

**A DECISION SUPPORT SYSTEM FOR SUSTAINABLE PEATLAND
MANAGEMENT REGARDING LONG-TERM CHANGES IN ECOSYSTEM
FUNCTIONS**

Knieß A., Trepel M.

In many European regions current use of peatlands is connected with several environmental problems. These include high emission of greenhouse gases, high discharge of nutrients into surface water, subsidence of peat soil and reduction of biodiversity. In order to develop sustainable land use strategies in Europe tools for the evaluation of long-term changes in ecosystems are essential. Experimental studies are usually planned for short periods. Process-based deterministic models have their limits in representing the complexity of process interactions and the long-term trends apparent in peatland ecosystems. Therefore the development of a semi-quantitative, rules based decision support system (DSS) was carried out.

The spatial resolution of the model is the site (field) scale, where the site conditions are controlled by its landscape setting. The model runs with annual intervals, and forecasts the change of the functions over a time span of 10 to 100 years. For practical reasons input data are easily collectable within a few days.

To get an overall view of the development of a peatland system, the DSS is based on the concept of ecosystem functions. The state variables in the DSS are greenhouse gas emissions, nitrogen leaching, proportion of water discharge from different outflow pathways, coverage of functional plant groups and harvest of plants and animal products. These act as indicators for the different peatland functions. The forcing functions, land use and water management, may cause human induced abrupt changes. Slow natural processes such as subsidence and succession cause continuous change of the system's status.

Results from the DSS are represented in time series diagrams for each state variable and in Amoeba-diagrams. Amoeba-diagrams show the relative change of all indicator values of a given time span in one graph. Scenarios with different land use and water management options to explore realistic management targets are presented.

It is believed that the DSS helps to achieve better management decisions as it allows long-term predictions for a peatland site and different important aspects of the development of peatland sites are regarded.