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Spatial variations of the soil of private gardens in the city: a case study of Tybee

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Gardens offer ecological, sociological and hydrological benefits. These gardens regulate temperature and energy conservation since the vegetation is an important factor in determining the microclimatic conditions. They function as sinks for runoff developed in paved areas, thus moderate runoff and flooding, and as sanctuaries for increasing species richness.
Studies on soil properties of private gardens in cities are rare but no such study was done in an Arab city. The general aim of this study is to investigate the spatial changes in soil, vegetation and architecture characteristics in gardens of the city of Tybee.
The city was divided into two regions: old- and new one. An abandoned agricultural field in the city margins was chosen to be as a control area. In each region 15 gardens were randomly chosen. In each, the soil was sampled, in one point, from three depth layers in the end of the dry season; in September 2016. In addition 15 points were sampled in the control. Soil samples were taken from areas with sparse herbaceous vegetation cover. Each of the soil samples was analyzed for color, organic matter, calcium carbonate, and sodium and chlorine contents, pH, electrical conductivity, texture and bulk density. The framework of the study included also observations to characterize the various land uses units of the gardens, and questionnaires to assess the gardening tradition of the owners and to indicate their motivations for maintaining their gardens.
Preliminary results show that both the old and new areas in the city have higher number of soil colors (dry and wet) with respect to the control. The distribution of colors in the gardens of the old city area is different from that of the new one. Soils of the old area have a wider spectrum of colors than that of the new one. Penetration depth in the new and old areas is lower than the control (1.5, 2.0 and 2.4 cm, respectively) and the coefficients of variation in the city are higher than the control (77.6, 42.9, and 19.6 %, respectively). Soil moisture values of each of the three depths in the control were higher than those of the city areas. The average water contents in the upper depth were 7.1, 5.0 and 8 %, in the second depth 7.1, 6.4 and 10.7 %, and in the third depth 8.6, 7.0 and 10.6 %, for the old, new and control areas respectively. Yet the coefficient of variations in the control were at least two times smaller than those of the urban terrain. We suggest that the increased heterogeneity in these areas can be attributed to variations in the addition of soil material, in the intensity of garden use and maintenance of the residents, i.e. variations in the type of anthropogenic activity.