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Assessment of possibilities and conditions of irrigation in Hungary by digital soil map products

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Sustaining proper soil moisture is essentially important in agricultural management. However, irrigation can be really worth only, if we lay sufficient emphasis on soil conservation. Nationwide planning of irrigation can be taken place, if we have spatially exhaustive maps and recommendations for the different areas.
Soil moisture in the pores originate from 'above' (precipitation), or from 'beneath' (from groundwater by capillary lift). The level of groundwater depends on topography, climatic conditions and water regime of the nearby river. The thickness of capillary zone is basicly related to the physical and water management properties of the soil. Accordingly the capillary rise of sandy soils – with very high infiltration rate and very poor water retaining capacity – are far smaller than in the case of clay soils – with very poor infiltration rate and high water retaining capacity.
Applying irrigation water can be considered as a reinforcement from 'above', and it affects the salinity and sodicity as well as the soil structure, nutrient supply and soil formation. We defined the possibilities of irrigation according to the average salt content of the soil profile. The nationwide mapping of soil salinity was based on legacy soil profile data, and it was carried out by regression kriging. This method allows that environmental factors with exhaustive spatial extension, such as climatic-, vegetation-, topographic-, soil- and geologic layers can be taken into consideration to the spatial extension of the reference data. According to soil salinity content categories, the areas were delineated as 1. to be irrigated, 2. to be irrigated conditionally, 3. not to be irrigated.
The conditions of irrigation was determined by the comparison of the 'actual' and the 'critical' depth of the water table. Since, if the water rises above the critical level, undesirable processes, such as salinization and alkalinization can be developed. The critical depth of the water table was calculated according to the literature, and based on average soil content of the soil profile, the water regime category of soil, salt content of the groundwater, and soil pH. The water regime category map originated from legacy polygon-based map of physical soil properties. The soil content, and the actual level of groundwater as well as the soil pH map – similarly to the soil salinity map – was compiled by regression kriging. The conditions are classified into the following three categories: 1. level of groundwater have to be sinked, 2. rising of groundwater level have to be hindered, 3. level of groundwater have to be regularly controlled.
The newly compiled maps can help decision makers to improve land use management, taking soil conservation into consideration.

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