



Fractal features of soil properties distribution in an urban park – a case study: Bar-Ilan University campus, Ramat-Gan, Israel

Helena Zhevelev and Pariente Sarah

Laboratory of Geomorphology and Soil, Department of Geography and Environment, Bar-Ilan University, Ramat-Gan 52900, Israel (Helena.Zhevelev@biu.ac.il)

Green open spaces in the city include campuses of various institutions. Their physical and sociological functions are similar to those of urban parks, and the present study was conducted in the campus of Bar-Ilan University. It aimed to detect the features of the distributions of several ecological properties, as affected by various land cover components and their associated microenvironments.

For this purpose, three types of microenvironments, representative of the campus were chosen. They were: under the canopies of nine species of trees; lawns (disturbed and undisturbed); and paths. In each microenvironment, soil was sampled from two layers (0–2 and 5–10 cm), soil temperatures were measured at depths down to 10 cm (0, 1, 2, 4, 6, 8, 10 cm), and air temperatures were recorded at heights up to 160 cm (30, 60, 100, 160 cm). For each soil sample, soil moisture and organic matter contents were determined in December 2011 and March 2012. Before the samplings, penetration depth was measured.

From December to March soil penetration depths and soil moisture contents decreased by 30–50%. In contrast, organic matter content increased from 0.5 to 1.5% in all microenvironments.

In December there were no differences in soil temperatures among the microenvironments, but in March differences of 4–5 $^{\circ}\text{C}$ were found.

Highest soil temperatures, at all depths, were found in the Lawn and Path microenvironments.

For all the various microenvironments, at each depth, the distributions by percentiles (deciles, medians and quartiles) of all soil properties were calculated and analyzed. Highly significant linear correlations between percentiles and averages of soil properties were found for all the microenvironments and at both depths. Thus, the soil properties of the Bar-Ilan University campus exhibited a fractal structure.