

ESTIMATION OF ACTUAL EVAPOTRANSPIRATION AND AGRICULTURAL DROUGHT RISK ANALYSIS USING REMOTE SENSING METHODS IN SEYHAN BASIN

PREPARED BY ESER BORA

ANKARA-2019

EXPERTISE THESIS ABSTRACT

In Mediterranean Climate Region, where Turkey is also located in, an increase in temperatures and a decrease in precipitations have been projected due to Global Climate Change. For this reason, non-irrigated agriculture lands are threat and the importance of agricultural drought studies has being increased day by day.

In this study, non-irrigated agriculture lands in Seyhan River Basin were considered. Agricultural drought risk analysis across the River Basin was investigated by determining the parameters between actual evapotranspiration estimated by remote sensing techniques and reference crop evapotranspiration specified by meteorological parameters. In agricultural drought analysis, Evapotranspiration Deficit Index (ETDI) was evaluated and reference and actual evapotranspirations values, which are required for ETDI calculations, were analysed in montly periods between the years of 1987 and 2018 across the River Basin. In order to calculate reference evapotranspiration, FAO Penman Monteith method; and for actual evapotranspiration calculations, the correlation of Vegetation Index (NDVI) and Crop Coefficient (KC), which was created by METRIC (Mapping Evapotranspiration at High Resolution) software, were applied. Monthly average NDVI values, which were created by utilising long-term monthly NDVI raster charts derived by Modis and Avhrr satellites, were analysed between 1987 and 2018 in non-irrigated agriculture lands across the River Basin. Estimated monthly crop coefficient and actual evapotranspiration values were obtained by utilising the correlation between NDVI and KC. In addition, SPI (The Standardised Precipitation Index) and SPEI (The Standardised Precipitation-Evapotranspiration Index) indexes, which have

been utilised for assessing meteorological droughts, were also analysed across the River Basin and compared with ETDI results over long-term periods.

As a result, in Seyhan River Basin, a 27 percent of severe agricultural drought risk were observed and Tomarza and Develi districts of Kayseri province are the most risky regions of the River Basin ranging from 35 to 38 percents of severe drought risks. Across the River Basin, the years of 1989, 2000, 2001, 2007 and 2008 were detected as severe drought periods, and 1988, 1992, 2004, 2005, 2014 and 2017 were detected as moderate drought periods.

Keywords: Seyhan Basin, Agricultural Drought, ETDI, METRIC, NDVI

