Lot Scale Rainwater Harvesting and Future Flood and Drought Risks in the City Of Whittlesea

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Biography:
Edmond Lascaris has been the Stormwater Management Coordinator at the City of Whittlesea for the past 5 years, starting this role as the project manager for the Melbourne Markets Stormwater Harvesting Project in Epping Victoria.

Edmond has 15 years of experience in research and development working in the food and packaging industry. Edmond holds a degree in the biological sciences from Monash University, and a PhD from Swinburne University for the application of industrial enzymes in paper production.

Edmond's other interests include teaching computer coding and electronics in schools and programming sensors connected to the Internet of Things (IoT).

Over the past 15 years the City of Whittlesea (population 216,438) has experienced significant urban growth and over the next three decades the Upper Merri Creek catchment will grow by an additional 260,000 residents. By 2050, climate modelling predicts an increase in the frequency of heavy precipitation events in Melbourne, punctuated by periods of drought, which will inevitably lead to flood events, excessive ground movements, and street tree deaths.

To minimise hardship to households, governments and water authorities are currently looking for novel ways to augment potable water supplies, minimise water utility costs and protect public and private infrastructure from extreme climate events. Within the municipality there have been significant investments in stormwater harvesting and recycled water, however the full potential of rainwater tanks at the lot scale, has not been fully explored.

The large scale uptake of domestic solar panel installations in Victoria and the popularity of other government policy initiatives directed at renewable energy demonstrate that the public is willing to make significant investments to their home. We believe that given the right environmental conditions, technology and incentives, the public may also be prepared to invest in rainwater tanks.

In this modelling study, the suburb of Lalor was hypothetically retrofitted with large rainwater tanks (up to 10,000L per 100m2 of roof space) and land permeability on the lot scale was increased. A hydrological ArcSWAT model, embedded within a Geographic Information System (GIS) allowed overland flows, stormwater outputs to the Darebin Creek and Directly Connected Imperviousness (DCI) to be calculated. The results show that large rainwater tank installations and increases in soil permeability significantly reduce the risk of flooding.

Rainwater tanks with embedded computing devices can also be connected to the internet and mobile phone networks as part of the emerging Internet of Things (IoT). The real-time monitoring of rainwater tanks (and soil moisture) on the lot scale would therefore offer more benefits relevant to residents and local authorities than larger centralised water projects.