

Hillside water management and possibilities of melioration in the Csatári-valley

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1. Introduction

The focus of my research is one of the valleys of Wine Region of Szekszárd, called Csatári-valley. The valley has a catchment stream at the floor called Csatári-stream. This collects the rainwater of the sub-valleys. This area had not been monitored in point of water management. However, this area plays a major role in the production of excellent Hungarian wine. Hence the protection and sustainment of this agricultural area is very important. My purpose was to find and suggest a solution which can provide a stable future for the valley.

2. Research Methods

First, I checked the characteristics of the area. As a result, my first suggestion was to make lakes by swelling back the water of this stream. The places of the lakes were determined with the help of Google Earth and on-spot altitude measurement.

I examined the workability of the suggestion in different ways. I collected surface water samples from Csatári-stream and two artificial lakes to determine the water quality and to see how it could change in future. The samples were analysed by colorimetric and titrimetric methods in the scientific laboratory of my school. I did not only analyse the physical and chemical quality of water but also examined the biological state of waters. The biological species were determined by optical microscopy.

Stream gauging was measured by float (see *Figure 1*) and “bowl” methods at two places of the Csatári-stream. Every gauging consisted of three flow velocity measurements and a cross-section calculation.

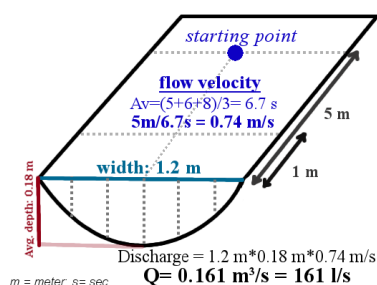


Figure 1 – Stream gauging with float method

The erosion rate of soil was estimated by Universal Soil Loss Equation (USLE) which was worked out by *Wischmeier and Smith* [1]. To calculate the average annual soil loss the factors should have been assessed. For this purpose, I collected data and soil samples, then I analysed the important parameters of soil (e.g. content of CaCO_3 , texture of soil, water holding capacity of soil).

Furthermore, I mapped the level of groundwater of the Csatári-valley. This measurement was done by my handmade tool in five wells of the valley.

As a part of my project, I also made an action at Celebration of St. Martin’s Day in Szekszárd, where I pointed the importance of surface and groundwaters out to the inhabitants.

3. Results

As a result, it can be stated that all of the analyses and researches are buttress up my conception.

The results of water analyses showed the actual quality of the water of the stream. The concentration of ammonium ion and nitrate ion were between the Hungarian standards (MSZ 12749). The concentration of nitrite ion and phosphorus were outlying because of the diffuse agricultural pollution and the rainy weather conditions before the analysis. Besides this, 34 species were determined by the hydrobiological study. Most of the species (e.g. diatoms, green algae, roundworms, etc.) are like to live in eutrophicated environment. The appearance of eutrophic bacteria and high concentration of phosphorous also are related to the structure and texture of soil of the investigated area and the rate of agricultural cultivation.

My stream gauging showed different values: the average discharge of the stream was 8 l/sec, although there were cases when the discharge was extremely higher. This can show the difference in the weather as well. As a consequent, the stream could be swelled up because it is able to serve enough water for the lakes.

Soil erosion estimations cleared that soil loss is huge in the area. On the basis of soil analysis, I determined four types of soil and the loss of those. Unfortunately, these can risk the formation of the lakes. That is why I suggested another solution: the owners task is to make bund ditches and benches to their lands [2]. However, we need the joining of every farmer or owner to create these.

4. Conclusion

In conclusion, I can state that the building of the lakes is practicable and advantageous to advance the water management of this area. On the other hand, improvements should be done against soil erosion (e.g. bund ditches, benches, application of biochar) with the help of the owners.

If my solution was materialized, then the agronomical potential of this valley would have more stable in the long term.

5. References

- [1] Wischmeier W. H. - Smith D. D. (1960): Rainfall energy and its relationship to soil loss, 39(4). Transactions, *American Geophysical Union*.
- [2] Dömsödi János, PhD (2010): Landscaping and landscape protection 4. *University of West-Hungary*.