STUDY OF THE POSSIBILITIES TO VALUE THE HYDRO POTENTIAL OF THE ALEU VALLEY IN THE FORESTRY FIELD

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Abstract

Capitalizing the hydro potential of the streams in our country must be regarded with a maximum of interest in order to re orientate the production of non polluting energy.

The hydraulic resourses represent one of the natural richness which are, in fac,t never on the point of extinction, having various and numerous uses in all the fields, including the forestry field. As water is primary both for industry, agriculture, silviculture as well as for the households when using the hydro energetic resourses all these necessities must be taken into consideration in order to ensure a whole and comlpex capitalization of the water courses.

Key words: hydro/water potential, flow, section, forestry field.

INTRODUCTION

The aim of this work is to present the water way of the Aleu Valley situated in Bihor county (north-west of Romania) in the hydrographic basin of the Crisul Pietros/Stony River, which represents a real hydro energetic potential, in order to fit it out and value it and for the possibilities it has to provide water to a certain forestry field.

Each water way must be considered a hydroenergetic potential and as a consequence it needs more attention in order to be properly valued. Thus, on the mountain rivers or streams (onto which a lot of trout nursery ponds had been built, these trout nursery ponds having the advantage of an existing construction or having the advantage that they can be built) people can build with minimum efforts certain micro hydro units/generating sets that can produce electrical energy for the above mentioned trouteries as well as for other consumers (for the forestry huts/hostels around the area, for installations of wood processing, etc). Or for other touristic sites.

There is a simple truth : industrial development needs more and more energy. But the exhaustion of the so far well known resources, exhaustion increased by the policy of the petroleum, needs reconsidering some development models. A lot of predictions and anticipation have been issued in time related to the possibility of implementing new resources of energy. (Tănăsescu F.T., 1986).

The impact that the unconventional energy sources shall have upon the society shall produce principle changes in what the generation and the use of the produced energy is concerned, but this thing takes a lot of time.

MATERIAL AND METHODS

The Aleu Valley springs from the Bihor mountains, it is a right side tributary of the Stony River, it has a length of 12 km and covers a forestry area of 2456 hectares within the Forestry Ward of Sudrigiu, U.P.II Aleu. It has a hydrographic basin with a surface of 40 square km, it is characterized through a longitudinal profile with an average slope of 95% and it also has natural slope breakings.

The used research method is the experiment, meaning the measurement of the morpho elements of the studied sections on the basis of which the speed and the water flows have been established through analytic calculus and through informatical procession.

In order to characterize the hydro energetic potential of a river or stream the most important element which has to be determined is its flow. (Q). The flow has been established with the help of the method based on the speed measured with photors and with the help of the method that measures the speed with the help of the hydrometer handmill.

The hydrometer handmill is a performant apparatus easy to be used, on a large scale, for measuring water speed in different points of the current (Morariu T. et al,1970). For these measurements the OTT type of handmill has been used.

Fig. 1 Scheme of the analyzed water flow – Aleu Valley

For the beginning we shall present the studied water flow, from Picture 1, divided with the help of 2 sections, in sectors. The limits of this are numbered as follows: Upstream 2 upstream section, mhc location down stream section, Upstream 1 being an intermediary section which divides the river in two sectors.

RESULTS AND DISCUSSION

In each characteristic section: mhc location, Upstream 1, Upstream 2 the following are known: the Q- the multi annual minimum flows, the quotas towards the Black Sea level - Z, and the lengths towards the mhc Location (down stream),L, values which are presented in Table1.

Table1

Data regarding the characteristic sections of the water way sectors

Section	Upstream 2	Upstream 1	MHCLocation
Q(m^3/s)	0.1437	0.0968	0.1080
Z(m)	401.000	379.000	267.000
D(m)	841.4657	308.9501	0

Table2

The flows on the Aleu Valley in the points of the fit out sectors considered as entry data for the analysis of the energetic feasibility

Q(m^3/s)	iulie-06	august-08	septembrie-08	Q_{min}(m3/s)
Locatie	0.5900	0.1120	0.1080	0.1080
Amonte 1	0.5290	0.1004	0.0968	0.0968
Amonte 2	0.7850	0.1490	0.1437	0.1437

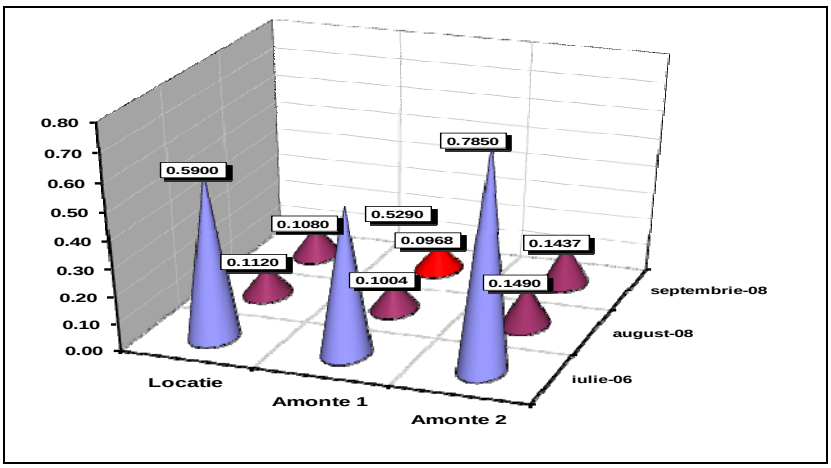

Fig. 2 Flows established on Aleu Valley

Table3

Absolute 3D coordinates of the sectioning points in which the water flows have been measured.

Coordinates of the sectioning points	X(m)	Y(m)	Z(m)
Location	*5161194.25*	*310503.4*	*267.000*
Upstream 1	*5161503.2*	*310503.58*	*379.000*
Upstream 2	*5162030.52*	*310574.45*	*401.000*

Table 4

Characteristic sizes of the sectors along the water way

Sector	**Upstream2-Upstream 1**	**Upstream 1-Location**	**Upstream2-Location**
□H(m)	22.0000	112.0000	134.0000
Q(m^3/s)	0.1203	0.1024	0.1258
P(kW)	***6.4867***	***28.1223***	**41.3438**
E(kWh)	56.8231	246.3512	362.1713
L(m)	532.5157	308.9501	0.0000
p(kW/km)	12.1811	91.0253	49.1330
e(kWh/km)	106.7068	797.3819	430.4053
□P(kW)	***6.4867***	***34.6089***	**41.3438**

On the studied sections the stream does not have any tributaries. As a consequence the values in Table 1 determine the sizes that characterize each sector separately. The results are presented in Table 4. In the last line, the power corresponding, in theory, to each sector limit represents the sum of the theoretical powers of the sectors between the upstream limit of the river and the downstream section that limits the current sector. These results are presented in two cases: the first case in which a micro hydrocentral is made up of 2 consecutive sectors Upstream 2, Upstream 1 and Upstream 1 mhc location; and the second case in which the micro hydrocentral presents only one sector Upstream 2- mhc location.

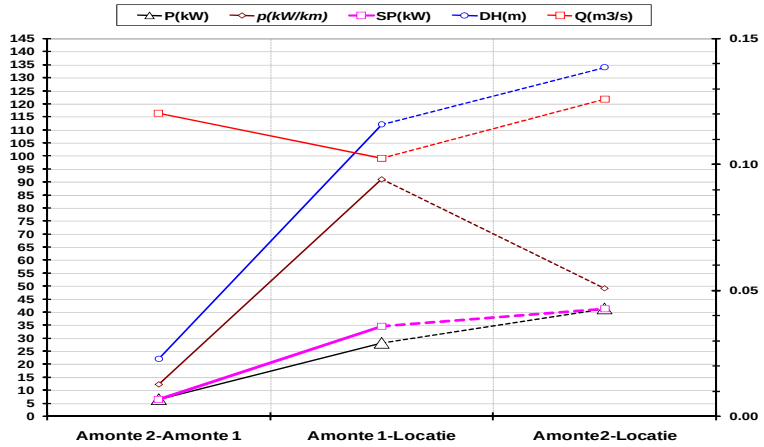

Fig.3 Reprezentation of the hydroenergetic survey – the MHC fit out of the Aleu Valley

If we analyze Picture 3 it turns out that the maximum value of the specific hydro energetic potential is obtained on the sector Upstream 1 – mhc location. Therefore the latter is the most suitable for a hgydro energetic fit out.

Thus it is an advantage to fit out a micro hydro central on the stream and to collect water from section Upstream 2 and supply through section Upstream 1 or directly over the relief to its location. As a comparison, in the second case the available power is 46.4% bigger than in the first case due to the big level difference. Still, the specific linear potential in the second case is with 63.3% smaller than in the first case a fact which leads to a higher cost for the fit out.

When calculating the available power of the considered sectors (Table2) there has been used a manufacturing coefficient of only $\varepsilon = 0.25$ (given 0,75-0,85) because thisd water way – as well as all the water ways mentioned in the work – are situated in mountain areas in which the environment needs are higher compared to the resources.

In Picture 2 we have marked with color red the minimum flow during the studied period. This value frames the water way in an area with a high potential of producing hydro electric energy on the water way.

The corresponding flows for each sector, in order to determine the available power, are chosen as being the minimum ones from the considered period. This fact explains itself on one hand because the relief through the water way flows is a karst one and therefore it can produce huge flow variations through underground infiltrations which can be filled and emptied temporary. On the other hand these flows of the Aleu Valley have an annual tendency to decrease between July 2006 and September 2008.

CONCLUSIONS

The potential of the studied water way (The Aleu Valley) offers optimal condition to apply it in order to produce non polluting energy for satisfying the needs of the forestry households, for a good functioning of the nursery trout ponds, for the many wood processing installations as well as for the other touristic sites.

It is recommended that in the future a great attention be given to the production of unconventional electric energy having in view its multiple advantages: it is ecological, cheap and at hand.

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