

**MODELLING AND MAPPING THE EVAPORATION  
WITH SPARSE DATA**

**BY**

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## ABSTRACT

The present study deals with modelling and mapping of evaporation with sparse data. A multiple regression technique was used to fill the gaps, where the proportion of missing data was relatively small and where the regression models obtained were of good quality. Simple linear multiple regression models were used. The data was rejected from the stations where the models obtained for infilling were not of good quality. The double mass technique was used to check the quality of basic data before used for mapping purposes. The records from some stations were checked against the record of known reliability. The reliable records were derived from stations of known reliability and from double mass analysis of selected stations. The pan evaporation data of 28 years (1963-1989), observed at 82 different sites and converted to average lake evaporation values of stationary water reservoirs at different climatological stations in Pakistan was made use of in the study for determining the ten daily free water surface evaporation. Based upon this data mean ten daily evaporation maps for each month of the year and finally mean monthly, seasonal and annual evaporation maps were developed for the whole of Pakistan. The compiled maps were utilised to work out the loss of water by evaporation from the presently existing storages.

None of the developed formulae for monthly evaporation estimation like Blaney & Criddle (1959), Penman (1948), Hargreaves

(1952) and Institute Formula (1964) gave consistent results, when tested for Sindh. The Institute Formula (1964) developed for Indus basin computed underestimated values at high evaporation sites of Sindh. Therefore, an empirical model for monthly evaporation estimation was formulated by using ten years (1968-1979) data of mean monthly temperature and mean monthly humidity for Sindh. The parameters used were mean monthly temperature and mean monthly humidity. The model was also calibrated for Punjab. The empirical coefficients of the model were found out. Adequacy of the model was verified by using data of the stations other than that used to develop the model.

The compiled maps of evaporation can be used extensively in both planning and engineering design to assess the natural demand for water imposed on rivers, lakes, and reservoirs and especially for sound planning and use of water resources in our country.

The developed EMP model in the present study for monthly evaporation estimation provides results with desirable accuracy. A close agreement was found between observed and estimated values, when the EMP model was tested for high evaporation sites.