

Hydrogeochemistry of Hodgson Creek Catchment, Queensland Murray-Darling Basin

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The majority of rivers in the Murray Darling Basin (MDB) export more salt than they receive via rainfall or inflow. This is generally ascribed to the change in water balance following clearing and agricultural development. The transfer of salts is generally treated as a hydrological problem, with electrical conductivity (EC) assumed to represent salt load. We use the Hodgson Creek, a 3rd order catchment in the Queensland MDB, to evaluate the efficacy of this assumption and make comment on the simplified notion of EC as a proxy for salinity in surface and groundwaters.

Hodgson Creek exports 9000t/a, or 16t/km²/a; comparable to some of the higher exporting catchments of the southern MDB. Unlike most rivers in the southern MDB, EC in Hodgson Creek groundwaters is dominated by non-chloride salts (mostly sodium bicarbonates). Magnesium is also high, from weathering of the regional basalts. Salt export is dominated by infrequent, large flood events of low salinity, raising the issue of the significance of salt load when describing salinity impacts and end of valley targets.

Hydrogeology of the area can be represented as three groundwater flow systems. Flat-lying, Jurassic coal measures and sandstones are overlain by layered Tertiary basalts, with unconsolidated alluvium filling valley floors.

Of over 1400 bores sunk in the area, only 21 are used for routine monitoring. 500 have geochemical data and 200 are pumped for irrigation. We use chemistry and isotopes to help define the groundwater flow systems and the groundwater attributes required for modelling groundwater and salt movement through this catchment and groundwater and salt evolution through reactive transport.

We compare groundwater chemistry with stream base-flow and examine the significance of this for salinity studies and end-of-valley salinity determinations. We quantify the groundwater component and use equilibrium mass balance reactions to estimate the evolution of waters through the regolith.