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Use of demolition waste and biochar in a hybrid constructed wetland-extensive green roof

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Implementation of green roof requires large amount of natural resources, such as water and natural components of growing media. Therefore, the green roof system that uses principles of circular economy has been developed and tested. The objective of the study was to verify the performance of the novel concept of hybrid green roof that is a combination of constructed wetland and extensive green roof irrigated with pre-treated grey water. Furthermore, novel substrate was designed. This growing medium of the extensive part of the green roof contains fraction of recycled crushed brick and pyrolyzed sewage sludge (biochar).

Two small test beds were built to test the viability of the novel green roof concept and innovative substrate. Substrate in both experimental beds contained crushed bricks (37.5 vol. %), whereas only one test bed contained biochar (9.5 vol. %).

After first six months of performance, the concept of constructed wetland-extensive green roof seems viable. There are relatively low concentrations of nutrients (phosphorus and nitrogen) in the leachate from test beds. Concentrations of nutrients increases only in response to precipitation. Nutrients from biochar are apparently available for the vegetation. Therefore, the vegetation on the bed with biochar amended substrate shows more vigorous growth and higher evapotranspiration. The monitoring of test beds continues in order to understand better the processes affecting water quantity and quality in long term perspective.