



## Anthropogenic transformation of city parks soils: spatial and time peculiarities.

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Despite of quasi-natural status of urban parks, these territories often have a complicated history of local landuse. Urban park territories can accumulate maximum volume of information about the ways and peculiarities of soil anthropogenic transformation due to the absence of large-scale ground works and sealing of territories.

As an objects of research 2 Moscow historical forest parks – “Pokrovskoe-Streshnevo” and “Tushinskiy” were chosen. From the one hand, these parks are characterizing by sufficiently square, which are representative by abundance of areas with different land use type. On the other hand, these areas have distinction both in soil forming factors and anthropogenic activities history.

For the description of anthropogenic soil cover transformation the set of landuse types schemes were created. By these schemes were characterized a more than 250 years period.

A range of soil pits were described on the different land use types territories. Different physical-chemical (pH, cation exchange capacity, amount of total organic carbon and nutrient element (P2O5 & K2O), amount of carbonates, and total amount of Cd, Pb, Zn, Cu, Mn & Ni), physical (particle size composition, bulk density and penetration resistance) properties were measured. The micromorphological (in thin sections) properties were described. Using scanning electron microscopy and energy-dispersive X-ray spectroscopy, the main morphological and chemical properties of black carbon particles were disclosed in every surface horizons type.

Using above-mentioned methods, we described following types of anthropogenic-transformed horizons – “post-agricultural” horizons of abandoned tillage field soils, “urbic” horizons of settlements area soils, “technogenic” horizons of soils of constructed or reclaimed territories and different intergrade horizons.

The presence of different type horizons with various properties marks existence of fixed land use for different periods.

The whole way of anthropogenic transformation was described by historical (chronicles) text data. A whole duration of the anthropogenic effects may be subdivided into the 5 main stages:

- 1) The stage without significant anthropogenic pressure (up to early medieval age);
- 2) The stage of maximal medieval anthropogenic activities;
- 3) Next stage begun after sharp decrease of anthropogenic pressure and can be described as the stage of gradual growth of arable land and urban areas from latest medieval to the end of XVIII century;
- 4) The stage of urban areas growth and beginning of industrial and recreational effects;
- 5) Modern stage of recreational and aerosols pollution impacts was begun at the time of getting the “especially protected areas” status in the Soviet Union time.

Time borders of the main anthropogenic transformation stages are sufficiently different as we found.

Every period of anthropogenic influence transforms existing soil profiles and soil cover in general. Often these changes can be described as a formation a new complex of soil peculiarities, or new soil horizons above the old profiles, or even new soil profiles. The urbopedogenesis have sinsedimentogenic nature favorable for the evolution trends showing up.

Based on the comparison of soil properties and the character of the landuse changes, three main anthropogenic transformation trends were suggested. These trends describe: i) soil transformation into the soils with anthric evidence and back evolution into the natural soil in favorable conditions; ii) transformation of soil into the urbic intergrades and Urbic Thechnosols (urbanozems in Russia); iii) transformation with forming of technogenic horizons (technosols and technozems in Russia). Counted trends may have different mixed variants as well.