Watershed Development by Using GIS and Remote Sensing For Water Budgeting

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

Morphometric analysis is a quantitative description and analysis of landforms as practiced in geomorphology that applied to a particular kind of landform or to drainage basins. Remote sensing (RS), Geographical Information System (GIS) has proved to be an efficient tool in delineation of drainage pattern and water resources management and its planning, in the present study.

Keywords: Watershed, Watershed Development, Arc-GIS, LISS-III Image, DEM, drainage map, Flow Accumulation Map, Malshiras Region.

1. INTRODUCTION

1.1 General:

With the beginning of a new millennium, humankind faces environmental challenges greater in magnitude than ever before because the scale of the problem is shifting from local to regional and even to global levels.

A watershed is a geo-hydrological unit, which drains at a common point. Rain on the mountains starts flowing down into small rivulets. Many of them, as they come down, join to form small streams. The small streams form bigger streams; and finally the bigger streams join to form a nallah to drain out excess water from a village in the form of Watershed is a region (or area) delineated with a well-defined topographic boundary and outlets. It is a region within which Hydrological conditions such that water becomes concentrated within a particular location, for example, a river or a water reservoir, by which the watershed is drained.

A watershed is made up of its physical and hydrological natural resources as human resources.

Therefore, watershed management is the process of guiding and organizing land use and use of other resources in the watershed to provide desired goods and services without adversely affecting soil and water resources. Embedded in this concept is the recognition of this concept is the recognition of the inter-relationships among land use, soil and the linkages between uplands and downstream areas.

Water budgeting equation as follow:

\[ \text{Total precipitation} = (\text{Runoff} + \text{Evaporation} + \text{Stored water on ground} + \text{Infiltration} + \text{Soil moisture} + \text{Recharge}) \]

Fig. 1: Watershed Management
1.3 Objectives:

1. To decide dimensions of proposed water and soil conservation structures.
2. To check watershed in rural area to increase availability of water for agriculture and other purpose.
3. To calculate storage capacity of watershed.
4. To analyze and recharging water level of ground water table.
5. Developing accuracy with the help of 3D modeling of GIS and Remote sensing to analyze and develop watersheds and ground water table.
6. To decrease rate of waterborne disease.
7. To analyze efficiency and de-efficiency of water with the help of population census.

2. PROBLEM STATEMENT

India is affected with unevenness of weathering conditions. Every state and region of nation has different topographical conditions, due to this the rate of rainfall and its intensities are different within every region.

In past few years in Maharashtra most of the region are facing drought due to uncertainty of rainfall. To overcome from this issue there is need to implement the effective method to increase the ground water table and natural resources of water.

3. METHODOLOGY

1. Site Selection
2. Pre field Work
3. Field Investigation
4. Laboratory Work
5. Result and Discussion

4. CONCLUSION

Difference between the amount of rain water and demand of water for various purpose is high, whether there is low or heavy rainfall.

Same issue occurs in other countries also, as we studied in paper presented on sub-Saharan Africa region across Mali.

By proper analysis, management and development of watershed by using advance techniques like GIS and Remote sensing, which gives higher accuracy. We overcome on sever issues like chronic drought and deficiency within population and water resources.

5. FUTURE SCOPE

By developing watershed in proposed selected region, it will improve Socio-Economical condition of local farmers.

Also at the appropriate location water and soil conservation structure suggested, which gives benefit to local farmer.

Ground water level in various micro-watersheds can increase through proper management & by constructing various water and soil conservation structures.

To understand the differential recharge condition in watershed, use of GIS and remote sensing gives higher accuracy in proposed region.

REFERENCES


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