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REMOTE SENSING AND GIS APPLICATION FOR DEMARCATION OF WATERSHEDS: A CASE STUDY OF SANGMESHWAR TALUKA, RATNAGIRI DISTRICT (MAHARASHTRA)

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1.0 *Introduction:*

Watershed is a basic hydrologic unit, and hydrologic and ecologic processes govern the quality of soil and water resources within the watershed. It can be defined as a delineated area with a well-defined topographic boundary and water outlet (Mishra, Archana, 2005). The watershed is an important source of drinking water and only protected watershed can provide pure water to drink. Recently central government of India has introduced Integrated Watershed Management Programme (IWMP) (http://dolr.nic.in) at village level. Watershed management is a term meant to capture the sum of the actions taken to preserve and maintain watersheds. Demarcation of watersheds and its mapping is a vital important for the sustainable watershed management. For the sustainable watershed management, delineation of micro watersheds is prerequisite condition. Remote Sensing and Geographical Information System (GIS) plays an important role in the demarcation of watersheds. It creates easily readable, rapidly accessible maps and database, which facilitates the administrators and planners to identify micro watersheds. In recent decades, remote sensing and GIS techniques are used to demarcate watersheds for both research and operational applications. In the present research paper, an attempt is made to demarcate watersheds of the study region by using remote sensing and GIS technology.

2.0 STUDY REGION:

For the present research paper, Sangmeshwar taluka of the Ratnagiri district is selected as a study region. The Sangmeshwar Taluka is located in the eastern part of the Ratnagiri district. It covers an area about 1275.5 sq. km. Chiplun taluka in the north, Ratnagiri taluka in the west, Lanja taluka in the south bound the taluka. The Kolhapur, Sangli and Satara districts bound the eastern boundary of the taluka. It is located between 16° 54' 15.9803" north and 17° 19' 55.5366" north latitudes and 73° 24' 52.5850" east and 73° 50' 38.9990" east longitudes (Fig. 1). The altitude of the taluka is ranges between 1 meter and 1038 meters from Mean Sea Level (MSL). The east-west length of the study region is 32 km while north-south width is 40 km, in an average. The population of the taluka is 2, 14, 819 persons, according to 2001 census.

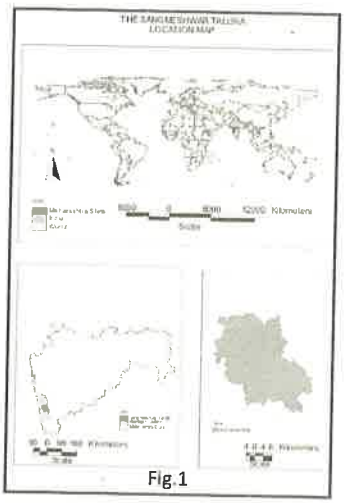
Fig.1

3.0 OBJECTIVES:

The main objective of the present study is to demarcate micro watersheds by using remote sensing and GIS technology and create database for the same.

4.0 RESEARCH METHODOLOGY:

The present research work is entirely based on satellite data. Hence, Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) Global Digital Elevation Model (GDEM) satellite data of the study region downloaded from the internet through Global Mapper GIS Software. The shape file of the taluka boundary is also downloaded from the DIVA-GIS.

After downloading the ASTER-GDEM satellite data, it has been cropped to study region by using Global Mapper GIS software. For that purpose, the shape file of the study region is used. After cropping,

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watersheds have generated by using generate watershed tool in Global Mapper GIS Software. The export tool of the Global Mapper is used to export the shape file of the watersheds demarcated. The attribute data of the watersheds is exported to the ms-excel for further processes. The location map and final output map of the same is prepared by using Arc-View 3.2 GIS software.

5.0 RESULTS AND DISCUSSION:

There are 1233 total number of watersheds demarcated in the study region (Fig. 2). Most of the watersheds are very micro in nature. Thirty-three watersheds have drained area less than one square km. The drained area of 472 watersheds is ranges between one and five sq. km. The drained area between five and nine sq. km. is observed in 193 watersheds and between nine and thirteen sq. km. in 126 watersheds. Drained area of more than 49 sq. km has recorded in 131 watersheds. Ninety-seven and twenty-five watersheds have recorded drained area more than 100 sq. km and 200 sq. km. respectively. The lowest drained area of a watershed is 509 sq. mt. and its estimated maximum flow of water is 502 cusecs whereas the highest drained area is 262.72 sq. km. and its estimated maximum flow of water is 259354 cusecs. It is intresting to note that No. of watersheds have been decreasing with increase in drained area (Table-I). The figure No. 2, 3 and 4 denotes the spatial pattern of watersheds in the study region.

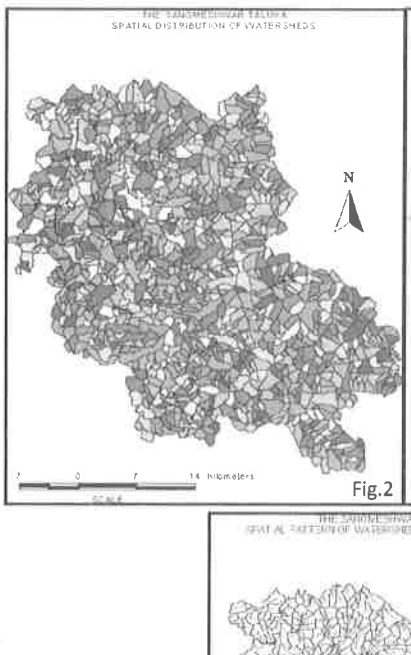

Fig.2

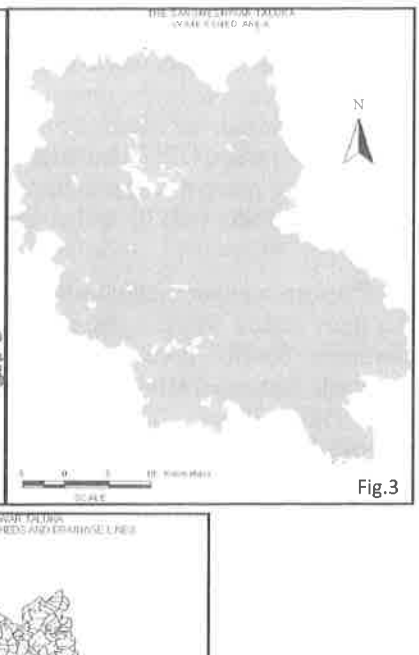

Fig.3

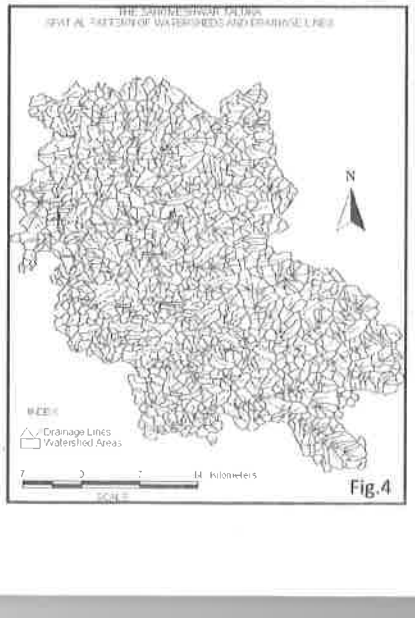

Fig.4

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Table-I
The Sangmeshwar Taluka
Watersheds and Drained Area

Sr. No.	Drained Area in sq. km.	No. of Watersheds
1	Less than 1	33
2	1-5	472
3	5-9	193
4	9-13	126
5	13-17	68
6	17-21	44
7	21-25	41
8	25-29	24
9	29-33	22
10	33-37	29
11	37-41	13
12	41-45	12
13	45-49	11
14	More than 49	131

Source: Attribute data.

6.0 Conclusions:

There are 1233 total number of watersheds have been demarcated for the study region, by using modern technology. The study reveals that the lowest drained area of a watershed is 509 sq. mt. and its estimated maximum flow of water is 502 cusecs whereas the highest drained area is 262.72 sq. km. and its estimated maximum flow of water is 259354 cusecs. It is also observed that No. of watersheds are decreasing with increase in drained area. For the sustainable watershed management, delineation of watershed is necessary. The modern technology like remote sensing and GIS plays very significant role in the demarcation of watersheds. Remote sensing satellites provide synoptic view of the study region. This advanced sensor technology alongwith GIS has provided immense scope to the mapping and analysis of watersheds.

REFERENCES:

1. Mishra, Archana (2005): Watershed Management, Authorpress Global Network, New Delhi, pp. 1-18.
2. Gupta, B.L., and Gupta, Amit (2008): Water Resources System and Management, Standard Publishers, Delhi, p.141.
3. Bhatia, S. C. (2008): Fundamentals of Remote Sensing, Atlantic publishers and distributors, New Delhi.
4. Joseph, George (2nd edition) (2009): Fundamentals of Remote Sensing, Universities press (India) private limited, pp. 349-389
5. Jhanwar, M. L. and Chouhan, T. S. (1998): Remote sensing and Photogrammetry, Vigyan Prakashan Jodhpur, pp. 273-304.
6. Rashid, S. M. (1993): Remote Sensing in Geography, Manak publications private limited, Delhi, pp. 207-221
7. http://dolr.nic.in/guidewd.htm
8. http://reverb.echo.nasa.gov/reverb/#utf8=%E2%9C%93&spatial_map=satellite&spatial_type=rectangle
9. http://www.mittra.org/prog_inter.php?type=int_watershed
10. http://asterweb.jpl.nasa.gov/gdem.asp
11. http://www.jspacesystems.or.jp/ersdac/GDEM/E/index.html

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