Introduction

- Rivers play an important role in the global carbon cycle, and process ~2.7 Pg C yr⁻¹ (Auffdenkampe et al., 2011; Fig 1 A).

- Similarly, eutrophication of riverine systems is a global environmental problem and its severity continues to increase in the recent years (Xu et al., 2016).

- In this study, we report the sources of carbon and nitrate and their transformation along the longitudinal gradient of River Sabaki (Kenya).

Study area and Methods

- Sabaki River is the second-largest river network in Kenya with a total catchment area of 46 800 km².

- Its headwaters are located in Aberdare range in central Kenya and Kilimanjaro in Tanzania (Fig 2 A).

- The upper catchment is dominated by agricultural areas while industrial activities and informal settlements dominate the subcatchment around Nairobi city (Fig 2 B).

- The basin is characterized by bimodal hydrological cycle of two dry seasons interspersed by a long (March–May) and short (October–December) rain seasons (Fig 2 C).

- Sabaki River experiences serious cyanobacterial blooms annually due to excessive nitrate inputs associated with industrial and domestic sewage discharge (Fig 2 D).

- Samples for organic carbon pools and nutrients were collected throughout the longitudinal gradient of River Sabaki at equidistant of ~40km during the dry season (August–September 2016) and analyzed using the standard techniques.

Results & Discussion

In situ measurements

- Longitudinal changes of total suspended matter and particulate organic carbon

- The down stream increase in δ¹³C-POC values (p<0.01, Fig 5) could be explained by a combination of two processes: (i) altitudinal differences in the δ¹³C signature of C3 vegetation, and/or (ii) a shift towards a higher contribution of C4 vegetation at lower altitudes as observed in Tana River, Kenya (Tamooh et al., 2012).

- The in situ field measurements of pH, temperature, specific conductivity and % saturation of dissolved oxygen, (B) pHe and specific conductivity and (C) NO3 and NH4 at lower stream of Sabaki River.

- The in situ field measurements of pH, temperature, specific conductivity and % saturation of dissolved oxygen increased steadily during daytime (indicative of CO2 consumption by photosynthesis) and decreased at night (indicative of CO2 release by respiration) (Tamooh et al., 2013).

References


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