Green walls could buffer flash flooding in cities

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Under very intense storm conditions (45 millimetres of rainfall in 15 minutes) a 0.4 metre bed of dry coconut peat is likely to retain around 30% of the water running off the roof, according to simulations. Credit: pilens | 123rf

Simulations reveal that green walls filled with coconut peat could absorb storm water running off buildings, mitigating flash floods.

Vertical plant-containing structures attached to the sides of buildings can boost the natural appeal of cities, but that's not their only attraction. Using a storm water modelling tool, engineers in Malaysia are exploring whether these so-called green walls can also help buffer roof run-off to combat flash flooding.

The team, based at the University of Malaysia Sarawak and supported by the Department of Irrigation and Drainage Malaysia, is focusing on a modular system filled with coconut peat.

This artificial soil, which can be obtained by processing readily available coconut husks, has proven good for gardening. However, its ability to control run-off is unknown. In the lab, the group measured key properties of the coconut-based soil including porosity and the speed of water infiltration, and inputted these values into the simulation.

The green wall is envisaged as a series of interlocking square panels with openings on the outer face of each block to support vertical planting. A lightweight metal frame links the panels to uprights attached to the building, which for this study is a modern flat-roofed three-story commercial lot. During operation, the run-off percolates through the structure to ground level, slowing the environmental impact of heavy rainfall.

Under very intense storm conditions (45 millimetres of rainfall in 15 minutes) a 0.4 metre bed of dry coconut peat is likely to retain around 30 percent of the water running off the roof, according to simulations. Retainment drops to 17 percent when the coconut peat is already saturated due to previous rainfall. Fully capturing 6.3 cubic metres of roof run-off could be achieved by a green wall design measuring 0.7 metres wide, 0.2 metres thick and 12 metres high, according to the model.

Encouraged by their results, presented at the International Association for Hydro-Environment Engineering and Research World Congress held in Kuala Lumpur, the next step for the team is to model the contribution of plants and their roots to the water behaviour of the green wall.

Provided by Universiti Malaysia Sarawak