RISK PHENOMENA IN THE HYDROGRAPHIC BASIN BIZDIDEL (2000-2007)

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ABSTRACT. – Artery Hydrographic Bizdidel is placed in the Sub-Carpathians area in Ialomița basin, being tributary of the river Ialomița. It falls within the small watershed, by precipitation liquid and solid. Annual regime of fluid leakage is influenced by food sources, the annual average flow rate being around 1 m^3/s, with a space-time variability influenced by food sources. On a multiannual basis, since the flow varied during the period examined in our study, between 0.1 m^3/s (in 2000) and 240 m^3/s (2001). Between the years 2000-2007 there were a number of special events such as water floods, flash floods can be classified as type „arrow", the flows recorded in the 24-72 h fluctuated between 180-240 m^3/s. Hydrographic artery produced flash floods that led to a series of changes in landscape Bizdidel basin and also have been lateral erosion that led to discontinuation in a short period of observations at hydrometric station located before the confluence with the river Ialomita which required the determination of flows through „limnimetric key in red". In the same context, it appeared to still needing a location upstream hydrometric station in the right side of Bezdead locality, in order to follow developments on this artery hydrographic liquid leakage.

Keywords: Bizdidel, liquid leakage, flood, hydrological risk, 2000-2007.

1. INTRODUCTION. GENERALITIES

Bizdidel has a surface water basin of 92 km^2 (0.97% in the Ialomita river basin district – 9431 km^2), was developed in the Subcarpathians of Ialomița, with mathematical details 45^o14’53’’ and 45^o3’42’’ north, $25^0$27’8’’and $25^0$33’48’’ east longitude. It delimits the turn of water in the west of the river Ialomița and it seeks alignment height consisting of: Culmea Mălăului (1148 m), Plaiul Ziacului (901 m), Culmea Brata (with its peaks Brata - 868 m - and Coțofeni - 823 m), Culmea Valea Bârzii (peak Crucea Buciumeni - 682 m), Măgura Bela Hill (664 m), Copăciş Hill (503 m), Patrana Hill (479 m) and Pucioasa Depression. Turn east for delimiting the water catchment it seeks alignment Cricovul Dulce height: Muchiile Hanului (869 m), Măgura Mare Hill (910 m), Plaiul Stârminelor (661 m), Plaiul Roşiorului (631 m), Fusaru Hill (737 m), Băloiu Hill (648 m) and Malurile (552 m). In the northern part of the catchment Bizdidel is placed Talea Depression and the south-south-west junction with the Ialomita river.

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Bizdidel is a tributary in left of Ialomiţa river, falling under sub-Carpathian local rivers. Stems from Plaiul Şirnea Hill (848 m), has a length of 26 km and south of the confluence with Ialomita is Pucioasa town, in the right of locality Brăneşti (Fig. 1).

Average altitude of the basin is 640 m with an asymmetry coefficient of 0.17, having a form factor of 0.24 (elongated). Average slope of the basin is 0.14, with a density of 0.87 km/km^2 in the hydrographic network.

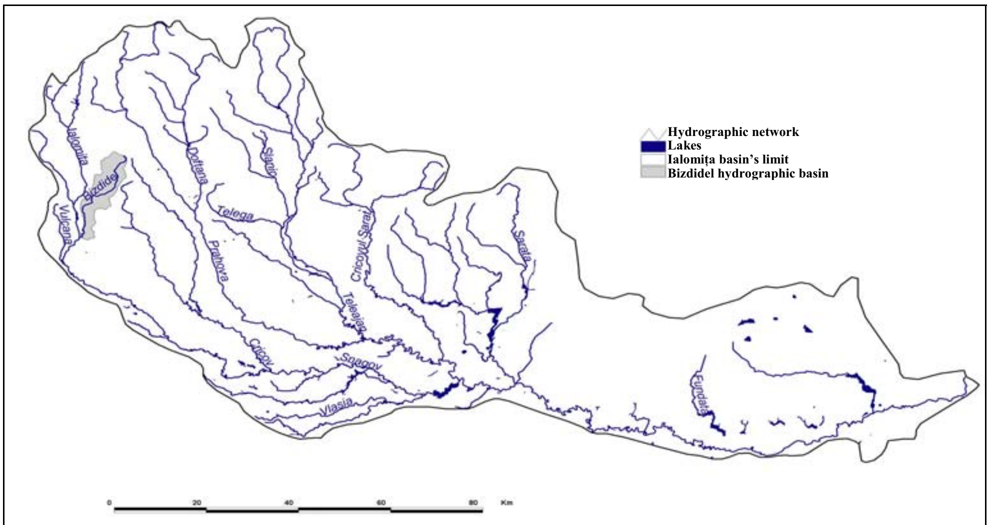

Fig. 1. ***The geographical position of the stream in the catchment Bizdidel in the Ialomiţa hydrographic basin***

2. DATA AND METHODS OF WORK

To analyze the development of liquid leakage, we studied the data strings statistical, mathematical pluvial stations Bezdead and Brăneşti in 2000-2007. Precipitation due to the two posts were generated by contact of the two maritime air masses, which led to higher precipitation in the years 2001-2002, 2005 and 2007. Following these amounts of precipitation, there were a number of hydrological risk phenomena all arteries draining Subcarpathians of Ialomiţa river.

3. LIQUID LEAKAGE

Liquid leakage is the synthetic indicator of water resources within a river system. Variability in time and space of liquid leakage is influenced by climatic characteristics, namely physical and geographical.

Regarding the type of power supply and its variability throughout the year, they determine the features of liquid leakage and other hydrological parameters (solid leakage, chemical composition, temperature, winter events).

In the Carpathian local rivers, including Bizdidel prevail surface feeding (75-93%), of which the rain has values of 60-70%, and the underground - less than 5%, leading to a very low leakage, and could produce the phenomenon of river draining.

It also may notice the large winter-spring waters, rich with food rain or snowing, because penetration of warm air masses that leading to snow melting. The rain floods can occur amid the summer-autumn low water due to high intensity rainfall.

In Bizdidel catchment, the flow module is 1.0 m^3/s at Brăneşti, near the confluence with the river Ialomiţa, with a specific average flow (q) of 10-20 $l/s/km^2$.

As regards the system liquid leakage monthly average, the largest volumes of water are transiting in March-April period (between 30-40%), the downward trend until August when it is noted a slight increase (8-10%), followed by a continuous decrease until October, when the minimum recorded is 1-2%. A significant increase is found in the month of December (7-11%), followed by a decrease in growth in January and February (Fig. 2).

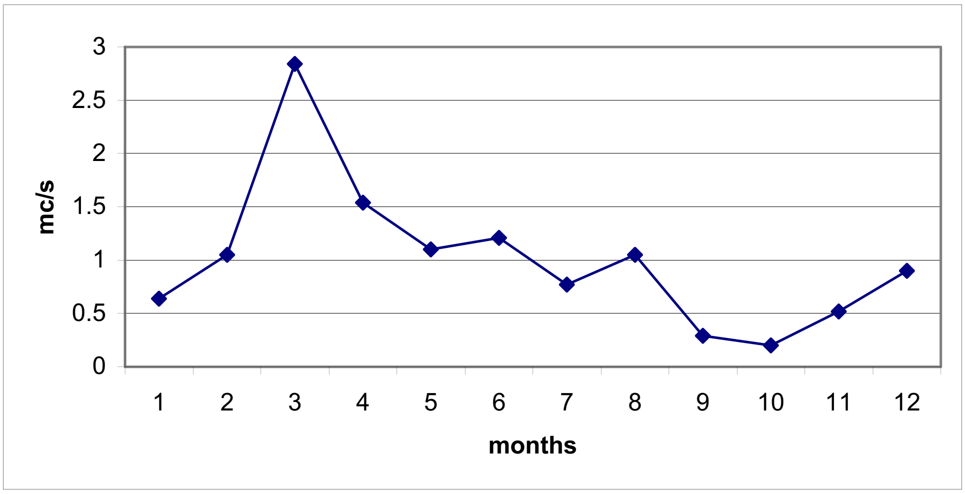

Fig. 2. ***Average liquid flow on the river basin Bizdidel (2000-2007)***

Minimum flow is achieved during periods of low rainfall quantity, or failing that, when supply is made almost exclusively from groundwater resources.

In this period, river flow, known as *small water*, is influenced by hidrostructures aquifers and the extent to which they intercepted minor beds. Minimum flow occurs during the end of summer - early autumn and winter.

In summer-autumn period, minimum leakage is due to low rainfall and high evaporation, caused by temperature. Minimum flow in winter is due to the low rainfall period in the fall, and those who died in solid form and negative temperature that may favor the emergence and growth forms of ice to produce ice bridges.

In the period under review (2000-2007), the lowest of the minimum leakage occurred in 2000 when surface supply was very low due to low precipitation throughout the year. Thus, liquid flow rates were around 0,01-0,02 m^3/s, but are recorded phenomenon of hydrological drought (Fig. 3).

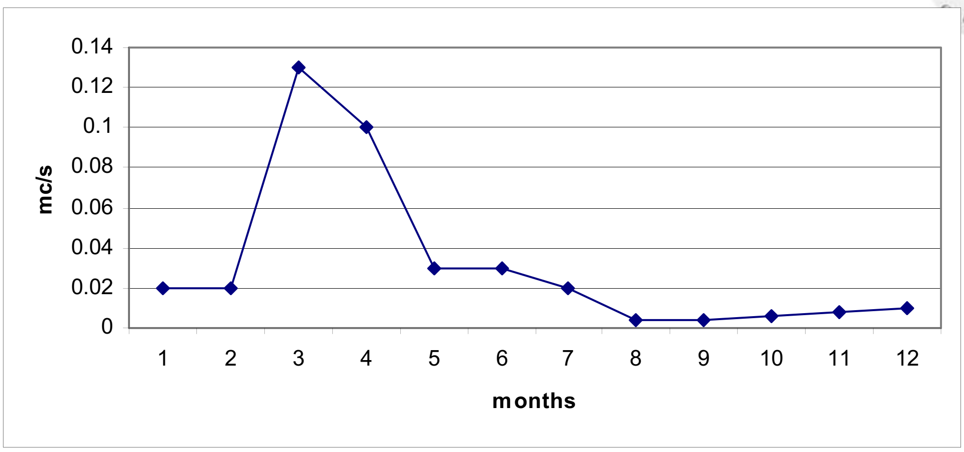

Fig. 3. ***Minimum liquid leakage in Bizdidel river basin (2000-2007)***

Maximum flow is characterized by the lowest percentage values in different months of the year.

Elements of maximum leakage used in the study are the maximum flows and flash floods.

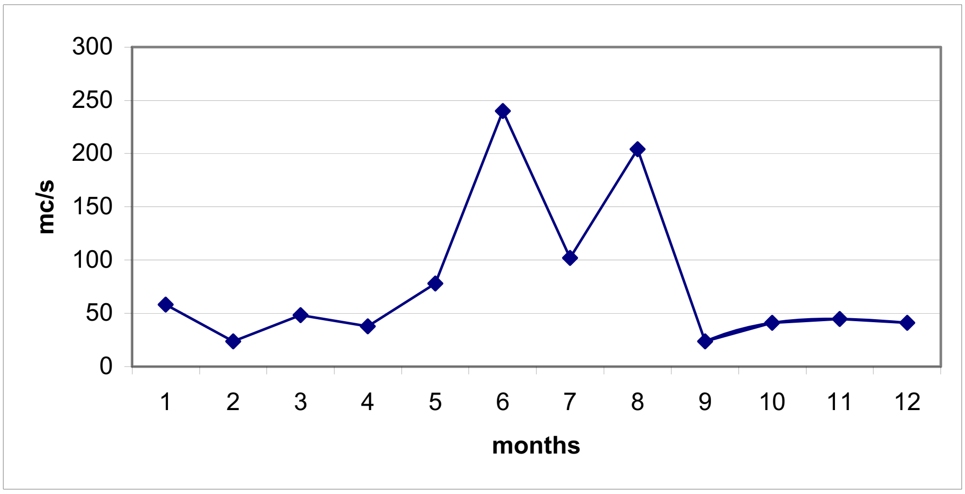

Fig. 4. ***Maximum fluid leakage on the river basin Bizdidel (2000-2007)***

If you consider the maximum levels of leakage of liquid, it is noted that the peak flows in catchment of Bizdidel differ widely depending on weather conditions which generated rainfall in 2001, 2005 and 2007. Thus, the average maximum fluid flow varied between 40-240 m^3/s in 2001, but with much higher values on the flood peaks (Fig. 4).

4. HYDROLOGICAL RISKS

The hydrological risk category have occurred or are likely to occur in the catchment Bizdidel, falling *floods* and *flash floods*. *Hydrological drought* was registered in the period under review, even though in 2000 found only a small leak with a flow located at around 0.01 m^3/s.

Regarding *flash floods*, they were founded in the period examined, such extreme hydrological events occurred with a repeatability of 2-3 annually since 2001. The representative, by the magnitude of fluid flow since, was the flood in June 2001, the entire upper catchment of Ialomița, but remarkable is that it occurred only in the sub-Carpathian habitat.

Flood of June 2001 was the highest flow rates at all gauging stations in Ialomița Basin, upstream of the Târgovişte, being higher than in 1975. It was generated by a front of precipitation centered 48 hours in Ialomița valley, abundant rainfall fell in the Carpathian mountain region and totaling between 125-175 l/m^2. Another factor was the wetting basin, rainfall insignificant quantities that have prepared basin.

Flood began to form on the evening of June 18th and the morning of June 19, on all tributaries. Evolution of increased flood is of paramount importance to 5-10 m^3/s leading to the values of 200 m^3/s in 15-20 hours. So, in the night of June 19, it reached values of 240 m^3/s on Bizdidel at Brăneşti - Pucioasa (Fig. 5).

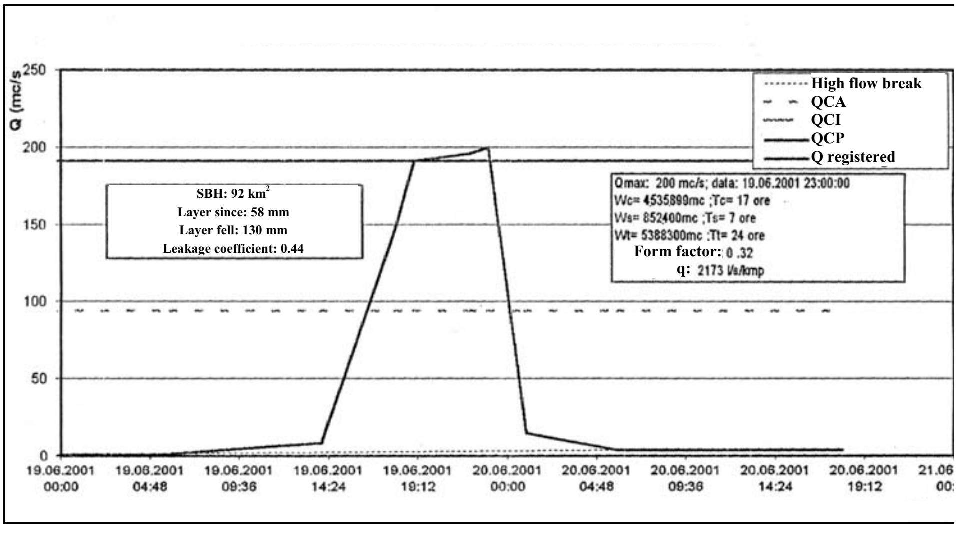

Fig. 5. ***Flood of June 19-20, 2001 at hydrometric station Brăneşti - Pucioasa***

Reduction of flood began June 21 and its volume was 5 million m^3/s.

Following high river flows in the junction with Bizdidel Ialomita river, the latter rose upstream, leading to flooding of part of the town Pucioasa. In this sense, is to remember water layer met at the station and the city's outlying neighborhoods, where there were 15-20 cm.

Following hydrological phenomena of the year 2001, when there were historical flow rates (greater than during floods in the 70^s of last century) on the upper catchment Ialomița (687 m^3/s at Valea Voievozilor) were parameters as flood and hazard rates.

Brăneşti hydrometric station being very close to the confluence with the river Ialomița (approx. 1 km), the next year was proposed and approved by INHGA Bucharest, the establishment of a hydrometric station at Bezdead at approx. 15 km away from the previous post, halfway between the source and confluence. This was necessary because of extreme hydrological phenomena, small river basin, to be quantified risk analysis of this type.

In chronological order, major floods occurred in 2005 when, unlike the events of 2001, precipitation exceeded the annual average fallen, coming up to values of approx. 1200 mm throughout the year. The level of this year has been several floods, of which we can mention those of the months from May to July and September.

In May, the flood took place on 5 (at 6.00) until the 8th (18.00). This occurred due to high amounts of precipitation fallen during the time mentioned, when the 24 h values ranged from 11 to 18 mm, which led to increases in flow on the river Bizdidel (Bezdead station) to values 67.6 m^3/s on May 7, 17.00 (Fig. 6).

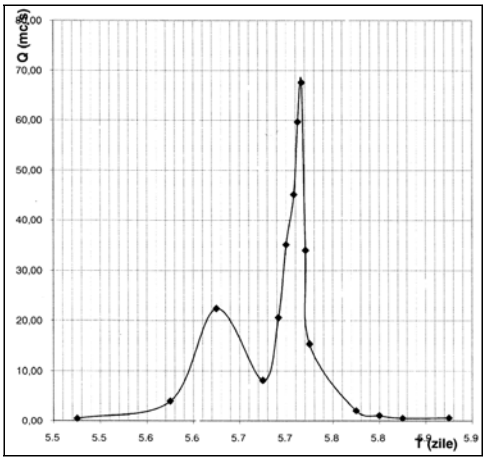

Fig. 6. ***Flood of May 5-9, 2005 (HM Bezdead)***

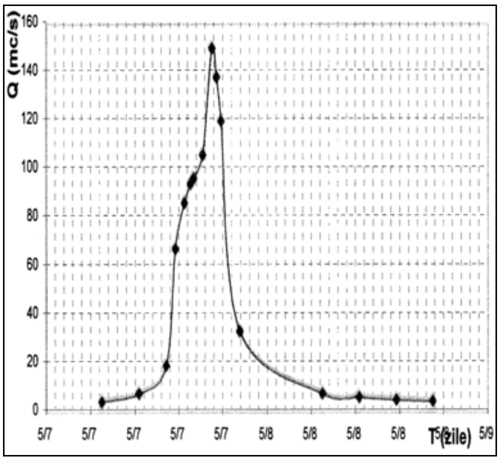

Fig. 7. ***Flood of May 7-8, 2005 (HM Brăneşti)***

Instead, the station Brăneşti, the flood wave was felt between days 7 (7.00) and 8 (18.00). The maximum was recorded on 5 May (18.00) and the flow passed was 150 m^3/s (Fig. 7).

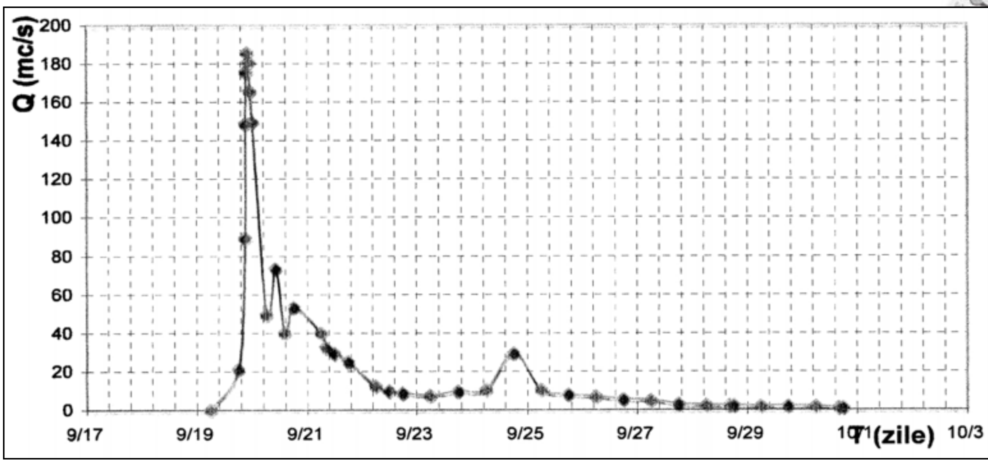

Fig. 8. ***Flood of September 19-30, 2005 (Brăneşti)***

The largest flood that drained water volume at both gauging stations, was recorded in September, when the phenomenon began to occur in 19 and lasted until 30, and the maximum liquid flow rate was recorded at both stations, in September 19, hour 22.00, with a flow of 186 m^3/s (Fig. 8).

The following year, 2006, were also noted as the second flash, one of them since April 27 (hour 6.00) and up on May 3 (at 6.00). Maximum water flow was recorded on May 1 (10.00), by approx. 50 m^3/s (Bezdead station) due to high amounts of precipitation fallen in April 27. The highest values of precipitation fallen in 24 hours were 38 mm, which led to the determination of the flood peak of May 1, but the effect was much lower flood at the Bzdead hydrometric station.

In June the same year, another phenomenon of this kind occurred in 30 and held until July 2 (Fig. 9). This time, the maximum water flow was higher than 102 m^3/s (July 1, at 5.50).

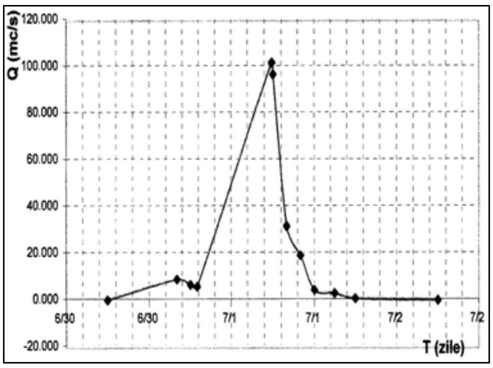

Fig. 9. ***Flood of June 30 - July 2, 2006 (Bezdead)***

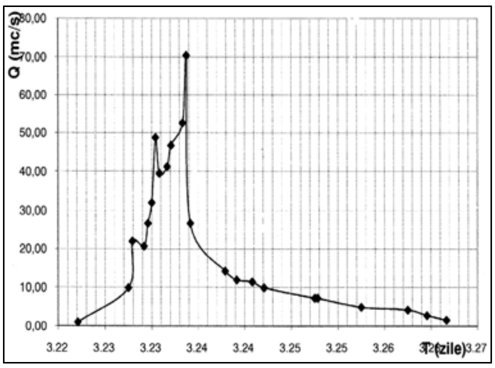

Fig. 10. ***Flood of March 22-26, 2007 (Bezdead)***

In the year 2007 there were two such hydrological events. The first took place from March 22-26, when it reached a maximum flow of 70.4 m^3/s and was fueled by falling precipitation, coupled with melting snow. The second, but with a smaller scale, took place in the period 16-21 November, with a maximum flow of 9.10 m3 / s, the background of massive precipitation (Fig. 10).

5. CONCLUSIONS

Information presented shows that the mechanism producing floods in the geographic area analyzed is generated almost exclusively by the fall of precipitation, either in torrential regime, be prepared for a long time. It was found that most floods are of „arrow" type, except water phenomenon of 2001, which we have referred.

Although fluid flow rates recorded flood peaks ranged between 9 and approx. 250 m^3/s, there were no human casualties, the only damage being a material, and most important, we observed reactivation of slope geomorphological phenomena, mainly due to the phenomenon of under-cutting and lateral erosion of the riverbed.

Such phenomena need to be known, due to the impact they have on the geographical landscape and the settlements and human activities, is absolutely imperative the development of hydrological risk maps at small basins.

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