Digital mapping of agri-environmental conditions and natural handicaps in a LAU1 region

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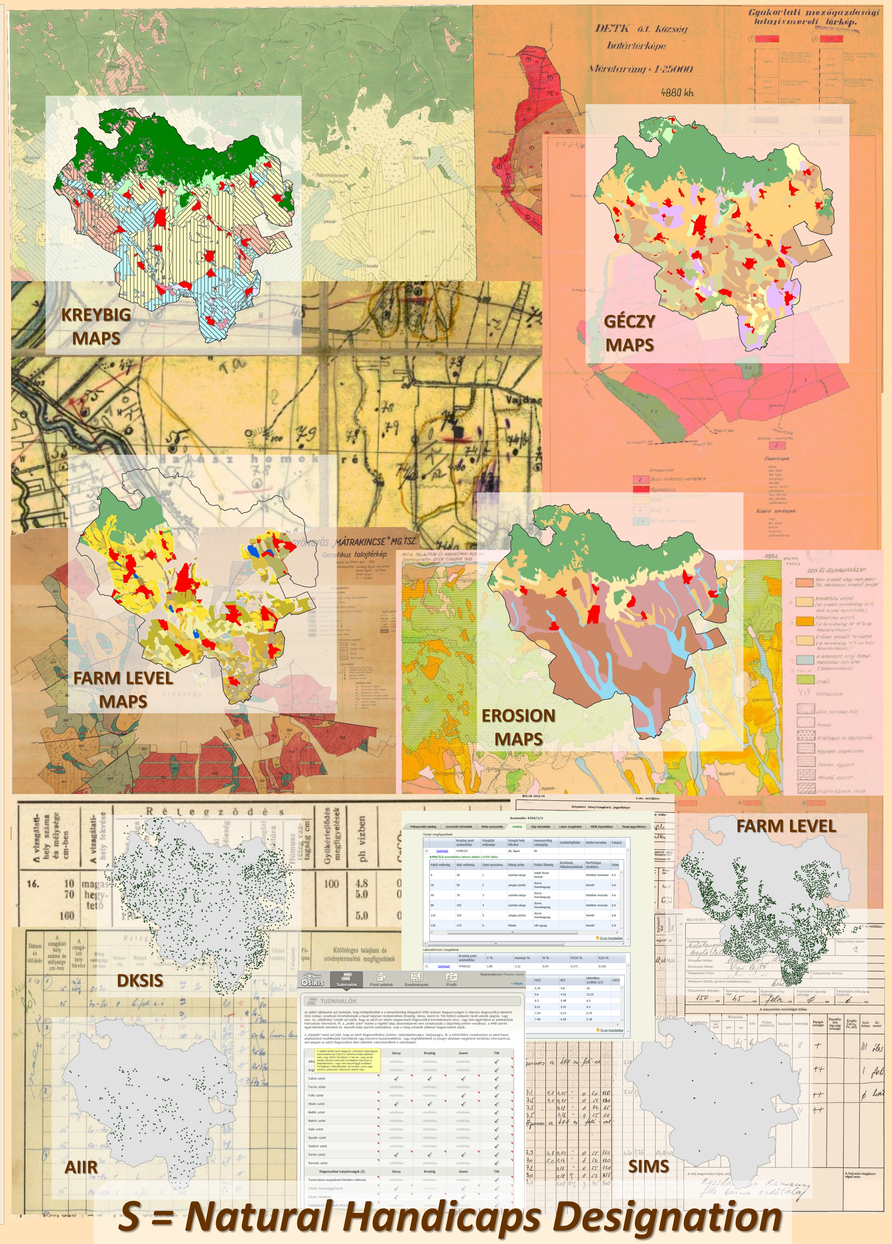
A specific data demand on soil characteristics was put up by the elaboration of the Production Site Specific GIS e-Consulting System (PSSGeCS) planned for Northern-Hungary Region. One of the most important modules of this system, which is still under development, consists of the spatial soil information sub-system of the regional level, soil related information. For the proper operation of PSSGeCS the agri-environmental conditions had to be characterized according to the 1:10,000 scale genetic soil mapping methodology and the category system applied in the Hungarian soil-agricultural chemistry practice. The factors constraining the fertility of soils had to be featured according to the biophysical criteria system elaborated for the delimitation of naturally handicapped areas in the EU.

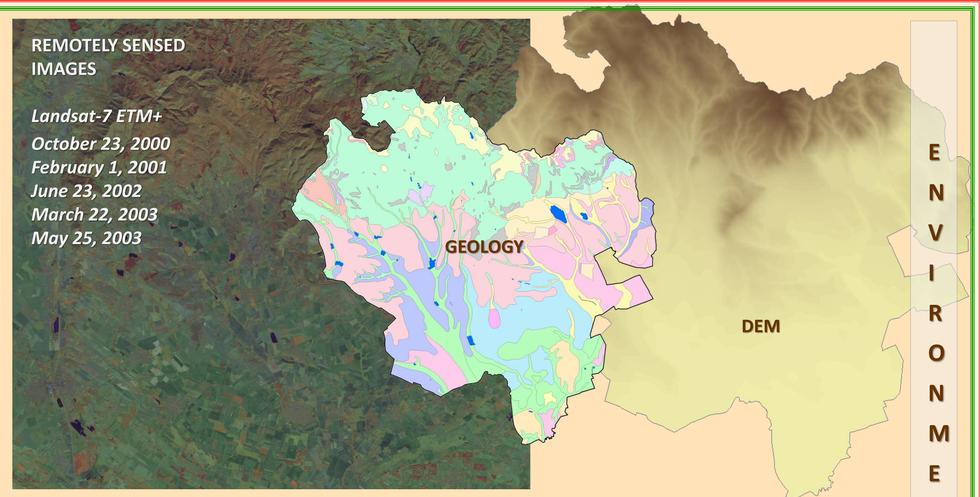
A great amount of soil information is available in Hungary due to former mappings and surveys. The collected data are available in different scales: national, regional, micro-regional, farm and field level and generally they are related to maps. The mapping objectives and methodology of the subsequent surveys also differed, various soil features were laid emphasis on. The legacy data provided by these surveys in one hand still represent a valuable treasure of soil information at the present time, and on the other hand are generally the sole information actually available. The diversity of various surveys carried out on a common region may pose questions concerning their joint applicability, nevertheless the disadvantages can be overcome.

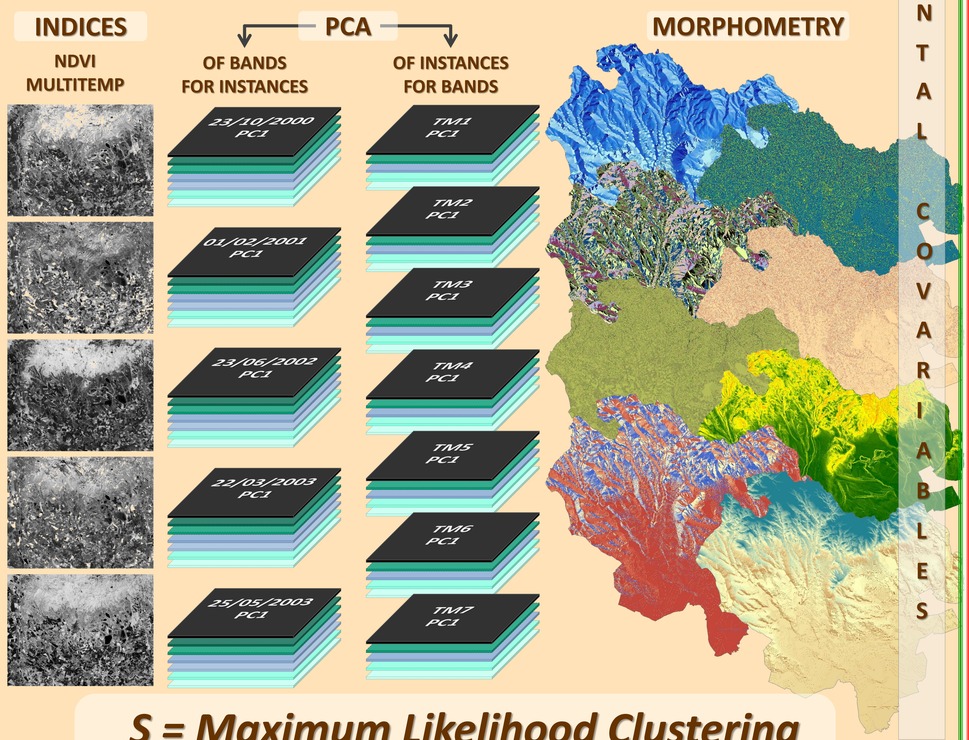
For the Gyöngyös LAU1 region pilot area, which is about 750 km^2 and situated in the Northern part of Hungary, all the available legacy soil data, both SMU and profile based, were collected. The spatial coverage of this information was neither complete nor homogeneous. As a consequence these data were not applicable in themselves to produce the required maps. They had to be integrated, harmonized and specific methods were developed for the digital mapping of the required agri-environmental conditions and biophysical criteria of natural handicaps. The spatial resolution of the derived digital soil related maps was 50 meter. Auxiliary spatial environmental information in the form of multispectral and multitemporal Landsat TM images, high resolution DEM and thematic maps on geology and landuse supported the regionalization process. Indicator (co-)kriging, principal component analysis preceded maximum likelihood clustering and classification trees were applied for the task specific elaboration of the two digital soil map series.

LEGACY SOIL DATA



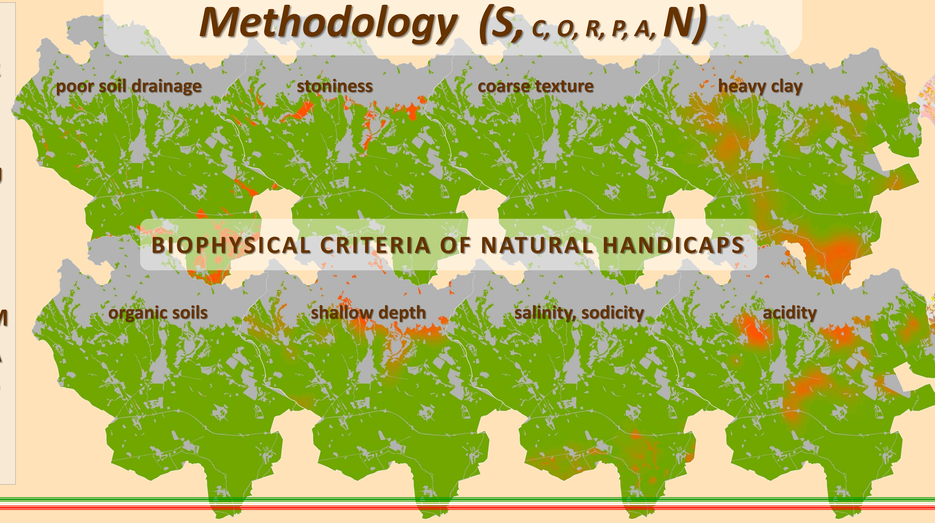
ENVIRONMENTAL COVARIABLES



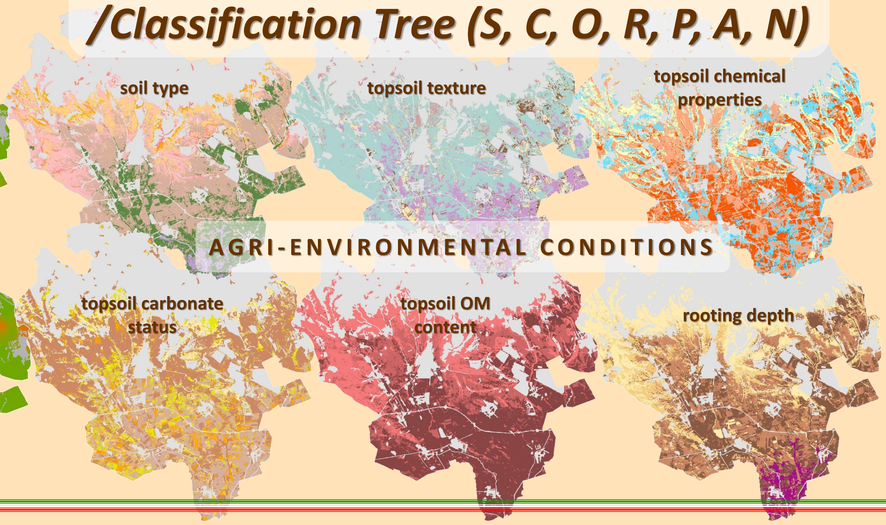


RESULT MAPS

S = Natural Handicaps Designation Methodology (S, C, O, R, P, A, N)



S = Maximum Likelihood Clustering /Classification Tree (S, C, O, R, P, A, N)



RESULT MAPS