

Urbanization may have a positive effect on soil

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Soils and the city. Credit: Vyacheslav Vasenev

A soil scientist from RUDN University (Russia) and his colleagues modeled how the expansion of the boundaries of the city of Moscow would affect the rural landscape in the next 30 years. Scientists came to an unexpected conclusion: Urbanization can have a positive impact on

the stocks of organic carbon in the soil. The results of the study are presented in the *Journal of Cleaner Production*.

Urbanization is responsible for large environmental changes worldwide. Traditionally, the impact of [urbanization](#) on soils and the environment in general has been seen as entirely negative—through pollution, salinization, soil sealing and the like. However, the picture is more ambiguous. For example, the effect of urbanization on soil organic carbon (an extremely poorly studied process) can also be positive.

A soil scientist from RUDN University and his colleagues from Russia, the Netherlands and Italy conducted an innovative study. They estimated changes in soil organic carbon under different scenarios of urbanization (depending on environmental and socio-economic factors). The model was constructed on the basis of data on soil organic carbon and growth of urbanized areas of the city of Moscow from 1980 to 2014 (initial data), and further to 2048 (forecast).

Of course, the construction of houses, industrial plants and roads leads to the loss of carbon—the sealing of the soil (when tearing off its top layer) and the elimination of natural landscapes are to blame. However, new green areas, parks and squares are being created in cities, in which work is carried out to preserve and improve the properties of urban soils. In addition, all urban soils are fertilized, enriched by peat, compost and new plants. Finally, the inhabitants create a carbon-rich cultural layer on the soils (a kind of historical heritage of cities).

The researchers took into account all these factors and modeled the growth of Moscow agglomeration in the near future. According to their analysis, by 2048 the metropolitan area would grow by 8-81 percent, with the expansion rate of 30 percent as the most probable scenario. Up to 2000 square kilometers of forests, arable land and wetlands would be converted into urban areas. As a result of urbanization, the highest

increases in soil organic carbon stocks occur on the less fertile Orthic Podzols and Eutric Podzoluvisols, whereas the stocks in Orthic Luvisols, Luvic Chernozems, Dystric Histosols and Eutric Fluvisols increased less.

"The results of our study show the potential of urbanization for the increase of [soil](#) organic [carbon](#) stocks. This process, in turn, would probably mitigate the effects of climate change. The optimistic conclusion of our study should be further explored by land-use planners and scholars worldwide, since urbanization will be progressively more important in the future," concludes Vyacheslav Vasenev, Ph.D., associate professor of the Agrobiotechnology Department of the RUDN University.

More information: V.I. Vasenev et al, Projection of urban expansion and related changes in soil carbon stocks in the Moscow Region, *Journal of Cleaner Production* (2017). [DOI: 10.1016/j.jclepro.2017.09.161](https://doi.org/10.1016/j.jclepro.2017.09.161)

Provided by RUDN University

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