THE POSSIBILITY OF CAPITALIZING THE HYDROENERGETIC POTENTIAL OF THE VĂRATEC VALLEY

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Abstract

The issue of the regenerating energies must be brought in the foreground of the research activities of the institutions of superior education, of the research institutes and even of the small enterprises. Within them the hydro component of small power occupies an important place, being based on historical, economic, ecological and technological motivations (Binig,A.V.,Stoican,M.,1999).

Key words: water energy, micropotentials, energetic resources

INTRODUCTION

Using water energy for utilitary or production purposes has a great and old tradition in Romania (Florea J., Nițu V.,1988) but this thing must be regarded in the future as a huge non-polluting resource that can substantially contribute to the realization of energy and fuel savings with relatively small investments (Paish O.,2002).

The problem of capitalizing energetic micropotentials is a world wide one and of course here in Romania we must also enlarge the interest regarding the building of microhydroaggregates (Spiridon D., 1984) which are obviously so necessary.

The worldwide energetic situation, the progressive loss and decrease of fuels and their price increase impose the use of all the energetic resources including the secondary ones. Thus, the use of very small power and of small power hydraulic resources brings into light the problem of microhydrocental realization.

The potential of the small water flows can be capitalized by realizing hydrocentrals near some already existent objectives or by designing and building independent microhydrocentrals.

If we want the energetic potential to be capitalized then it is necessary to enlarge our preoccupations related to: the inventory and the adjustment of small water courses, the energy contained in the non-energetic hydrotechnic adjustments.

During the last decade when the greenhouse effect has become more and more dangerous, the European Union in its effort to reduce the direct emission of CO_2 promoted a series of programs for the development of

renewable sources of energy based on research, development and demonstrative programs (Mustață O. et all., 1982). The European Union Council recommended the state members a convergent development of the energetic policies as well as sustaining the independent producers of electric power, the main objectives being the following (Voia I., 1996):

- promoting the interests of the independent producers of energy, who produce this energy from small power hydraulic resources together with promoting the interests of the equipment producers.
- encouraging the energy transfer.
- supporting the study and the analysis of the relevant problems from an ecological, legal, ethnic and economical point of view.

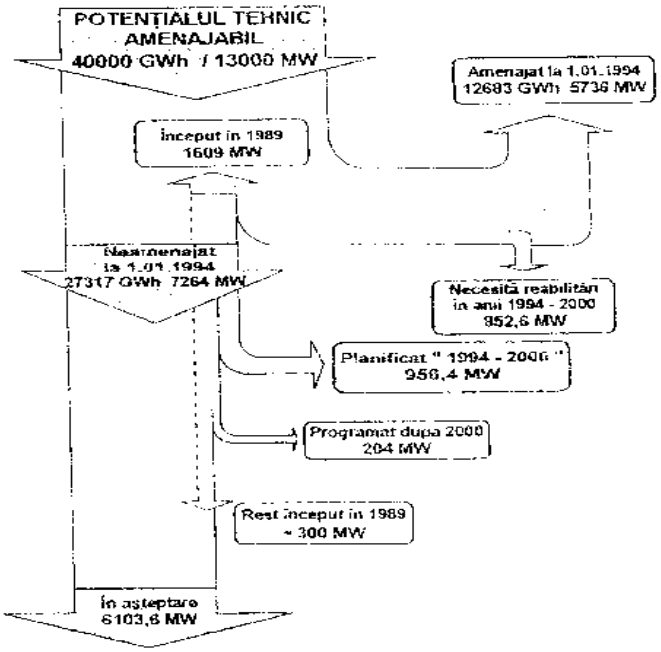

Figure 1 The situation of capitalizing the Romanian hydroenergetic potential on the 1st of January 1994 and the RENEL evolution program (Lefter L., Luca G.,1988)

MATERIAL AND METHODS

The water course studied in this work is rthe Văratec valley stream, a left tributary of the Black River situated on the area of the Vascau Forestry from the Oradea Forestry General Offices.

This valley springs from the Codru-Moma mountains, small mountains with altitudes between 600-1000 meters, fragmented with deep hollows, limestone plateaus, with beautiful karst phenomena (sinkgholes, springs and small hills) (10.***). This valley characterizes itself through a

permanent and relatively constant flow ensured by its tributaries: the Coleşti Valley, the Briheni Valley, the Lazu Valley and the Calului Valley.

The forestry vegetation from this hydrographic basin is represented by pure beech woods or mixed ones, by sessile woods, spruce woods and by mixed types of wood.

The hydraulic energy is the energy of the most worldwide spread bearer - the water or more directly it is the energy of the water courses due to the solar radiation, to the convection of the planet bark, to the physical phenomena of evaporation and condensation and to the gravitational force (Baya,A.,1999).

In order to value the hydroenergetic potential the necessary conditions are: to know the volume of the flow Q (m^3/s) and of the level difference H (m) (Leca,A.,1977). Knowing these two features one can calculate :

The hydraulic power

$$P=9,81 \times Q \times H \qquad [kw]$$

The hydraulic energy

$$E=Q \times H \times t / 367 \qquad [kw/h]$$

Thus, from the measurements done on a transversal profile of the stream the average width (1m) could be determined on the measured tronson which is of 6 meters. On this average width (6m) of the stream (fig.2 and 3), the average depths of the water flow had also been measured, at a distance of 1 meter between them, these depths being presented in table number 1.

Table 1.

Average depths of the water course

h_0	h_1	h_2	h_3	h_4	h_5	h_6
o cm	5 cm	12 cm	19 cm	18 cm	10 cm	1 cm

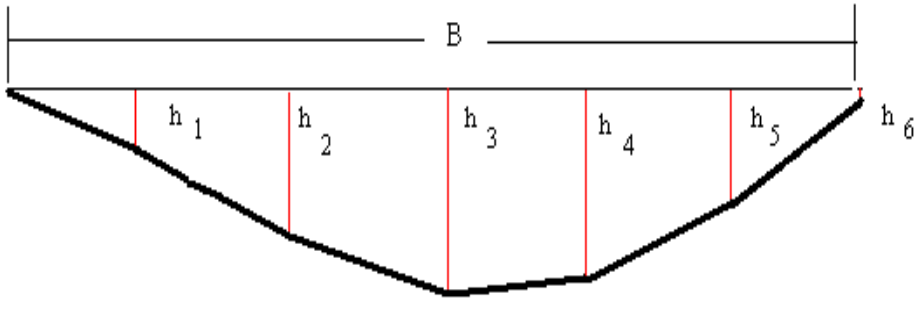

Figure 2. The transversal section

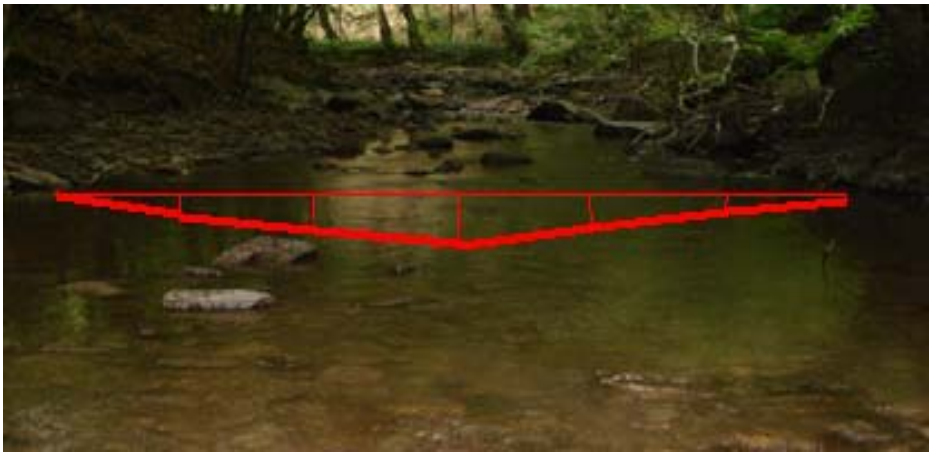

Figure 3. The profile of the transversal section on the water course

From these measurements the section area resulted (the wet surface) S=0,645 m^2. The next step was measuring the moving speed of the water course obtaining an average value of v_m=0,89 m/s.

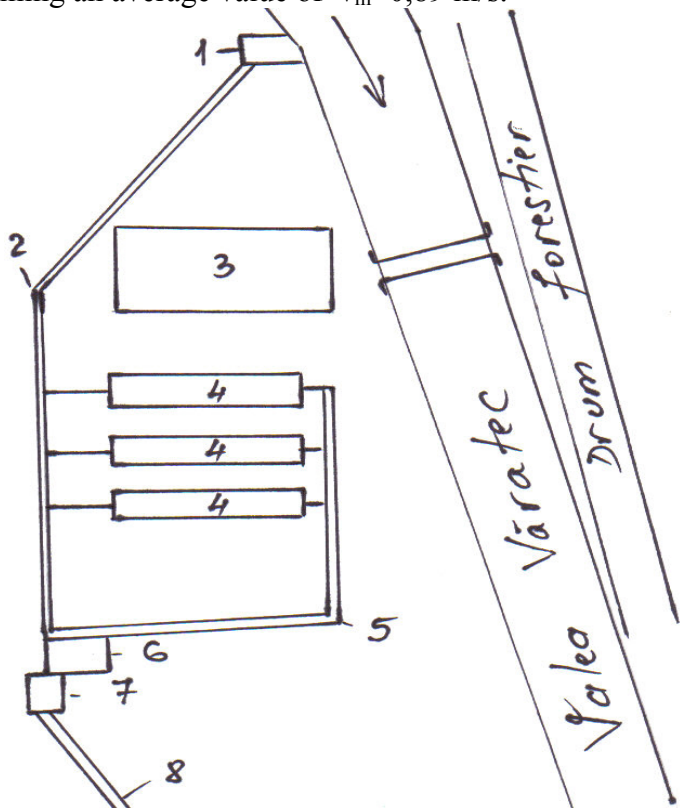

Figure 4. Suggestion for arranging a microhydrocentral in a trout nursery pond – top view- (1- intake;2- supply channel; 3 – the house of the trout nursery owner; 4- basins; 5- eviction channel; 6- evacustion; 7- microhydrocentral; 8- tailrace channel)

RESULTS AND DISCUSSION

Having in view the measurements and the calculus and all these introduced in the 1st and 2nd relations we have obtained:
-the hydraulic power P=9,81 x 0,574 x 0.5=2,815 [kw]
-the hydraulic energy E=0,574 x 0,5 x 3600/367=2,81 [kw]

As a consequence one can notice that the Varatec Valley offers all the natural conditions for capitalizing this unconventional source of energy because producing hydro based energy answers many requests of the society, requests among which we can mention : the costs, the safety functioning of the energetic system and the impact upon the surrounding environment (Baya,A.,1999). As a result relaunching the capitalization of the hydroenergetic potential in Romania can start with the micro component.

CONCLUSIONS

Designing and putting the mycrohydrocentrals and the experiments that can be realized into operation shall create the possibility to generalize the suggested solution.

A thoroughgoing study of the aspects presented in this study means knowing the reliability parameters, the electromechanical equipments of the microhydrocentrals as well as establishing some safety indicators in their exploitation and function.

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10.***Amenajamentul O.S. Vaşcău