Estimation of evaporation using Penman's equation: an approach for Tanzanian conditions

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In this short thesis Penman's formulae for open water evaporation, E_o, and potential (reference crop) evaporation, E, are developed from an energy balance and aerodynamic considerations. The constants of the equations are worked out for the local conditions and the final equations are expressed in the form in which environmental parameters commonly recorded at our weather stations can be used to evaluate the average monthly and decade evaporation rates. A total of 11 tables have been prepared to be used in the Penman equations as delivered from the local conditions. The report also provides a summary of the procedure of collecting and improving the input data how the data are processed in order to be used in the derived Penman equations. Since this method of calculating evaporation is relatively complex, a calculation format has been prepared in order to simplify this work. This format is then used to calculate the average monthly and decadal evaporation rates for the university hill Dar es Salaam and the international airport Dar es Salaam for the period 1st February-30th June 1976. The calculation procedure is dealt with step by step following the format chosen. Finally in two appendices, attention is paid to some problems regarding wind speed determinations and their influence on Penman evaporation following a procedure due to Doorenbos and Pruitt. This procedure appears to offer a better wind function than the original Penman formula in the case of reference crop (potential) evaporation. However because of their choise of the constants in the long wave radiation them, their procedure cannot be taken over completely without further local research.