



## **Buffering effects of the lacustrine floodplain on river discharge into Lake Tana (Ethiopia)**

Mekete Dessie (1,2), Verhoest Niko (2), Teshager Admasu (3,4), Valentijn Pauwels (5), Jean Poesen (6), Enyew Adgo (3), Jozef Deckers (6), and Jan Nyssen (4)

(1) School of Civil & Water Resources Engineering, Bahir Dar University, Bahir Dar, Ethiopia, (2) Laboratory of Hydrology and Water Management, Ghent University, Gent, Belgium, (3) College of Agriculture & Environmental Sciences, Bahir Dar University, Bahir Dar, Ethiopia, (4) Department of Geography, Ghent University, Gent, Belgium, (5) Department of Civil Engineering, Monash University, Clayton, Victoria, Australia, (6) Department of Earth and Environmental Sciences, KU Leuven, Heverlee, Belgium

Lake Tana, in the northwestern highlands of Ethiopia, has an extensive lacustrine floodplain in which its tributary rivers meander in the dry season their way to the lake. To assess the effect of this floodplain on river discharge, measurements were made on 12 stations on six tributaries in the basin. The effects of the floodplain on river discharges were investigated in 2012 using the upstream and downstream discharge observations of the Gumara, Rib and Megech Rivers. Total annual runoff coefficients ranged between 0.23 and 0.81 in 2012. River discharge varied depending on drainage density ( $r = 0.75$ ), lithology ( $r = -0.72$  for percentage of Tertiary igneous rocks) and land use/land cover conditions ( $r = 0.61$  for dominantly cropland with no significant other classes). Analyses revealed that the floodplain abstracted 76.9 million  $m^3$  of water with a corresponding increase in floodplain storage of 94.4 million  $m^3$  during the beginning of the rainy season (June to July) and released stored water starting from August until the middle of September. However, the annual water balance indicated that the runoff contribution from the Rib and Megech floodplains is negligible. The lacustrine floodplain downstream of the Gumara River showed a considerable runoff contribution to Lake Tana, also in relation to the presence of springs. The floodplain acts as storage of flood waters, and consequently the magnitude of peak floods was on average 71% smaller in the lower compared to that of the upper stations.