Geophysical Research Abstracts, Vol. 7, 05915, 2005
SRef-ID: 1607-7962/gra/EGU05-A-05915

Linking hydrology and water quality models to improve water management in the Murray River Basin, Australia

A.I.J.M. van Dijk (1), K. Rutherford (1), M. Kirby, N. Abel (2)

(1) CSIRO Land and Water, Canberra, Australia, (2) CSIRO Sustainable Ecosystems, Canberra, Australia (albert.vandijk@csiro.au)

Water resources throughout Australia are under increasing pressure to satisfy often conflicting environmental and economic objectives. In the Murray-Darling Basin, changes to land use and river management have led to pressure on the Basin's resources, and concern over water quality and ecosystem health. One indicator of changed river management is that the median annual flow to the sea is now only 27% of the natural (pre-development) flow, whereas wetlands along the Murray River are increasingly affected by a decrease in flooding events. Competition for scarce water resources is increasing between agricultural, urban and environmental uses. For example, in a bid to save valuable wetlands for future generations, water allocations equivalent to $\sim$5% of irrigation diversions have already been committed to environmental flows, and this is expected to increase.

A hydrological modelling framework is under continued development to address a variety of related questions: how these environmental flows are to be used most effectively; what the damage is to other water uses; how this damage can be minimised; and how all these will be and are already impacted by changes in climate, land cover, and water use and management. Various factors combine to place a very high demand on such a modelling framework. These include the many different processes and associated spatio-temporal scales of component models; the importance of water quality (stream salinity in particular) in the above questions; the hydrological characteristics of the Murray River system (high level of regulation and diversions, large temporal climate variations, very low runoff coefficient); and a very diverse but fragmented model legacy for components of the river system.

We present the development and characteristics of the current version of this Murray River Water Quantity and Quality modelling framework, with particular attention to:

- the underlying generic modelling system to integrate model components (E2; CRC for Catchment Hydrology, in prep.);

- linking surface and groundwater hydrology;

- reconciling disparate spatio-temporal scales between model components;

- the parameterisation, calibration and validation of the framework and its components.

Subsequently, we present some example scenarios of expected (and often already occurring) natural and anthropogenic changes and the modelled hydrological impacts.