

Decision Support Tool for Selecting Appropriate Sustainable Rainwater Harvesting Based System in Ibadan, Nigeria

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Abstract : The approach to water management worldwide is currently in transition, with a shift from centralised infrastructures to greater consideration of decentralised technologies, such as rainwater harvesting (RWH). However, in Nigeria, implementation of sustainable water management, such as RWH systems, is inefficient and social, environmental and technical barriers, concerns and knowledge gaps exist, which currently restrict its widespread utilisation. This inefficiency contributes to water scarcity, water-borne diseases, and loss of lives and property due to flooding. Meanwhile, several RWH technologies have been developed to improve SWM through both demand and storm-water management. Such technologies involve the use of reinforced concrete cement (RCC) storage tanks, surface water reservoirs and ground-water recharge pits as storage systems. A framework was developed to assess the significance and extent of water management problems, match the problems with existing RWH-based solutions and develop a robust ready-to-use decision support tool that can quantify the costs and benefits of implementing several RWH-based storage systems. The methodology adopted was the mixed method approach, involving a detailed literature review, followed by a questionnaire survey of household respondents, Nigerian Architects and Civil Engineers and focus group discussion with stakeholders. 18 selection attributes have been defined and three alternatives have been identified in this research. The questionnaires were analysed using SPSS, excel and selected statistical methods to derive weightings of the attributes for the tool. Following this, three case studies were modelled using RainCycle software. From the results, the MDA model chose RCC tank as the most appropriate storage system for RWH.

Keywords : rainwater harvesting, modelling, hydraulic assessment, whole life cost, decision support system

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