APPLICAION OF GIS AND REMOTE SENSING TECHNIQUES FOR WATER RESOURCE MANGEMENT

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ABSTRACT

APPLICAION OF GIS AND REMOTE SENSING TECHNIQUES FOR WATER RESOURCE MANGEMENT Water is one of the natural element which makes life possible on Earth but today's over exploitation of water is one of the major problem in the developing country like India. Population pressure, urban development and industrialization are main source. The field of water resource management is highly dependent on spatially distributed data. GIS (Geographical Information System) and Remote Sensing techniques are effectively used to replace complement and supplement data collection in various facts of different kinds of water resources projects. It has obvious economic, environmental and social benefits. Dr. Naveen Kumar Anjali Meena** (PDF Scholar) (Research Scholar) Department of Geography Department of Geography J.N.V University J.N.V University Jodhpur (Rajasthan) Jodhpur (Rajasthan) drnaveenkumar81@rediffmail.com 09414135931 D.O.B.:- 16/06/1981 SECTION: - Humanities (Geography)*

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INTRODUCTION

One of the underlying principles of watershed management is the recognition of the interrelationships among land use, soil, and water, and the linkages between uplands and downstream areas Watershed management has always required synthesizing a vast array of spatial information to assess downstream impacts. Moreover, it is important to know not only the percent of a given land use, but also its distribution in a watershed. For example, runoff and sediment from a dirt road has a greater probability of reaching a stream channel if the road is located in a flood plain rather than on a ridge top. the past, obtaining spatial information has been time consuming and difficult. As a result, many of our watershed assessment methods and are predicated on only general information regarding the spatial characteristics of our watersheds. However, even the relatively simple task of manually overlaying land use and soil maps, delineating the watershed and soil/land use boundaries, and then finding their with a plan meter could take a watershed manager days, if not weeks, to accomplish for a complex watershed. Using conventional means, the time it takes to perform such analyses at regular intervals to assess the effects of dynamic land use is prohibitive. The revolution currently occurring in the field of information technology is changing the profession of watershed management. New tools such as Global Positioning Systems (GPS) and Remote Sensing are being developed to inventory and monitor watershed characteristics. Geographic Information Systems (GIS) have the power to collect, store, analyze and display geo-referenced information. Maps have always been one of the principal tools of a watershed manager and these computerized maps are becoming one of the most important tools in watershed management. In turn, GIS are being linked to simulation models and decision support systems. This change is fueled by rapid expansion in the computer industry that is providing technology capable of delivering, storing, and analyzing vast quantities of information.

In theory, given a suite of sophisticated research tools, solving the aforementioned Curve Number of problems should now be simple and quick. Unfortunately, that is usually not the case. The spatial (GIS) data for soils and land use first must be gathered and entered into the computer, models redesigned and encoded to efficiently use the new

information, and watershed managers trained to use the new technology. This investment in developing new processes is essentially an up-front cost that will diminish and pay large dividends as techniques are developed and improved. The profession of watershed management has already embarked on this process. Databases are being developed and spatial data is becoming readily available through the Internet. Models and Decision Support Systems (DSS) that can utilize the spatial information are becoming available at a rapid rate. Emerging tools and technologies hold great promise for improving the understanding of ecosystem process and revolutionizing watershed management the tool and technologies include:

- Improved remote sensing platforms
- GPS
- GIS
- The internet

Here an attempt has been made how to apply the resent Geo-technologies to extend the prospects of watershed management.

HYPOTHESIS

1. Water management will improve the ecosystem.
2. Water management may increases the underground water level of study area.
3. Emerging tools and technologies may induce the new ways to explicate the problems.
4. It help to formulate guidelines for the next generation of watershed management development
5. Improving the management of land and water, and their interactions and externalities.
6. Increasing the intensity and productivity of resource use in the upland area with the objective of reducing poverty and improving livelihoods.
7. The excessive use of agriculture inputs contributes in contamination of ground and surface water.
8. New tools such as Global Positioning System (GPS) and Remote sensing are being developed to inventory and monitor watershed characteristics.
9. Research tools may solve the problem of study area in simple and quick way.

METHODOLOGY

1. Maps have always been one of the principal tools of a watershed manager these computerized maps are becoming one of the most important tools in watershed management in turns, GIS are being linked to simulation models and decision support system.
2. To pursue the research both primary and secondary data will be collected.
3. On the basis of result, present and future scenario of water management in study area will be projected more affectively.
4. Survey of some related area will be conducted to understand the problems of water management.
5. A questionnaire will be prepared and queries will be filled up with help of related people and authorities.
6. Emerging tools and technologies hold great promise for improving the scientific understanding of watershed processes and are already revolutionizing watershed research.

HINDRANCES IN WATERSHED DEVLOPMENT PROGRAMME

There are many natural and man made situations, which affect the normal process of development .the main among them are as under:

1. Lack of awareness due to illiteracy.
2. Lack of participation and and local politics.
3. Difficult geographical boundary, difficult accessibility.
4. Sensitive environment.
5. Lack of technical knowledge and suitable human capacity.
6. Lack of correct information and statistics.
7. Lack of funds

Data Acquisition

By definition, watershed and landscape processes are spatially distributed, and a host of surface characteristics dictate hydrological responses to landscape change. Assessment and modeling techniques must therefore account for the spatial variability of important variables, including soil, vegetation, management, topographic geologic and hydrologic characteristics. Determining the precise boundary of these and other characteristics is critical, yet a daunting proposition. Mapping techniques relying on surface travel and surveying equipment are tedious, locally intensive but non-continuous, and relatively inaccurate. Advances in the spatial characterization of the earth, specifically the advent of remote sensing and global positioning systems (GPS), allow for the rapid and precise assessment and mapping of spatially distributed surface properties.

Remote Sensing and Geographic Information Systems (GIS)

Remote Sensing means getting information regarding any place located at a distance using artificial satellites and space skills. This is an advanced technique, which gives information regarding changes occurring on the earth from time to time. Electro-Magnetic energy obtained from sun or auto-abandonment is used as a source in it. Transmission of this energy into the atmosphere is caused on the ground as a source through absorption or expansion Reflection and abandonment of electro-magnetic energy from the ground is important for getting information from the earth. They cause interaction, which transmits energy from the earth to remote sensors. The remote sensors located in satellites, collect different types of information and send it to receiving stations on the earth, which is used after digital image processing. The resolution of remote sensors is the most important fact in this technique. For example, the resolution of remote sensors LISS III of Indian Satellite IRSIC is 23.5 metre whereas the resolution of Panchromatic (pan) is 5.8 metre.

There are three types of platforms in the remote sensing technique. Platform is a rectangular position of the camera which obtains information regarding the target. According to height, they are of three types. These are:

1. Ground Borne
2. Air Borne
3. Space Borne

Ground-borne remote sensing system is used for study of land resources for which detailed information is received with the help of space technology and satellites. Airborne technique is normally used for getting air photo picture for photo interpretation and detailed description can be obtained at any time through them. Space borne platform are generally not affected by the environment of the earth and they move independently in their orbit. Vast statistics can be obtained from them though they depend on the extension of the sphere of the satellite.

For the last 30 years, many geographers had been thinking about a system by which spatial information could be organized and stored using computer. During the last decade, this growing technique came to be known as 'Geographical Information System'. Geographical Information System is mainly a system of computer hardware and analysis and individual planning. In other words, it is an information technology which analyzes spatial and non-spatial data after its Management Technology. They include mainly computer science, cartography, information management, telecommunication, geology, photo-geometry, remote sensing etc. Geographical Information System has developed in many forms. The first publication of the word 'Geographical Information System' was made in 1965 by Michael Decy and Deven Marbel

Of Northwest University in a paper written by them. This name is related with the following techniques:

1. Automated Mapping
2. Computer-Aided Mapping
3. Computer-Aided Design
4. Computer-Aided Drafting
5. Geographical Information System
6. Geo-processing and Network Analysis
7. Land Information System

Elements of Geographical Information System

The main elements of Geographical Information System (GIS) include hardware, software, digitizers, C.D., key board, graphics, monitor, plotter and printer.

Computer Hardware:

The computer hardware has a hard disc for collection of data and programs. Digital tape cassette, C.D.Rom etc., are also parts. Scanner digitizer is used for converting maps and data in digital form. Plotter or printer is used for demonstrating the result.

GIS Software:

Geographical Information System is divided in five function classes. They are:

1. Presentation and verification of data.
2. Storage and management of data.
3. Exit and presentation of data.
4. Transfer of data.
5. Interaction with user.

Utility of Geographical Information System and Remote Sensing

Use of Geographical Information System and Remote Sensing is possible in the following areas:

1. Agricultural development
2. Land valuation analysis
3. Study of changed reflection capacity of vegetative regions
4. Analysis of deforestation and environment crisis.
5. Supervision of vegetative health.
6. Management of land degradation.
7. Estimation of area of crops and production8.Mapping of waste lands.
9. Soil Resource Mapping.
10. Groundwater probability Mapping.
11. Discovery of geological minerals.
12. Supervision of forest fire.
13. Supervision of Oceanic products.
14. Water Resources Management etc.

Geographical Information System and Remote Sensing technique has performed an important role in water resources management since suitable and sufficient quantity of information can be obtained from satellite. The following aspects of water resources management can be studied with the help of Geographical Information System and Remote Sensing:

1. Survey and search of surface water.
2. Hydrological studies.
3. Watershed conservation, planning and management.
4. Management of flood affected areas.
5. Water management in irrigated areas
6. Groundwater management.

Conclusions

Emerging technologies like GPS and GIS hold the promise of making research and management tasks easier and provide capabilities previously unknown. New modeling systems will allow us to ask spatial explicit questions, such as what effect will a buffer have downstream water quality. However, using the new technology does not remove the need of having clear objectives and then determine at what level the new technology will be used.

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