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UNCNET

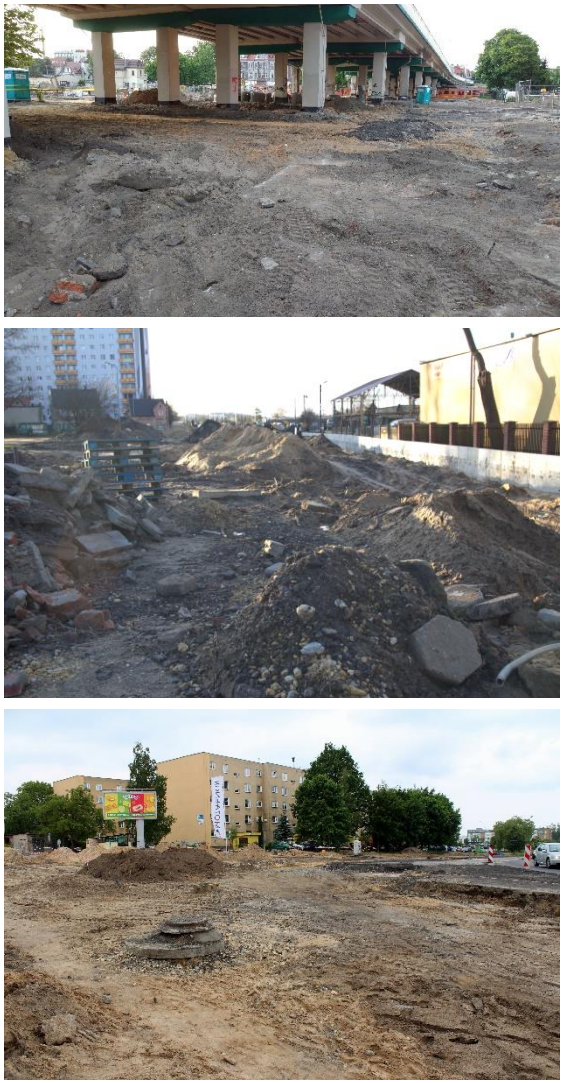
Anthropogenic soils in the context of water and chemical elements circulation in urban environment

Prof. Andrzej Greinert, Dr, hab. Eng.
Dr Eng. Jakub Kostecki
University of Zielona Góra, Institute of Environmental Engineering

MAIN TRANSFORMATIONS OF SOIL

In urbanized areas, there are soils with different soil profiles as well as chemical, physical and physico-chemical properties.
When talking about the water and chemical compounds cycles, the mechanical transformations of soils are of particular importance.
The urban soils are most frequently transformed by:

- mixing soil horizons and layers vertically and horizontally;
- addition of foreign materials to the soil material, mainly municipal and constructional waste; often the deposition has a layered structure, which strongly changes the conditions of migration of water with chemical compounds and elements in soil;
- shortening of the soil profile, usually by removing the humus level; in shallow soils only the bedrock can be left, so the soil practically ceases to exist;
- sealing the soils with solid materials (bituminous, concrete surfaces, cobblestone or precast cubes on cement ballast) or covering with loose materials (organic or mineral);
- compaction of soil horizons by heavy construction equipment.

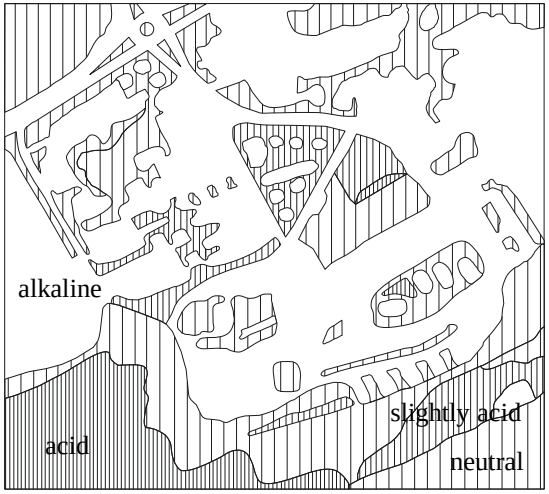


Examples of a big scale soil transformations.

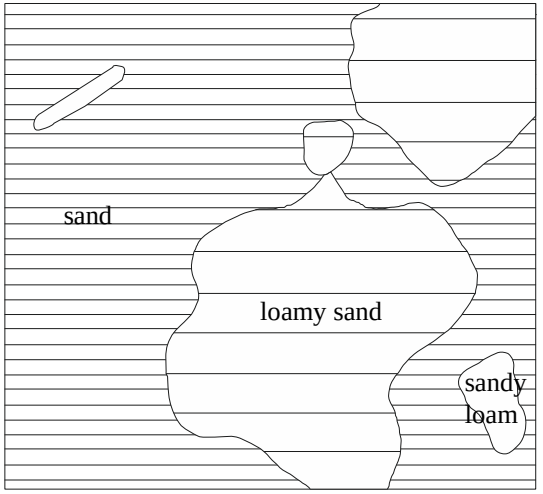
MAIN TRANSFORMATIONS OF SOIL

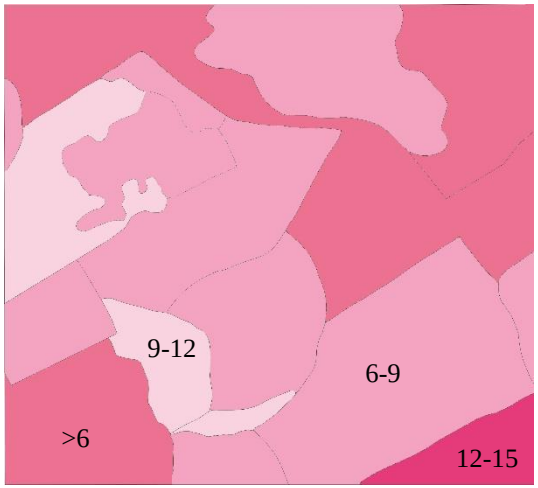
land use form

reaction

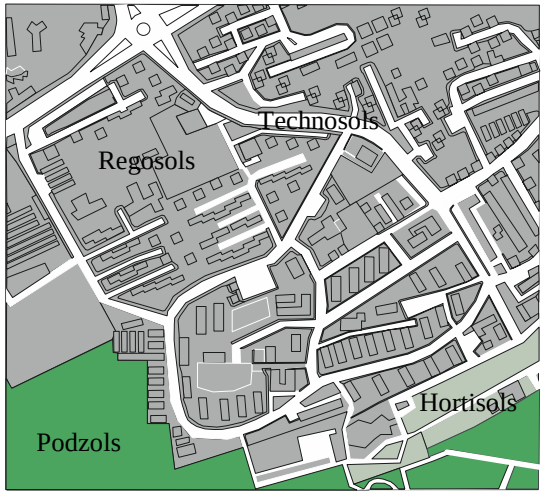


texture

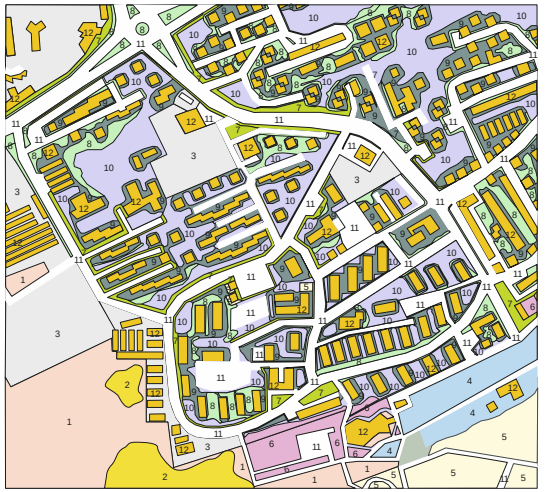




CEC (cmol·kg^{-1})



simple result



true diversity

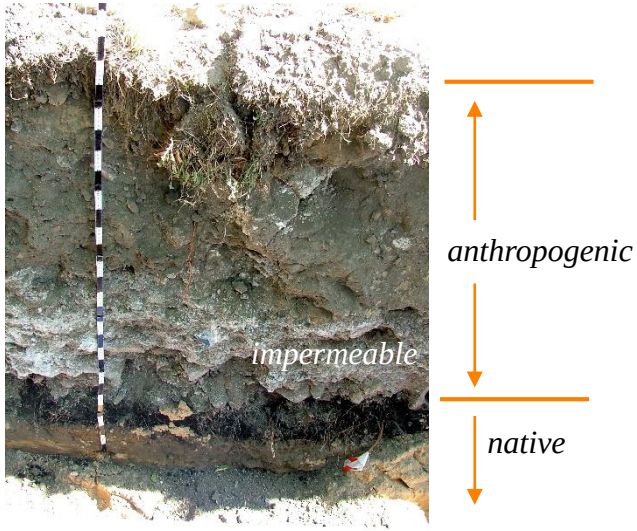
Distribution of selected soil characteristics in the Piastowskie housing estate in Zielona Góra

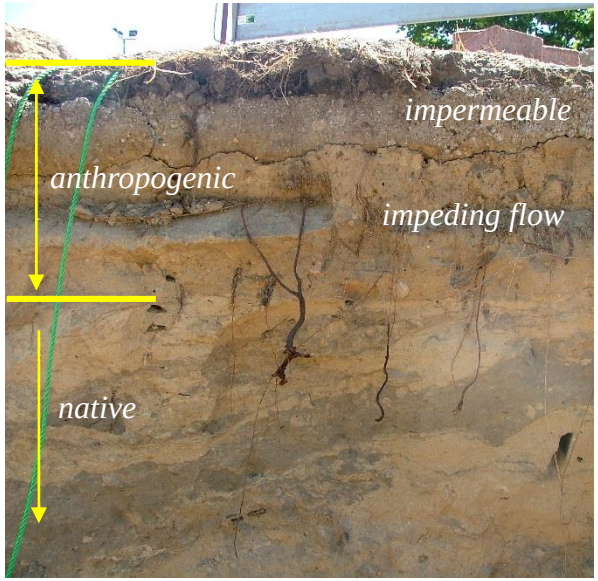
URBAN SOILS MAIN CHARACTERISTICS

Main chemical and physcio-chemical characteristics of urban soil are strictly related to the form of land use and general practice related to waste management:

- Litter deposition in forest, but frequently not in parks
- Fertilization and irrigation of municipal green areas
- Deposition of debris (CDWs) and communal wastes
- Road-side soils salinization and contamination
- Industrial areas contamination

As a result of transformations, classification of urban soils often includes Technosols and Regosols in built-up areas, and Hortisols in parks and gardens. Due to the rigorous approach of the WRB classification to the Technosols, most areas of cities are covered with soils characterized as Regosols, what means „other soils”. This is unfavorable situation, bringing us a wrong image of high similarity of soils of urban areas. The insufficient recognition of soil cover variability may result in unsatisfactory land development effects.





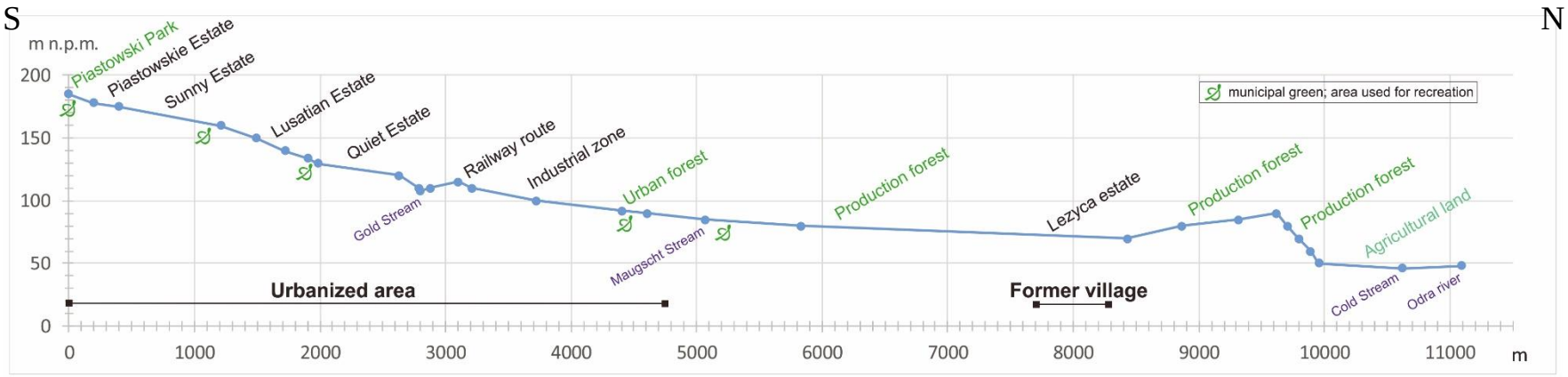
SOIL HORIZONS

When talking about the water cycle, as well as chemical compounds and elements, the construction of soil profile, soil texture, and some other characteristics are of main importance:

- location of the soil in the field (relief);
- grain size composition (texture) – both of natural and human induced genesis;
- presence and method of formation of debris and waste layers;
- compaction of materials in soil horizons;
- presence of technical drainage installations in soil.

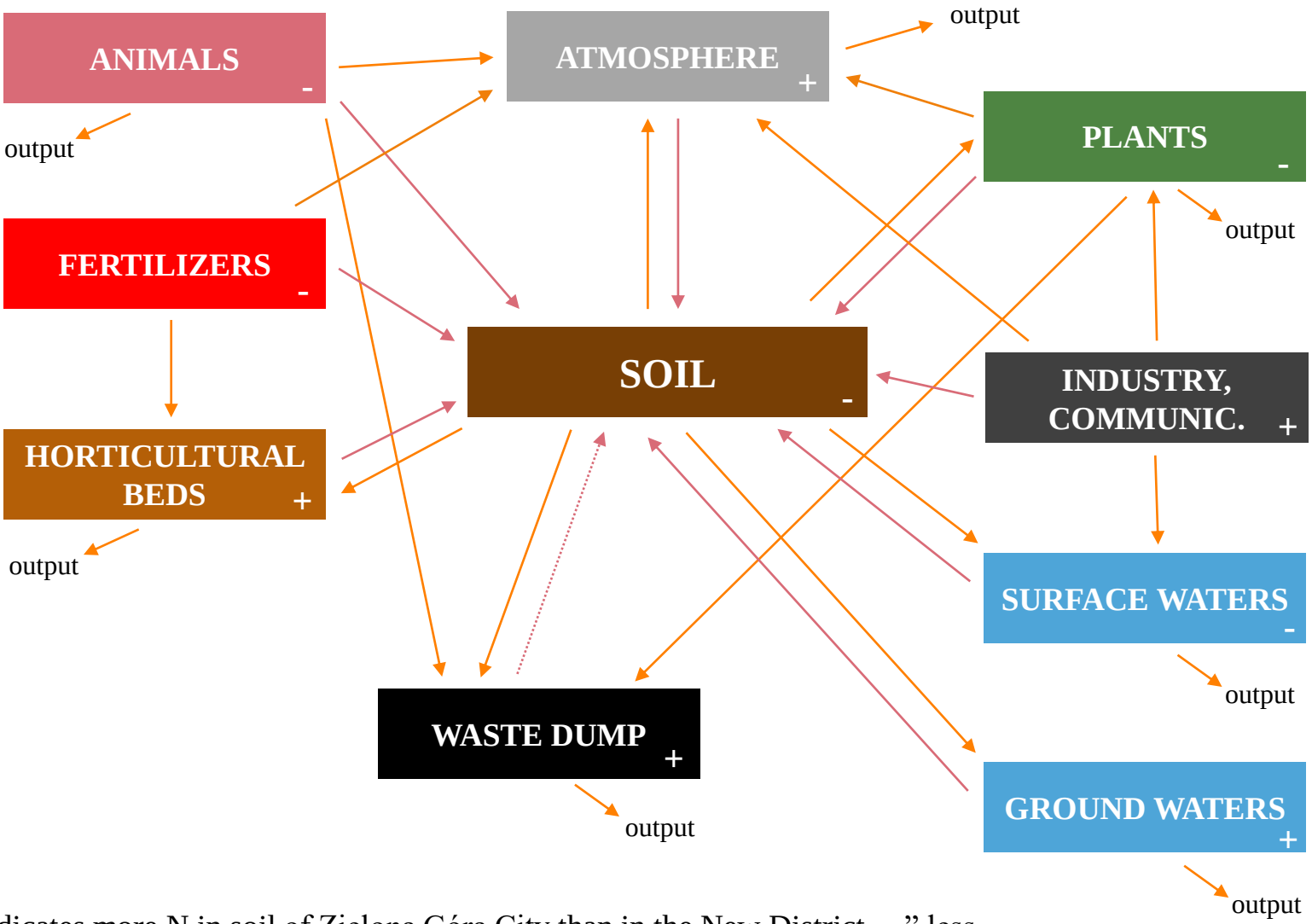
Anthropogenic horizons in urban soils of Zielona Góra

DETERMINANTS OF WATER CIRCULATION IN URBAN ENVIRONMENT



Many informations about the potential water flow streams in soil can be taken from terrain observations and the spatial planning elaborations analyzes.

NITROGEN CIRCULATION IN URBAN ENVIRONMENT



„+” indicates more N in soil of Zielona Góra City than in the New District, „-” less

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