

International Conference on Emerging Trends in Engineering, Science and Technology (ICETEST - 2015)

Identification of Suitable Sites for Water Harvesting Structures in Kecheri River Basin

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Abstract

Water is the most precious resource on the earth which is essential for the existence of life. Though Kerala is blessed with two prominent monsoons with an average rainfall of around 3000mm, it experiences water scarcity in off monsoon seasons. Peculiarities such as steep slope and undulating terrain accelerate surface flow and hence most of the water received as rainfall goes as unutilized. Water Harvesting is the best technique which can be used effectively to trap the unutilized surface runoff and thereby increase the groundwater recharge. But these structures have to be located at places where water is available in excess and conditions are favourable for enhanced infiltration. The objective of this study is to identify suitable sites for water harvesting structures. For ideally locating the sites, the guidelines put forward by NRSA, Hyderabad for Integrated Mission for Sustainable Development (IMSD), is being followed. ArcGIS is used for the spatial analysis and the sites are located by overlaying thematic maps of land use, soil, slope, runoff potential, soil permeability and stream order. It is found that 37 percentage of the total area is ideal for constructing check dam, 7 percentage for farm pond, 4 percentage for percolation pond and about 2 percentage for subsurface dyke. Check dams are the most suited one and location for subsurface dykes is sparse. Locations of water harvesting structures are suggested by conducting meteorological and topographical analysis. However, for the practical implementation of these structures, viability of other considerations such as economy, social implications, practical feasibility etc. need to be considered.

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Peer-review under responsibility of the organizing committee of ICETEST – 2015

Keywords: Water harvesting; Site identification; ArcGIS; Thematic maps

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1. Introduction

The amount of water present in earth is always constant. It is transformed from one form to another in a specified manner. Though two by third of earth is filled with water, the usable water for irrigation and drinking purpose is only two percentage of total available. So proper management of the available water is very important for the sustainable utilization of it. The major share of usable water is present in the inner part of earth known as ground water. Increase in the ground water storage of a region is the direct measure of water richness. Water harvesting technique plays a vital role in increasing the ground water recharge.

Kerala, the southernmost state of India is blessed with two important monsoons, South-West and North-East. Plenty of water is available from these two monsoons. According to the Kerala Hydrologic Department, the average rainfall of Kerala is more than 3000 mm, still most part of it experiences water scarcity. The worst thing is the fact that though the rainfall is high, it doesn't effectively increase the groundwater storage as the major share of water is not infiltrated through the soil but flows off as overland flow. Kerala have its own peculiarities and pattern in terms of surface terrain, topography and climatic conditions which promotes runoff. Thus the plenty of water available from the two rich monsoons can't be effectively utilized for domestic and other purposes in off monsoon season. So to meet the requirement of water round the year, it is essential to effectively trap the surface runoff in monsoon season and retain it so long as to get infiltrated which can be done by proper management of excess rainwater available in monsoon season.

Harvesting is the technique which is used to effectively trap the surface runoff. In technical terms, water harvesting is a system that collects rainwater from where it falls around its periphery rather than allowing it to go as runoff. By constructing water harvesting structures in appropriate sites it is possible to increase the ground water recharge and level of water table, so that we can effectively use this water for irrigation and drinking purpose in the off monsoon season [1]. Also these structures act as a barrier to soil erosion and prevent flooding. Percolation Ponds, Subsurface Dykes, Farm Ponds, Check Dams, Bunds etc. are some of the type of water harvesting structures that are widely in use [2].

In this study the suitable sites for constructing water harvesting structures in Kecheri watershed is identified using ArcGIS. For the selection of suitable sites many guidelines put forwarded by various agencies are available such as IMSD, INCOH, FAO etc. In this study, selection of water harvesting structure is done on the basis of IMSD (Integrated Mission for Sustainable Development) guidelines put forwarded by NRSA (National Remote Sensing Agency, Hyderabad). Integrated Mission for Sustainable Development is one of the projects put forwarded by the department of Space for providing practical solutions to various problems through the technology of satellite remote sensing [3].

2. Study area and Data collection

2.1. Study Area

Kecheri River basin lies between $10^{\circ}25'44.41''$ to $10^{\circ}43'17.77''$ North latitude & $76^{\circ}02'05''$ to $76^{\circ}21'26.25''$ East longitude. It covers an area of 772.09 km^2 . The Kecheri river consists of two main Rivers, namely, Kecheri River and Puzhakkal River. Kecheri River is also known as "Wadakkancheri Puzha". The Kecheri river originates from Machadmalai and the elevation is 365m. Puzhakkal river also originates from Machadmalai with an elevation of 525m. Length of Kecheri river is 51km and that of Puzhakkal river is 29km. The main tributary of Kecheri river is Chundalthodu and that of Puzhakkal river are Parathodu, Pomaalthodu, Naduthodu and Kattachirathodu and that of Puzhakkal river are Parathodu, Pomalathodu, Naduthodu and Kattachirathodu. Vazhani is the existing irrigation project in the study area. Vazhani dam is one of the biggest clay dams in Kerala having a length of 792.48 km. This water is mainly used for irrigation and drinking purposes. The project was completed during the year 1962 and it envisages construction of an earth dam built across the Vadakkancheri puzha.

Kecheri Mainly has mixed plantation and forest. Gravelly clay, Clay, Sand, Loam and Gravelly loam etc. are the normally seen soil textures in this region. Kecheri River basin has its presence in 10 blocks in Thrissur District and one in Palakkad District. There are 48 Panchayats and 39 villages in this basin.

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