SPATIAL AND TEMPORAL VARIABILITY OF RIVERINE CARBON AND NITROGEN EXPORT OF KELANI, KALU AND GIN RIVERS IN THE SOUTHWEST MONSOON

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ABSTRACT

Kelani River, Kalu River and Gin River, three largest typical perennial mountainous watersheds in the wet zone of Sri Lanka, were sampled monthly during the period of Southwest Monsoon (SWM) (May to September) in 2016, with objectives of providing baseline data for Organic Carbon and Nitrogen flow to the Indian Ocean and to understand the role of Sri Lankan carbon budget over global carbon cycle. The study was conducted during 20th May to 18th September 2016. Water sampling was done at the middle of the month using a Ruttner sampler under a mean tide level. Concentrations of TSM, TOM, POC, PON, DOC, TDN and DIN forms (NO_2^-, NO_3^- and NH_4^+) were estimated and TOC, DON and TON were calculated, as well as all their fluxes. Mean monthly rainfall over the river basin was calculated and used to understand the correlation between rainfall and fluxes. Exponential relationship ($y = 34.371e^{0.0023x}$) was observed between average monthly stream discharge for each river and monthly mean rainfall over respective river basin, during 2016 SWM. Temporal variation of all 3 forms of DIN, DON and TDN was observed even within the monsoon period. Only NO_2^-, NH_4^+ and DIN were observed with a spatial variation within the 3 rivers. There was no temporal or spatial variation observed in PSM for 2016 monsoon period. Nevertheless, both temporal and spatial variations were observed in POM. Highest TN, DOC, PSM, POM fluxes were recorded as 742.70±0.56 t day^{-1}, 3021±75-5.77 t day^{-1}, 103.75±9.17 Gt day^{-1} and 6.82±0.56 Gt day^{-1}, respectively, in Kelani River for May (Roanu storm period). Total export of PSM and POM was estimated as 572.99±33.61 Gt and 55.54±1.05 Gt for entire SWM period in 2016. NO_3^- was observed with a moderate positive correlation with monthly mean rainfall and stream discharge. Both TDN and DON were positively correlated with monthly mean rainfall, while DOC and PSM were also positively correlated with both monthly mean rainfall and stream discharge. The study also provides basic information for researching how land use may affect climate by measuring the carbon flux in the wet zone, as well as supporting scientists to understand how the wet zone of Sri Lanka affect the global carbon cycle.

Key words;

Total Suspended Matter (TSM), Total Organic Matter (TOM), Particulate Organic Caron (POC), Particulate Organic Nitrogen (PON), Dissolved Organic Carbon (DOC), Total Dissolved Nitrogen (TDN) , Dissolved Inorganic Nitrogen (DIN), South West Monsoon-2016