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Using SWAT and MODFLOW to predict salt loads in Barr Creek catchment, South East Australia

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Salt mobilisation from irrigated areas in the Murray Darling Basin (MDB), Australia is a major concern for its impact on downstream irrigation, urban water supply and ecosystems. Barr Creek catchment situated in the MDB is characterised mainly by irrigated pasture, deep drains and shallow saline water tables. The catchment is drained by Barr Creek which is a large exporter of salt to the Murray River. Shallow groundwater seepage into deep drains dominates salt mobilisation in the catchment. In order to quantify and manage salt mobilisation from irrigated areas, there is a need to understand movement of water and salt in the surface and groundwater systems. Spatial and temporal patterns of irrigation and rainfall, temperature, vegetation, topography, hydrogeology and soil types influence water and salt mobilisation processes and consequently the water and salt balances in irrigated catchments. These factors vary across the catchment and interact to determine how much water runs off on the surface and how much water recharges the groundwater system.

In this study we applied semi-distributed SWAT model to simulate salinity impacts due to irrigation in the Barr Creek Catchment. The groundwater component of SWAT model does not take into account the spatial distribution of groundwater processes. However, the fully distributed groundwater model MODFLOW is able to model the interaction between different aquifers, the aquifer and the drains, as well as the spatial-temporal distribution of aquifer heads. Thus, we hypothesised that running MODFLOW using recharge estimates from SWAT would yield improved salt load predictions. Preliminary results showed that SWAT-MODFLOW provided a better estimate of the salt load from the Barr Creek catchment than the single semi-distributed SWAT model.

Keywords: *SWAT modelling, MODFLOW, groundwater discharge, salt load*

Abstract only