Title: Flux dynamics at the groundwater-surface water interface in a tropical catchment

Authors: Hai Manh Vu, Margaret Shanafield, Okke Batelaan

PII: S0075-9511(16)30065-2
DOI: http://dx.doi.org/doi:10.1016/j.limno.2017.06.003
Reference: LIMNO 25595

To appear in:

Received date: 23-6-2016
Revised date: 12-5-2017
Accepted date: 13-6-2017

Please cite this article as: Vu, Hai Manh, Shanafield, Margaret, Batelaan, Okke, Flux dynamics at the groundwater-surface water interface in a tropical catchment.Limnologica http://dx.doi.org/10.1016/j.limno.2017.06.003

Flux dynamics at the groundwater-surface water interface in a tropical catchment

Hai Manh Vu[1], Margaret Shanafield[1], Okke Batelaan[1]

[1]School of the Environment, Flinders University, GPO Box 2100, Adelaide, South Australia, 5001

ABSTRACT

Seasonal shifts between wet and dry seasons cause marked changes in river flow regimes and therefore exchanges with the streambed surface. This seasonal variation is particularly apparent in tropical climates, which are characterized by strong differences between wet and dry seasons. However, fluxes between surface water and groundwater and the impacts of these interactions on streambed dynamics are rarely investigated in tropical climates, where few surface water-groundwater field investigations have been performed. In this study, an intermittent river in south coastal Vietnam was investigated to better understand links between seasonal hydrologic shifts, human use of water resources, and streambed dynamics. Three transects along the main tributary were instrumented with water level and streambed temperature sensors to examine both spatial and temporal variability in stream-aquifer dynamics. Calibrated models estimated increasing streambed fluxes along the length of the river, with highly variable fluxes up to 1.6 m^2 h^{-1} upstream and 0.2 m^2 h^{-1} downstream during the rainy season (i.e. the rate of the total amount of water exchanged per meter of river length) decreasing to low fluxes of 1.0 m^2 h^{-1} upstream and 0.15 m^2 h^{-1} downstream in the dry season before flow ceased. During the wet and into the dry season the river was gaining (i.e. flux from the aquifer into the river) at all times and all locations with the notable exception of fluxes into the streambed only at the upstream and downstream sites during peak flow of the largest captured rain event (550 mm in 164 hours). Based on 30 years of precipitation data, this suggests that water is pushed from the stream into the streambed approximately three times