Water retention assessment in traditional agricultural landscape (case study Liptovská Teplička, Slovakia)

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I. THEORY

Water plays a vital role in the supply of water for plant growth. Knowledge about the processes of water retention in different types of landscapes is crucial for improving the functional performance of the agricultural landscape. From the point of view of the quality of water retention, different soils have different water retention characteristics. Thus, the type of soil is an important factor in assessing water retention using methods of analogical and numerical analysis. The length of the sample (e.g., 10 days) set within sample plots of different agricultural conditions in traditional agricultural landscapes is an important factor in assessing the characteristics of water retention. Furthermore, the results of the analyses of water retention characteristics can be used for assessing the condition of the agricultural landscape and taking appropriate measures to improve it.

II. SAMPLE SITES SELECTION

A. LOCALITIES – 14 in total
   - Location of sample sites
   - Assessment of the FAH properties (length, height, skeleton content)
   - Root sampling

B. SAMPLE STANDS
   - Upper sample stand – A
   - Middle sample stand – B
   - Lower sample stand – C
   - Central production plot site – D

C. FIELD WORK
   - GPS location of sample site
   - Sampling of the FAH properties (length, height, skeleton content)

D. STATISTICAL EVALUATION

For the first time, a correlation analysis was performed to assess the impact of independent variables on the water retention. According to the results, the best water retention is associated mainly with the following variables:

- Geology – Rainfall distribution
- Landscape – Soil structure
- Far Rock Content
- FAR orientation along contour/fall lines

Furthermore, the factors of FAR length and height were correlated with factor analysis of water retention using Spearman’s correlation coefficient (r ≤ 0.5). Based on this, the FAH length and height have a significant effect on the variability of water retention values.

V. STATISTICAL EVALUATION

The presented results are plotted on the diagrams in order to record soil moisture correlated with precipitation data measured at local meteorological stations.

Preliminary Results

The FARs were characterized as relief forms created by continuous and spontaneous agricultural activity of men, using traditional agricultural equipments and technologies in order to increase the productivity of landscape, with regard to the character of natural environment and the degree of economic and cultural-social development of local inhabitants. The results have been divided into two basic groups according to land, orientation, water and soil sampled. The morphological parameters of terrains can be oriented along the sloping direction, oriented toward fall lines, or in diagonal direction toward contour lines. Terrain slopes are composed of soil with different proportions of stones depending on the type of soil and natural layer. Proportion of slopes on terrain slopes was increased also by farmers who accumulated them to improve productive plots.

The FARs, which are the result of the soil conditions, mostly further as directly not cultivated soil heaps were formed from the soils removed during annual ploughing and deposited to one place within a field along its edges. The farming practices have been conditioned by cultivation and arable land along the slopes. The morphological parameters of the terrain surface are dependent on distribution of rocks, loose degradation, moraines and other polygons. Farms (R), have been created gradually by merging of heaps. They create linear or concave slope features, characterized by different elongation and soil content.

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