EVOLUTION TENDENCIES OF SOME HYDRO -CLIMATIC FACTORS INFLUENCING THE DESERTIFICATION RISK IN THE PLAIN OF BANAT

Popa Veronica ; I. Borza

U.S.A.M.V.B.Timisoara, Calea Aradului, nr. 119, email: vera.popa@gmail.com

Key words: climatic factors, rivers’ flows variation, piezometric levels, evolution tendency

Abstract: The studied hydro-climatic factors tendency that influencing the desertification risk, are the annual temperature average, the annual amount of precipitations, rivers’annual flows and of piezometric levels from three drillings, all of them from representative points from the Plain of Banat. From the analysis it can be drawn the conclusion of a general aridization tendency.

INTRODUCTION

Analysing some hydro-meteorological factors in order to establish a tendency of present climatic changes is a compulsory activity due to the risk phenomena (drought, flooding) produced in the Plain of Banat. In this area, the climate is relatively uniform, regarding the temperature, with annual averages of 10,7\textdegree{}C – 10,9\textdegree{}C, manifesting dryness tendencies from East to West, the annual precipitations at Timişoara being of 614,3 mm and at Sânnicolau Mare of 544 mm [1].

MATERIAL AND METHOD

It had been used climate data, temperature and precipitation from three meteorological stations (Timișoara, Sânnicolau Mare and Banloc) as well as hydrologic data regarding the fluctuations of Bega Veche and Bârzava rivers’ early flows and of piezometric levels from three drillings, all of them from representative points from the Plain of Banat. We have worked upon annual average of temperatures and annual amounts of precipitations from different periods, from the meteorological stations of Timișoara (1958-2006-temperatures; 1873-2006- precipitations), Sânnicolau Mare (1961-2006-temperatures; 1950-2006-precipitations) and Banloc (1958-2006- temperatures; 1950-2006-precipitations), drawing charts of gliding averages for five years. In order to spotlight the evolution tendencies of the two rivers’ flows we have used annual averages from the period 1962-2005, registered at Cenei, for the Bega Veche river and at Partoș for the Bârzava river. For the fluctuations of the piezometric levels, there were represented in charts the annual averages registered at the F1 drillings from Timișoara, Sânnicolau Mare and Banloc, for the period 1967-2006.

RESULTS AND DISCUSSIONS

The main water flows met in the Plain of Banat are: Aranca, Bega, Timiş, Bârzava and Moraviţa. The natural hydrologic regime of the Bega river is characterised by very high flows and level variations and that is the reason there were built two canals of connection between
the Bega and the Timiș rivers with the purpose of flows regularization. That is why we avoided the two rivers. We have chosen another two rivers with the smallest anthropic influence (Bega Veche and Bârzava).

The Bega system is formed by two courses: Bega Veche and Bega. The Bega Veche flows in Romania 88 km having a basin of 2140 km² and its most important tributaries are Niarad, Ier, Bacin and Suma [3]. The Bega Veche had organised upon the hydrographical basin of Beregsău.

The Bârzava has its source on the Semenic Mountain, its basin in Romania is of 971 km², and a length of 127 km [2]. The Bârzava enters the plain area downstream of Berzovia, after which it reduces a lot the flowing slope [5]. The most important tributaries are: Râul Alb, Valea Mare, Terova and Fizeș.

The meteorological station and the drillings F1 have same location (Timișoara, Sânnicolau Mare and Banloc).

From the analysis of the charts representing the multiannual variation of annual average temperatures it can be seen a value growth of these, on the basis of some typical sinusoidal oscillations. The tendency line is clearly ascendant (Fig.1) at all three meteorological stations, although the variations follow the characteristic cyclicities with periods of decrease like the one from 1975-1985 [4].

![Fig.1a. Variation tendency of annual temperature average](image-url)
Fig. 1b. Variation tendency of annual temperature average

Fig. 2. Variation tendency of annual amounts of precipitations
The annual amounts of precipitations register a decrease of the value, the position of the tendency line being descendant (Fig.2) due to the characteristic cyclicity. The decrease of the amounts of precipitations is obvious only analysing a long range of data like in the case of the Timișoara station. At Banloc, the tendency line is almost the same with the multiannual average.

It could be seen mostly in the last decade an intensification of extreme values, both for the annual average temperatures (12.6°C – in the year 2000 and 10.0°C - in 1996 at the Sânnicolau Mare station) as well as for the annual amount of precipitations (915.2mm- in the year 2005 and 297.3mm- in 2000 at the Banloc station).

The flows variation of the Bega Veche and Bârzava rivers measured in the low plain area present a slight decreasing tendency (Fig.3) which is mostly spotlighted in the case of the first river. In this situation, there can be seen extreme values in close years such as 2005 (13.6mc/s) and 2002 (4.07mc/s), registered at Bârzava. By comparing the charts representing the amounts of precipitations with those representing the rivers’ flows in the same period, it can be noticed that these superpose, due to the influence of the first upon the latter.
The charts representing the piezometric levels of three drillings from the Plain of Banat show a clear growth in depth of these (Fig.4), starting with the year 1982, when it had also been registered a decrease of the amount of precipitations. The growing distance between the soil surface and the phreatic layer is even more obvious and sudden at the F1 Banloc drilling, when it came to depths of 366 m in 1996 from values of 44 m in 1980.

Fig.4. Tendency of piezometric levels (annual average)
CONCLUSIONS

From the analysis of the variation of the studied hydro-climatic index, it can be drawn the conclusion of a general dryness tendency, with annual temperatures average growth and of a decrease of the amounts of precipitations, these leading to the decrease of rivers’ early flows and the lowering of the piezometric levels. The extreme values registered in the last period and even in close years emphasises the excessive character of the climate which makes a long term evolution prognosis very difficult. There is a positive connection between the analysed factors so that the modifications of some determine the variation of the others. The temperature growth and the decrease of the precipitations lead to the modification of water flows and of the phreatic layer level as well as to the diminution of the aridity index specific to the zone.

BIBLIOGRAPHY

***The data was processed based of the values supplied by C.M.R. Banat-Crișana, Direcția Apelor Banat and Direcția Apelor Mureș.