Czech University of Life Sciences Prague
Faculty of Agrobiology, Food and Natural Resources

Study programme: **Exploitation and Protection of Natural Resources**

Department of: **Soil Science and Soil Protection**
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Topic: Spatial allocation of soil classes at different scales using digital soil mapping approaches

Hypotheses:

Soil classes are related to landscape position and other environmental factors and this relationship can be described by reliable models. Soil classes can be allocated and mapped in various scales with reasonable accuracy using prediction models.

Summary:

Soils are results of the influence of soil forming factors and properties, and therefore it is possible to allocate soil classes using models based on environmental covariates. The relationship of soil classes (using the World Reference Base for Soil Resources - WRB classification) and environmental variables of the stands (relief parameters, geology, land use, vegetation type etc.) will be analyzed on selected areas. Legacy soil data (Systematic soil sruvey, Basal monitoring of soils, forest surveys etc.) will be used as the principal source of soil data. Consistency of soil data from various resources will be assessed, and methods of disaggregaton and harmonizing of data will be tested. Spatial allocation models will be developed and calibrated using the determined relationships of soil classes and environmental covariates, exploiting advanced computational methods and machine learning (e.g. regression trees, random forests, artificial neural networks, fuzzy methods) in various scales (from local, through regional to national level). The effect of scale and resolution on the reliability and uncertainty of the allocation will be analyzed. Selected models will be evaluated using independent datasets and complementary field surveys. The best models will be applied on other areas and further evaluated. Reliability nad uncertainty of the spatial allocation of soil classes will be assessed.

Principal objectives of the thesis wil be:

1) Analysis of the relationship between soil classes and environmental covariates, comparison of various allocation models and selection of the best models.

2) Identification of the most important environmental covariates for soil class allocation.

3) Assessment of the effect of scale and resolution on the reliability and uncertainty of soil class allocation.

4) Production of maps of soil classes and related uncertainty for selected regions.

Source of: Project of the Czech Science Foundation No. 17-27726S on "Spatial prediction of soil properties and classes based on the position in landscape and on other environmental covariates"