



Estimating and Forecasting of Regional Meteorological and Hydrological Droughts: A Case Study for West Shewa, Ethiopia

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Abstract: Information on regional drought characteristics provides critical information for adequate water resource management. This study introduces a method to calculate the probability of a specific area to be affected by a drought of a given severity and demonstrates its potential for calculating both meteorological and hydrological drought characteristics. The method is demonstrated using West Shewa as a case study. The calculation procedure was applied to monthly precipitation and stream flow series separately. The hydrological drought is concerned with low flows while the meteorological (agricultural) drought is concerned with the adverse effect of an abnormal soil moisture deficiency resulted from a sustained period of time with deficient rainfall. Low flows and the rainfall data of four representative watersheds in western Shewa were analyzed. Drought-forecasting equations were derived from multiple regression analyses of precipitation (P), potential evapotranspiration (PET), soil moisture (Sm) and some other watershed characteristics. The derived equations can be used to estimate hydrological and meteorological droughts. The obtained equations can give satisfactory help in the planning and management of agricultural activities so as to reduce the negative effects of low flows and deficient soil moisture (agricultural drought) on agriculture.