



## **Data-driven behavioural modelling of residential water consumption to inform water demand management strategies**

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The continuous expansion of urban areas worldwide is expected to highly increase residential water demand over the next few years, ultimately challenging the distribution and supply of drinking water. Several studies have recently demonstrated that actions focused only on the water supply side of the problem (e.g., augmenting existing water supply infrastructure) will likely fail to meet future demands, thus calling for the concurrent deployment of effective water demand management strategies (WDMS) to pursue water savings and conservation. However, to be effective WDMS do require a substantial understanding of water consumers' behaviors and consumption patterns at different spatial and temporal resolutions. Retrieving information on users' behaviors, as well as their explanatory and/or causal factors, is key to spot potential areas for targeting water saving efforts and to design user-tailored WDMS, such as education campaigns and personalized recommendations.

In this work, we contribute a data-driven approach to identify household water users' consumption behavioural profiles and model their water use habits. State-of-the-art clustering methods are coupled with big data machine learning techniques with the aim of extracting dominant behaviors from a set of water consumption data collected at the household scale. This allows identifying heterogeneous groups of consumers from the studied sample and characterizing them with respect to several consumption features.

Our approach is validated onto a real-world household water consumption dataset associated with a variety of demographic and psychographic user data and household attributes, collected in nine towns of the Pilbara and Kimberley Regions of Western Australia. Results show the effectiveness of the proposed method in capturing the influence of candidate determinants on residential water consumption profiles and in attaining sufficiently accurate predictions of users' consumption behaviors, ultimately providing valuable information to water utilities and managers.