



Stormwater quality from extensive green roofs in a subtropical region

Jonas Onis Pessoa, Daniel Allasia, Rutineia Tassi, Juliana Vaz Viegas, and Paula Fensterseifer
Environmental Engineering Program, Centro de Tecnologia, Federal University of Santa Maria(dga@ufsm.br)

Green roofs have increasingly become an integral part of urban environments, mainly due to their aesthetic benefits, thermal comfort and efficiency in controlling excess runoff. However, the effects of this emerging technology in the qualitative characteristics of rainwater is still poorly understood. In this study was evaluated the effect of two different extensive green roofs (EGRs) and a traditional roof built with corrugated fiber cement sheets (control roof) in the quality of rainwater, in a subtropical climate area in the city of Santa Maria, in southern Brazil. The principal variant between the two EGRs were the type of plant species, time since construction, soil depth and the substrate characteristics. During the monitoring period of the experiment, between the months of April and December of 2015 fourteen rainfall events were selected for qualitative analysis of water from the three roofs and directly from rainfall. It was analyzed physical (turbidity, apparent color, true color, electrical conductivity, total solids, dissolved solids, suspended solids and temperature), chemical (pH, phosphate, total nitrogen, nitrate, nitrite, chloride, sulfate, BOD, iron and total hardness), heavy metals (copper, zinc, lead and chromium) and microbiological parameters (total coliforms and *E. coli*). It was also characterized the substrates used in both extensive green roofs. The results showed that the quality of the water drained from EGRs was directly influenced by their substrates (in turn containing significant levels of nutrients, organic matter and some metals). The passage of rainwater through green roofs and control roof resulted in the elevation of pH, allowing the conversion of the slightly acidic rainfall into basic water. Similarly, on both types of roofs occurred an increase of the values of most of the physical, chemical and microbiological parameters compared to rainwater. This same trend was observed for heavy metals, although with a much smaller degree. Thus, under the assessed conditions and time, the green roofs, in general, have not provided an improvement of water quality as indicated by some authors. However, it was found that some of the measured parameters showed a gradual improvement during the monitoring period. This suggests that the age of green roofs can affect efficiency in the qualitative control of water. In this regard, long-term research can contribute to a better understanding quality of stormwater runoff from green roofs, especially in regions such as Brazil, where the implementation of green roofs is incipient and in a phase of adaptation to the different environmental conditions of the country.