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The Geodiversity in Drift Sand Landscapes of The Netherlands

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The authors carried out detailed field studies of more than twelve drift sand landscapes in The Netherlands. The objective of these studies was to restore Natura-2000 values by restoring the wind activity. Active drift sands occur almost exclusively in The Netherlands, Natura 2000 habitat 2330 'Inland dunes with open Corynephorus and Agrostis grasslands', for which reason our country is largely responsible for this European landscape.

Active drift sands had almost disappeared for two reasons: first, the stabilization of the drift sands by air pollution, mainly nitrogen, which stimulates the growth of algae and grasses that initiate soil formation, and second, by the growth of forests surrounding the sands, which decreases the wind force.

The restoration studies revealed differences in the geodiversity between and within the drift sand areas. Whereas the drift sands on geological and soil maps show as almost homogenous areas, they have in fact highly variable geo-conditions of which examples will be given. These geodiversity aspects concern differences in geomorphological structure, origin, sediments and age of the drift sands. Differences in wind and water erosion, trampling and soil formation add to the geodiversity within the drift sand areas. Especially in the primary stages of succession the differences in geodiversity are relevant for the Natura-2000 values.

We discerned three main types of active sands. Firstly, the impressive drift sands with large parabolic dune structures, often consisting of series of interlocking parabolic dunes. They developed from the northeast towards the southwest, against the direction of the dominant wind, and must have taken centuries to develop. Small parts of these systems are still active, other parts show different degrees of soil formation. Their origin is still unclear but probably dates from medieval times (Heidinga, 1985, Jungerius & Riksen, 2008). Second are the drift sand areas with irregular hills from 0.5 to about 2 metres high. They are common near villages. They originated through sand blown from fallow agricultural fields and local overgrazing. They vary in age from prehistoric to modern time and are now mostly planted with forests. Third are the linear drift sand areas with one to three metre high ridges that align old roads and originated through dust whirled up by horses and carriages over many centuries. They also occurs within drift sands of the first system.

In the re-stabilization of reactivated drift sands, differences in geodiversity on a still more detailed scale are important (Ancker, Jungerius et al. 2013). Even a small change in slope can cause primary dunes to develop and stop wind erosion.

Gradually the geodiversity aspects are recognized as relevant for the management of active and fossil drift sands, and also is becoming a management issue in itself.

An important future research issue is the completion of the Drift Sand Atlas, a project that describes the geodiversity aspects of all drift sand areas of The Netherlands. This project has been retarded by lack of means. Knowledge of the geodiversity also is important for correct sampling of C14 and luminescence data. Other future research includes the processes that caused the formation of 'randwallen' (rim walls), rates of water and wind erosion and soil formation and links between flora, fauna and Natura 2000 species.

References