Geophysical Research Abstracts,
Vol. 10, EGU2008-A-07010, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-07010
EGU General Assembly 2008

Quantifying the influence of climate and forest management on the lake water balance in a lowland catchment in Germany

M. Natkhin, J. Steidl, O. Dietrich

Leibniz Centre for Agricultural Landscape Research (ZALF) (marco.natkhin@zalf.de / +49-33432-82-350)

Changes of climate and forest management have an influence on groundwater recharge. This can affect the water balance of different landscape elements, especially in areas with low annual precipitation (annual average lower than 600 mm). Groundwater recharge mainly controls the supply of water available for lakes and wetlands. Declining water levels observed in forested catchments in North-East Brandenburg (Germany) are indicators of an actual reduction of groundwater recharge. Quantifying the share of changes in both climate and forest management in this decline is necessary to identify courses of action for improving supply of water for lakes and wetlands. Therefore, analyses of the participating processes using field measurements and water balance modelling are carried out in a small lowland catchment.

As subject of research the lake Redernswalder See (0.5 km^2) was chosen. Changes of climate and forest management are actually observed and will alter its catchment area. During the last 25 years, the water level of the lake declined by more than 3 m accounting for a loss of more than 50 percent of its volume. Hence, the lake is representative for a large number of lakes and wetlands showing declining water levels in the transition zone between maritime and continental climate. Over the last 3 decades annual precipitation declined, whereas potential evapotranspiration increased. Currently, in the Redernswalder See catchment just as throughout North-East Brandenburg, vegetation is dominated by pine monoculture. This differs from potential natural vegetation of beeches and oaks among mixed deciduous forest and pine only in meagre

areas, respectively. Depending on the climate conditions, groundwater recharge may be significantly lower under pine than under broad-leaved trees like beech or oak.

By using the modular water balance model WaSiM-ETH it is possible to separately consider and evaluate all the processes relevant in this Late Pleistocene lowland catchment. This is necessary to separate the effects of climate and forest management. Furthermore, a built-in 2D groundwater model is used as a connector between the catchment and the lake.

Based on this analysis and using regionalised climate scenarios, possible development directions of this lake and ways of forestry conversation for stabilising its water balance will be developed.