



Green roof runoff assessment using different modeling approaches

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One of the main environmental benefits of green roofs is their ability to transform outflow of the rainwater. In general, green roof hydrologic performance varies depending on local climatic conditions as well as vegetation cover and soil substrate used.

Two simple lumped models (storage routing model and instantaneous unit hydrograph model) and a distributed one-dimensional soil water flow model (S1D code developed at the Czech Technical University in Prague) were used to assess the hydrological response of green roof test beds. The two test beds were filled with distinct soil substrates and installed at the University Centre for Energy Efficient Buildings (UCEEB) of the Czech Technical University in Prague in Bustehrad. The data from the long-term monitoring, i.e. complete micrometeorological and outflow measurements, weighing of a selected test bed, and non-invasive imaging of excavated samples, were used in the analysis.

The storage routing model performed very well for rainfall-runoff events with the runoff coefficient higher than 0.35. For episodes with lower runoff coefficient, the model did not provide relevant results. The instantaneous unit hydrograph model provided more consistent functioning during the whole experimental period. However, frequently it failed to mimic the variability of observed hydrographs. Moreover, examination of the performance of both models indicated low transferability of results to other years or studies.

S1D code allowed assessing the soil water regime and analyzing the hydrological functioning of green roof test beds. The results indicate that runoff prediction is further complicated by temporal changes of the green roof structure during its life-cycle.

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