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## Renewal of a national soil water management category system and legacy map by data mining methods, digital primary and hydrological soil property maps

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Soil physical properties and soil water regime have been in the focus of soil surveys and mapping in Hungary due to their importance in various environmental processes and hazards, like waterlogging and drought, which endanger extended areas.

In the late '70s a category system was elaborated for the planning of water management, which was used as the legend of a nationwide map prepared at a scale of 1:500.000. Soils were characterized qualitatively (e.g.: soil with unfavorable water management was defined with low infiltration rate, very low permeability and hydraulic conductivity, and high water retention), without quantification of these features. The category system was also used for creating large-scale (1:10.000) water management maps, which are contained legally by expert's reports prepared on the subject of drainage, irrigation, liquid manure, sewage or sewage-sludge disposal. These maps were prepared eventually, essentially for individual plots and are not managed centrally and are not available for further applications.

Recently a 3D Soil Hydraulic Database was elaborated for Europe at 250 m resolution based on specific pedotransfer functions and soil property maps of SoilGrids. The database includes spatial information on the soil water content at the most frequently used matric potential values, saturated hydraulic conductivity, Mualem-van Genuchten parameters of the moisture retention and hydraulic conductivity curves. Based on similar idea, the work has been continued to produce more accurate and spatially more detailed hydrophysical maps in Hungary by generalizing the applied pedotransfer functions and using national soil reference data and high resolution, novel, digital soil property maps.

We initiated a study in order to formalize the built-in soil-landscape model(s) of the national legacy map on water management, together with the quantification of its categories and its potential disaggregation. The relation of the legacy map with the newly elaborated 3D estimations were evaluated at two scales: nationwide with 250 m resolution and at catchment scale with 100 m resolution. Hydrological and primary soil property maps were used as predictor variables. Unsupervised classifications were performed for spatial-thematic aggregation of the soil hydraulic datasets to identify their intrinsic characteristics, which were used for the elaboration of a renewed water management classification. Hydrological interpretation of the categories provided

by the optimum classifications has been carried out (i) by their spatial cross-tabulation with the categories of the legacy map and (ii) using the interval estimation of the applied soil hydraulic properties provided for the individual water management categories. Machine learning approaches were used to analyze the information content of the legacy maps's category system, whose results were used for its disaggregation. Conditionally located random points were sequentially generated for virtual sampling of the legacy map to produce reference information. The disaggregated maps with the legend of the traditional water management classes were produced both on national and catchment level.

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