Watershed Development in Rural Area of Vadodara District Land using Gis and Remote Sensing

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Abstract— The aim of the project is to develop an action plan for watershed development. Watershed development is the process of creating and implementing plans, programs, and projects to sustain and increase watershed functions that affect the plants, animal and human communities inside watershed boundary. The recent technologies like remote sensing and GIS support us to giving a quicker and cost effective analysis of various applications with accuracy for planning. The present study is an attempt to develop watershed by using remote sensing and GIS in rural area of Vadodara district land. Study area selected by using Grouping analysis in Arc GIS.

Keywords: GIS tools, Global mapper

I. INTRODUCTION

Effective use of land and water is fundamental to growth and sustainable development. The concept of watershed management has evolved to ensure effective use of both natural and social capitals. Thus, the watershed development programmes include land, water and human resources as essential components. The watershed programme is primarily a land based programme, which is increasingly being focused on water, with its main objective being to enhance agricultural productivity through increased in situ moisture conservation and protective irrigation for socio-economic development of rural people.

The concept of watershed has traversed many changes over the years. This changes have Expanded the preview of watersheds in many ways, from soil conservation to livelihood promotion, from top down to bottom of approach, etc. These changes have definitely influenced not only the implementation process of watershed development programme (WDP) but also budget patterns.

"A watershed can be defined as the drainage basin or catchment area of a particular stream or river." Simply put, it refers to the area from where the water to a particular drainage system, like a river or stream"

Human activities on land have a direct and cumulative impact on water and other natural resources within a watershed. Upstream activities Influence riverHows and water quality down-stream. Channelizing rivers, removing vegetation along watercourses, paving recharge areas, filling in wetlands, and consuming groundwater at rates faster than it can be replenished can have severe, and in some cases, irreversible effects on natural systems. These effects in turn usually impair water quality, degrade aquatic and terrestrial habitat, contribute to a loss of biodiversity, contaminate underground aquifers, and increase risks of flooding and erosion damage.

Aim of the Study

To study the need of watershed development in rural area of Vadodara district land using GIS with GIS.

II. LITERATURE REVIEW

Literature survey helps to learn about the different watershed management problems, their analysis and the way GIS has been used to deal with watershed management in different situation. For the study purpose, literature was collected from books. Internet websites, Papers. In this study, literature survey was carried out mainly for two purposes:

A. Dr .Eldho T.I.1:

The recent use advances of in watershed modeling are the integrated use of numerical methods, remote sensing and GIS technologies. In this paper, characterization of watershed for parameter i.e Drainage, Land use/land cover by using GIS and RS data has been discussed.

Runoff estimation by FEM based model by using input derived from the watershed Characteristic maps has been presented. GIS used for prepare FEM grid map and input files such as manning's roughness and slope used for watershed. Watershed characterization and runoff estimation has been done for few rainfall events in Banha watershed, India.

B. K. Palanisamia and D. Suresh Kumarb.2:

The overall performance of watershed development programmes has been examined in the state of Tamil Nadu. The impacts of major watershed development programmes have been outlined in terms of biophysical impacts, environmental impacts, socio-economic impacts and overall economic impacts. It is pointed out that the watershed development activities have made significant positive impacts on various biophysical aspects such as soil and water conservation, soil fertility, soil and water erosion in cropped area, changes in cropping pattern, cropping intensity, production and productivity of crops. Watershed development activities have shown significant positive impacts on water table, perennially of water inwells, water availability for cattle and other domestic uses, etc.

C. Vinayak N. Mangrule and Umesh J. Kahalekar.3:

The aim of the project is to develop an action plan for watershed management. Watershed management is the process of creating and implementing plans, programs, and projects to sustain and increase watershed functions that affect the plants, animal and human communities inside watershed boundary.(Wikipedia) The recent technologies like remote sensing and GIS support us to giving a quicker and cost effective analysis of various applications with accuracy for planning. It also gives a better perspective for understanding the problems and therefore helps Planners evolve a better solution for sustainable development. From the final output of these themes generate; Recharge wells,

percolation tank and check dams are recommended for the study area, mainly to control sedimentation from the catchments. To increase the
Groundwater recharge and vegetative cover to control soil erosion, various action plans like construction of recharge structures, afforestation etchave been proposed. This project describes in brief the work carried out for the study area using remote sensing and GIS.

D. U.K. Shanwad . V. C. Patil . H. Honne 4:

The current study was taken up to investigate the utility of remote sensing and GIS tools for evaluation of Integrated Wasteland Development Programme (IWDP) implemented during 1997-2001 in KatangiddaNala watershed, Chincholitaluka, Gulbarga district, Karnataka.

The images were classified into different land use/land cover categories using supervised classification by maximum likelihood algorithm. They were also classified into different biomass levels using Normalized Difference Vegetation Index (NDVI) approach. The results indicated that the area under agriculture crops and forest land were increased by 671 ha (5.7%) and 1,414 ha (11.94%) respectively. This is due to the fact that parts of wastelands and fallow lands were brought into cultivation. This increase in the area may be attributed to better utilization of surface and ground waters, adoption of soil and water conservation practices and changes in cropping pattern. The area under waste lands and fallow lands decreased by 1,667 ha (14.07%) and 467 ha (3.94%), respectively.

The benefit-cost analysis indicates that the use of remote sensing and GIS was 2.2 times cheaper than the conventional methods.

III. SELECTION OF THE STUDY AREA

Vadodara District is a district in the eastern part of the state of Gujarat in western India. Vadodara District covers an area of 7,794 km.

The physiography of Vadodara features a number of rivers. The main city of Vadodara is located on the banks of river Vishwamitri. Besides, the topography of Vadodara also features Narmada river to its south and Mahi river to its north.

By using arc Gis , do the grouping analysis by using bellows parameter and selected the villages which have minimum irrigated land.

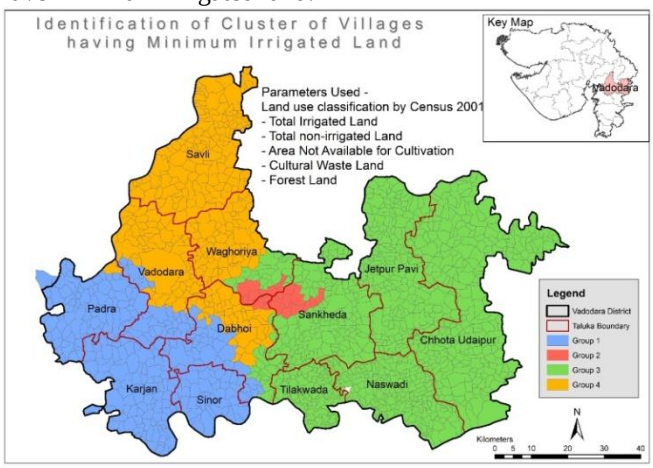

Fig. 1: Identification of Village Cluster

Using grouping analysis for the following parameters, the district is divided into 4 groups –
Total irrigated land
Total un-irrigated land
Forest Land
Area not available for cultivation
Cultural Waste land
These land cover classification is by the census 2001. The grouping analysis is run on these variables in order to side-line a specific group for which the watershed development is necessary. The specific group for which the man of total un-irrigated land is more than others is the cluster for which watershed development is of priority. The parallel box plot indicates that for the variable of total un-irrigated land, the mean for group 2 is maximum and hence those villages are selected for further study.
Here, group 2 selected for the further study and it have minimum irrigated land. Three talukas with 21 villages which cover 157 sq.km area.

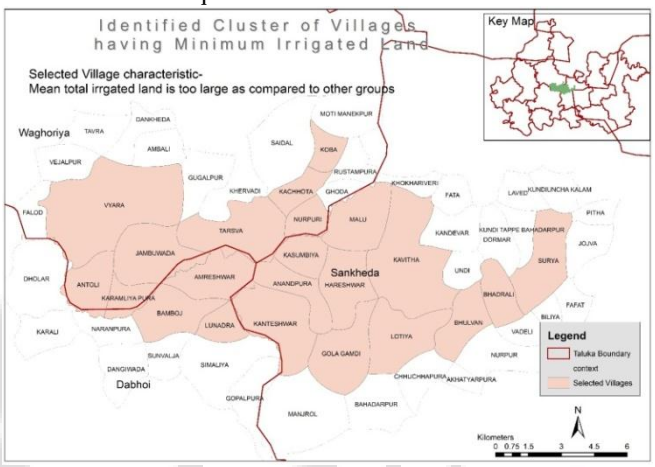

Fig. 2: Cluster of Identified Villages

Here by grouping analysis, selected group 2 which have 22 villages of three talukas. And villages shown in fig.2

IV. CONCLUSION

From the study of the literatures related to watershed development and by using Grouping analysis selected villages which have minimum irrigated land in Vadodara. This study can helps for the development of watershed in selected minimum irrigated area. Use of the GIS for the selection of the villages is faster than any other method.

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