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Climate parameter uses as indices for assessment of climate change and water balance in Duhok basin North -Iraq

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Abstract

The main goal of current study was to assessment the climatic parameters in Duhok basin. The climate parameters that used for current assessment are rainfall, relative humidity, temperature (average, max and min), evaporation, sunshine duration, and wind speed. The research area's climatic type and drought state were determined using data from the Duhok meteorological station for the years 2000 to 2023. The results show a noticeable drop in relative humidity and rainfall over the past two decades, as well as a considerable rise in temperature and evaporation. The mean annual rainfall was 547.7mm, relative humidity 48.74% used as term of water availability, and mean annual temperature was 201.15°C, total annual evaporation was 1316.97mm, sunshine duration was 9.2 hours/day, and wind speed 1.7m/s were used as water loss elements. Kharufa technique was applied to determine the potential evapotranspiration, water surplus and water deficit period's .The results indicate that total potential evapotranspiration, water surplus, and water deficit are 2257.59mm, 94.6mm, respectively. Annual surface runoff was 30mm, and annual recharge from rainfall was 11.75%. Different climatic classifications, including those by Mather, Alkubaisi, Brown, and Cocheme, were used to determine the climate type of the Duhokbasin. The results showed that the climate is arid according to the first classification, moist to sub-arid according to the second classification, and dry according to the third classification.

Keywords: Climate parameters, climate change, water balance, Duhok basin, and climate classification

Dedication

I dedicate this project the head of the department and to the research supervisor and finally to all those who would benefit from this project. Presented to all who brought the Kurdistan closer to freedom and happiness with their minds, words and lives.

with expressive erosional modeling) and second units composed of denduational origin composed of relief of mountain slopes with excessive erosional modeling.

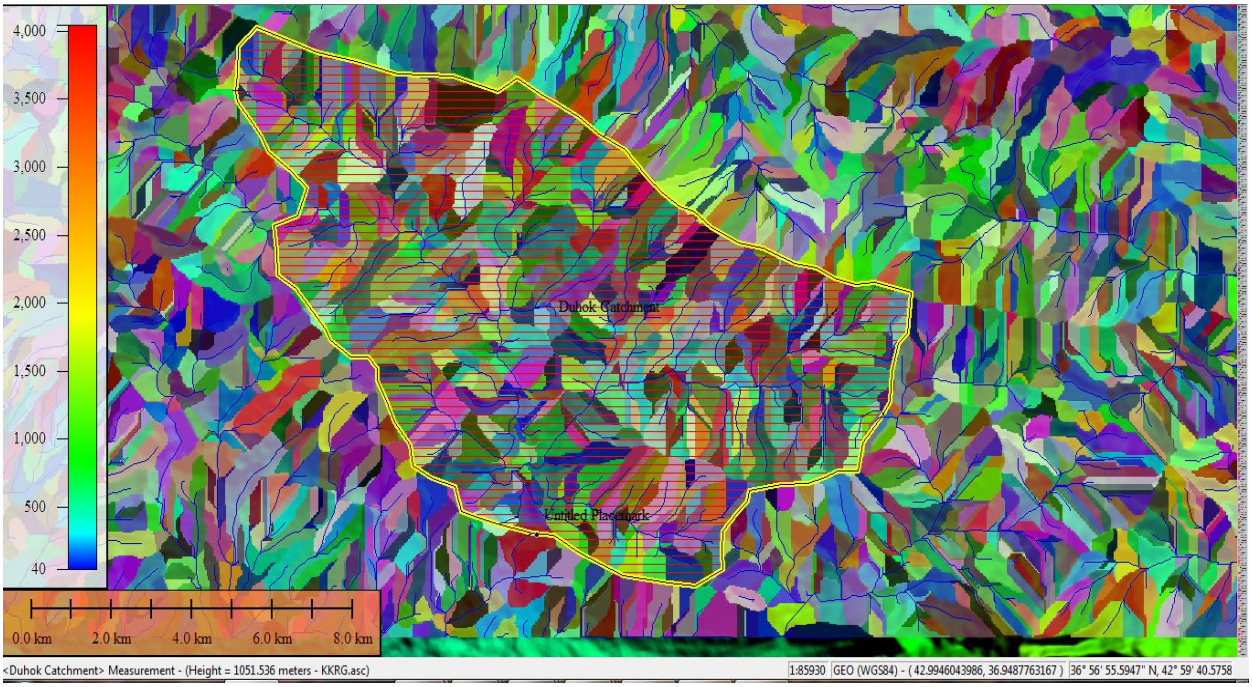

Figure1-4 :Duhok Catchment

1.5 Climate

Hydro-meteorological measurements aid in the planning, managing, creating, and building of water resources. They generate the data required for developing and validating hydrologic models. The hydro-meteorological strategy for water balancing is frequently utilized when the production of a small basin, within which urbanization occupies a portion, is known. Empirical methods were taken into consideration because such output isn't always available. As a consequence, probable water surplus and deficit periods are identified using the input parameters for this type of water balancing. The factors in the first set of these characteristics have to do with water availability, while the ones in the second group have to do