

## PHD PROJECT DESCRIPTION

(4000 characters max., including the aims and work plan to be published online)

### Project title:

#### 1.1. Project goals

The main objective of the project is to identify and assess changes occurring in soils as a result of forest management, and in particular treatments that interfere with the morphology and properties of soil, in the areas of Soil Reference Areas.

#### 1.2. Outline

Soil Reference Areas (Glebowe Powierzchnie Wzorcowe) are a unique form of nature conservation, focused on soil protection, established in the Polish State Forests half a century ago (in 1975). Due to the technical limitations of foresters' work on these areas and the conservative nature of their protection, the actual soil condition in these areas is currently unknown. The project aims to identify the impact of management practices on the morphology and properties of soils and determine the degree of their naturalness/transformation. The project will be based on the analysis of geospatial remote sensing data (including LAS) and the properties of soils diagnostic to determine their transformation (e.g. morphology, content and distribution of organic carbon, pedogenic forms of iron and aluminum, and selected microelements), compared to soils unaffected by forestry practices.

#### 1.3. Work plan

1 year: elaboration of remote sensing data (Laser Airborne Scanning, cartographic sources, satellite scenes); field reconnaissance; selection of representative plots for laboratory analyses.

2 year: main part of field works; main part of laboratory analyses; publishing of first data.

3 year: completion of field and laboratory works; data elaboration and publishing.

4 year: final data integration and publishing; construction of PhD thesis.

#### 1.4. Literature (max. 7 listed as a suggestion for a PhD candidate preliminary study)

Basista, I., Dębińska, E., Koziół, K., Czerniec, J., Sosnowski, M., 2023. Micro-morphological analyses of digital terrain model in search of traces of ploughing on archaeological objects. *International Journal of Conservation Science*, 14(1), 131–158. <https://doi.org/10.36868/IJCS.2023.01.10>

Kabała, C., Bojko, O., Medynska, A., Szczepaniak, A., 2013. Spatial variability and temporal changes in the heavy metal content of soils with a deep furrow-and-ridge microrelief formed by an afforestation plowing. *Environmental Monitoring and Assessment*, 185(6), 5141–5150. <https://doi.org/10.1007/s10661-012-2931-3>.

Prusinkiewicz, Z., Czapiewski, S., Wieczorek, J., 1977. *Zasady zagospodarowania i urządzania glebowych powierzchni wzorcowych w lasach państwowych*. [Principles of development and arrangement of soil reference areas in state forests]. Naczelny Zarząd Lasów Państwowych, Polskie

Sewerniak, P., Gonet, S.S., Quaium, M., Słomiński, W., 2011. *Przygotowanie gleby do odnowienia*

drzewostanu jako czynnik kształtujący pokrywę glebową na przykładzie leśnictwa Zielona w Kotlinie Toruńskiej. [In:] Jankowski, M. (Ed.), Wybrane problemy genezy, systematyki, użytkowania i ochrony gleb regionu kujawsko-pomorskiego. PTSH, PTG, Warszawa, 135–147. Towarzystwo Gleboznawcze, Warszawa, 10 pp. (in Polish).

Zarządzenie Naczelnego Zarządu Lasów Państwowych z dnia 31.05.1975. [Z-2-710-48/75], Warszawa 1979, 10 pp. (in Polish).

Zielony, R., Chojnicki, J., 1996. Glebowe powierzchnie wzorcowe – historia, stan obecny, perspektywy. [Soil model area – history, current status, perspectives]. Sylwan 140(12), 83–87. (in Polish with English summary).

### **1.5. Required initial knowledge and skills of the PhD candidate**

- knowledge in soil science, especially experience in work with soil classification (Polish Soil Classification, World Reference Base for soil resources);
- basic skills in laboratory analyses;
- experience in work with GIS software and LAS data;
- English and Polish at a communicative level.

### **1.6. Expected development of the PhD candidate's knowledge and skills**

- advanced skills in work with environmental remote sensing data and elaboration methods;
- advanced skills in laboratory work;
- elaboration and integration of scientific data;
- construction and writing scientific publications.