

MODELLING WATER BALANCES OF WETLANDS WITH CONTROLLED DRAINAGE AND SUBIRRIGATION SYSTEMS

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In the last centuries in most of the Middle Europe wetlands water management systems were installed for an agricultural or forestry use of the wetlands. At first these water management systems served primarily the purpose to drainage the wetland areas. But especially in regions with low precipitation and high water demand in the wetlands within the vegetation period the drainage systems later were supplemented with subirrigation systems to increase the agricultural production. Nowadays the intensity of agricultural production has changed because of altered economic boundary conditions in the EU, but the existing water management systems still affect the water balance of these wetlands. Their impact and the possibilities to regulate the water balance with water management measures have to be considered in the planning processes for the improvement of the ecological status and for the long-term protection of these wetlands. Consequently, the models used in the planning process have to be able to accurately represent both the water balance of the wetland areas and the water management of such wetlands.

Within a research project a water balance model especially for wetlands with water management systems was developed. The basis of the wetland water balance model is WBalMo, a commercial available long-term water balance model. Special modules for the calculation of the water balance of wetland sub-areas and the regulation of the water distribution within the stream and ditch system were developed and integrated in the long-term water balance model. It enables the consideration of the most important processes of the water balance of wetlands with controlled drainage and subirrigation systems. In the paper the model WBalMo Spreewald is demonstrated on the example of the Spreewald wetland. The comparisons of observed and calculated water balance parameters and ground water levels of the Spreewald wetland show the aptitude of the model concept for wetlands with water management systems. Hence WBalMo Spreewald was used for scenario investigations to develop water management strategies for the long-term protection of a typical wetland water balance in the Spreewald. The results show the danger for the wetland because of changing climatic and economic boundary conditions especially in the basin of the wetland. Furthermore they point out possibilities to reduce unwanted consequences for the wetland water balance.