



## **Climate change effects on water level extremes modelled for an oxbow**

**A. Hunyady** (1), J. Mika (2), R. Pongrácz (1) and I. Zsuffa (3)

(1) Dept. of Meteorology, Eötvös Loránd University, Budapest, (2) Hungarian Meteorological Service, (3) Water Resources Research Centre (esox@metnet.hu/Fax +36 1 372 2904)

Climate change may increase vulnerability of oxbow ecosystems since dramatic changes of water level may result in temporary or irreversible dry-up of oxbows. The purpose of this paper is to determine how deeply global warming affects the Csatlói oxbow, located on the floodplain of the river Tisza, in Hungary. The presented analysis is based on a meteorological-hydraulic coupled model. The hydraulic part computes daily water level changes based on the water budget components including precipitation, evaporation, and inflow/outflow. The meteorological part simulates temperature and precipitation derived from a monthly climate anomaly generator. It consists of an empirical AR(1) stochastic process perturbed by regional climate change scenario, using the MAGICC/SCENGEN package. No change in standard deviation, auto-correlation and inter-variable correlation is expected, hence, they remain as derived from observed data of a nearby station, Szolnok, for the 1970-1999 training period (preliminary whitened from the linear trends). Water budget of the Csatlói oxbow is computed for the period 1990-2100, expecting moderate global warming according to the B1 scenario. Fifty realizations are considered and the post-processing is focused on the lowest levels within a calendar month and on extremes of the 50-member ensembles. The following conclusions can be drawn: (1) Frequency of extremely low water levels is expected to increase during the 21st century. (2) The monthly minimum water levels are expected to decrease, moreover, extreme drought events sometimes result in temporary drying-up of the oxbow. (3) Duration of periods when the water level remains below a given threshold exhibits significant increase by the last 30 years of the 21st century. Simulated behavior of the water level extremes indicates increasing vulnerability of the oxbow ecosystems in case of similar hydro-morphology and climate tendency, and projecting disadvantageous consequences on tourism, as well.