

Hydrologic Balance and Water Resources Development in Prefecture of Korinthos (Greece)

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The prefecture of Korinthos is located in the northeastern part of Peloponnesus in southern Greece, covering a total area of 2290 km². Currently, 30.5% and 26% of the land consists of forest and grassland, respectively, and only 1.3% is occupied by water. The study area consists of 30 drainage basins. According to Thornthwaite classification system, the studied area has a semiarid climate in lowlands and a typical Mediterranean climate in highlands.

The main objective of this work is to determine the parameters of hydrological balance for individual basins of the prefecture of Korinthos, using hydro-meteorological data and geographic information systems (GIS) technology.

Monthly rainfall and temperature values from seventeen stations (17) were analysed with GIS. The annual rainfall distribution is mainly controlled by the area physiography. Multiple regression analysis between annual rainfall and geographical coordinates of each station found precipitation decreases in West-to-East and North-to-South directions. Rainfall is strongly correlated with the altitude due to the orographic effect. Generally 85% of total precipitation occurs in the wet period, normally extending from late October through May, with sparse storm events during summer. The unequal rainfall distribution results in water surplus in the western part and water deficit in the eastern part of Korinthos prefecture. The mean annual temperature of 17.5 °C at sea level decreases by 0.59 °C per 100 m of ground elevation. Actual evapotranspiration, based on Thornthwaite approach, ranges from 38-51% of annual rainfall in highlands to 74-81% in lowlands.

Water balance estimation revealed a water surplus from January to April with the process of soil water consumption taking place during May-June. Water deficit is observed from June to October, while the period October-December is the replenishment period. Since the Second World War, four severe drought events occurred in the Prefecture of Korinthos.

In order to correct the negative water balance in lowlands an integrated management scheme should be applied and based on conjunctive of surface and groundwater, capture of diversion of more runoff water, construction of small dams, introduction of water saving irrigation methods and increased use of treated wastewater.