THE REGIME OF THE ATMOSPHERIC PRECIPITATION IN THE BARCĂU HYDROGRAPHICAL BASIN

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Abstract

River Boat basin is part of the hydrological system of the western rivers, which collects water from Transylvania and the Apuseni Mountains, the ultimate collector Tisza River. Barcău River drains an area of 6095 km^2, with a length of 208.5 km course, 134 km in Romania and 74.5 km in Hungary.

The analysis of the average annual rainfall regime in the Barcău Hydrographical Basin shows that there is a general increasing trend from west to east. The highest average rainfall amounts recorded in the Plopis Mountains (866 mm) and the lowest in Szeghalom (545.4 mm). The years with the highest amounts of precipitation were 1996 and 1999, when the precipitation were about 720-880 mm. Following the analysis of variance multiannual monthly rainfall can be observed an unequal and uneven distribution, with a minimum period of January-February, a progressively increase from March to June and a progressively decrease from June to December. The driest month of the year is January and the wettest month is June.

Key words: precipitation, hydrographical basin, river, climate, weather station.

INTRODUCTION

River Boat basin is part of the hydrological system of the western rivers, which collects water from Transylvania and the Apuseni Mountains, the ultimate collector Tisza River. Barcău River drains an area of 6095 km^2, with a length of 208.5 km course, 134 km in Romania and 74.5 km in Hungary.

The area of study included its climate Province Cf, sp. Cfbx, with the average hottest month from 20 to 22 Celsius degrees and the maximum precipitation in early summer. Only a small part of the area occupied by the basin is part sp. CFBK, with the average temperature of the hottest month from 18 to 20 Celsius degrees and cold winters. Aridity index values range between 25 and 45, values between 25 and 30 correspond to the steppe, between 30 and 35 steppe zone, and values greater than 35, corresponding to foothill and mountain areas.

MATERIAL AND METHODS

To analyze the spatial distribution of rainfall, data were used from the National Administration of Meteorology for weather stations from Oradea,

Săcuieni and Nuşfalău (meteorological station of Nuşfalău was closed in 2001) and data from stations Szeghalom, Ticovizig Debrecen, Berettyoujfalu and Pocsaj.

RESULTS AND DISCUSSION

The table no.1 presents average annual rainfall values from weather stations of the study area, during 1992-2010 and in figures no.1 and 2, the evolution of mean annual precipitation.

Table 1

Average annual rainfall values from weather stations of the study
(Source: National Administration of Meteorology and Tikovizig Debrecen)

Station/ Year	Oradea	Săcuieni	Nuşfalău	Pocsaj	Berettyoujfalu	Szeghalom
1992	449 mm	448 mm	580 mm	456 mm	447 mm	434 mm
1993	504 mm	483 mm	672 mm	490 mm	487 mm	414 mm
1994	532 mm	490 mm	453 mm	460 mm	390 mm	446 mm
1995	638 mm	612 mm	680 mm	610 mm	514 mm	514 mm
1996	884 mm	798 mm	834 mm	780 mm	866 mm	726 mm
1997	713 mm	616 mm	612 mm	573 mm	623 mm	432 mm
1998	786 mm	733 mm	774 mm	752 mm	762 mm	610 mm
1999	870 mm	780 mm	782 mm	774 mm	727 mm	738 mm
2000	364 mm	391 mm	410 mm	386 mm	320 mm	306mm
2001	821 mm	737 mm	-	720 mm	764 mm	630 mm
2002	531 mm	563 mm	-	572 mm	470 mm	443 mm
2003	499 mm	488 mm	-	524 mm	440 mm	450 mm
2004	739 mm	799 mm	-	746 mm	683 mm	664 mm
2005	656 mm	650 mm	-	684 mm	780 mm	700 mm
2006	652 mm	592 mm	-	587 mm	520 mm	500 mm
2007	655 mm	625 mm	-	637 mm	590 mm	594 mm
2008	546 mm	721 mm	-	576 mm	492 mm	486 mm
2009	572 mm	626 mm	-	612 mm	562 mm	570 mm
2010	592 mm	647 mm	-	620 mm	580 mm	592 mm

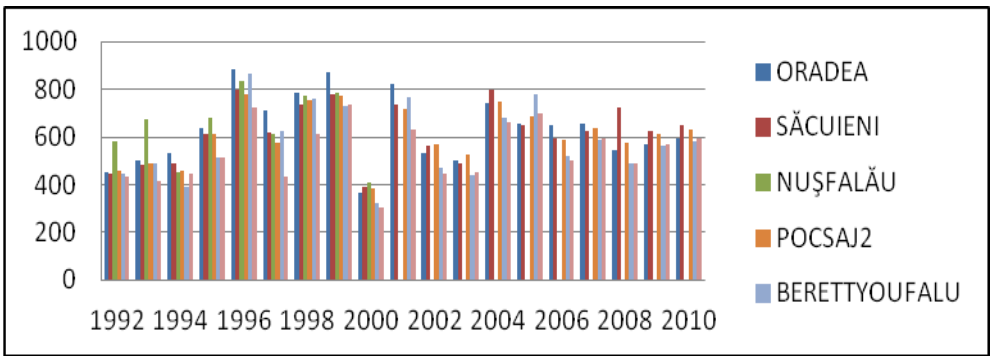

Fig. 1. Graphical representation of the average annual precipitation amounts during the period 1992-2010, in the basin of Barcău
(Source: National Administration of Meteorology and Tikovizig Debrecen)

Average annual rainfall, for the period 1992-2010, are presented in figure no.2.

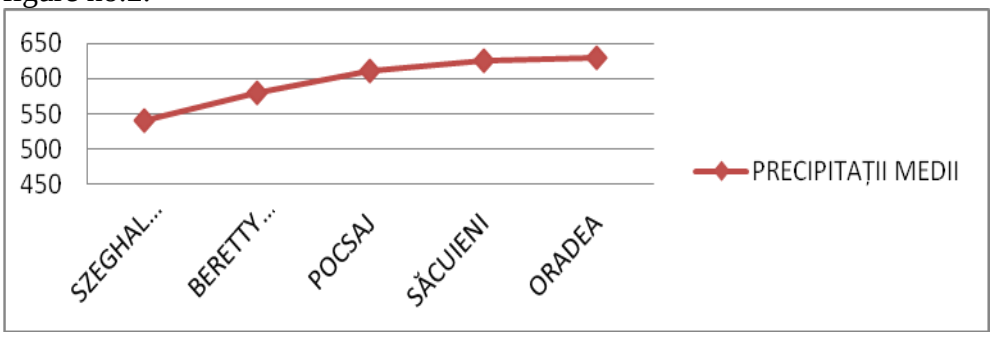

Fig. 2. Average annual rainfall for the period 1992-2010
(Source: National Administration of Meteorology and Tikovizig Debrecen)

After analyzing the average annual rainfall regime (Fig. no.2), there is a general increasing trend from west to east. The highest average rainfall amounts recorded in the Plopis Mountains (866 mm) and the lowest in Szeghalom (545.4 mm). From the time taken in the analysis, is characterized by high precipitation 1996 (Oradea - 884 mm, Săcuieni - 798 mm, Nuşfalău - 834 mm, Pocsaj - 780 mm, Berettyoujfalu - 866 mm, Szeghalom - 726mm) and 1999 (Oradea - 870 mm, Săcuieni - 780 mm, Nuşfalău - 782 mm, Pocsaj - 780 mm, Berettyoujfalu - 727 mm, Szeghalom – 738 mm).

Figure no.3 presents average annual precipitation during the period 1970-2010, in localities situated in the basin and in some localities related Barcău basin (Oradea and Debrecen). Increasing trend from west to east is heavily emphasized.

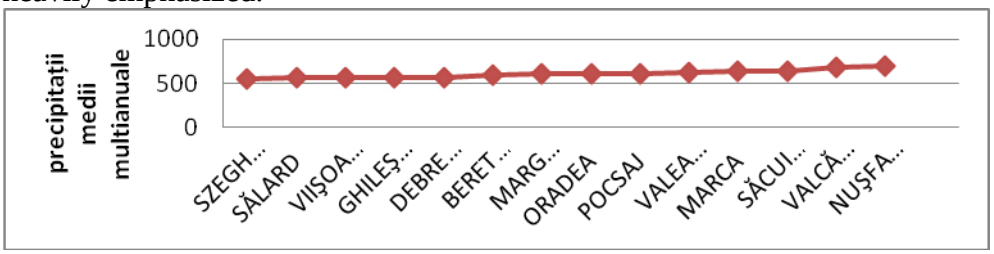

Fig. 3. Average annual rainfall for the period 1960-2010
(Source: National Administration of Meteorology and Tikovizig Debrecen)

Following the analysis of variance multiannual monthly rainfall (Fig. no.4) can be observed an unequal and uneven distribution, with a minimum period of January-February and a progressively increase from March to June. It is maintained constant in September to May share in October there

is a further drop, but then December to record an increase. Within that month study highlights rich and poor rainfall in January (the driest month) and June (the wettest month).

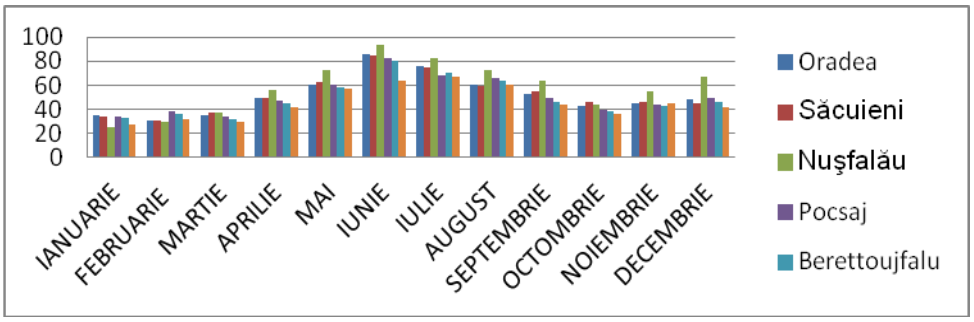

Fig. 4. Multiannual monthly average precipitation variation
(Source: National Administration of Meteorology and Tikovizig Debrecen)

The average number of days with the ground covered by snow, in the observation of the five plants in the study was approximately 35 days, the layer of snow having a protective role on the ground, and thus the thermal conditions influencing the biochemical processes.

By their amounts and character (long-term rainfall, torrential rainfall, rainfall by an amount that exceeds the mean), the rainfalls may produce negatively influence on the physical, chemical and biological soil properties, with direct implications for order pedological, hydrological and ecological processes.

Negative action is manifested by:

- worsening regime aerohidric;
- damage to soil structure;
- increased adhesion and plasticity of the soil material;
- the solubilization and leaching of organic and inorganic compounds of specific;
- debazificarea complex absorption;
- acidification of soil solution;
- the formation of toxic plant growth and development;
- halting aerobic microbiological activity of soil;
- onset of anaerobic digestion processes;
- blocking the respiration of plant roots.

CONCLUSIONS

The analysis of the average annual rainfall regime in the Barcău Hydrographical Basin shows that there is a general increasing trend from

west to east. The highest average rainfall amounts recorded in the Plopis Mountains (866 mm) and the lowest in Szeghalom (545.4 mm). The years with the highest amounts of precipitation were 1996 and 1999, when the precipitation were about 720-880 mm.

Following the analysis of variance multiannual monthly rainfall can be observed an unequal and uneven distribution, with a minimum period of January-February, a progressively increase from March to June and a progressively decrease from June to December. In October there is a further drop, but then December records an increase. The driest month of the year is January and the wettest month is June.

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REFERENCES

1. Bogdan Octavia, Elena Niculescu, 1999, Riscurile climatice din România, Edit. Sega-Internaţional, Bucureşti, 280 p.
2. Ciulache S., 2002, Meteorologie şi climatologie, Edit. Universitară, Bucureşti, 469 p.
3. Cristea Maria, 2004, Riscurile climatice din bazinul hidrografic al Crişurilor, Edit. Abaddaba, Oradea, 186 p.
4. Doveny Z., 2010, Magyarorsag Kistajainak katasztere, MTA Foldrajztudomanyi Ktatointezet, Budapest
5. Dragotă Carmen Sofia, 2006, Precipitaţiile excedentare în România, Edit. Academiei Române, Bucureşti, 175 p.
6. Josan N., 1994, Riscurile naturale din judeţul Bihor, Analele Univ. din Oradea, Seria Geografie, tom IV, Oradea, pp. 12-15
7. Josan N., N. C. Sabău, Tamara Romocea, Monica Costea, Maria Cristea, D. Borota, O. Berchez, Dorina Ilieş, S. Nistor, M. Vlaicu, 1999, Hazarde şi riscurile naturale şi antropice în bazinul Barcăului, Edit. Universităţii din Oradea, Oradea, 156 p.
8. Köteles N., Ana Cornelia Pereş, 2011, The conditions of atmospheric precipitations in Huedin Depression. Analele Universităţii din Oradea, Fascicula Protecţia Mediului Vol. XVI A, Anul 16, Editura Universităţii din Oradea, 2011, ISSN 1224-6255, pag. 404-410.
9. Măhăra Gh., 1977, Câmpia Crişurilor, în volumul Câmpia Crişurilor, Crişul Repede, Ţara Beiuşului, Edit. Ştiinţ. şi Enciclop., Bucureşti, 372 p.
10. Măhăra Gh., 2001, Meteorologie, Edit. Universităţii din Oradea, Oradea, 302 p.
11. Moza Ana Cornelia, 2009, Clima şi poluarea aerului în bazinul hidrografic Crişul Repede, Editura Universităţii din Oradea, ISBN 978-973-759-775-5, 286 p;

12. Pereş Ana Cornelia, 2012, Meteorologie şi climatologie, Editura Universităţii din Oradea, ISBN 978-606-10-0962-6, 253 p.
13. Pereş Ana Cornelia, N. Köteles, 2013, Frequency and quantity of atmosphere rainfall in Băile Boghiş spa area, Analele Universităţii din Oradea, Fascicula Protecţia Mediului Vol. XX, Anul 18, Editura Universităţii din Oradea 2013, ISSN 1224-6255, pag. 223-228.
14. Pop Gr. P., 2000, Carpaţii şi Subcarpaţii României, Edit. Presa Universitară Clujeană, Cluj-Napoca, 264 p.
15. Pop Gr. P., 2005, România. Dealurile de Vest şi Câmpia de Vest, Edit. Universităţii din Oradea, Oradea, 176 p.
16. Posea Gr., 1997, Câmpia de Vest a României, Edit. Fundaţiei "România de Mâine", Bucureşti, 429 p.
17. Şerban Eugenia, 2004, Cantităţile maxime de precipitaţii în 24 de ore în Câmpia de Vest situată la nord de Mureş, Analele Universităţii din Oradea, Seria Geografie, tom XIV, Edit. Univ. din Oradea, Oradea, pp. 101-110
18. Şerban Eugenia, 2005, Precipitaţiile excedentare din Câmpia de Vest, ca fenomene de risc climatic, Analele Universităţii din Oradea, Fasc. Protecţia Mediului, vol.X, anul 10, Edit. Univ. din Oradea, Oradea, pp. 149-156
19. Şerban Eugenia, 2010, Hazarde climatice generate de precipitaţii în Câmpia de Vest situată la nord de Mureş, Edit. Universităţii din Oradea, Oradea, 395 p.
20. * * *, 1983, Geografia României, vol.I: Geografia fizică, Edit. Academiei R.S.R., Bucureşti, 662 p.
21. * * *, 2008, Clima României, A.N.M., Edit. Academiei Române, Bucureşti, 365 p.