

Restoration of inland sand dunes in site-typical habitat complexes of a floodplain ecosystem*

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Most open land habitats in central Europe developed due to human activities, especially on the basis of extensive land use practised in historical times. As a consequence, a wide variety of habitats arose in central Europe. Many of them, however, have meanwhile disappeared. In the Emsland region (Northwest German Lowland, Lower Saxony) it was possible to restore inland sand dune complexes in an alluvial pasture landscape, characterised by pioneer stands, wetlands, and dry sites on formerly intensively managed maize / cereal field and pastures.

The main question was, if it would be possible to establish persistent site-typical target communities on newly built 'neo-dunes'.

After having introduced favourable abiotic conditions in the restoration area (dykes were moved backwards and a landscape relief was established on two meander loops of the river "Hase"), the target plant communities (Spergulo-Corynephorum, Diantho-Armerietum) were transferred into the restoration area. This was arranged by inoculation of mown and raked plant material taken from the target plant communities (nature reserve "Sandtrockenrasen am Biener Busch", Lingen/Ems and others), which should serve as reference systems.

The vegetation was analysed by relevés and multivariate ordinations. The ordinations show increasing floristic similarities of the inoculated plots, which developed in the direction of their target communities within three vegetation periods. A comparison of inoculated and non-inoculated plots showed that inoculated plots have significantly higher species numbers. Additionally, an enclosure system was established to investigate whether cattle grazing would support the development of the sand ecosystems. Grazing impact was also examined on the basis of a grid system covering the whole area and by using a scale of six levels [1] to assess the removed phytomass on each grid plot. According to the results of the grid-based analysis (which was completed by yearly relevés), cattle generally prefer plant species of moist and fresh grasslands in the studied vegetation mosaic. Target species of the Spergulo-Corynephorum were not preferred but the open dune structures served as resting areas. We also studied the pattern of dung deposition and its relation to grazing intensity. It was shown that faeces are more or less homogeneously distributed in the area and are not connected to the sites of high grazing pressure [2].

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References

- [1] Stroh M, Storm C, Zehm A, Schwabe A (2002) Restorative grazing as a tool for directed succession with diaspore inoculation: the model of sand ecosystems. *Phytocoenol.* 32 (4): 595-625.
- [2] Stroh M, Kratochwil, A, Schwabe A. (2004) Fraß- und Raumnutzungseffekte bei Rinderbeweidung in halboffenen Weidelandschaften: Leitbildflächen und Restitutionsgebiete im Emsland (Niedersachsen). *NNA-Ber.* 17 (1): 133-146.

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