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POTENTIAL PROPOSE SELECTED VILLAGE WATERSHEDS IN KARJAT TAHESIL – USING GIS TECHNIQUES (JALAYUKTHA SHIVAR 2014)

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Abstract

Water is basic natural resource on the earth for all living organisms including mankind and for development and survival of plant community. People generally say "no water no life". Water is necessary for every-day life. Availability of water motivates development and absence of water leads to destruction. However, during last century man has exploited this resource very fast through various activities which had led to quantitative and qualitative deterioration of water resource (Guljar R.K.et.al. 2008), More (2014).As a result, the world has become a hot spot of water crisis.

Key word: *development, motivates, destruction, exploitation deterioration*

Introduction

Distribution of water resource is uneven on the earth surface. About 97.2% is salt water found mainly in the oceans and only 2.8% is available as fresh water at any time on the planet earth. Fresh water constitutes about 2.2% of surface water, 2.15 % of fresh water is found in glaciers and icecaps and only 0.01% of fresh water is found in lakes and streams and the reaming 0.04 % of fresh is from other sources. Of the total groundwater stored (0.6%) only 0.25% can be economically extracted with the present drilling technology (Nagarajun J. 2012).This quantity of water resource is very high on the earth but only small quantity is useful for mankind. As global population is increasing rapidly, water for food production is becoming an increasing scare resource and the situation is further aggravated by climate change(Molden D., 2007).The changes made by human community demanding water and the uneven distributions of water in nature have made the problem of water resource worst. In the world many more rain fed areas are the hotspot of food insecurity, soil degradation, water sacristy, poverty, out migration, malnutrition and poor social economical development. Hence there is urgent need for early rational and practical policy for development, use and the conservation of water resource for the overall development.

Water is a precious natural resource and at the same time a complex factor to manage. There is no doubt that India has done well in the sector of water resource development in the form of major, medium and minor irrigation projects, in the last fifty years which has in turn played an important role in the progress of the country. Water resource development is a continuous process which has to be resorted on account of ever increasing demand. The major irrigation projects cater to millions of hectares of land, whereas at the other extreme local level projects such as small pond/tanks involving small structures may also be used to fulfill the requirements of a small community at the village level. The integrated watershed management (IWM) approach has been globally accepted as the best for natural resource management (Gosain et al. 2004), Nilesh Kale, Jyotiram More (2014.

For watershed harvesting structure site selection the researcher has used the criteria of model and ideal villages' i.e. contour trenches, loose boulder structure, farm pond, check dam and percolation tank. In this context the researcher proposes five suitable villages for watershed management structures in KarjatTahesil.

Study Area

The Karjattahesil is one of the drought prone areas of Ahmednagar district.Tahesil located 180 20' to 180 55' N latitude and740 30'to 75039' E longitudewith occupies 1503.61sq.km area of 118 villages. The Tahesil has experience a sub tropical monsoon climate. It received maximum average 554mm rainfall annually and more than 75 percentage of which occurs during the July- September and

maximum period are dry. So water scarecity is major problem for various purposes. The total population of tahesil is 235792 (Census 2011). Most of population is engaged in agriculture and their allied activity.

Location Map

Methodology and techniques

Geographical Information System (GIS) techniques are also used for understanding ground truth. However, brief idea of the methodology adopted in the study is given in the following points.

Spatial data-

Data related to the space means real world is known as spatial data. This data is collected in the form of primary and secondary.

Village Survey

Regular visits are carried out to the study area for field observation. During the field survey of the study area present status of watershed development is checkout.

GPS (Global Possessing System) Survey –

GPS survey is done for all selected village watersheds to obtain the information of latitude, longitude and elevation of related watersheds. Also GPS is used for preparation of rainwater harvesting structures of proposed village watersheds in the study area.

Secondary data

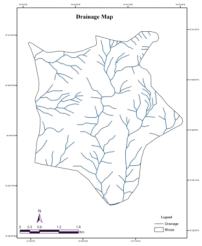
For the generation of base map in GIS, toposheets, tahesil cadastral maps and satellite images are used.TheKarjat is covered in the Survey of India toposheets numbers 47 M/ 8 of 1:50,000 scale.Cadastraltahesils map of census 1991 of the Nagar, Parner, Shrigonda, Karjat and Jamkhed are used as base maps.

All mentioned toposheets and satellite images namely IRS 1C/1B (NRSC, Hydrabad) are mosaic and details such as contour of 20 Mt. interval, drainage, tahesils and village boundaries are digitized in ArcGIS 9.3X software. Various maps are prepared including contour, drainage, stream

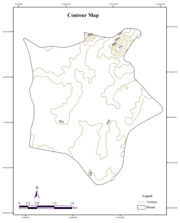
ordering, slop and aspect. Shuttle Radar Topographic Mission (SRTM) DEM data of 30 Mt. spatial resolutions are used to create digital elevation models of the south Ahmednagar district and proposed village watershed of the study area in ArcGIS 9.3X, ERADAS IMAGINE 9.2 software.
For preparation of proposed village watershed structures various thematic maps i.e. contour, drainage, stream ordering, slope, aspect and rain water harvesting structures are prepared in ArcGIS 9.3X, ERADAS IMAGINE 9.2 and Global Mapper v15.1 software. Finally with the help of above thematic maps and data analysis interpretation is done.

Result and discussion

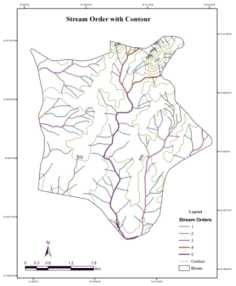
1. Bhose



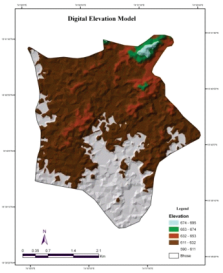
A: Drainage map



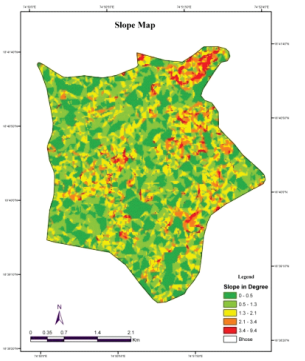
B: Contour map



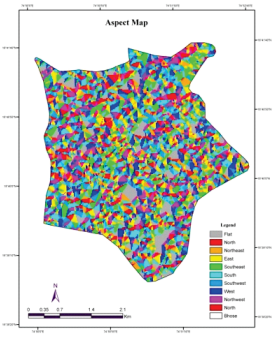
C : Stream order with contour map



D: Digital Elevation Model



E: Slope map

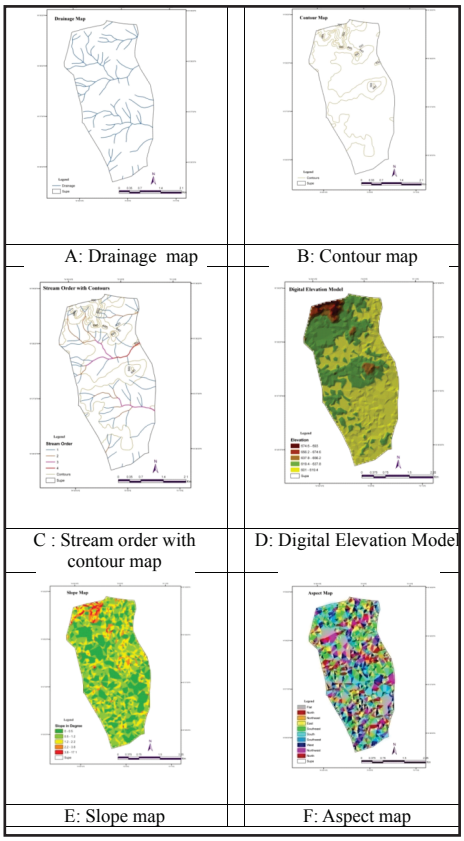


F: Aspect map

Bhose is in Karjattahesil. It situated on 18°38'54" to 18°40'49" N latitude and 74°49'28" to 74°52'32" E longitude. Bhose have 1787 is population.

Bhose has circular shape, so this region accumulates maximum water. Physiographically this village is undulated hence slope of this area is about 0 to 10 degree and direction of slope is toward south. River system of this region flows toward south direction. In this region fifth order stream are seen, and the number of streams is more accumulating high rain water. Drainage pattern of this river system is parallel. Bhose village has 92 existing rainwater harvesting sites, consisting them 11 cement dams, 36 loose bolder structures, 30 continuous contour trenches, 14 farm ponds and 01 percolation tank. These rainwater harvesting structures are insufficient to fulfill the need of water. This village has ideal location for rainwater harvesting. Therefore, we are proposing main five different types of structures and 68 different ideal sites of rainwater harvesting. Out of these 08 earthen or cement check dams are suggested in the middle portion of first and second order streams, 24 loose boulders are suggested in the upper reaches of first order river to reduce gully erosion on first order streams, 26continuous contour trenches are suggested in upper plateau portion, 09 farm ponds are suggested in the middle reaches according to natural sites and 01 percolation tank are proposed to accumulate water at lower reaches. Proposed structures are helpful to reduce soil erosion, increasing underground water level and increasing availability of ground water in the village. Proposed watershed development of the village will be helpful for changing the existing agriculture system and it will bring new economic and social transformation of Bhose village.

2.Supe



A: Drainage map | B: Contour map

C : Stream order with contour map | D: Digital Elevation Model

E: Slope map | F: Aspect map

Supe is in Karjattahesil. It situated on 18°36'32" to 18°41'39" N latitude and 74°59'15" to 74°60'28" E longitude. Supe have 672 population.

This village watershed has elongated shape and the numbers of streams are more so the collection of water trough all tributary is high. Slope of this study area is 17 degree which shows direction toward east. Parallel drainage pattern is seen in this village with forth order as a highest order of streams. There are 56 existing rainwater harvesting sites. Among them 05 are cement dams, 24 loose bolder structures, 19continuous contour trenches and 08 farm ponds 08.These rainwater harvesting structures are insufficient to fulfillment need of water for various purposes of Supevillage. On the basis of ideal physiographic and hydrological setting of the village five main types of structures and 42 different ideal sites of rainwater harvesting are proposed.Out of these 04 earthen or cement check dams are suggested in the middle portion of first and second order streams, 18 loose boulders are suggested in the upper reaches of first order river to reduce gully erosion on first order streams, 12 continuous contour trenches are suggested in upper plateau portion, 07 farm ponds are suggested in the middle reaches according to natural sites and 01 percolation tank are proposed to accumulate water at lower reaches.Proposed structures are will reduce soil erosion, increase underground water level and availability of ground water in the village. Proposed watershed development of the village will be helpful for changing the existing agriculture land use and bringing economic and social transformation of Supevillage.

Conclusion

Before JalayukthaShivar 2014 villages has always problem of water scarecity. After intensively implementation of JalayuktaShivarAbhiyan Government has constructed rainwater harvesting sites. There are not sufficient to fulfill the need of water villages Bhose and Supe. So with the help of GIS techniques and field visits we suggested rainwater harvesting sites for sustainable development.

These Proposed structures are beneficial to reduce soil erosion, increase underground water level and availability of ground water in the village. It will also helpful for changing the existing agriculture land use and bringing economic and social transformation of above villages.

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