

# Water Conservation by using QGIS

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**Abstract**— Water conservation implies the proper use of water resources with maximum yield with minimum possible hazards to natural resources. Lake and rivers are drying faster due to worm climate. A fact is that the finite resources of fresh water are becoming scares. People using the fresh water faster than it can be retreated. For insuring the continuous benefits of sustainable basin, watershed is an ideal hydraulic technique. The water conservation of Soni village district Sangli is done by using QGIS (Quantum Geographical Information System). Watershed delineation has become smooth due to use of DEM(Digital elevation model).QGIS has given different maps of Soni village like aspect map, hillshade contour map and also watershed delineation which are very useful for water conservation. After studying all the factors and maps of Soni village, we have suggested some water bodies and farm pond and also some remedial measures are suggested.

**Key words:** GIS, Village Map, DEM

## I. INTRODUCTION

Water is a precious resource. Over the years growing population, industrialization and expanding agriculture have pushed up the water demand. The rural areas of India are suffering from increasing water scarcity as a result of an imbalance between water supply and demand. Groundwater has become the unbeatable source of water for irrigation and village water supply in these rural areas.

Water conservation sustainably manages the natural resources of fresh water with all its policies, strategies and activities to protect the hydrosphere, and to meet the current and future human demand of portable. Conservation refers to the protection, management, and restoration of natural resources including the plant and wildlife communities that inhabit the environment. Conservation efforts focus on addressing threats to the natural environment such as global climate to be through habitat fragmentations and species extinction.

A geographic information system (GIS) is a computer based system which capture, store, check, and display data of related position on earth surface. GIS can use any information that includes location. The location is expressed in many different ways, such as latitude and longitude, address, or ZIP code. It is one of the simplest technique which can be used to highlight water scarcity problems for a rural areas of India.

Sangli district has hot semi-arid climate and there are large variations in rainfall pattern. Several villages in Sangli district are facing acute shortage of drinking water. Soni is a village of Sangli adversely facing the scarcity problems thus conservation of water in this village has become need of today. GIS is the best tool which creates all maps required for proper planning and designing the water conservation operation.

## II. METHODOLOGY

### A. Study Area



The study area is Soni village of Sangli district in Maharashtra state, India. We choose Soni village as it is suffering from acute scarcity. Thus this village serves as a location for our pilot study with primary aim to collect and analyze data for planning and conservation implements of local water. The reason behind this study is that it focuses on the water problem facing by such villages for drinking and agriculture as agriculture is the main occupation of this village.

#### 1) Data Collection:

The socio economical and hydrological data is collected from the village area. Gram panchayat and local communities are involved in data collection activity. The socio economic data was collect from each household through survey. The village map and the toposheet were collected for the gram panchayat of the village. The detailed information was collected from owners of farm regarding type of crop, schemes applied in their agricultural land, water supply schemes, number of well in their farm water demand for their crop etc.

#### 2) QGIS:

The main purpose of adopting GIS software is that it is feasible than other software and easy available on internet. GIS means Geographical Information System. This system gives us various data view, analysis and creating map. In the QGIS system creates different types of map. Map can assemble different format and it used for different way.

In QGIS map to be composed of raster and vector layers. In vector data is stored point, line or polygon feature various types of raster image are supported and software can georefranced data image GIS I used for highlight water scarcity problem in India.

GIS system gives the direction of how to control different problem of scarcity and give the direction of decision making. GIS software improve work efficiency and program data.

#### 3) DEM:

DEM means digital elevation model. In DEM model various maps are prepared. This model gives the elevation of surface

on earth. Mostly DEM is used in geographic information system and digitally produced maps. DEM is used for creating maps. DEM is 3D representation of terrain surface.

DEM is used for many purposes such as hydrological modeling, land mapping and agriculture etc. DEM can be represented as grid of square or irregular network. DEM is the type of raster GIS layer. DEM model gives the value of each grid corresponding to elevation. DEM model gives the latitude and longitude.

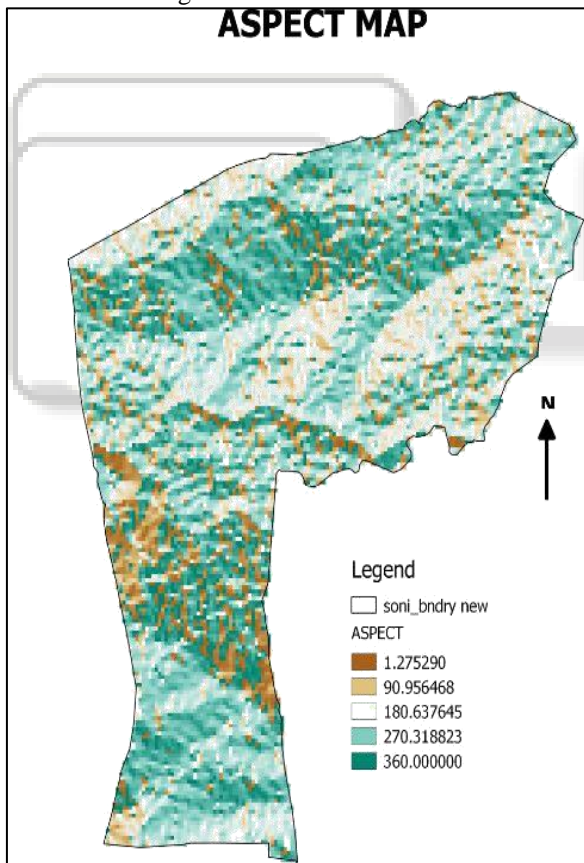
90 meter DEM consist of elevation value approximately 90 meter intervals.

4) *Slope Map:*

In slope map gives the slope location on earth surface. In water shed management slope map is important point of view for conservation of water. The slope map gives the idea about how to conserve water like where bunding is to be provided etc. Slope is calculated for each triangle in TINS and for each cell in raster. Slope can be expressed in degree or percentage.

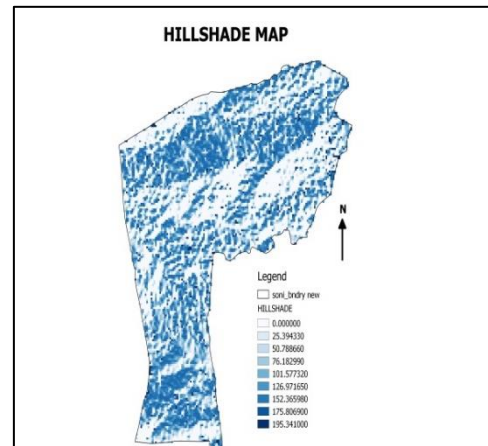
5) *Aspect Map:*

The village map the raster image is added in DEM. In aspect map calculate exposing converted in to degree in clockwise direction starting 0 to North. The main term of aspect can be used to describe alignment.



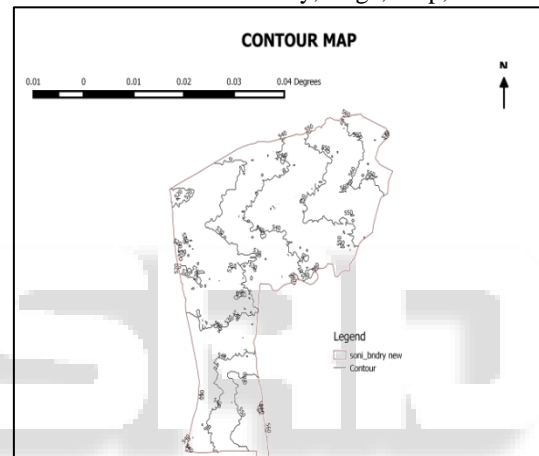
6) *Hill Shade:*

This tool creates a hill shed raster with lighted area and shadow. The hill shed map creates terrain in 3D surface from 2D display. Hill shed is a map used to visualize terrain as shaded relief, illuminating with a hypothetical light source.



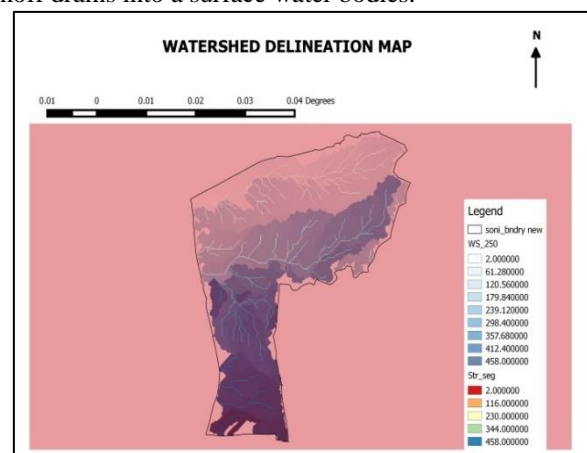
7) *Contour Map:*

Contours are imaginary line joining the points of equal elevation. This map gives the different elevations of ground in horizontal and vertical direction. This map indicates different zones of land like valley, ridge, loop, Cliff etc.



8) *Delineation Map:*

Water shed delineation means water shed boundary. The water shed boundaries are selected on the basis of topographic information. Delineate areas where surface water runoff drains into a surface water bodies.



III. RESULTS AND DISCUSSION

We have studied different maps this village using QGIS. Slope map shows that the upper north region belt is hilly region and Middle East west belt in plane region where gavthan is located. According to contour map, slope of

ground is towards western Hill shade creates terrain surface. This map shows that upper some portion and southern portion are located in hill region. We have prepared water delineation map which shows direction of streams flow in rainy season and area saturated by each stream. First of all we have to collect data and carried out the all information of hydrological survey and socio economy survey then prepare DEM of Soni village. Then to prepare all maps like contour maps, slope maps, hills map, water delineation maps, aspect maps using QGI software. This all maps is very useful because this map gives information and to know how to conservers water and where is water bodies can be located.

#### IV. CONCLUSION

The village suffers from large scarcity in summer season and the need to hire water to fulfill their daily demands and for agriculture purpose.

In this village the farming is done only on rainwater as no other sources are other sources are available in this village.

In this village the water table level is very low so we are suggested some water recharging technique to increase ground water table.

#### V. REMEDIAL MEASURES

According to this results we have suggested some remedial measures as follows which will definitely help in water conservation of Soni village.

##### A. Mechanical Measures

The main objective of water conservation is to reduce velocity of runoff so that it can be percolate in land which can be increase water table. As the main source of this village is bore wells and wells, thus increasing water table is must. This includes contour bunding graded building and vegetative waterways.

##### B. Contour Bunding

Contour bunding is the most useful practice in low rainfall area and having mild slope of 1-6%. Contour bunding is useful for storing water so that it immediately infiltrate into the land. This moisturizes the soil for low fed crops.

##### C. Graded Bunds

Graded bunds are usually provided across the contour loop. This bunds are recommended where there is low infiltration rate and in area where there is high rainfall intensity.

##### D. Vegetated Waterway

For disposal of runoff from field traces area, diversion channel, spillway and other structure. Vegetation are provided in waterways.

##### E. Diversion of Runoff

In this practice barriers are provided along or across the runoff to divert its flow from high terrain to low lying areas. In this method tanks are provided at required interval with outlet which permits the flow of water to low reaches.

##### F. Deepening and Widening of Streams

This helps us in storing more water in stream during rainy season. This will increase the capacity of stream and avoid wastage of water due to overflow.

##### G. Drip and sprinkler irrigation

In this villagers to suggest for forming furrow irrigation will be avoided and adopt drip irrigation will be avoided and adopt drip irrigation and sprinkler method because do not waste of water.

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