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NUMERICAL AGRICULTURAL SOIL MAP OF POLAND AT THE SCALE OF 1:500 000

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A b s t r a c t. In Poland, soil cover has been identified in detail in terms of spatial variability which resulted in soil records that comprise data on soil properties put in order according to the criteria of administrative and physiographic division. These data were not available in the numerical format till quite recently which meant that their application did not fully meet present requirements of agriculture, environment and landscape conservation, modification of functions, etc. The newly created numerical soil map at the scale of 1:500 000 corrects this difficulty. The main information content of the map at the scale of 1:500 000 covers complexes of soil usefulness and soil types and subtypes. Basic characteristics such as granulometric composition, origin of the parent rock and land use attributes, i.e.: forest, grassland, arable land, waters or barren land, are also included. Apart from the soil coverage, the map contains 13 topographic coverages.

K e y w o r d s: soil, numerical map, GIS.

INTRODUCTION

Soil is one of the fundamental elements of the natural environment [3]. Due to its origin and basic properties decisive for its agricultural usefulness, it is characterised by a significant spatial variability. Identification and description of the soil cover at a general and detailed scale, is an object of interest of such disciplines as soil science, agricultural sciences, conservation of nature, and more recently, physical planning and landscape architecture.

MATERIALS

In Poland, soil cover has been identified in detail in terms of spatial variability which resulted in soil records that comprise data on soil properties put in order according

to the criteria of administrative and physiographic division. These data were available only in the analogue form till quite recently with the effect that their application in the broad sense of spatial analyses did not fully meet the requirements of agriculture, conservation of environment and landscape, modification of functions, etc. Spread of GIS tools [1,2] necessitated preparation of a survey numerical soil map with the view of its application for the environment description. To meet these requirements, a numerical soil map at the scale of 1:500 000 has been created.

RESULTS

The main information content of the current map at the scale of 1:500 000 covers complexes of soil usefulness and soil types and subtypes. In addition a basic characteristics such as granulometric composition, origin of the parent rock and land use attributes: forest, grassland, arable land, waters or barren land, was included. Apart from the soil coverage the map contains 13 topographic coverages.

Creation of the map consisted in digitising the analogue material prepared from the soil maps at the scales of 1:300 000 and 1:100 000. Soil contours were described by text attributes and written in an appropriate database. The information content of the map had to be verified by comparing it with the analogue base map taking natural conditions into account. Incoherent topography and indeterminate projection of the analogue base map as well as deformations in the base map caused a lot complications. Cartographic edition was conducted in the Mapinfo GIS. Alignment of individual coverages was laborious as we wanted to preserve clarity of soil information. It is one of the tasks that cannot be done automatically.

DISCUSSION

Usefulness of numerical maps as compared to their analogue counterparts is especially evident in spatial analyses. A numerical soil map may be easily exported to formats used by other GIS software. The attribute data of the map can be easily converted to formats used by such programmes as Microsoft Excel or Microsoft Access for further processing. In fact, the map was converted to the Arc/Info system to conduct spatial analyses required for the Integrated Spatial Information System on Agricultural Resources in Poland and other current projects. The soil coverage of the map has been used so far in combinations with other data to create maps of weed crop infestation and analyses of site location of hop gardens in Poland. In the latter case, three soil complexes were isolated from the map. They

were assigned values of hop yield and used in combination with a cover of climatic index for hop yields to determine potential hop yields in Poland. The numerical format of the soil map allowed to use a simple procedure to create a cover of hop yields. In order to satisfy further needs, maps at the scale of 1:25 000 and 1:100 000 in 1942 projections should be made.

The numerical soil map of Poland will soon be made available for education purposes as well as commercial use, subject to the satisfactory solution of problems aroung its licence rights.

CONCLUSIONS

1. Usefulness of numerical agriculture soil maps for spatial analyses has been confirmed by creating maps of weed crop infestation and a map of potential hop yields.

2. Advantages of a numerical map as compared to its analogue counterpart are especially evident in spatial analyses and in data processing with database tools (e.g. Microsoft Excel or Access).

3. Maps at other scales should be made to satisfy more recent requirements. The primary usage for such a map will be in the environment and soil conservation strategy planning, town and country planning, valuation of agricultural space and in various disciplines related to soil science.

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KOMPLEKSY
ROLNICZEJ PRZYDATNOŚCI GLEB

THE COMPLEXES
OF AGRICULTURAL USEFULNES OF SOILS

Kompleksy gleb użytków ornych
Complexes of arable lands

- **Kompleks pszenny bardzo dobry**
  Very good wheat soils
- **Kompleks pszenny dobry**
  Good wheat soils
- **Kompleks pszenny wadliwy**
  Defective wheat soils
- **Kompleks żytni bardzo dobry**
  Very good rye (wheat-rye) soils
- **Kompleks żytni dobry**
  Good rye soils
- **Kompleks żytni słaby**
  Weak rye soils
- **Kompleks żytnio-łubinowy**
  Rye lupin soils
- **Kompleks zbożowo-pastewny mocny**
  Cereal-fodder strong soils (mainly for wheat)
- **Kompleks zbożowo-pastewny słaby**
  Cereal fodder weak soils (mainly for rye)
- **Kompleks pszenny górski**
  Mountain wheat soils
- **Kompleks zbożowy górski**
  Mountain cereal soils
- **Kompleks owsiano-ziemniaczany górski**
  Mountain oat-potatoes soils
- **Kompleks owsiano-pastewny górski**
  Mountain oat-fodder soils

Kompleksy trwałych użytków zielonych
Complexes of permanent greenlands

- **Użytki zielone dobre i bardzo dobre (w przewadze łęgowe)**
  Good and very good greenlands (mainly occasionally flooded)
- **Użytki zielone średniej jakości (w większości grądowe)**
  Medium quality greenlands (highly situated, not flooded)
- **Użytki zielone bagienne i pobagienne słabe i bardzo słabe z przewagą gleb torfowych i murszowych**
  Weak and very weak greenlands with dominating peaty and post-peaty soils
- **Lasy**
  Forests
- **Jeziora, zalewy i rzeki**
  Lakes, gulfs and rivers
- **Nieużytki**
  Barrens
- **Nieużytki rolnicze**
  Waste agricultural lands
- **Miasta**
  Cities
- **Miasta wojewódzkie**
  Voivodeship cities
- **Granice województw**
  Boundaries of voivodeships
- **Granica państwa**
  Boundary of the country

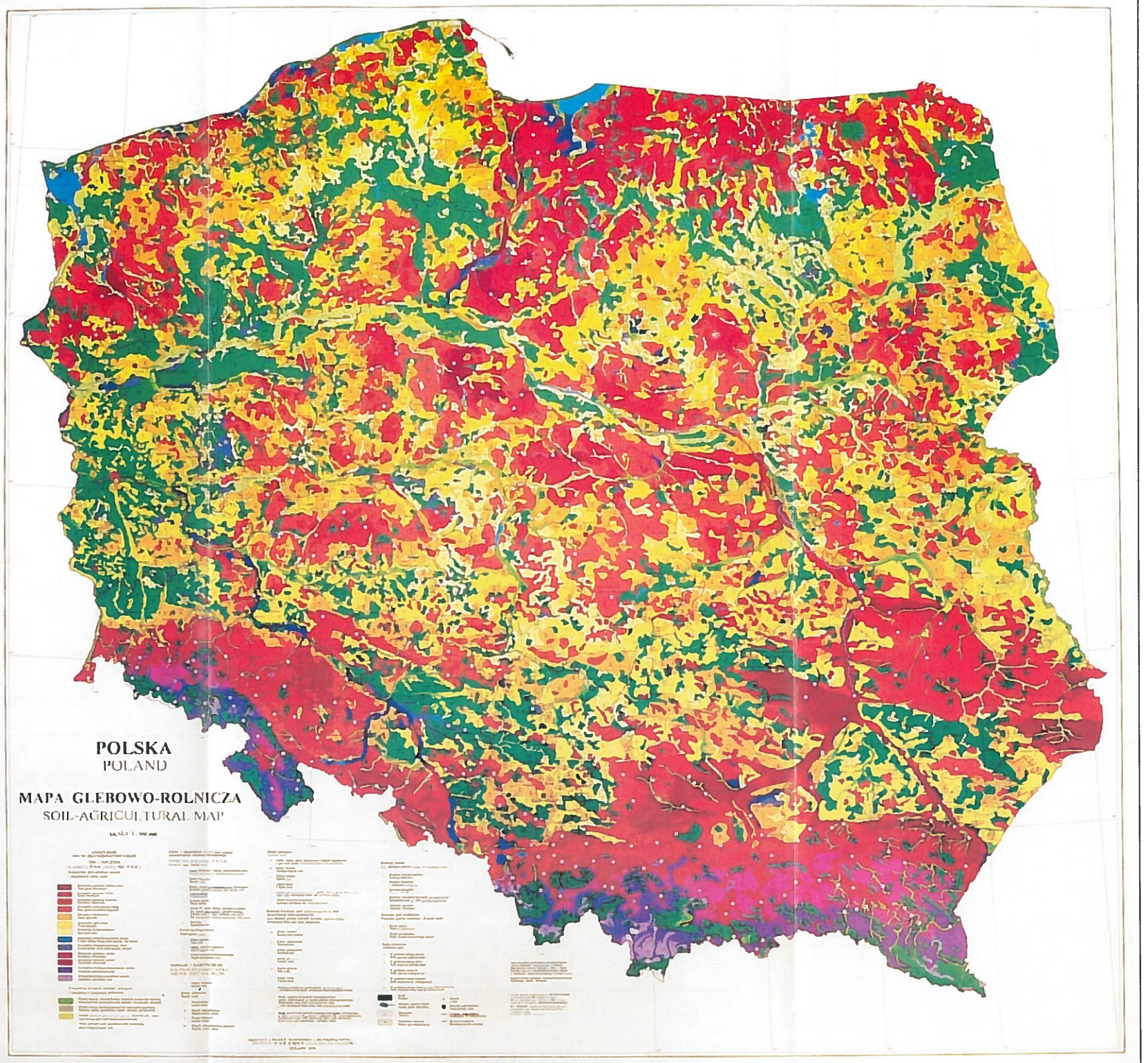

Fig. 1. Numerical agricultural soil map of Poland at the scale 1:500 000.