ANALYSIS OF THE GALBENA VALLEY HYDROGRAPHIC BASIN PARAMETERS. CASE STUDY

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Abstract

The analysis of hydrographic basin parameters helps forming an image over the area's hydrographic features which can afterwards contribute to the basin classification according to its potential to reduce the surface leaking and to conclude different types of objectives related to the anti erosion or hydro energetic fitting out or valuing in any way the potential of a valley(of a water course). Thus, it is necessary to have a preoccupation concerning the characterization and the description of the hydrographic basins, the surface waters from a certain area, the ways of representation for the water course elements. The hydrographic basin (the reception basin, the water collecting basin) represents all the territory that includes the hydrographic net from which it collects its waters. (Man T.E. et al.,2010).

Key words: hydrographic basin, valley, parameters.

INTRODUCTION

By analyzing the parameters of a hydrographic basin we follow their characterization as well as their quantification (perimeter, surface, form, average altitude, average slope, orientation) (Bechet S. et al.,1975), which offer an assembly image of the hydrographic basin. Knowing these parameters helps establishing more easily the priorities related to the necessary interventions in order to improve the hydrologic manifestations which are produced inside the hydrographic basin (Bădescu G.,1972), and it helps determining the valuing ways of these manifestations with a view to hydro energy, production, improvement or, why not, with a touristic view.

We have analyzed the parameters of the Galbena Valley which is an entirely mountain water course situated in an area that offers a lot of water flow valuing possibilities, due to the level differences between the superior and inferior part and implicitly of the water power resulting from out of these.

MATERIAL AND METHODS

The parameter analysis of Galbena valley hydrographic basin was conducted in 2005-2010. Galbena Valley is formed in the superior part of the Bihor-Vladeasa Mountains which constitute the most massive unit and which has the highest absolute altitudes in the Apuseni Mountains (14.***), and it flows into the valley of the Stony River as a left tributary (25.***).

With the help of the level curve drawing of the area (fig.1), the Mapsys informatics program and of the 1, 2, 3 calculus relations we have delineated the perimeter of the hydrographic basin with the features presented in Table 1; this perimeter has then been divided in 8 surfaces (called partial surfaces and numbered from S1 to S8) whose parameters have also been determined and are to be found in Table 2.

$B_{med} = \frac{S_b}{L}$, (1)

$H_m = \frac{1}{2S_b} \Sigma\, s_i(H_i+H_{i+1})$, (2)

$I_m = \frac{\Delta H \cdot \Sigma l}{S_b}$, (3) where:

S_b is the surface of the basin;
L is the length of the basin on the median axis
S_i represents the partial surfaces from two level curves
H_i, H_{i+1} are the quotas of the level curves that delineate the partial surfaces
ΔH is the equidistance of the level curves from the hydrographic basin having the surface S_b
Σl is the total length of the level curves (Man T.E. et al.,2010).

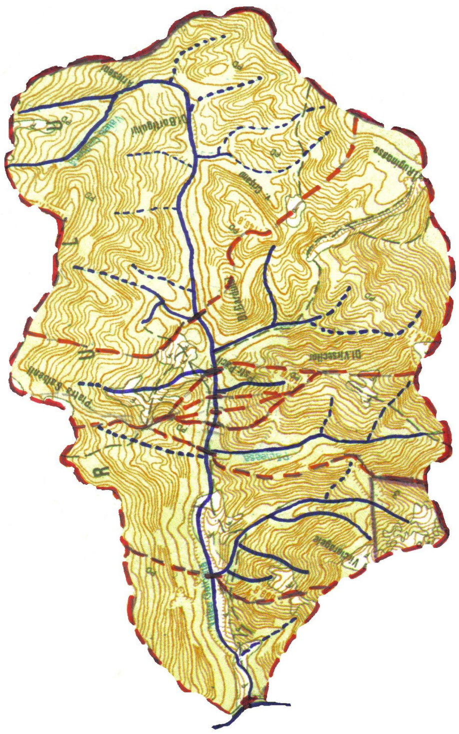

Fig. 1. The decomposition of the hydrographic basin in partial surfaces

Table 1

Parameters of the hydrographic basin

Hydrographic Basin	**Surface** (km^2)	**Maximum Length** (km)	**Maximum Width** (km)	**Form coefficient**(L/l)	**Perimeter** (km)
Galbena	31,07	9,45	5,00	1,89	24,85

Table 2

Features of the partial surfaces of the hydrographic basin

Criteria No.	**Code**	**Surface (km^2)**	**Length from the river mouth (km)**	**Quota (Z) (m)**	**Average quota of the basin (m)**	**Δz**	**i(%)**	**Average i (%)**
1	S1	31,07	1,79	455	842	215	12,01	7,78
2	S2	28,61	1,80	570		10	0,85	
3	S3	23,04	0,11	580		3	2,73	
4	S4	20,37	0,10	583		3	3	
5	S5	20,11	0,10	586		3	3	
6	S6	20,00	0,82	589		6	0,73	
7	S7	19,57	0,27	665		2	0,74	
8	S8	11,18	1,71	667		274	16,02	
9	source		6,70	941				

The decomposition of the hydrographic basin in partial surfaces has been done with the help of some placed sections mainly at the confluence with the secondary tributaries.

As one of the major concerns related to the characterization of the hydrographic basins is linked to the relation water – forestry vegetation, certain functions have been attributed to some types of stand from the hydrographic basins of Romania. This stand protects the water through a series of specific forestry and technologic measures applied throughout their entire existence. (Dumitru I. et al., 2004). In this way, the present study takes into consideration the stand present on the surface of the hydrographic basin, stand which has been analyzed with the help of *the stand hydrologic indicator*, whose expression is:

$G=1,20T^{0,06}D^{0,4}B^{-0,03}E^{-0,05}$, in which T, D, B, and E represent the age of the stand, the consistence, the production class and the erosion degree of the soil (Gaspar R.,2003). According to this hydrologic indicator, the stand from the Galbena Valley basin is delineated in the group of excellent hydrologic stand, which leads to the idea that hydrologic manifestations are highly controlled by it.

RESULTS AND DISCUSSION

In fig. 2, one can notice an obvious deviation of the slopes that describes the water course in each partial surface resulted after the decomposition of the hydrographic basin in comparison with the average slope of the valley, the explanation being that the length on the 8 sections differs a lot.

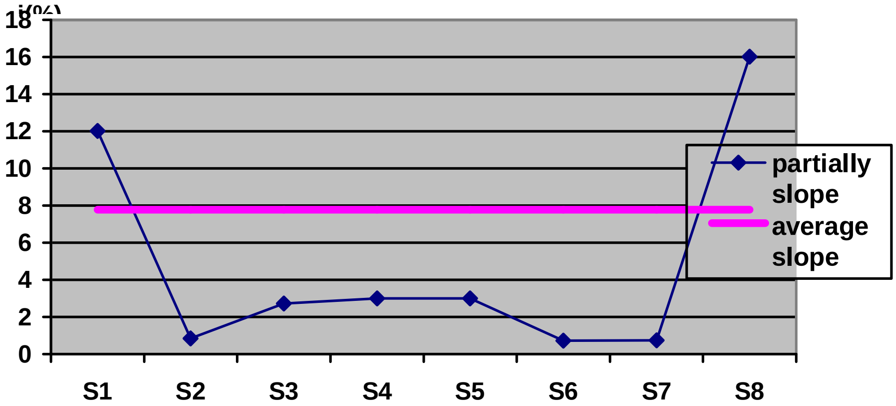

Fig. 2. Variation of the slope from the partial surfaces in comparison with the average slope of the water course

The cumulated slope of the 8 water course sections has been presented in fig. 3. From the drawing one can notice a mixed form of the valley longitudinal profile, a linear form in the inferior third and with a slope breaking in the superior part (according to fig. 4), more precisely between the last two partial surfaces.

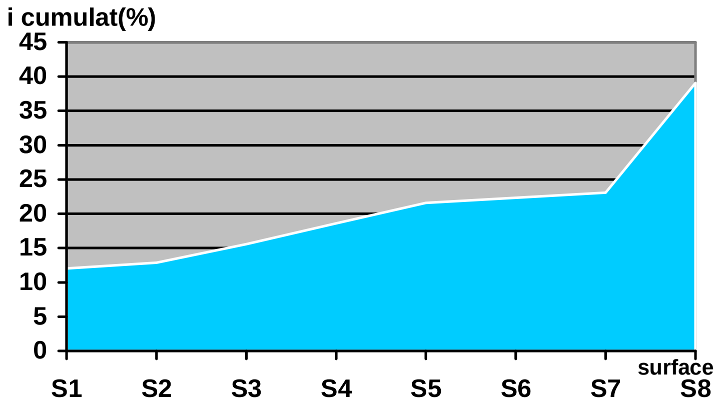

Fig. 3. Representation of the slope cumulated in partial surfaces

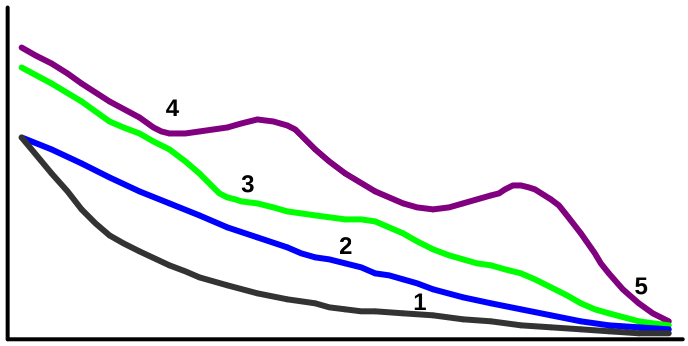

Fig. 4. Types of longitudinal profiles: 1-balance profile; 2-liniar profile;
3-profile with slope breakings; 4-ice profile (with counter slopes); 5-main level.
(Morariu T. et al., 1970)

CONCLUSIONS

The analysis of the hydrographic basins is an engineering activity and it has a prevalent forestry character (Clinciu I. et al., 1997), due to the formation of water courses in higher mountain areas where the forestry vegetation rules a vegetation that decisively sets its print upon them.

As we can notice from fig. 3, the longitudinal profile of the Galbena Valley is mostly a linear one, which offers a decreased degree of danger in what the torrential manifestations are concerned and a remarkable possibility to value the cumulated slopes with the water flows.

The analysis of the parameters presented in this study constitute a starting point for all the studies or practical applications related to the capitalization of the potential offered by the mountain water courses but at the same time and, equally, a starting point for the actions of fitting out the hydrographic basins in order to prevent possible torrential manifestations.

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