Impact of drainage and climate change

Drentsche Aa

The construction of drainage and irrigation systems in agriculture are interventions that can have significant effects, in particular on groundwater levels and seepage. The Province of Drenthe has therefore made agreements with the farmers' organisation LTO Noord, as well as nature and environmental organizations about drainage and irrigation in and around Natura 2000 areas in Drenthe. With this stakeholder support, a set of measures has been developed and implemented in each Natura 2000 area, to further improve the hydrological status of each area. Part of the improvement package is a buffer zone, to be determined with general rules for drainage and irrigation, so that no licensing procedures are necessary in the future.

The province of Drenthe has used the existing SIMGRO model to elaborate the effects of tube drainage on the Natura 2000 areas as part of the Interreg VB project TOPSOIL. To make the model suitable for such simulations, the hydrogeological schematization has been updated. The aim of this project is to gain insight into the effects of tube drainage on the Natura 2000 areas in the Drentsche Aa catchment. Not only the current research zone must be calculated, but also the effect of a narrower buffer zone, possibly in combination with the deepening of existing drainage. The effect of climate change and drainage is also estimated with the model.

Simulations of the current situation and the worst-case scenario provides a picture of the extreme effects resulting from installed tube drainage in all agricultural land outside the current research zone. If the research area is reduced to 500 m, the phreatic effects become slightly greater in spring (up to 3 cm) and up to about 5 cm in a buffer zone of 200 m. Outside the N2000 area, at the drained plots, the groundwater level will be lowered by more than 20 cm.

When the existing tube drainage is laid shallower, we mainly see local effects at the drained plots. With this scenario, more water is retained on the farmland. However, the effects radiate only to a limited extent to the environment. Only where the tube drainage is situated close to the stream, do the phreatic effects (up to 2 cm) affect the habitat types.

In the W_H climate scenario, the effects for the N2000 area are considerably greater than the effect of changing the depth of the tube drainage, or the effect of a narrower buffer zone. In the stream valleys the groundwater levels rise up to about 10 cm in spring. In the summer, the groundwater level drops about 30 cm.

It is recommended to replace the tube drainage at a shallower level in the entire Drentsche Aa basin. Although the effects are limited, more water is retained on the higher grounds. This not only benefits nature but - with an increasing chance of dry summers due to climate change - it also reduces drought damage to agriculture. Moreover, sprinkler irrigation is less necessary then.