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"The Harvesting rain water in the upper of Wadi Nakhla & Rasyan basins"

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Abstract

The issue of water harvesting is among the issues of importance for arid and semi- arid environments, to reduce pressure on groundwater resources, in addition to securing an important water source. The study addressed an area where the issue of where harvesting is considered to be of economic, social and environmental importance, given its location within arid and semi- arid environments. The study area is located in the upper Wadi Nakhla and Rasyan basins, within the southern and western highlands of the Republic of Yemen, on the water dividing lines between the Wadi Zabid basins in the north and the Wadi Mawza basins in the south.

The study area is characterized by man physical and human characters that enable it to establish rainwater harvesting projects and techniques, which had a significant impact on the subject of the study, both negatively and positively, including annual rainfall rates, which reached 812 mm, while the annual water revenue reached 420. 253. 748 m^3. Therefore, it is considered an encouragement for the process of harvesting rainwater in the study area, whether by residents or competent authorities. By studying these characteristics, to achieve the objectives of the study and reach the main goal of building a spatial modal to determine the best suitable sites for establishing rainwater harvesting facilities in the region, the study used the descriptive approach, to describe physical and human phenomena, and also the quantitative analytical approach in order to analyze data and information related to a topic and area. the study. The study supported its methodology by using several programs, the most important of which is the Geographic information Systems Program Arc GIS 10.8 to build an information database about the study area, and the Cropwat8.0 Program to estimate water needs in the study area, as well as analyzing the morphometric and hydrological characteristics of the water basins and creating maps of the basins and the water network from the digital

elevation model. DEM, which showed the possibility of harvesting rainwater using its various techniques, because its considered important for giving realistic quantitative indicators of the quantities of water collected, especially for drinking needs and domestic uses, in addition to knowing the amount of surface runoff, which was estimated at 206.959m^3, through which flood water can be harvested in Small and medium barriers for supplementary irrigation purposes, especially in the southern and eastern parts of the region as well as the central parts of Wadi Nakhla and they are also included in the high and very high levels of rainfall.

A number of criteria were applied, through which we were able to determine the most suitable sites for harvesting rainwater, the most important of which are slope, rainfall, geology, faults, land uses, topography, hydrology, and distance form villages, through which a map of the best suitable areas for establishing Rainwater harvesting techniques in the study area. The study showed many results and

recommendations, the most important of which was collecting rainwater harvesting in optimal ways, to achieve multiple benefits for the residents of the study area, including providing drinking water and household needs estimated at 102.2 m^3 /year. the study also estimated agricultural needs at about 128.382.727.2m^3, as well as the possibility of harvesting rainwater for all purposes, such as groundwater recharge, in addition to achieving many environmental, social and economic dimensions for the study area. The study also reached a number of recommendations, the most important of which is encouraging and expanding the establishment of rainwater harvesting systems in the region.