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Regionalization of soil degradation processes in Hungary

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In the last decades soil degradation processes have been significantly increased and, according to the predictions, it is almost sure that without adequate arrangements this tendency will continue. The Commission of the European Communities in the Thematic Strategy for Soil Protection defines the eight most important soil degradation processes in the EU: erosion, organic matter decline, contamination, salinization, compaction, decreasing biodiversity, soil sealing, hydrogeological risks (landslide, flood) as well as proposes a Framework Directive as the means of a comprehensive approach to soil protection and ample freedom on how to implement its requirements is left to Member States. Various threats occur in specific risk areas, which must be identified which will be required by Member States in a national or regional approach possibly on the basis of common elements. Over time more harmonised monitoring approach and methodology may be developed, exploiting ongoing work of the European Soil Bureau Network on harmonisation of methodologies. Soil Information Working Group of the European Soil Bureau Network elaborated common criteria and approaches to identify risk areas for five specific soil threats. Member States will be free to develop and combine approaches to combat further and concurrent threats.

In the frame of Land Degradation Mapping Sub-project of PHARE MERA '92 identification, delineation and description of Hungary's major land degradation regions (areas of potential land degradation risk) at 1:500.000 scale were accomplished by building and analysing an extent digital land degradation geographic database in the late '90s. Territories affected by various limiting factors of soil fertility were determined by complex spatial queries of the integrated GIS evaluating the proper influencing

factors (grade of erosion, soil texture, genetic soil type, rootable depth acidification, deflation, depth to groundwater, annual precipitation etc.). Generalising and merging the maps of individual degradation factors resulted in the compilation of a complex degradation map. To derive the boundaries of land degradation regions required the consideration of a further information source. The physiographical delineation of the complex land degradation regions became possible using microregion landscape units. Finally 88 regions resulted in Hungary, which then were thoroughly characterized. The applied GIS analysis techniques were mainly based on traditional cartographic methods and had not fully exploited the opportunities, which were later emerged in digital soil mapping. Additionally, numerical analysis of the resulted maps was not really straightforward, however it was highly expected by responsibles in soil conservation actions.

Digital soil mapping (DSM) integrates the recent developments in numerical soil mapping techniques with the knowledge on soil cover which has been accumulated by soil surveyors. The development of DSM methods has been a growing activity for the past decades. DSM with the computational power integrated into modernised GIS packages provides new solutions for the improvement and straightforward functional application of spatial soil information systems.

Recently the available techniques provided by DSM together with the renewed interest in spatial delineation of areas endangered by various soil threats has been combined in the recompilation of land degradation regions of Hungary. The available map-based data related to soil degradation processes on nationwide scale were integrated and expanded with new spatial information -as compared to that used in MERA project-. The following land degradation factors were distinguished, identified and interpreted: acidity, salinity-alkalinity, wind erosion, nitrate leaching, water erosion, excess inland water, low organic matter content, compaction.

Different levels of specific threats were determined in the form of ranked categories. For the overall spatial characterization of degradation status, spatial information was integrated in a result map which can and should be post-processed in different ways. Pixel values of the raw degradation maps serve as spatial index of soil degradation hazard. It can be used for the comparison of the individual geographical and administrative regions and characterizes the territorial extension of the soil degradation processes and the grade of the required soil conservation actions. Appropriate contouring of grid data provides soil degradation regions.

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