Trend Analysis of Rainfall in Bayech catchment, southwestern of Tunisia during 1984-2019 in the context of climate change

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Abstract

Shortage of water in the river in relation to rainfall change especially in arid areas plays a pivotal role in water sharing like Bayech catchment. In attempt to understand the rainfall changes, many index used to analysis of rainfall such as SPI (Standardized Precipitation Index), chronological graphical treatment method of the information (MGCTI) and breakage indices. These trends have been proposed over a period of 37 years of measurement and for 25 rain gauges. Statistical methods have shown the severe and lasting nature of the climatic drought observed in the study area where water resources are limited, not very renewable and excessively exploited. As well as, climatological or hydrological study, it is necessary to have homogeneous climatic data series for the results to be statistically significant. This is how we first started with the homogenization of rainfall data using the regional vector method which made it possible to homogenize the time series but also to complete the missing data. This method made it possible to obtain an operational rainfall database. To study the rainfall variability, several methods were applied: regional vector indices, statistical tests for the detection of breaks and the standardized rainfall index. The analysis of the rainfall by the MCGTI allows for a two-dimensional approach (time and space) and therefore makes it possible to clearly visualize the rainfall situation in the study area. The first thing to note, the high variability of the values expressed by an absence of homogeneity of the color ranges over the major periods (Nouaceur and Murărescu, 2016). Second, a trend towards some compliance from 2004 is more uniform across the bayech catchment. The number of years of disputed precipitation, with a negative index, is very high. Drought was severe in 1989 and 1993. During these years, the regional index exceeded -1.6. The last years of the rainfall series (from 1995) marked the return to favorable conditions for rainfall, with the exception of 1998, 2000 a negative index of -1.5 was recorded. We thus find the three phases which marked the rainfall of the study site: The first phase, 1984, and from 2004 to 2006, 2013 and 2014 is considered normal to dry tendency and the second phase begins in 1990 and ends in 1992. Significant wet and very wet years occur at all stations. However, the last phase, 1987, 1998, 1994, 2008 to 2013, is characterized by an increase in dry and very dry years (92%). The MCGTI method confirms that there is agreement with the SPI index during the cycles considered, wet, dry and normal. In addition, the chronologies studied by SPI index are distinguished by two years with heavy annual rainfall: the years 1990 and 2003 with an index close to 3.4 and two very dry years 1998 and 2005 with a rainfall index of -1.8 (severe drought). We note it is decrease in wet years and its increase in dry years. We can therefore confirm the decrease in Ip in the Bayech watershed and therefore in the climate, which is becoming increasingly dry.

Keywords: SPI, MGCTI, climate change, Tunisia.