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SEASONAL MONITORING OF WATER FEATURES USING REMOTE SENSING TECHNIQUES: A CASE STUDY OF MADURAI ENVIRON

Suja Rose RS, Ilangovan P and Krishnan N

A systematic, accurate and up-to-date assessment of hydrological system and its monitoring is an urgent need for water resources management and other developmental plans. Assessment, development and management of water resources are a major issue, which attracts the attention of both the scientific and farming communities. Most traditional means of monitoring the earth's water depend on measurements made at specific points or collection of samples from discrete locations. Remote sensing provides a valuable perspective concerning broad scale, dynamic patterns that can be difficult to examine in detail using only point measurements. They can provide valuable field data by revealing broad scale patterns not recognisable at the surface, recording changes over time, and providing data for inaccessible regions. Remote sensing provides a straight forward, reliable and timely information to map the extent of water bodies, and to monitor changes in surface water bodies' overtime. With the help of large-scale topographical maps, aerial photographs and satellite imageries, it is possible to conduct water resource inventory. An attempt has been made to demonstrate how satellite images can be used in the identification of water features and to map the water spread area during various seasons. In Madurai district, flow in the rivers and filling up of tanks and reservoirs is seasonal and surface water flow can be seen only during monsoon season. Based on this, the study has been taken in six firkas located in the southeast zone of Madurai environ, where agricultural activities are dominant.

TEMPORAL CHANGE DETECTION OF ASHTAMUDI WETLANDS IN KOLLAM DISTRICT USING REMOTE SENSING AND GIS

Suresh Francis, Jane Mithra S, Anil Kumar NC, Suresh P, Ramesh Kumar B and Bindu P Raman Kutty

Wetlands of Kerala comprise estuaries, mangroves, coastal lagoons, freshwater lakes etc. Wetlands serve a wide variety of functions including flood control, water purification, shoreline stabilisation, hydrological cycle control among other functions. However, wetlands of Kerala are facing severe threat mainly on account of unscientific development activity. Ashtamudi wetland, the second largest estuarine system in the State is facing severe threat both in terms of quality and quantity. Continuous monitoring of this system is an urgent need accounting for scientific management, for which, remote sensing is an effective tool. Multidate data analysis in GIS environment shows drastic decrease in the areal extent of wetland to the tune of 1.5km^2 area. The estuarine system is found to be highly silted, siltation being more in Thekkumbhagam, Kuzhippuzha, Kadachira and Padappakkara regions. A drastic decrease in the size of channel islands is noted which can cause dynamic changes in the estuarine system.

REMOTE SENSING AND GIS APPLICATION FOR WET LAND ECOSYSTEM STUDIES: A CASE STUDY OF SASTHAMKOTTAH LAKE, KOLLAM DISTRICT

Anil Kumar NC, Jane Mithra S, Suresh Francis, Suresh P, Ramesh Kumar B and Bindu P Raman Kutty

Wetland ecosystems is the most productive ecosystem constantly affected by human intervention. They also provide unique habitats for a wide variety of flora and fauna. India, by virtue of its extensive geographical stretch, varied terrain and climatic conditions holds a rich biodiversity of inland and coastal wetlands. The Sasthamkottah lake is one of the most important freshwater ecosystems which is now notified in the Ramsar site for protection and conservation. Remote sensing is an advanced tool to monitor natural resources and the integration of remote sensing in GIS platform provides useful information for scientific management of these resources. This study is to identify the changes in the Sasthamkottah lake over the last thirty five years using multidate remote sensing and other data. The study shows a 20% decrease in the water spread area as a whole. Notable shrinkage is identified in the upper portions of the lake. The shrinkage is attributed to siltation, encroachments and unscientific landuse practices.

MAPPING AND LANDUSE CLASSIFICATION FOR THE PART OF PUSHKAR VALLEY MICROSHED, RAJASTHAN: A REMOTE SENSING APPROACH

Palria S and Rajesh Singh

Remote sensing technology using satellite data and image have to be an indispensable tool, known to provide valuable and up to date spatial information on natural resources and physical terrain parameter of an area. For optimum utilisation of natural resources on any area, watershed development approach is considered most ideal as it help in maintaining the ecological balance. Watershed is considered as an ideal unit for analysis and management of natural resources base and development planning spatially in hills. Continuous exploitation of natural resources with little or inadequate management leads to land degradation and lower productivity levels. Sustainable development of region would require utilisation of natural resources in an optimal manner. Integrated approach using remote sensing and GIS provides cost effective support in resources inventory including landuse mapping, comprehensive database for resources assessment, analytical tool for decision making and impact assessment for plan evaluation.

Pushkar valley drained by the Luni river basin and having one of the striking features of Aravalli range, which represent a zone of confluence between northwest arid and southeast agro climatic region were taken for the present study. The methodology adopted for the present study involved visual/digital interpretation of IRS-IC LISS-III+PAN data of March, 2003 on 1:50000 scale. The mapping and landuse classification of Pushkar micro shed were carried out and results of the study are presented in the paper.

LANDUSE/LANDCOVER MAPPING IN THE COASTAL AREA OF NORTH KARNATAKA USING REMOTELY SENSED DATA

Shamsudheen M, Dasog GS and Tejaswini NB

A comprehensive information on the spatial distribution of landuse/landcover categories is a prerequisite for planning, utilisation and management of land resources. It is gaining more importance in the coastal areas where the pressure on available land resources is increasing. Remote sensing techniques have been proved to be of immense value for preparing accurate landuse/landcover maps. Remote sensing tool can be effectively utilised for mapping of natural resources. A study has been undertaken to map the status of different landuse/landcover pattern of Kumta taluk of Uttara Kannada district, Karnataka. It is one of the coastal taluks of Karnataka and is representative of zone-10 in NARP agro-climatic classification. The study aims at classifying landcover where there are a variety of physiographic units and a part of the terrain is inaccessible. The area receives a mean annual rainfall of 3521.7mm

and a mean annual temperature is 27.6°C. The region is characterised by different geomorphologic units like fluvio-littoral formation, dissected hilly hinterland, laterite capped plateaus and hills. Indian Remote Sensing satellite data (IRS 1D LISS III) of January 2003 was used for the study. Digital data were georeferenced, mosaiced and the subset image of Kumta taluk was prepared using ERDAS Imagine 8.4. Ground control points representing different categories of land were collected. A supervised classification was run to classify different land resources in the area. Based on the data different landuse/landcover patterns were interpreted. The study revealed that forests occupy about 29.4% of the total geographical area of the taluk, mostly on hills, escarpments, plateaus and narrow valleys. Both agricultural and horticultural crops together cover an area 9.2%, generally on coastal and alluvial plains. Major landuse in the study area was forest plantation crops covering an area of 21% of the total geographical area of the taluk. In the *Rabi* season, pulses formed the second important crop, raised on residual moisture. Other categories found in the study area are fallow lands that were cropped to paddy during *Kharif*, wastelands, laterite capped mesas and water bodies. Overall accuracy of the supervised classification was 75%. Landuse classification has in all 23 classes and 19 classes have the producer and user accuracy more than 80%.

AN INTEGRATED APPROACH USING HIGH RESOLUTION REMOTE SENSING AND GIS FOR OBSERVING REAL TIME CHANGES IN THE COASTAL LANDFORM: A TOOL FOR MICROLEVEL RESOURCE INVENTORY

John Paul, Raju D and Aneesh Raj

Remote sensing techniques can provide valuable information on the dynamic natural resources of the coastal zone. The IRS 1C PAN digital images in conjunction with conventional cadastral maps on 1:4000 scale were utilised to monitor dynamic environmental changes related to the growth of a spit north of Kochi inlet in Elankunnapuzha panchayat. Physical assets plotted with reference to plot boundaries of the cadastral maps and the landuse/landform characteristics, which are resultant to different geomorphic processes, were derived from IRS PAN Image. These features were ground checked and superposed using GIS. The integration resulted in preparation of an updated cadastral map for Puthuvypeen village in Elankunnapuzha panchayat.

The study revealed accretion and formation of wide beach north of the Kochi inlet. Presence of 3 sets of seawalls situated at distances 400-500m shoreward from the present shoreline was located. Elongation of the spit by littoral processes and the stabilisation of the beach material north of the inlet resulted in a significant propagation of mangrove vegetation along the banks of the Puthuypeen thodu. Further, these maps have helped in reorienting the Coastal Regulation Zone of Puthuvypeen village, in accordance to the changes in the sensitive ecology.

APPLICATION OF IRS DATA FOR LANDFORM AND LANDUSE INVESTIGATIONS IN PURVI NAYYAR RIVER WATERSHED OF WESTERN HIMALAYAS

Martin D, Mahapatra SK, Singh SP, Jagat Ram and Dhankar RP

IRS 1D, LISS III data was used to study land resource inventory and also to compare with inventory conducted earlier by using conventional method. Based on the image characteristics and their pattern landforms of the study area was delineated into major units such as, summits/ridge tops, side/reposed slopes, valleys and escarpments. They were further divided into eight physiographic units based on the association and combination of their image characteristics. Whereas, conventional method resulted in delineating only two physiographies namely, steep to very steep hill slopes and moderately steep to very steep hill slopes in the same study area. Soil survey data incorporated with image characteristics resulted in identifying nine soil series in different physiographic units, whereas, conventional method resulted in six soil series in two physiographic units. The study revealed that by using IRS data physiographic boundaries could be delineated more accurately over conventional method and the information extracted from FCC could be extrapolated to inaccessible areas with similar image characteristics. It could also be made possible to identify the areas with differences in geology as clearly reflected in their image characteristics.

Geosciences

AN APPROACH TO EVALUATE GROUNDWATER POTENTIAL OF MARIHAN BLOCK, MIRZAPUR DISTRICT (UP), INDIA THROUGH INTEGRATION OF REMOTE SENSING, GEOPHYSICAL AND GIS TECHNIQUES

Amaresh Kr Singh and Ravi Prakash S

Conventional approach groundwater investigation are ground based surveys and exploratory drilling, which are time consuming and expensive. Keeping this in view, the present study attempts to demarcate and evaluate groundwater potential zones in hard rock areas using an integrated approach of remote sensing, geophysical methods and GIS techniques. The study area is the Marihan block of Mirzapur district, Uttar Pradesh, India. Comprising of upper Vindhyan formations consisting of sandstone, quartzite and shale, the area is geologically complicated for groundwater exploration. In view of the above, the said area has been selected for the study.

Hydrogeomorphological and lineament maps have been prepared using IRS 1C LISS-III data by visual interpretation. Topographic information has been collected from SOI toposheet at 1:50000 scale. TIN has been generated from elevation contours at 20m interval and spot elevation. Slope map has been generated from TIN. Surface drainage map has also been prepared from SOI toposheet and modified with satellite data on 1:50000 scale. Hydrogeomorphologically, the area divides into valley fill (VF), shallow weathered buried pediplain (BPP-S), pediment on plateau P(PT) and dissected plateau (DPT) categories. The drainage pattern is mainly dendritic but locally exhibits structural control.

Surface electrical resistivity surveys were conducted at 143 sites to collect subsurface lithological information, identification of horizontal and vertical disposition of aquifer system and for pin pointing suitable sites for drilling. The geo-electrical layer parameters of drilled sites were correlated with the lithological data to infer the subsurface lithology at other sounding locations. Overburden thickness and aquifer layer thickness maps have been prepared through GIS techniques using geo-electrical and drilling data.

To prepare a realistic ground water potentiality map of the area, the relevant layers i.e. hydrogeomorphology, lineament, slope, overburden thickness and aquifer thickness were integrated in ArcInfo grid environment. Criteria for GIS analysis have been defined on the basis of ground water conditions and appropriate weightage has been assigned to each information layer according to relative contribution towards the desired output. The ground water potential zone map generated through this model was verified