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# Rainwater Harvesting and Check Dam Construction Sites in Kallehol Village of Belgavi District, Karnataka : Using Geospatial Technology

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**Abstract :-** This study presents a methodology that is used to identify Rain water harvesting (RWH) sites using Geospatial product in Kallehol village which belongs to the semi arid zone and is likely to face water deficiency in the near future as new settlements are coming up and the area is getting increasingly urbanized. ArcGIS 10.3. For the assignment of weights to each factor and site suitability analysis weighted overlay method in ArcGIS 10.3 is used. The obtained results have revealed that the study area has plenty of scope for the development of water harvesting structures.

**Keywords :-** Rain water Harvesting, Check Dams, Arc GIS.

**Introduction :-** Rainwater harvesting refers to direct collection of precipitation falling on the roof of onto the ground without passing through the stage of surface runoff on land. It is sometimes used to describe the entire gamut of water harvesting. There are two types of rainwater harvesting, roof water harvesting and 'In situ' water harvesting.

Traditionally, rainwater harvesting comprises collection of the precipitation falling on to the roof or terrace of building and storing it in a waterproof sump at ground level for use year round on in periods of scarcity of supply from other source such as a pond or a well. Roof water harvesting was practiced as a matter of necessity, mostly in the low rain fall area of the country, having annual rainfall less than 500 mm per year. Roof water harvesting and storage system are a common feature of all old buildings in north Gujarath, Saurashtra and western Rajastan. Roof water harvesting was also practiced in some costal areas where the ground water was brackish.

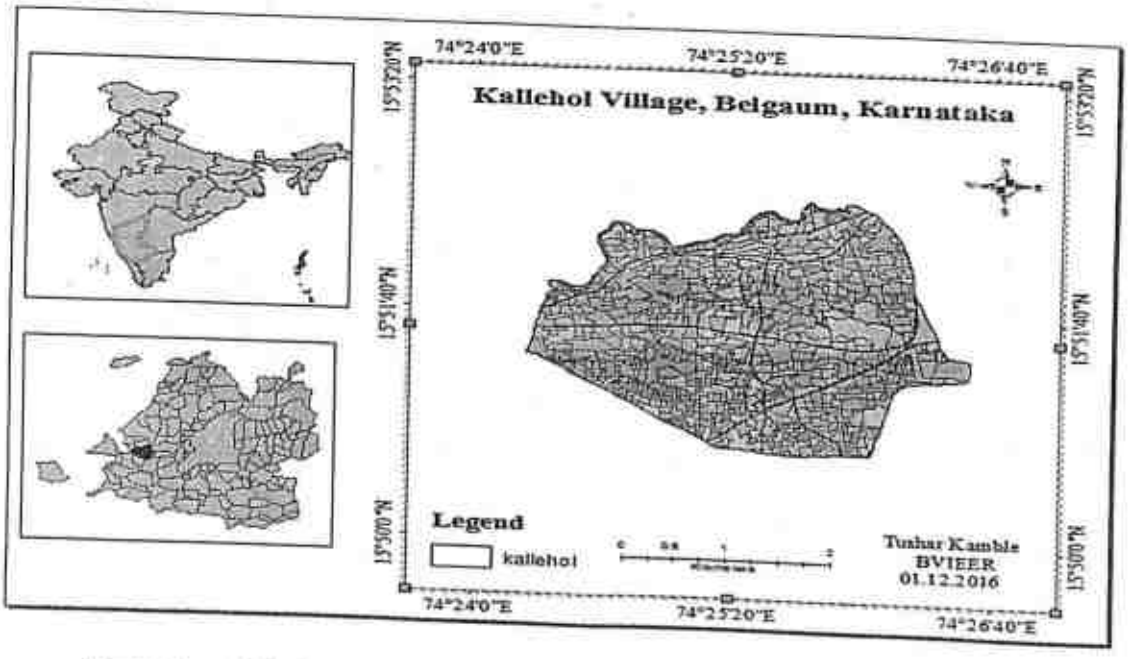
Modern construction during the last 50 years, especially in urban areas, has no provision for the collection and storage of roof water. The increase of population and inefficient system of distribution of municipal water supply has led to seasonal scarcity of domestic water supply in practically all the urban agglomerates. The utility roof water harvesting is now being realized and the movement of roof water harvesting is slowly gathering momentum in urban areas. In prevailing situation of uncertain supply, having a captive source of potable water is main resource for a dweller.

**Study area :-** The study area is located at15.8646° N, 74.4203° E. in Belagavi District .it covers an area of 849.42 hectares and accommodates 3,031 people.The climate of the study area is very hot in summer and extremely cold in winter. The cold season starts by the middle of November and continues up to the beginning of March. The summer season follows thereafter and extends up to the end of the June.In Kallehol village 85% people are working in farm and 15 % people employee.

The study area is 90% covered by agriculture and rest area is covered by mining area, settlement, barren land and grass land. The study area is located in high rainfall zone but in the summer season there is lack of water availability. In Belagavi Taluk there are 10 rainguage stations so one of them rainguage station is located near Kallehol village.

**Objectives :**

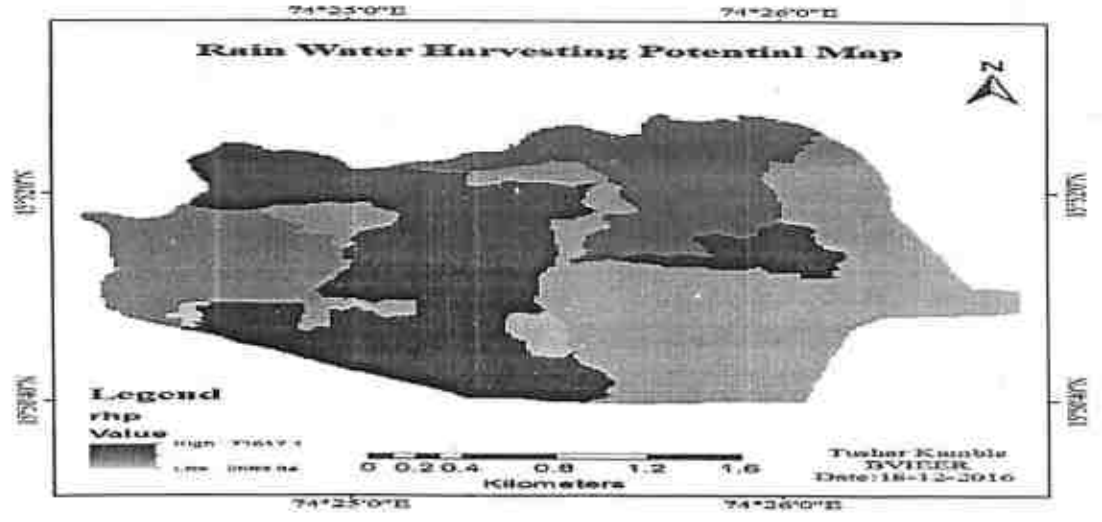
- To identify potential sites for setting up water harvesting structure using geospatial technologies.
- To identify potential check dam construction sites through geospatial technologies.




Map-1. Map of Kallehol village, Belgavi, Karnataka

**Data Base and Methodology :-** Present research work based on primary and spublished data, Field Survey and Laboratory analysis and published data collected from District statistic department Belgaum,Karnataka ArcGIS Desktop 10.3 for Vector and Raster based analysis such as Map Overlay, Proximity Analysis, Rainfall Interpolation, and for generating Flow Accumulation map, Raster Stream Network and Stream Order map.Q-Gis has been used for digitizing study area.

**Analysis of Rain water Harvesting in the Kallehol Village :-** Potential sites for rain water harvesting in the Kallehol village. Note that the sites identified in these maps correspond to either high or very high suitability levels for all included water harvest.Weighted overlay analysis allocates potential sites for dams close to the Markandayriver which is flowing in study area. Potential water harvesting sites occur predominantly in the mining area. This is due to the spatial variability in topographical features. For example topography is largely rocky surface and with less continuous drainage networking .The most suitable sites for dams are located close to the Markandey river and have deep slopes (0–2.48%). The results also agree with findings by Mbilinyi, Tumbo et al, who 5 argue that water reserves are constructed close to streams with slopes where water can easily enter and exit by gravity.




Map-2.Rainwater Harvesting Potential Map of Kallehol

In study area applied a GIS approach for identified the suitability for RWH interventions in Kallehol village. Integrated bio physical criteria such as slope, vegetation cover, soil texture, and drainage area and modified the criteria and assigned the weightage to each criteria.This result is agree with Zindal et al he applied bio physical criteria and assigned one of two ratings, best or second best. These rating provides more flexibility for determining the suitability of an intervention.

The study has demonstrated the capabilities of using Multi Criteria Analysis supported in GIS for identifying potential sites for RWH technologies that may be used for development and management of rainwater harvesting intervention.

**Suitable Site For Rainwater Harvesting and Check Dam Construction** :- Within the agricultural areas, suitable sites for water harvesting are located in places with moderately undulated to steep slopes (4 – 12 %) and with clay soils. Suitable locations for check dam construction are found in areas which combine deep slopes with clay, silty clay, or sandy clay soils. These characteristics agree with findings obtained by Prinz. Relatively fine soils such as clay and silt have a high water storage capacity and thus are suitable for percolation pits.

The MCA approach was used in this study to identify areas for RWH technologies within a GIS context. The weighted linear combination was useful to evaluate multiple criteria in a consistent way in order to obtain suitability maps. The rainfall data as well as soil information were also considered. The criteria factors taken into consideration for the rainfall data, slope map, soil information, drainage map, and land cover land use from the Google earth satellite imagery. These criteria maps were re-classified into numerical figures. Buffer operation was done for each layer on the digitized imagery i.e drainage, settlement and roads and overlaid with the classified weighted overlay for each catchment. Thus subjective numbers in the suitability levels and weights of the criteria can be changed according to the study area characteristics. The suitability maps was classed into five comparable units i.e. suitability classes namely; 1) Most Suitable, 2) Moderate Suitable, 3) Suitable, 4) Serve Suitable. The suitability maps shows location of rock, check dams.

In the present study, one type of structure namely check dam taken in to consideration. To carry out this study, various thematic layer have been generated namely

drainage map, slope map, land cove/ land use map, digitized village map using google earth. And using the Arc GIS software multi criteria analysis was done. Using the guideline given by various reference, a decision rule was applied for identification of suitable site for various water conservation structure. Check dams provide a good measure of rainwater harvesting structure by arresting runoff and increasing the surface area of infiltration. Suitability of these structure depends on various factors, which can be integrated by GIS techniques.

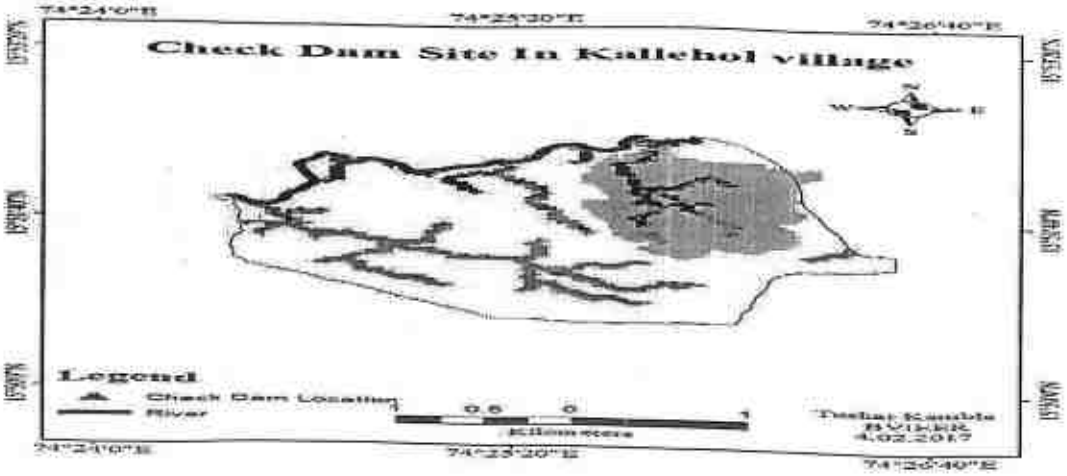
Check dams are small devices constructed of rock, sediment retention fiber rolls, gravel bags, sandbags, or other proprietary product placed across a natural or manmade channel or drainage ditch. A properly designed, constructed, and maintained check dam will reduce scour and channel erosion by reducing flow velocity and encouraging sediment settlement.

In the study areas having double crop, stone, very deep slope and 1st and 2nd order stream are proposed for check dams. Multiple sites for construction of check dam are suggested in the Kallehol village. The suggested sites are near the Markanday river. These areas fulfill all the necessary conditions needed for construction of check dams.

The site suitability analysis has helped in locating the suitable sites for the water harvesting structure. The hilly part and stone mining area with rocky outcrops and steep slopes acts as a high runoff zone. The runoff washes away precious top soil from the hill slopes. Hence there is a need for proper soil moisture conservation measures and rain water harvesting.

This study analyzed the hydrologic and geographic attributes of the watershed in study area and identified major factors influencing groundwater recharge potential,slope(%),Water holding capacity of map, land use land cover, drainage density Each factor was examined was assigned an appropriate weight. Each recharge potential factor may influence the groundwater recharge process to a different degree.

Overlay analysis is carried out, using weighted overlay analysis tool provided in the ArcGIS software, to integrate various thematic maps viz. Water holding capacity map, slope(%)map, land use land cover map, drainage density map which are being very informative and plays important role in the study for groundwater recharge potential zones of study area :




Map -3. Check Dam site in Kallehol village

The various thematic maps were assigned with different weightages of numerical value to derive groundwater recharge potential zones. On the basis of weightage assigned to these maps and bringing them into the function of spatial analyst for integration of these thematic maps, a map indicating groundwater recharge potential zones is obtained, which is as per hydrological soil map. This map has been categorized into four zones viz. 'most suitable', 'moderate suitable', 'suitable' and serve suitable from groundwater recharge potential point of view. The most suitable area is located near Markndeyriver and Lake. It is good opportunity to build up the check dams because near the river water evaporation will less.

**Conclusion :-** The study area have a less drainage network, so for the watershed cannot be collect the more water. As per using the whole DEM identified the big watershed location but that's comes out of the study area so it's not benefits for the Kallehol people. So in the study area identified the small watershed.

**Agricultural Extensification :-** Formerly barren lands have now been brought under irrigation as a direct result of the water availability with the advent of check dams. Owners of this property now have additional days of agricultural employment.The suitability maps provide an easy to understand source of information to quickly identify areas that are more promising than other areas for RWH intervention. Such information is helpful for decision-makers and planners.

Site selection for RWH is carried out by overlying the slope, soil, land cover /land use & buffered stream order maps. The study area is having full scope for percolation tanks, farm ponds and check dams. Produced map will help in the selection of the suitable location of harvesting structures and hence, help in water conservation in water depleted area.

**References :-**


- De Winnaar G, Jewitt GPW, Horan M. A GIS-based approach for identifying potential runoff harvesting sites in the Thukela River basin, South Africa. Phys Chem Earth Parts ABC. 2007;32(15–18):1058–67.
- George KV, Pillai KV, Mathew J. Studies on Water Resource Management: Approaches and Strategies. Int J. 2015;3(11):781–791.
- Harvesting R. Literature Review and Case Studies. 2013.
- Kadam AK, Kale SS, Pande NN, Pawar NJ, Sankhua RN. Identifying Potential Rainwater Harvesting Sites of a Semi-arid, Basaltic Region of Western India, Using SCS-CN Method. Water Resour Manag. 2012 Jul;26(9):2537–54.
- Kumar MD, Ghosh S, Patel A, Singh OP, Ravindranath R, others. Rainwater harvesting in India: some critical issues for basin planning and research. Land Use Water Resour Res. 2006.
- Ling E, Benham BL, others. Rainwater Harvesting Systems. 2014.
- Morey A, Dhurve B, Haste V, Wasnik B. Rain water harvesting system. 2016.
- Saleh Alatawi EA. Dam Site Selection Using Remote Sensing Techniques and Geographical Information System to Control Flood Events in Tabuk City. J Waste Water Treat Anal [Internet]. 2015.
- Sivanappan RK. Rain water harvesting, conservation and management strategies for urban and rural sectors. In: National Seminar on Rainwater Harvesting and Water Management [Internet]. 2006.