GIS based for Pre- selection of suitable site for Water Harvesting in arid areas case study in the West of Iraq

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Abstract

Planning for construction of water resources infrastructure requires high quality data to explain water demands, environmental conditions, and a range of impacts on economic, social, and natural systems. Where the required data are scarce or of low quality, poor decisions are often made and this has been the case in developing nations for many years. Now, however, the situation has changed as global-scale geospatial data combined with the powerful capabilities of a geographic information system have created the potential to assist greatly in water resources planning. Scope of the study is the determination of appropriate sites and techniques for water harvesting in West Desert of Iraq by using Geographic Information System (GIS) and Multi Criteria Evaluation (MCE) as a tool for decision support. The selection criteria are defined both in a qualitative and quantitative way, and are based on a territorial analysis using geospatial data and hydrological and climatological information that are easily and freely available. Qualitative criteria imply the identification of suitable valleys based on visual interpretation of satellite images. Other qualitative selection criteria concern the distance from settlements and infrastructures. Quantitative criteria are expressed in terms of indexes that synthesise the effectiveness and feasibility of the possible interventions: the evaporation index (d); calculated as a benefit/cost ratio(c)in terms of volume of water that can be stored versus volume of the dam; the hydrologic index (1/P), based on the analysis of the contributing watersheds to each site; the soil water holding capacity(s), estimated from the analysis of vegetation patterns using satellite indices. The methodology, applied in the West of Iraq Horan vally, allowed the individuation of 53 sites, whose only 32 sites passed the proposed selection criteria. The 32 sites are ranked according to the highest scores. The results served to organize the subsequent field Surveys thus considerably reducing the time and cost of the survey.