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Assessment of Urban top soil quality from Pune Municipal Corporation India A review

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Abstract:

Urban areas are becoming hotspots for environmental challenges due to the increasing proportion of the world's population that lives in cities and the corresponding rise in activity levels. Moreover, urban areas are increasingly garnering more attention for their contributions to the creation of environmental consequences, such as the disruption of the global biosphere and geochemical cycles. The present study aims to have a better understanding of urban soil quality. Pilot observation of study area and primary data collection relevant to urban top soil quality, heavy metal concentration, and their effect on human health. The study area is located in the city of Pune, India. The soil samples are collected from selected sites from various locations. The physicochemical properties of selected soil samples were analyzed by using X-ray diffraction (XRD). The analysis of macronutrients, micronutrient, and heavy metals in soil samples was carried out by using geospatial technology. The results show that urban soil has an impact on the environment in many ways.

Keywords: soil,samples,biosphere,quality,diffraction,hotspots,metals,environment,analysis,cycles

Introduction

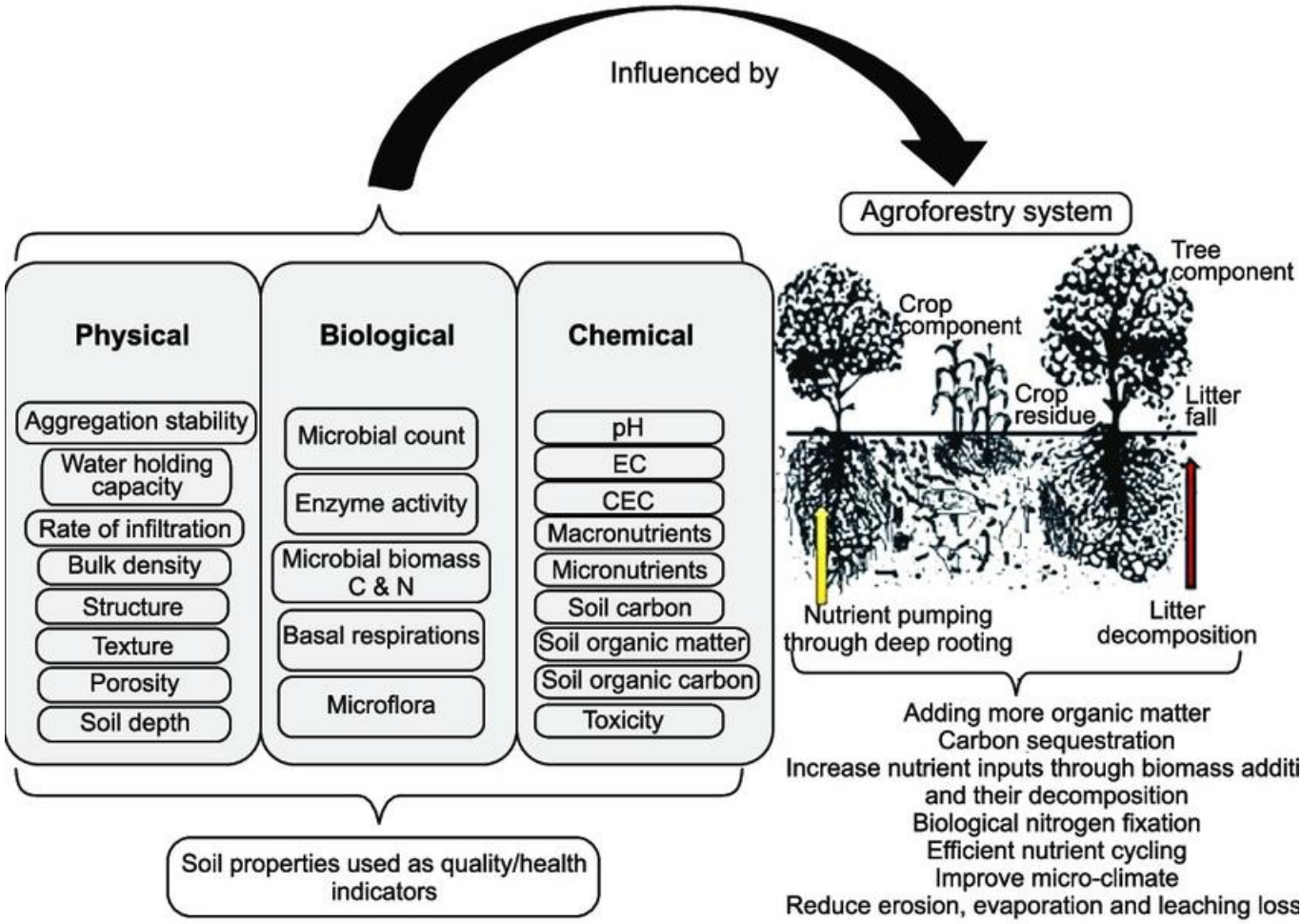
Soil is one of the very essential natural resources which provides a lot of benefits to human beings and the environment as a whole (The Importance of Soil on Life - CHEC International). According to the Natural Resource Conservation Service, it as "a natural body that occurs on the land surface and is composed of solids (minerals and organic matter), liquids, and gases; and it also retains space and is characterised by one or both of the following: horizons, or layers, that are differentiated from the original material as a result of additions, losses, transfers, and transformations of energy and matter; or the ability to support rooted plants" (NRCS) (Soil Survey Staff 2014a). More than 54 percent of the world's population currently lives in cities, primarily due to migration from rural areas and the expansion of towns and cities (FAO et al., 2018).

Moreover, the population explosion is creating dire consequences on soil ecosystem in many ways. The availability of land has declined very rapidly and agricultural land has been utilized for urbanization and this shifting has been causing damage to the soil quality. Moreover, with limited land for getting more production of the crop the extensive use of chemical fertilizers, and insecticides and pesticides are going on which has resulted into a serious problem like soil pollution (Aktar et al., 2009). However, in an urban area the industrialization and vehicular pollution are responsible for soil pollution through the deposition of pollutants in soil. The soil pollution is not only causing damage to the flora and fauna but also affecting to human health. The pollutants are entering the food web and food chain and causing bioaccumulation which ultimately results in the bio magnification problem and cause many health issues like cancer, neurological damage (Manisalidis et la., 2020). The green revolution's effects on public health provide the best illustration of this problem (Andrews et al., 2002). They need a specially designed set of markers to assess the soil's quality as a consequence. One of the three elements of environmental quality is soil quality, along with water quality and air quality (Andrews et al., 2002). It is defined as a soil's ability to function within ecosystems and land-use restrictions in order to maintain biological productivity, protect the environment, and promote plant and animal health, including human health (Doran and Parkin, 1994). The basic concept of soil quality is a soil's ability to operate (Karlen et al. 1997). The physical, biological, and chemical components of soil are balanced according to this functional notion. This functional definition is broadened to include a soil's capacity for maintaining plant and animal productivity, preserving or enhancing the quality of the water and air, and supporting human health and habitation within the confines of a natural or managed ecosystem (Karlen et al. 1997).

How to decide the soil is good quality? It varies depending on land use and/or geographical area. As a result, Karlen et al. (1997) propose a relational rather than an absolute way of quantifying soil quality. Similarly, Doran et al. (1996) contend that soil quality should be determined by how effectively a soil performs within its particular ecosystem (agriculture, urban, etc.). In an agricultural field, for example, a soil's ability to maintain crop development would be determined by various soil parameters such as bulk density, soil moisture, infiltration, and

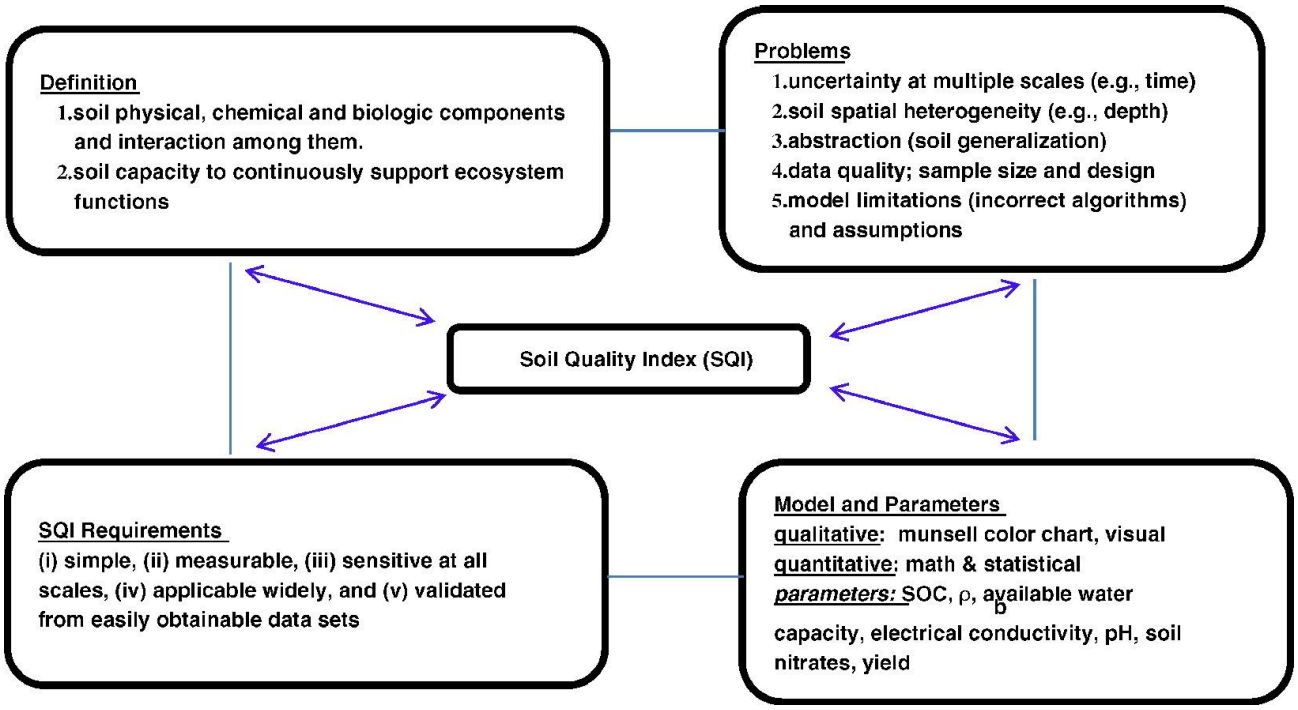
biological activity, to name a few. Many of these features (for example, infiltration and organic matter content) may be altered through management, and soil quality can be enhanced based on its function.

Additionally, the Soil has an impact on the Environment's water, air, and biotic quality. Protecting and/or enhancing soil quality might serve as a first step toward enhancing overall environmental quality. For instance, growing cover crops in an area that would otherwise be bare aids in retaining soil and nutrients on-site, preventing their movement to streams where their impact on water quality would be felt. In metropolitan settings, anthropogenic activities alter the soil (ICOMANTH 2003) Urban soils' physical, chemical, and biological characteristics are altered by the effects of urban infrastructure on the environment. Notably, soil compaction from building and road infrastructure reduces pore space, raising soil bulk densities. **Our present research aims to have a better understanding of urban soil quality. Understanding the characteristics of urban soil can help manage both the quantity and the quality of water resources.**



Soil quality/ health indicators influenced through different soil improving processes in agroforestry systems

Sarvade, S., Gautam, D. S., Upadhyay, V. B., Sahu, R. K., Shrivastava, A. K., Kaushal, R., ... & Yewale, A. G. (2019). Agroforestry and soil health: an overview. *Agroforestry for Climate Resilience and Rural Livelihood. Jodhpur, India: Scientific Publishers India*, 275-297.



de Paul Obade, V., & Lal, R. (2016). A standardized soil quality index for diverse field conditions. *Science of the total environment*, *541*, 424-434.

Conclusion

Soil is an essential natural resource that provides numerous benefits to human beings and the environment. However, urbanization and population growth have led to the decline of land availability and the deterioration of soil quality, resulting in soil pollution and negative impacts on human health. The study aims to analyze the physicochemical properties of urban soil samples, assess soil nutrient levels using geospatial technology, and make recommendations for integrated soil management. The significance of the study lies in its potential to improve soil quality, preserve ecological equilibrium, and enhance overall environmental quality.

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Credit authorship contribution statement

Authors contributions

Deepak soni (Research Scholar, Pune University) , Dr. Pramod Kamble (Associate Professor ,Central University of Rajasthan): Formal analysis, Investigation, Writing - original draft and editing, Methodology.

Data availability statement

The data that support the findings of this study are available on request from the corresponding author.

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