Assessment of nutrient retention by Natete wetland Kampala, Uganda

Author(s)

V. Kanyiginya
F. Kansiime
R. Kimwaga
D.A. Mashauri[b]

Abstract

Natete wetland which is located in a suburb of Kampala city in Uganda is dominated by C*yperus papyrus* and covers an area of approximately 1 km^2. The wetland receives wastewater and runoff from Natete town which do not have a wastewater treatment facility. The main objective of this study was to assess nutrient retention of Natete wetland and specifically to: determine the wastewater flow patterns in the wetland; estimate the nutrient loads into and out of the wetland; determine the nutrient retention by soil, plants and water column in the wetland; and assess the above and belowground biomass density of the dominant vegetation. Soil, water and plant samples were taken at 50 m intervals along two transects cut through the wetland; soil and water samples were taken at 10 cm just below the surface. Physico-chemical parameters namely pH, electrical conductivity and temperature were measured *in situ*. Water samples were analyzed in the laboratory for ammonium-nitrogen, nitrate-nitrogen, total nitrogen, orthophosphate and total phosphorus. Electrical conductivity ranged between 113 μS/cm and 530 μS/cm and the wastewater flow was concentrated on the eastern side of the wetland. pH varied between 6 and 7, temperature ranged from 19 °C to 24 °C. NH_4-N, NO_3-N, and TN concentrations were retained by 21%, 98%, and 35% respectively. Phosphorus concentration was higher at the outlet of the wetland possibly due to release from sediments and leaching. Nutrient loads were higher at the inlet (12,614 ± 394 kgN/day and 778 ± 159 kgP/day) than the outlet (2368 ± 425 kgN/day and 216 ± 56 kgP/day) indicating retention by the wetland. Plants stored most nutrients compared to soil and water. The belowground biomass of papyrus vegetation in the wetland was higher (1288.4 ± 8.3 gDW/m^2) than the aboveground biomass (1019.7 ± 13.8 gDW/m^2). Plant uptake is one of the important routes of nutrient retention in Natete wetland. It is recommended that harvesting papyrus can be an effective way of nutrient removal especially phosphorus which is not easily lost to the atmosphere like nitrogen. Natete wetland needs to be left in its natural state for better efficiency in nutrient retention. Bio-manipulation of the wetland by spreading the wastewater as it enters the wetland could enhance the interaction between plants and wastewater and subsequent nutrient removal.

Keywords

- *Cyperus papyrus*;
- Biomass;
- Natete wetland;
- Nutrient retention;
- Uganda