# Characterisation of the hydrology of an estuarine wetland

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## Abstract

The intertidal zone of estuarine wetlands is characterised by a transition from a saline marine environment to a freshwater environment with increasing distance from tidal streams. An experimental site has been established in an area of mangrove and salt marsh wetland in the Hunter River estuary, Australia, to characterise and provide data for a model of intertidal zone hydrology. The experimental site is designed to monitor water fluxes at a small scale (36 m). A weather station and groundwater monitoring wells have been installed and hydraulic head and tidal levels are monitored over a 10-week period along a short one-dimensional transect covering the transition between the tidal and freshwater systems. Soil properties have been determined in the laboratory and the field. A two-dimensional finite element model of the site was developed using SEEP/W to analyse saturated and unsaturated pore water movement. Modification of the water retention function to model crab hole macropores was found necessary to reproduce the observed aquifer response. Groundwater response to tidal fluctuations was observed to be almost uniform beyond the intertidal zone, due to the presence of highly permeable subsurface sediments below the less permeable surface sediments. Over the 36 m transect, tidal forcing was found to generate incoming fluxes in the order of 0.22 $m^3$/day per metre width of creek bank during dry periods, partially balanced by evaporative fluxes of about 0.13 $m^3$/day per metre width. During heavy rainfall periods, rainfall fluxes were about 0.61 $m^3$/day per metre width, dominating the water balance. Evapotranspiration rates were greater for the salt marsh dominated intertidal zone than the non-tidal zone. Hypersalinity and salt encrustation observed show that evapotranspiration fluxes are very important during non-rainfall periods and are believed to significantly influence salt concentration both in the surface soil matrix and the underlying aquifer.

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