

CLIMATOLOGICAL ESTIMATES OF ACTUAL, EVAPOTRANSPIRATION AND
POTENTIAL EVAPOTRANSPIRATION VALUES IN EAST AFRICA.

BY

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ABSTRACT

Estimates of mean monthly and annual potential evaporation and actual evapotranspiration for East Africa have been made for 106 stations using Morton (1971, 1975, 1976 and 1977) model. The model assumes that there exists a complementary relationship between potential evaporation estimated from the modified Penman (1948) equation using the climatological observations and the actual evapotranspiration from the surrounding area. The station climatological data required are air temperature, dew point temperature, actual sunshine duration or global radiation, average rainfall and average surface pressure.

The long term averages of all the available data up to and including 1974 were used in the analysis. More than 95% of stations used in the study had data of more than five years. However, there were a few cases where data of less than five years was used in the analysis. Also, for stations without radiation and station pressure data, various techniques were applied to derive the missing data.

In order to map mean monthly and annual distribution of both actual evapotranspiration and potential evaporation 84 representative stations were selected. The mean monthly and annual distribution of actual evapotranspiration show that the lowest values exist, during all months, over the semi-arid/arid areas of central Tanzania, northern and north eastern Kenya. Higher values of mean monthly actual evapotranspiration are observed over the

East African rainfall favoured areas of the coastal strip, highlands and Lake Victoria basin. These are also the areas with good vegetation cover.

The monthly variation of actual evapotranspiration shows good agreement with the north/south movement of rainy belts across East Africa with higher values during or just after the rainy periods. High values of the annual actual evapotranspiration are found over the East African coastal strip, the highland areas and around Lake Victoria. Low values are found in the semi-arid/arid areas of central Tanzania; and northern and north eastern Kenya.

The mean monthly and annual distributions of potential evaporation show that high values exist in the semi-arid areas of northern and north eastern Kenya and central Tanzania. Low values of potential evaporation dominate on the highland areas. The monthly distribution shows that the high values are associated with the movement of over head sun over East Africa and clear sky areas.

A comparison of the magnitudes of the actual evapotranspiration and potential evaporation values from this study for ten climatologically representative stations has been made with the results of previous studies conducted in different parts of East Africa. The comparison shows that there is a fairly good agreement in the temporal variations of all the results for different climatological regions of East Africa. The E_p values from this study are generally everywhere lower than E_0 values of Woodhead (1968) and higher than the E_T values from Obasi and Kiangi (1973)

1975). The estimated E_A values compare favourably with those of previous studies except in the semi-arid/arid regions where E_A values from this study are everywhere higher than the others.