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USING OF REMOTE SENSING APPLICATIONS IN LAND USE AND LAND COVER STUDIES FOR GROUND WATER EXPLORATION

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ABSTRACT

The land use and land cover of an area gives excellent idea about the occurrence of ground water in that area in that area. Land use and land cover information is the basic requisite for land , water and vegetation resoures utilization, conservation and management in other sense landuse is referred to man's activities on land, in other words the purpose for which land is used, while "land cover" is referred to "natural vegetation, waterbodies ,rock/soil/artificial cover and other features noticed on the land. a sudden change in land use and land cover maybe indicative of change in hydrogeological conditions.

KEY WORD: *land use, land cover, resources, vegetation, artificial cover, management sudden change.*

INTRODUCTION

Remote sensing data is an important and effective tool for hydro morphogeological and hydrogeological zonations, which will be highly depending up on the physical,geological,hydrogeological andgeomotphological characteristics for ground water exploration.therefore,studies have been carried out using remote sensing technique for hydromorphogeological investigation. In study area ,the remote sensing has been effectively used an tool to delineate hydromorphological features using standard remote sensing interretation techniques.

Lineaments are found to have an impact on the groundwater occurrence and ground water table configuration and fluctions. The influence of high density lineament is prominent on the wells in the plain areas.

The Low density lineaments are associated with moderately deep and deep wells with poor ground water occurrence .The observations on lineament show a good relation between ground water occurrence and lineaments pattern and this aspect can better utilized in ground water exploration in the study area.

The overall objectives:

Land use/land cover information is the basic requisite for land , water and vegetation resoures utilization, conservaton and management. Land use describes how a piece of land used(for agriculture or industry),where as land cover describes the materials such as vegetation, rocks or buildinds that are present on the surface

THE NEED OF STUDY:

The term lineament has been used with different meaning. Lineament is a simple or composite linear feature of surface, whose parts are aliged in a rectilinear of slightiy curvilinear relationship and which differ distinctly from the patterns of adjacent features and presumably reflect a subsurface phenomena. In the study area a number of lineament has different trend and lengths.

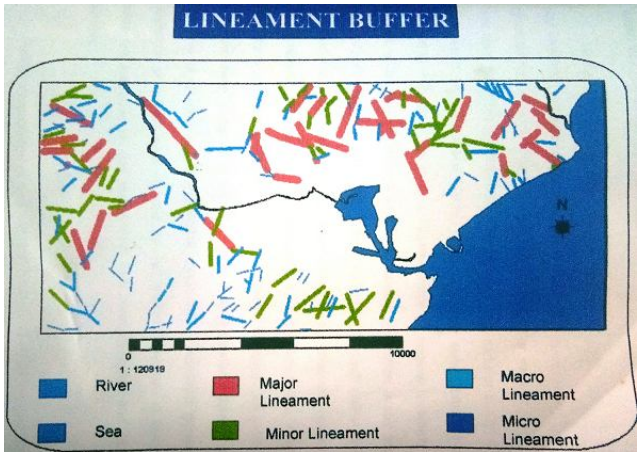
Lianeaments play an important role in the development of groundwater regime. They create the secondary porosity and the weak zones help in the precipitation to percolate downwards to aquifer. In hard rock terrain these lineaments create the opening which increase the permeability of the rocr, which forms a trap for groundwater to form an aquifer. Therefore, in any study related to groundwater or surface water ,delineation of lineaments are very important.

LINEAMENTS CHARACTERSTICS:

a)another important observation is that the lineaments are extendeinto piedment zones of both the hill ranges consequently become higher potential zones for the residential zones.occurrence of lineaments in central portion of the city are very less and hence the groundwater potentials in the central portion of the city is low.basing on lengh and sread of lineaments and the groundwater potentials and aquifer.these are classified into classes as shown below

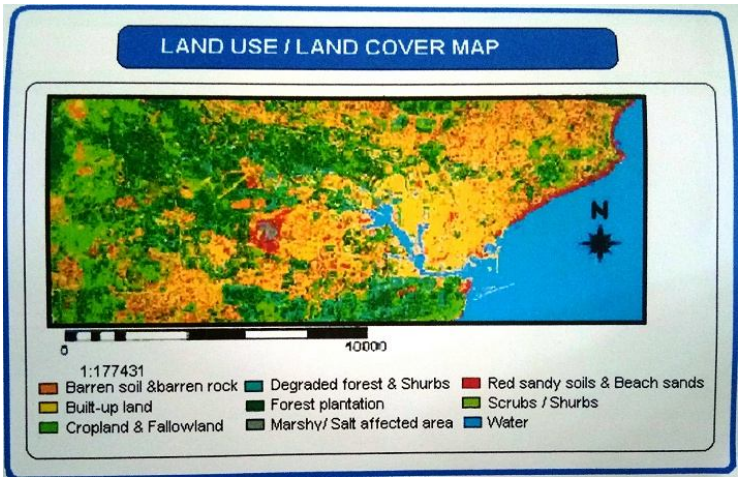
1. major lineaments(buffer-125mts)
2. minor lineaments(buffer-75mts)
3. macro lineaments(buffer-50mts)
4. micro lineaments(buffer-25mts)

To establish the zones of influence along these lineaments buffer are create using operation distance and slicing. Along lineaments a buffer zone of 25m, 50m, 75m, 125m has been created in these zone which is shown in



Land use/land cover classification(NARA)

This classification is a



Interpretation of remote sensing data for landuse/land cover mapping can be carried out by two different methods
1.visual interpretation
2digital image processing

Inin visual interpretation, an interpreter uses tone, texture,shape,size,pattern, shadow,site,association and resolution of the imagery etc., to extract information about land use activities .besides that these are three major factors, which are governing the interpretability of an interpreter
1 the visual and mental activity of the interpreter
2the equipment and techniques of interpretation
3the interpretation keys, guide, manual and other aids used

The classification scheme with special reference to utilization of remote sensing data for landuse classification was originally by Anderson (1971-76),modified to suit the requirement of the country by and narayan (1982)who suggested a landuse/landcover classification which is now generally accepted and adopted by the remote sensing interpreters in india.

Land cover change detection is necessary for updating land cover maps and the management of natural resoures. The change is usually detected by comparison between two multi date images, or sometimes between an old map and an updated remote sensing image. the method of change detection into two component image.
The
1 comparison between two land cover maps which are indepently produced
2 change enhancement by integrating two images into a principal component

The size or area of watershed is an important parameter in determining the peak rate of runoff. This peak rate of runoff calculated plays an important role in designing control measures.

s no	Drainagpe area	unit
1	>1 lakh	Catchment
2	40,000-1,00,000	Sub-catchment
3	4,000-40,000	Watershed
4	2,000-4,000	Sub-watershed
5	400-2,000	Mini watershed
6	< 400	Micro watershed

a) Shape:

Shape is another key factor which is affecting land use land cover. Long and narrow watersheds are likely to have more time of concentration resulting in lower runoff rates than more square shaped watersheds of same size, the time of concentration which affected by shape of watershed is an influencing factor is determining the infiltration of water in to soils.

b) Slope :

Slope has major implications for the land use. The speed and extent of land use depend upon the slope of land. The slope of land adversely affects the velocity of flow, which is a very important criterion for the soil erosion. When velocity increased the erosion capacity almost increased four times.

Slope is calculated in % by the mathematical formula

Slope = MN/A * 100

M= total length of contour

N=contour interval
A=area of watershed

c) Drainage density and pattern:

Drainage density effects runoff patterns. It is the ratio of total length to catchment areas. The pattern refers to design of streams courses and there tributaries. It influenced by slope, litho logy and structure. Drainage patterns acts like guidelines to locate vulnerable areas requiring different kinds of soil conservation techniques.

d) soil and geology :

The soil and geology of land use land cover determines the amount of water which will percolate and the soil erosion is also very much affected by them. The soil characteristics play important role in silt calculations.

e) land use :

The land in watershed affects the rate of runoff infiltration and types and qualities of vegetative cover. The vegetative cover influence runoff, infiltration, sediment production and rates of evapotranspiration.

f) Precipitation :

The amount and nature of precipitation is the most important factor which will determine what happens in watershed, evenly distributed rainfall, and has different impact than sudden sharp rainfall.

GROUND WATER DETERIORATION

Ground water deterioration takes place due uncontrolled, UN planned. Unscientific land use of people surrounding it. This deterioration may cause due to different factors or combination of different factors. The different causes are given below

1. Agriculture

Cultivation on sloping land without adequate precautions cultivation of erosion permitting crops, over-cropping area without replenishing soil fertility are the main causes of deterioration ground water.

2. Forest lands:

Clear felling on steep slopes, drastic thinning of plantation along the slopes, faulty logging, cutting of forests along the slopes are also the important factors contributing ground water deterioration.

3. shifting cultivation :

Shifting cultivation destroys protective and productive vegetation in preference for brief period of immediate crop production results in soil loss and other consequential damages to watersheds.

4. Human activities :

Human activities like unscientific mining and quarrying can cause considerable damage to landscape there by causing damage to ground deterioration. Sometimes bad alignment of roads can cause of lot of dislocation of life in watershed located especially in hilly areas.

The success of planning for developmental activities depends on the quality and quantity of information system available. These systems must be capable of handling vast amount of data collected by modern techniques and produce up to date information. Remote sensing data is available on both natural and socio economic resources such as crop land use such as crop, land use, soils, forests etc on regular basis. On the other new geographic information system (GIS) are the latest tools used to store retrieve and analyze

different types of data for management of natural resources. RS facilitates systematic handling of data to generate information in a desired format. Hence it is significant role in evolving alternate scenarios for natural resources management. The role of remote sensing data and geographical information system is rapidly increasing of area of water resources development.

One of the greatest advantages of using RS data for hydrological modeling and monitoring is its ability to generate information in spatial and temporal domain, which is very crucial for successful model analysis, prediction and validation. The GIS has the ability to manage large and complex databases. Image data have been used as a primary source of natural resources.

Information in thematic mapping which in turn is utilized in various hydrological studies. The remote sensing data provides synoptic view of a fairly large area in the narrow and discrete bands of the electromagnetic spectrum at regular intervals. The space borne multi spectral data enable generating timely, reliable and cost effective information on various natural resources, namely surface water, ground water, land use/cover, soil, forest cover and environmental hazards, namely water logging, salinity, alkalinity, soil erosion by water etc. For many hydrological purposes, remote sensing data alone are not sufficient and need to be merged with data from other sources. Hence a multitude of spatially related data concerning i.e. geographic data concerning topography, rainfall, vegetation, evaporation, geomorphology and soils erosion by water etc. For many hydrological purposes remote sensing data alone are not sufficient and need to be merged with data from other sources. Also of interest are social and economic data related to where the demand is for water urban and industrial supplies, irrigation. Etc. In addition technical data are required, such as locations and types of tube wells, rain, and river gauges, etc. RS provides an extremely useful technology for considering the interaction between spatially distributed resources.

Applications of remote sensing and in land use and land cover

Remote sensing has emerged as power full tools in planning land use. As well as management of water resources of using more technologies various land use and land cover of the watershed can be easily mapped in addition to change in river morphology. Land use and land cover can easily seen and information can be updated using temporal satellite data. remote sensing unique technology and widened the spectrum of remote sensing applications in natural resource management and more importantly in land use and land cover. Remote sensing has now become a powerful for ground exploration. Various aspects associated with watershed management like land use/ land cover mapping, runoff estimation, soil erosion study, and site suitability analysis for rain water harvesting, watershed prioritization etc. can be effectively carried out using these remote sensing and GIS techniques. Further high resolution remote sensing data like PAN, IKNOS&TES can be used to increase the accuracy of land use and land cover classification. Location of water conservation structures can also be accurately done with the help of these high resolution satellite data.

Digital Elevation Model (DEM) provides perspective view of water exploration. Taking DEM as input can create slope and aspect map. With known values of slope and aspects different water conservation practices can be proposed. Water harvesting structures can be easily located overlying drainage map, over DEM using slope and land use information.

The remote sensing data is operationally being utilized for mapping various resources. The need is to step ahead to words integrating these resource maps with other resource information other organizing integrated spatial and non spatial data base utilizing in GIS tools in systematic manner. The spatial data consists of maps from remotely sensed data and also conventional source have to be input organized on standard cartographic reference.

Significance of RS improves mainly in the areas of:

- Data acquisition and pre processing of land use and land cover.
- Multiplication of data of availability of ground water occurrence

It offers efficient tools for handling both the data sets also allows for both spatial data base organization and non spatial data base organizations, mainly as spatial attributes of spatial elements. It also performs integrated analyses and transformation for obtaining required information.

Remote sensing technology is useful in identifying, locating and ultimately in mapping of soil with greater precession remote sensing.

CONCULSION:

This paper gives brief about RS&GIS techniques provides up to date and continuous information about the land use and landcover areas for evolution of its hydrologic response. Assessment of development plans helps for formulating various methods to achieving the functioning of water exploring improvement techniques it caters the information needed by the rural areas to identify the vulnerable conditions of ground water conditions through this applications they are implemented.

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