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Promoting inquiry, networking and collaboration in the Australian cotton research community

3. Natural Resource Management

Annual entitlement for the Condamine floodplain irrigators – is it really working?

Elad Dafny
University of Southern Queensland

Rigorous analysis of monitoring bores hydrographs demonstrates that since 2008 the water table in the central part of the Condamine Floodplain has stabilized, ending several decades of a consistent decline in groundwater levels. It seems that the stabilization is a result of the 2007 revised water pumping restrictions scheme in the Condamine Groundwater Management Area (CGMA). Prior to 2007, water allocations were set only at the heart of the 'cotton land', between Pampas and Macalister, where the focal of groundwater drawdown was observed. However, this measure had no noticeable impact on groundwater levels. From that year onward, water allocations were also set at the peripheral parts of the CGMA, including the southern part ('sub-area 4'). In this area, groundwater from the upper alluvial valleys, as well as large parts of the basaltic ridges, merge and flow laterally toward the central alluvial aquifer. In other words, pumping reduction in the southern area resulted in an increase in the lateral flow toward the central area, which act to compensate and prevent further drawdowns. These observations emphasise the need in integral water management for the entire floodplain, including target values for sustainable yield for different zones within the basin. Further monitoring and modelling could assist this task.

Recharge processes at the St George Irrigation Area

Elad Dafny
University of Southern Queensland

Since the 1950s, irrigated cropping has taken place in the St George Irrigation Area (SGIA), following clearance of the native vegetation and construction of water canals, carrying river water to the agricultural lands. The change from open-forest to arable lands mostly irrigated involved changes to the groundwater balance and in turn, groundwater quality. Deep-drainage and leaks from the water canals and dams, to name two possible water sources, which carry different amounts of salts into the sub-surface, may affect the groundwater salinity.

The groundwater under the SGIA ranges in quality from fresh water, with about 50 mgCl/L, to salty water, with ~10,000 mgCl/L. We analysed all of the available bore water samples, to detect any on-going salinity trends (rising/stable/falling) and identify potential sources. Results indicate the existence of four end-members, namely, saline formation water, brackish deep-drainage, slightly brackish flood-recharge water, and fresh imported river-water. Each of these has a typical geochemical composition, which allows reconstructing the past and the current recharge processes in the SGIA. The groundwater composition at many bores varied over time, to reflect the changes in the dominant end-member.

This study demonstrates that effective changes in groundwater quality can occur in a relatively short time-frame.