a substantial effect on the vegetation development in the sod cutted southern part of the duneslack. Because the frequency and scope of inundations have decreased during the last years, the influence of the suppletion of sand increased. Monitoring of the vegetation and flora recorded great changes. Diversity in communities and species has increased. Red list flora species have grown from 8 up to 15 species in 2003. These changes point at an increase of marine and aeolic influence in the area and indicate gradient-richness (dry-wet, saltwater-freshwater, acid-basiphilous) (ten Haaf and Kat, 2003).

In the monitoring program the Mycoflora is described as a quick responder on changes in the degree of coverage and vegetation development (Staatsbosbeheer, 1997). The results of the monitoring confirmed this. A problem with the monitoring of macrofungi is their great variety in fructification each year. To obtain a representative scope of the Mycoflora three continuous years of monitoring are required (Groenendaal, 2003).

Though a lot of research has been done on Carabidae, the use of this specific group of Coleoptera for monitoring is not very common. The indications of ecological changes in the population (species and numbers) of Carabidae in 'De Kerf' match with the results of monitoring geomorphological development and changes of vegetation, flora and macrofungi (Vertegaal *et al.*, 2003).

Although the monitoring programme proposed an annual breeding bird inventory, actual monitoring only took place in 2002. Because of the very small populations and size of the monitoring area, the statistics are not very discriminating. It's hard to tell whether changes are caused by the habitat development on the site or by chance. Monitoring of birds on this scale isn't reliable, and therefore not useful for evaluation (Wondergem, 2003a).

According to the monitoring program Sand lizard (*Lacerta agilis*) should also have been monitored. Unfortunately no standardized monitoring was done until 2002. In 2002 the species was recorded within 'De Kerf', but not on the open sod cutted dune slack. Within the Carabidae-monitoring Sand lizard was also caught, mostly in the borders of the dune slack. The population of Sand lizard was probably not negatively influenced by the initiation of dynamics in 'De Kerf' (Wondergem, 2003b).

## Conclusions

Monitoring of 'De Kerf' resulted in a lot of information and knowledge of restoration of dynamics in the dune. The measures were a novelty within the Dutch tradition of coastal defence and some aspects of the monitoring were a novelty too.

Development and changes of 'De Kerf' were well recorded by monitoring the geomorphological development and confirmed by the monitoring of vegetation and flora. The monitoring of macrofungi and Carabidae also confirmed these conclusions,

though methods were not standardized. Breeding birds and Sand lizard (*Lacerta agilis*) showed some qualitative information though methodological problems occurred. Essential information is collected by monitoring geomorphological development and vegetation and flora. For a successful monitoring programme two premises are relevant: a detailed description of the site (abiotic and biotic) before measures are taken and the use of reference sites during the monitoring period to discriminate site-specific factors from local, regional and national trends (Vertegaal *et al.*, 2003).

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