Geophysical Research Abstracts
Vol. 16, EGU2014-204, 2014
EGU General Assembly 2014
© Author(s) 2013. CC Attribution 3.0 License.

Sediment deposition and associated organic carbon dynamics in a tropical River system; the Tana River (Kenya)

Fred Omengo (1,2), Tine Alleman (1), Naomi Geeraert (1), Steven Bouillon (1), and Gerard Govers (1)

(1) Katholieke Universiteit Leuven, Dept. of Earth & Environmental Sciences, Celestijnenlaan 200E, 3001 Leuven, Belgium, (2) Kenya Wildlife Service, P.O. Box 40241-00100, Nairobi, Kenya

Floodplains are known to play a potentially important role in regulating the downstream transport of sediments, carbon, and nutrients in river systems. We investigated sediment and carbon transport, retention and deposition in the floodplains of the lower Tana River (Kenya), between the two main downstream gauging stations Garissa and Garsen. The Tana River is the largest river in Kenya and runs for more than 1,000 km from Kenya's highlands (Mt Kenya and the Aberdare mountains). The catchment covers around 100,000km^2 and the hydrology is controlled by the shifting of intertropical convergence Zone (ITCZ), leading to a bimodal precipitation cycle.

Sediment cores were taken at various sites within the floodplains, and analysed for bulk density, organic carbon (OC) and nitrogen content, stable isotope signatures (δ13C) of organic C, and grain size distribution. We determined 137Cs and 210Pbxs activities in order to estimate historical sedimentation rates and to quantify the post-depositional losses of organic carbon. In addition, we measured fresh sediment deposition rates immediately after an extended period of flooding, along with associated flood heights and the distance relative to the main River .

Fresh sediment deposition rates ranged between 1mm and 15mm for the period of study at an average rate of 1.13 gcm-3 (dry weight). This varied with distance of the floodplain from the main river and its elevation relative to the full bank. The fresh deposited sediment had an average organic carbon content of 1.55 $\pm$ 0.42%.

Sediment cores showed a strong downcore gradient in OC content, from 3 - 12%C in the top layers to typically less than 0.5 % below 50 cm. The C:N ratios varied from 8 to 16 with majority averaging 9-11. Stable isotope signatures (δ13C) of organic C varied between -28‰ to -16‰ for the deeper core samples. 137Cs and 210Pbxs profiles indicate a vertical accretion at an average rate of 0.6 cm per year in the sites measured so far.

The Tana river floodplains thus appear to be important sinks for suspended sediments, thereby regulating the downstream transport of sediments and organic carbon to the Indian ocean. However, the depth gradients in OC stocks suggest that post-depositional mineralization rates are relatively high, suggesting their role as long-term C sinks may be limited.