Monitoring Soil Moisture Patterns in an Agriculturally Used Wetland in Central Uganda

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http://www.wetlands-africa.de

Introduction

Recent changes in temporal and spatial rainfall patterns have affected agricultural production in East Africa. Wetlands are being extensively converted into agricultural lands because of their prolonged water availability throughout the year. Intensive cultivation of wetlands may alter their biophysical status hence affecting soil water availability and other water related ecosystem services. Therefore, this study aims at understanding spatial and temporal dynamics in soil moisture in Namulonge inland valley wetland (1100 m a.s.l.) of central Uganda.

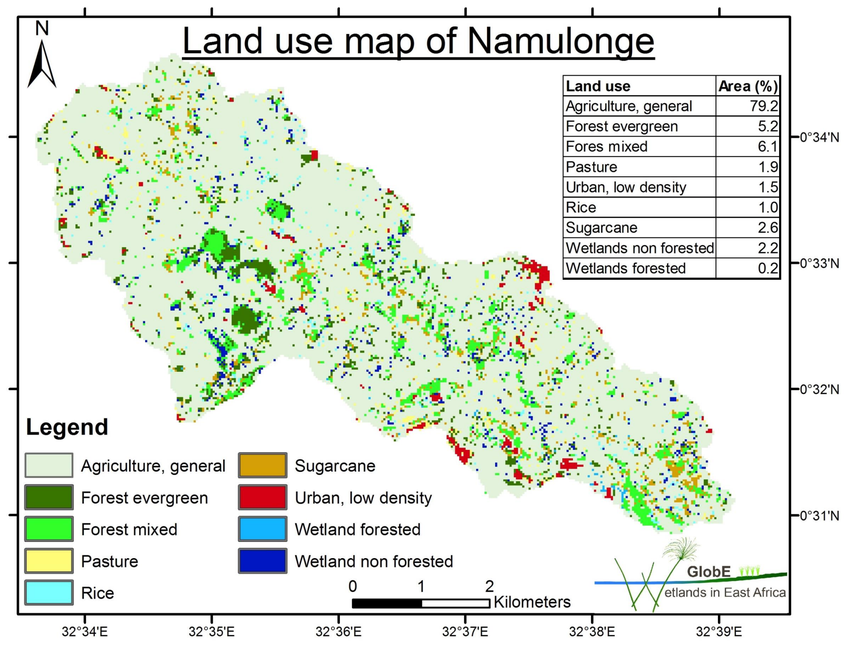

Fig 4. Land use map of the wetland. Derivation with Sentinel 2 satellite images from 2015 and ground truth data.

Materials and Methods

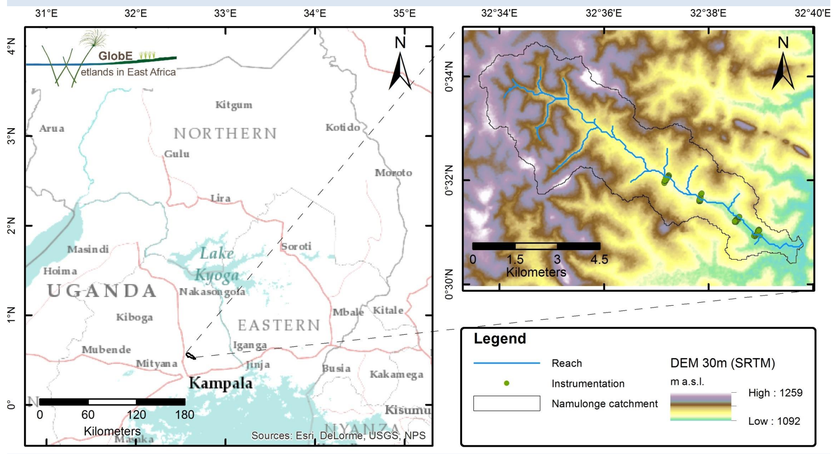

Fig 1.Study area and hydrological instrumentation

- Automatic soil water station and rain gauge at fringe position using FDR system.
- 52 access tubes installed across the hydrological regimes (center, middle , fringe & slope) to monitor soil moisture using FDR system
- 19 piezometers installed for shallow ground water level measurements at one hour time interval across wetland transect
- Stream water level measured at the outlet using a multiparameter probe at 15 minutes interval

Key Findings

- There is a significant ($p<0.05$) difference in soil organic C along the hydrological regimes with increasing trend along the slope.
- There is no significant difference in soil moisture between the center and middle hydrological regimes.
- Soil moisture retention is higher in arrow roots (C.*esculenta*) and fallow lands than in upland crops located in the valley bottom.
- Annual temporal soil moisture and shallow groundwater are higher in the valley bottom than in the fringe position.

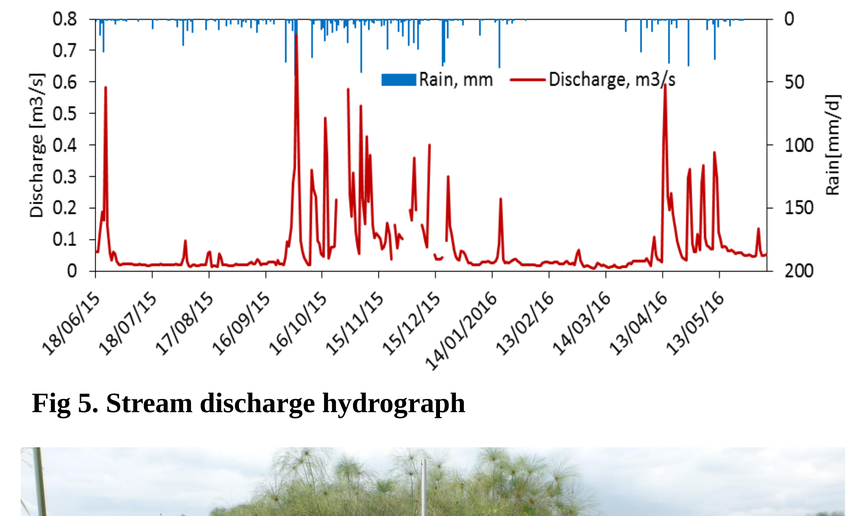

Fig 5. Stream discharge hydrograph

Stream discharge measurement

Results

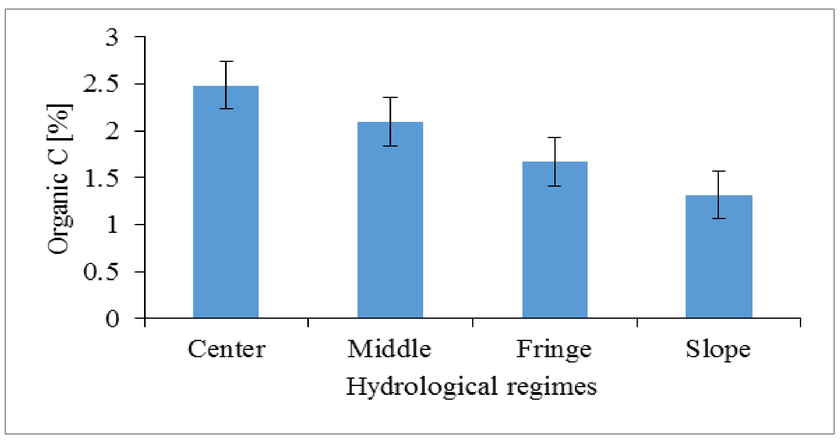

Fig 2.Organic carbon content along hydrological regimes.

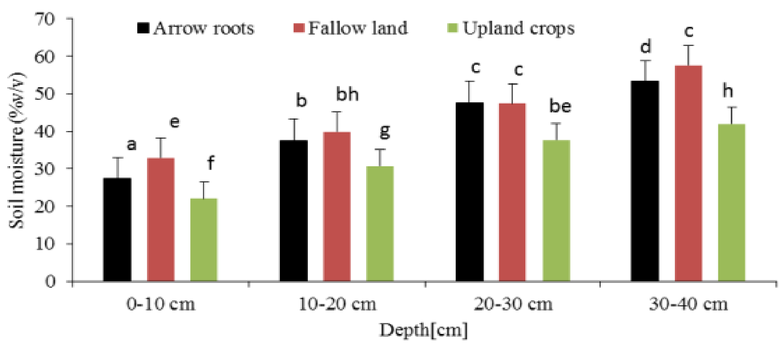

Fig 3. Spatial variation of soil moisture across land use at valley bottom.

Soil moisture instrumentation

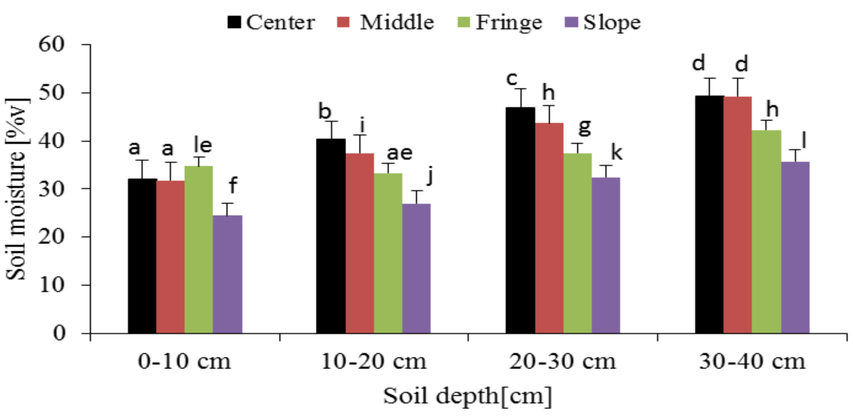

Fig 6. Spatial variation of soil moisture along hydrological regimes.

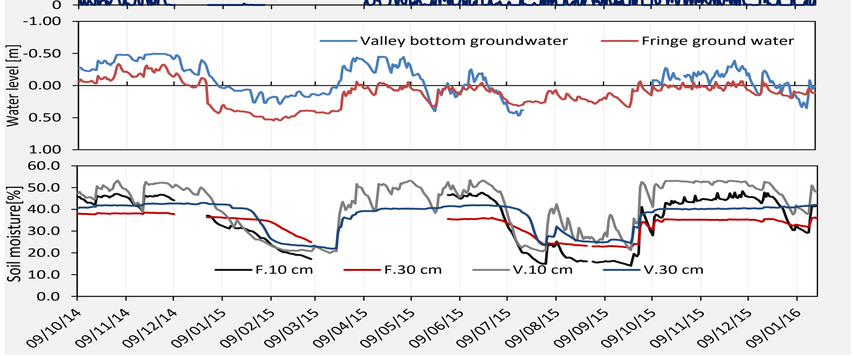

Fig 7. Soil moisture and shallow ground water dynamics along hydrological regimes.

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