

SPATIAL DECISION SUPPORT SYSTEM FOR IDENTIFICATION OF WATER HARVESTING STRUCTURES USING GIS

B. N. MALLESWARA RAO¹ and N.V. UMAMAHESH²

¹ Department of Civil Engineering, Kavikulguru Institute of Technology and Science, Ramtek – 441 106, Maharashtra, India
(e-mail: bnmrao_v@yahoo.co.in)

² Water & Environment Division, Department of Civil Engineering, National Institute of Technology, Warangal – 506 004, Andhra Pradesh, India
(e-mail: mahesh@nitw.ernet.in)

Abstract

The importance of water is increasing in all sectors as the demand and needs of the population is growing. Along with surface water resources groundwater exploitation has reached peak levels. Hence there is an urgent need to think of strategies for water conservation and management. Keeping this as an objective, the suitable site for water harvesting structures has been identified using an integrated approach of Remote Sensing and Geographic Information System (GIS) in the Khindsy lake watershed of Ramtek taluk of Nagpur district of central India. The decision support framework considers issues such as the impact of deforestation on stream flow, soil erosion and subsistence production. There is enormous data volume and complex criteria for the site selection of various water harvesting structures like check dams and percolation tanks that cause much more difficulty for decision making. The methodology involves the preparation of Various thematic maps of study area like drainage map, contour map, slope map, land use/land cover maps from the SOI toposheets and IRS 1D LISS III imagery on 1:50000 scale. The overlaying and query analysis of thematic layers has been carried out using ArcView 3.2a. Querying analysis has been done as per the constraints given by IMSD (Integrated Mission for Sustainable Development) and other sources.

1. STUDY AREA

The Khindsy basin covers a part of Ramtek taluka of Nagpur district. The total basin area is 183sq.km. The Khindsy has a fan shaped catchment. The Khindsy basin is a sub basin of Wainganga river basin, which is a sub basin of Godavari. The basin length has been found to be 21.17 km. The flow direction of river is towards southeast direction. The topographical map of the Khindsy basin is produced by combining toposheet number 55 O/2, 55 O/3, 55 O/6 and 55 O/7. The location map has been shown in the fig. 1.

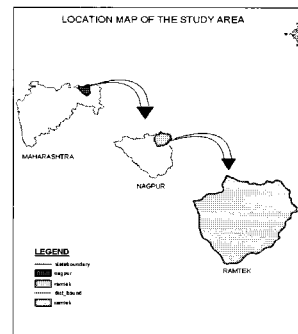


Fig. 1

2. GIS DATA USED

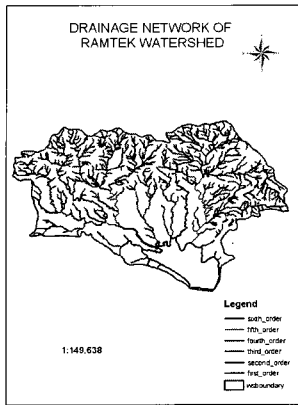


Fig. 2 Drainage map

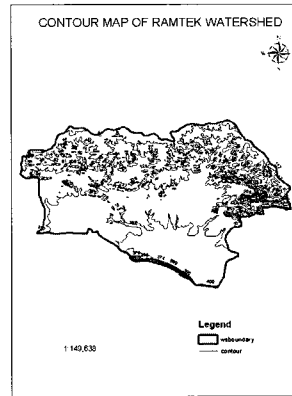
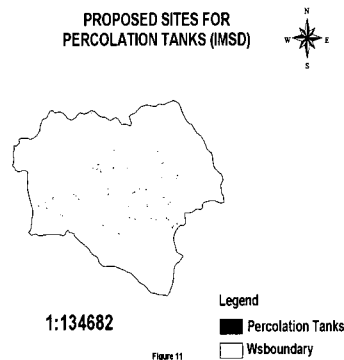
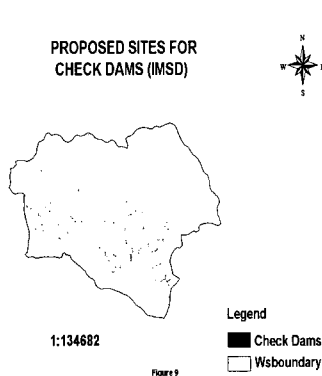


Fig. 3 contour map

3. RESULTS

The final output of the GIS analysis of the spatial natural resources thematic layers was carried out to show the suitable sites of water harvesting structures for improvement of surface water as well as ground water. Several factors have been considered in addition to the IMSD guide lines for selecting sites for the water harvesting structures. Water harvesting structures like check dams and percolation tanks are identified for the study area. The thematic layers that were considered are overlapped on the slope map, which shows the contours that are very close to the streams and forming a valley were selected for locating the water harvesting structures.

The following figures show final out put of the analysis and number of site for location of water harvesting structures.



REFERENCES

- Dieter Prinz, Theib Oweis, Annette Oberle, "Rainwater Harvesting For Dry Land Agriculture – Developing A Methodology Based Remote Sensing and GIS"
- Kavitha, Malleswara Rao and Umamahesh, "prediction of runoff from ungauged watershed –A GIS approach", proc. of the international conference on advanced modeling techniques.
- Rajashree V Bothale, Vinod M Bothale, Srinivasan G and Sharma J R, "Identification of Suitable Sites for Water Harvesting Structures in upper Betwa Watershed through Waris".