QUANTITATIVE ESTIMATION OF THE CONTRIBUTION OF THE VEGETATION TO THE EVAPOTRANSPIRATION OF WET DUNE SLACKS

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During the last decades the surface of species rich herbaceous vegetations of dune slacks has decreased strongly due to lowering of the groundwater-table and scrub-encroachment. In several hydrologically intact dune areas, scrub vegetations are recently partly removed, enabling the development of herbaceous vegetations. Such drastic measures seem to be necessary to preserve the populations of a number of specific plant species. Large-scale interventions in the vegetation dynamics of a relatively natural ecosystem, like coastal dunes, require however a profound insight of the most important processes. Therefore, knowledge of water consumption of a number of the most important herbaceous and scrub species for these ecosystems can allow to support management decisions, especially large-scale scrub removal projects.

The main objectives of this project were (i) the study of the evapotranspiration characteristics of the different vegetation types based on ecophysiological research of representative herbaceous and scrub species and vegetation types; (ii) the study of the dynamics of the groundwater-table under the different vegetation types by means of observation wells; and (iii) the integration of objectives (i) and (ii), so that the influence of the different representative vegetation types on the hydrological balance can be estimated, together with the influence of scrub removal on the hydrological balance, to support active dune management.

Stomatal conductance was intensively measured for both the selected herbaceous and scrub species. The data revealed that stomatal response to solar radiation, vapour pressure deficit of the air and air temperature was highly variable and not basically different for herbaceous and scrub species. When merging all data for respectively the herbaceous and scrub species, it seemed that the maximal stomatal conductance for scrub species (0,03 s m^{-1}) was slightly higher than that for the herbaceous species (0,02 s m^{-1}).

The leaf area index (LAI) was determined using as well an optical as a destructive method. Based on the destructive method, stand LAI was determined after scaling up the destructively obtained data with the results of the vegetation survey. Main outcome was a higher LAI of the scrub vegetations (1,6) compared to the herbaceous vegetations (0,4).

The above data, stomatal conductance and LAI, were consecutively used as input parameters for the vegetation model FORUG. Simulation results clearly showed that the evapotranspiration of the scrub vegetation was much higher than that of the herbaceous vegetation types. For the measurement period, from the beginning of April till the end of October, total evapotranspiration (including plant transpiration and soil evaporation) was respectively 164 and 427 mm $year^{-1}$, for herbaceous and scrub vegetations. Taking also the interception evaporation, from plants and soil litter, into account this evapotranspiration was respectively 201 and 540 mm $year^{-1}$, for herbaceous and scrub vegetations.

Groundwater data are currently being processed.