Rainfall trends in the Lake Victoria Basin, Uganda

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Rainfall trends in the Lake Victoria Basin, Uganda

BY EGERU ANTHONY

The ferry from Bukakata to Luku (Kalangala Island, part of the Ssese Islands in Lake Victoria).

Lake Victoria is an important water mass that has influence on rainfall in the Lake Victoria basin. The effects of the rainfall are limited on the northern and western shores of the lake as they do not exceed 40 km inland. Typically, rainfall increases from east to west with average gradient between 600 to 2,800 mm annually.

The Victoria basin's temperatures reach a maximum level in February, shortly before the March equinox. Meanwhile the lowest temperatures are often experienced around July shortly after the June equinox. The temperatures in the basin depending on the location generally range between 28.6C-28.7C (maximum) and 14.7C and 18.2C (minimum).

The basin's hydraulic processes are greatly influenced by seasonal wind movements with a convergence zone often occurring over Lake Victoria (Figure 1). Wind movements parallel to the equator often occur in the months of January and February and between June –September. These movements are predominantly in the east-west orientation; these winds emerge from western parts of Kenya and partly Tanzania. They are quite dry but quickly get moisturized as they traverse through Lake Victoria; eventually creating rainfall in the western parts of the lake (COWI Consulting Engineers, 2002). The pattern however changes during the months of March-May and October-December; with the winds changing direction to the north ending of the lake.

Over the years, rainfall in the basin has fluctuated with debilitating impacts. This is because 80% of the lake's water input is from rainfall; as such the lake is generally described as an "atmosphere controlled" lake (Tate et al., 2004).. In that regard, the variability of rainfall over the lake both spatially and temporally is important in influencing the lake's water levels. Research into the spatial and temporal variability of rainfall over Lake Victoria basin have been undertaken by several researches but have shown no significant trends.

However, from time to time, dry spells continue to occur over the basin, leading to the necessity to show not only the patterns but the intensity of rainfall variability in the basin as well. In this current work rainfall trends and intensity of variability over the basin in the Uganda part are shown, using data from five weather stations (Masaka, Wakiso, Kampala, Mukono and Jinja). Data covers 35 years (1980-2014).

With 1980 as our base year, three (Kampala, Mukono, Jinja) out of the five rainfall stations show a positive rainfall trend (Figures 2-5). Meanwhile Masaka district rainfall revealed a declining trend (Figure 6). The significance of these trends is however limited. A comparison of monthly rainfall patterns indicated that Wakiso district had a higher increase in the

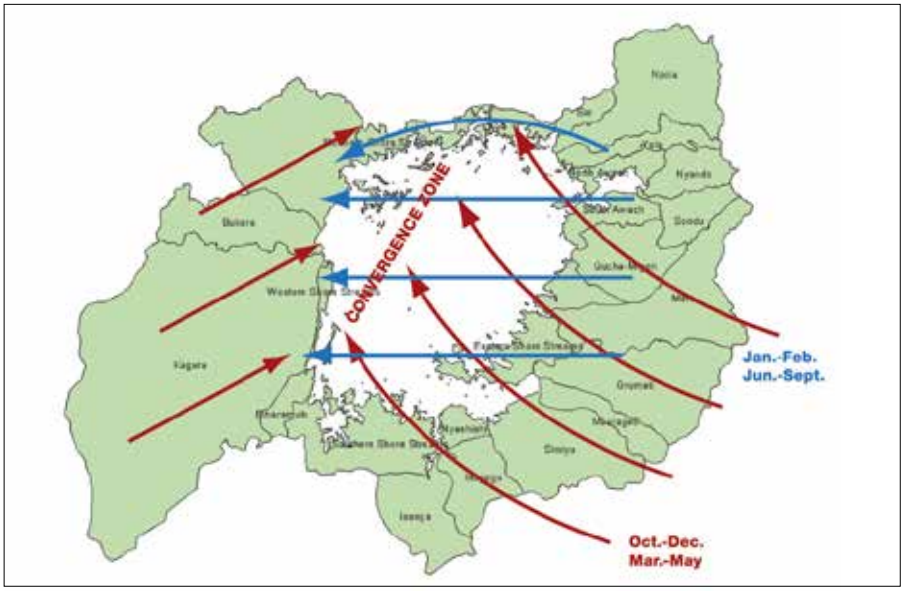

Figure 1: Seasonal wind patterns of the Lake Victoria Basin (Adapted from COWI Engineers Consulting, 2002).

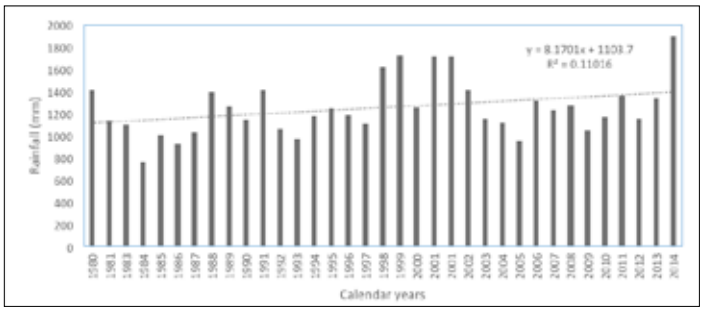

Figure 2: Rainfall for Kampala district

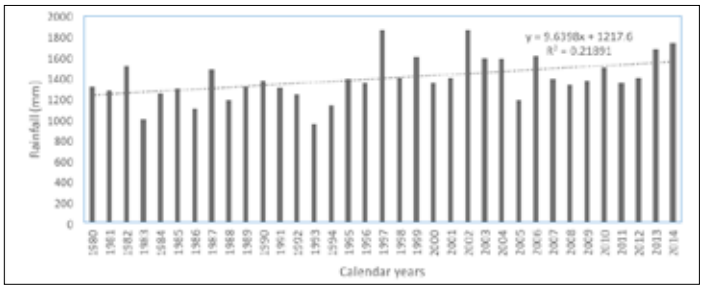

Figure 3: Rainfall for Mukono district

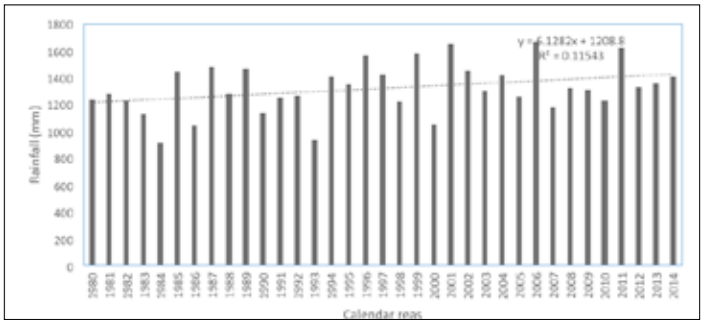

Figure 4: Rainfall for Jinja district

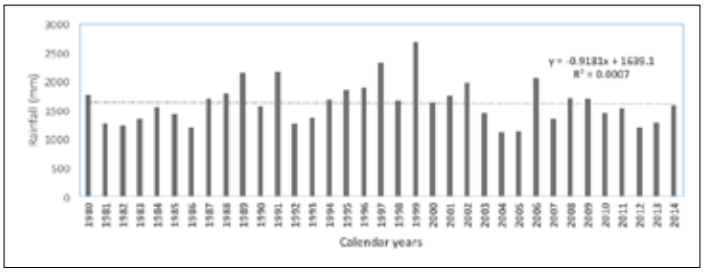

Figure 5: Rainfall for Wakiso district

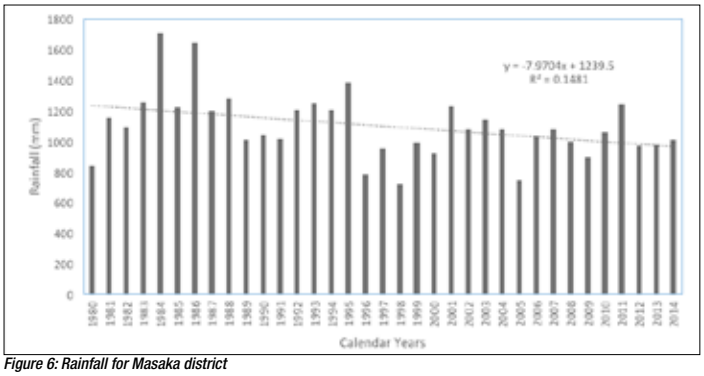

Figure 6: Rainfall for Masaka district

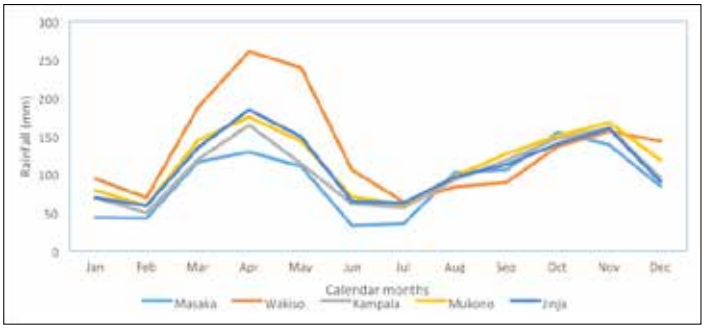

Figure 7: Annual Rainfall trend for Masaka, Wakiso, Kampala, Mukono and Jinja Districts

River Nile leaving Lake Victoria at Jinja

March, April and May (MAM) rainfall (long rains) compared to all other districts (Figure 7). The MAM period thus remains a major rainfall season for the basin; particularly for farmers.

The patterns reflected above provide four key messages:

(i) rainfall patterns in the Victoria basin are variably differentiated with two patterns; an increasing and a decreasing trend;

(ii) the varied patterns of rainfall around the Victoria basin require strategic adaptation that is case specific but integrated;

(iii) an analysis of variability intensity is required across scale and scope to provide spatial and temporal adaptation indices for the basin;

(iv) further inquiry into the rather peculiar higher rainfall MAM totals for Wakiso district from a satellite system analysis and modeling ought to be undertaken.

References

COWI Consulting Engineers (2002), "The Integrated Water Quality/Limnology Study", Technical Report, Part II, Lake Victoria Environmental Management Project, East African Community, Arusha, Tanzania.

Tate, E., Sutcliffe, J., Conway, D., & Farquharson, F. (2004). Water balance of Lake Victoria: update to 2000 and climate change modelling to 2100/Bilan hydrologique du Lac Victoria: mise à jour jusqu'en 2000 et modélisation des impacts du changement climatique jusqu'en 2100. Hydrological Sciences Journal, 49(4).

Figure 1: Seasonal wind patterns of the Lake Victoria Basin (Adapted from COWI Engineers Consulting, 2002).

Wakiso, Kampala, Mukono and Jinja Districts

The writer is a lecturer at the Department of Environmental Management, Makerere University
Email: eanthony@caes.mak.ac.ug