Statistical analysis of hydrological regime in North-Western Algeria (Macta watershed)

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INTRODUCTION

The Mediterranean semi-arid and arid areas are particularly affected by recurrent and prolonged drought and the issue of water is a real challenge in this century. Several studies have shown a decrease in rainfall Mediterranean basin since seventies. Reference [1] demonstrate that the second half of the 20 th century shows a general decrease of 2.2mm / month / decade, particularly, the period from beginning eighties to late nineties, which saw a general drying over large parts of the Mediterranean. Reference [2-3] analyzed the seasonal variability of precipitation and its evolution throughout the Mediterranean area for the period 1901-1998, a negative trend appears for the winter rainfall.

In Algeria several studies show a significant decrease of rainfall since seventies particularly in the North-West regions during winter and spring seasons [4-5].

In this study, Macta watershed was selected to better assess the impact of climate variability on water surface in semi-arid region of Algeria.

MAIN RESULTS

The time series of 55 annual values (1950/1951-2005/2006) observed at two runoff stations has been selected and submitted to rupture tests to detect a break over the study period. Three statistical tests were used; Kendall test, Pettitt test and Hubert segmentation procedure. All the rupture tests indicate a break in 1976 with a decrease of about 37% and 57% respectively at "Sid Ali Ben Youb" (Fig.1) and "Three rivers" runoff stations. At the seasonal scale, the statistical tests reveal a significant decrease of flow in winter and spring that excess 50%. Therefore, the wet season seem to be the main cause of the hydrological drought. The number of years that have suffered a severe drought has been determined using standard stream flow index (SSFI). It appears that the decades of 90's and beginning of 2000 have experienced the most dries years. Finally, a comparison between the evolution of the mean annual flow and the average annual rainfall of the Macta watershed has been established and which highlights a good correlation between precipitation and flow. The statistical tests show a decrease around 30% of rainfall since 1976 which could be explain the downward trend of flow.

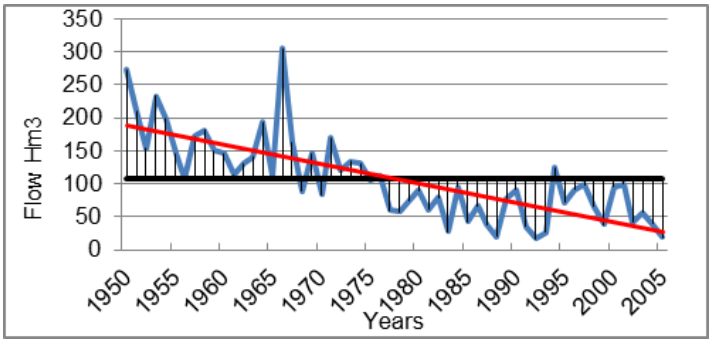

Figure1. Flow evolution at Sid Ali Ben Youb runoff station.

REFERENCES

[1] Xoplaki E., et al., Climate Research, vol.14, 2000, pp. 129-146.
[2] Jacobeit J., Petermanns Geogr Mittl, v.144, 2000, pp.22–33.
[3] Giorgi F., Clim Dyn, v.18, pp. 675–691
[4] Taibi S.et al, IAHS Publ, v.359, 2011,pp.191-197
[5] Meddi M. and al., Water Resour Manage, n.24, 2010, pp.3817-3833.