Development of a Decision Support System for Sustainable Implementation of Rural Gravity Flow Water Systems

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Rural water scarcity is a serious issue facing many of the world's population. Gravity flow water systems provide a cost efficient means of providing those in need of improved water with a sustainable service. This manuscript presents software to be used by organizations, individuals, and institutions involved in managing and developing gravity flow water supply systems. Five software modules were developed with the Visual Basic for Applications programming language for use in a Microsoft Excel program. This software is aimed at water supply system project managers who at present may not have the proper tools, ability, or time to complete the engineering calculations required. Current tools and methods used by engineers addressing rural water systems are discussed.

A clear need is demonstrated for a tool specifically tailored to address the unique challenges of development of rural water systems. It is hoped that the software package GOODwater can fill this void. The program consists of different modules which assist the project manager during the various life stages of a project. Menus and navigation are intuitive to use and simple to learn. Once an organization sets up a GOODwater template, users can quickly enter information about the proposed system and generate standardized reports. A module is provided to help in assessing the suitability of different sites for a gravity flow water system. Once a site is chosen, detailed topographical information can be entered into the design module. This module creates a system design optimized for least capital cost using a simple genetic algorithm. Budgets and schedules can also be prepared in the subsequent modules of the software. Finally the GOODwater software evaluates the overall sustainability of the project. A case study was presented in which the GOODwater software was applied to the communities of Guaranal and Quita Sueño in the Dominican Republic, where the author had lived for two years.