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Community engagement for developing strategic planning of residential water reuse schemes

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EXTENDED ABSTRACT

Due to the major adverse impacts of external drivers such as limited water resources and climate change and population growth on urban water services, strategic planning for using innovative technologies and management in water systems is inevitable to improve the water system performance and water conservation. Urban water reuse schemes are one of the most efficient ones that have positive impacts on both water supply and wastewater/stormwater systems and increase the resilience of water systems [1]. Unlike traditional intervention options for development of urban water systems that can be planned, designed and implemented mainly by water companies, development of water reuse interventions in cities is more complicated that needs close collaboration of both stakeholders and communities in addition to the availability of appropriate households and infrastructure and climate suitability as shown in Figure 1.

Methods and Materials

This paper conducted a survey of communities in five developing countries comparing willingness, motivation and challenges of developing water reuse schemes (i.e. rainwater harvesting (RWH) and greywater recycling (GWR)) based on the influencing factors of the four main components shown in Figure 1. The survey first received the ethical clearance from the University of West London as the project PI before conducting in five cities including Cape town in South Africa (SA), Ota in Nigeria (NG), Kuala Lumpur in Malaysia (ML), Penonomé in Panama (PN), and Lazaro Cardenas in Mexico (MX). A total number of 684 respondents participated in the survey (an average of over 100 per city) [2]. The data collected include general information of participants (age, gender, education, job and income), dwelling and infrastructure (location, ownership, house type, roof top, age, occupancy, available garden/water reuse systems and water supply and wastewater systems) and socio-economic factors (interest in water reuse schemes, affordable water bill, monthly payment for water supply and motivation/challenges of household water reuse schemes). The study analysed the connection of community responses with the potentials for developing water reuse interventions based on their existing household situations and climate suitability and limitations in the study areas.

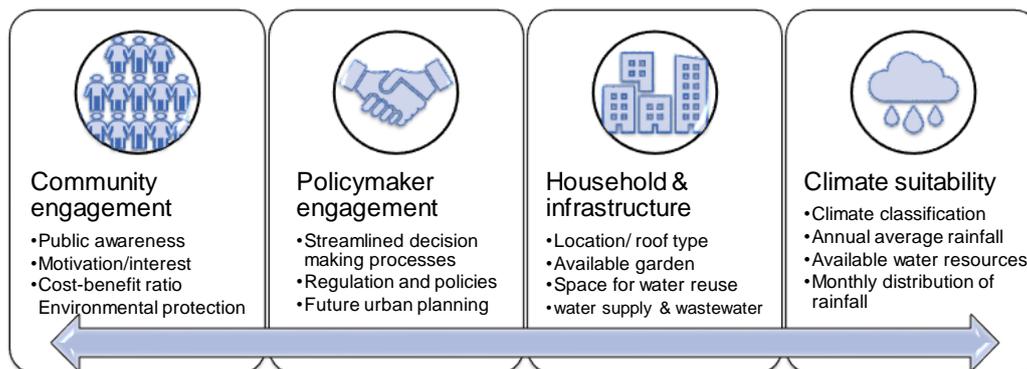


Figure 1. Main components required for strategic planning of water reuse schemes in residential water reuse schemes

Results and Discussion

Four out of the five case studies are in tropical climates with an annual average rainfall of above 1250mm and temperature of above 25° C (NG in Am, ML in Af, PN in Am and MX in Aw) and SA located in Mediterranean (Csb) with an annual average of 620mm and temperature of 16° C according to the Köppen-Geiger climate classification [3]. This shows great potential for developing RWH schemes in almost all pilot studies based on the climate suitability.

The survey results shown in figure 2 reveal residents in all case studies are quite willing to do water reuse (all above 76%). Motivation behind this intention for water bill saving is for most respondents in South Africa, Nigeria and Malaysia while this motivation has minor attraction for respondents in Panama and Mexico. This can be mainly due to the low price of water for these respondents mainly living in non-urban areas. Majority of respondents in Malaysia express the highest motivation for water conservation and environmental protection (77%) that can be linked to raised environmental awareness in the communities. Although the capital costs may not be a major concern in all cases, lack of information can be a major issue for respondents in Panama (75%) who are mainly both in non-urban areas and without a higher education degree. However, respondents in Panama and South Africa have minimum challenge to access water reuse technologies that can be due to the availability of industrial technologies in the area or being self-sufficient in applying water reuse schemes.

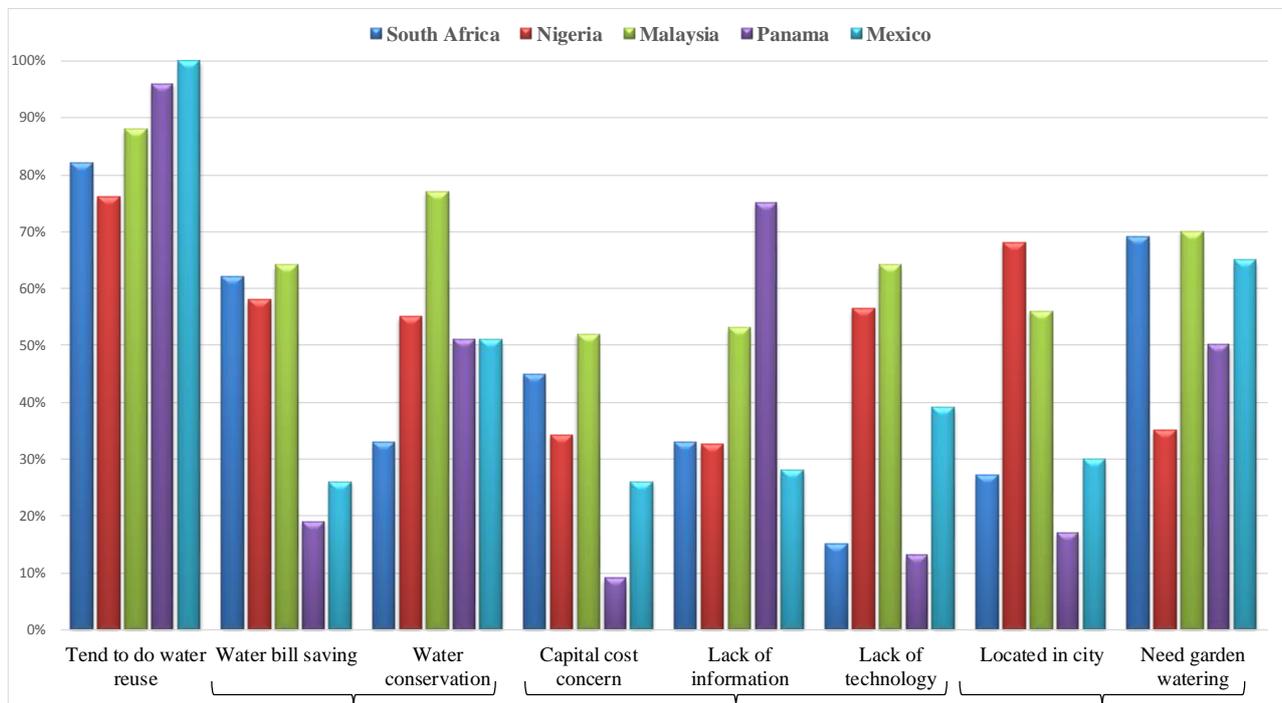


Figure 2. Survey results for willingness for water reuse, motivation (saving water bill and water conservation), challenges (costs, lack of information/technology) and household features (location and garden watering) in the case studies

Conclusions

The survey of water reuse schemes conducted in five pilot studies suggests the residents have every intention of applying water reuse mainly for water bill saving and water conservation, however lack of information and availability of technologies seems to be major barriers for developing these schemes. Furthermore, climate, household and infrastructure are key components that need to be suitable and show points of consumption for any specific water reuse schemes.

Acknowledgement

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