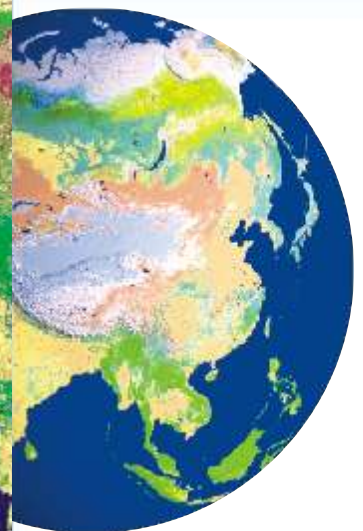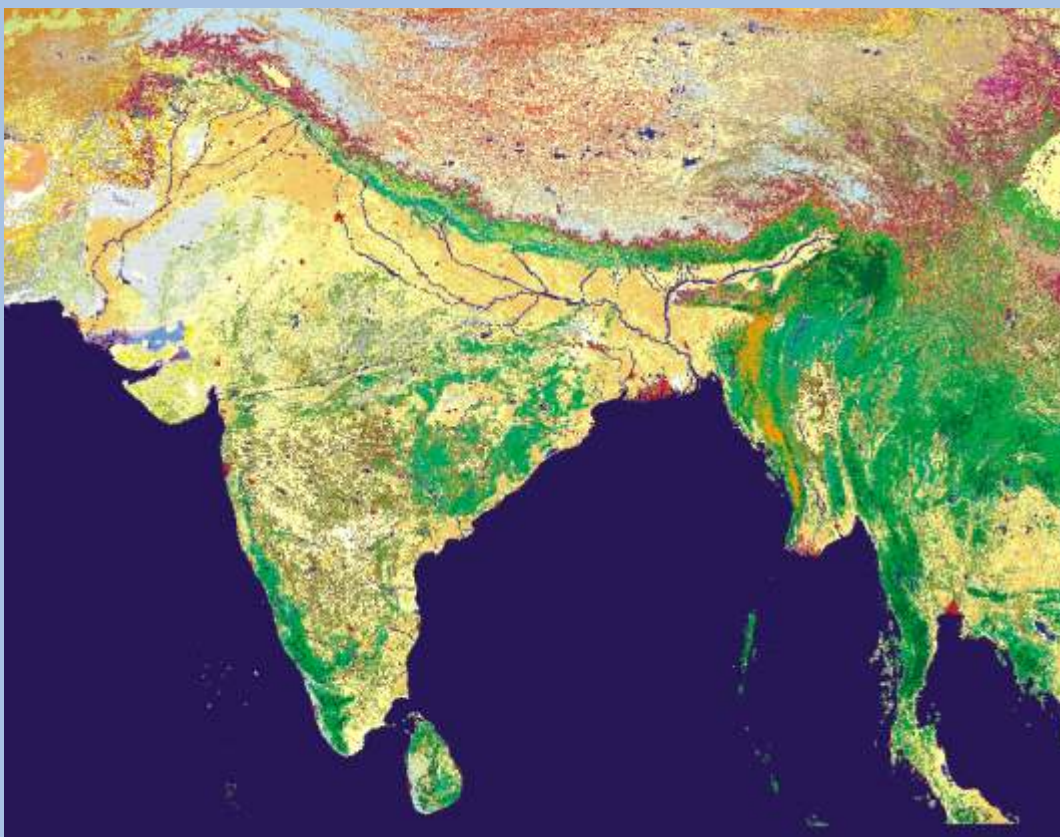# PILOT PROJECT ABSTRACT

Remote Sensing and Geographic Information System (RS & GIS)
PG Course (Phase-I)

Development of Spatial Decision Support System for optimum location of additional village amenities

Mr. Iftikhar Uddin Sikder
Bangladesh

Supervisors
Dr. K.P. Sharma, RRSSC-D,
Dr. A.P. Subudhi, HUSAG
Dr. P.S. Roy, FED
IIRS, Dehradun, India

The study intended to develop a Spatial Decision Support System (SDSS) to aid decision makers to plan in spatial context, especially with respect to village ammenities. Various parameters like human settlement, service population, distance factor of the farthest settlement from any of the service cantre were used as indicators to derive at the optimum location of amenities. Emphasis was laid on location of hospitals. The System offers a menu based interface for the prospective planner.

Development of Spatial Decision Support System for optimum location of additional village amenities

Ms. Nagma Yasmin
Bangladesh

Supervisor
Mr. R.C. Lakhera, GSD
IIRS, Dehradun, India

The optimal location of secondary schools with respect to parameters like human settlements, service population, distance factor and amenities is one of the primary functions of management. Using GIS techniques, this study was taken up on a test site so emulated elsewhere.

Satellite remote sensing and GIS for studying Alpine pasture of North Western Himalayas

Ms. Jiang Yulin
China

Supervisors
Dr. P.S. Roy, FED,
Dr. M.C. Porwal, FED
IIRS, Dehradun, India

On the high elevation lands of Himalayas, it is critical to have grazing systems for traditionally migrating populations of goats and sheep. Estimation of the biomass of these grazing lands is a challenging task. An NDVI based regression model was developed to study the carrying capacity of high altitude pastures. The possible impact on pasture due to landuse change during 30 years is being analyzed as well.

Optimum land use planning by Remote Sensing & GIS techniques

Supervisors

Mr. Jo IL Gwang
DPR Korea

Mr. L.M. Pande, ASD,
Dr. Jitendra Prasad, ASD
IIRS, Dehradun, India

Using multisspectral data, it was attempted to prepare thematic maps of a region. Further, land evaluation was made using standard techniques to assist in an optimum landuse planning and land utilization scheme for the region.

Watershed prioritization using remote sensing, GIS and AGNPS model

Supervisor

Mr. Hong Yong IL
DPR Korea

Mr. P.L.N. Raju, GID
IIRS, Dehradun, India

Using multispectral remote sensing data & topographic maps, estimating of runoff and soil loss were attempted. In doing so, a prioritization model was used and the spatial criticality of soil loss was studied.

Geo-information database for an existing water availability to an urban centre

Supervisors

Mr. Pondari Satyanarayana
India

Mr. A.K. Chaklraborthy, WRD,
Mr. V. Hari Prasad, WRD
IIRS, Dehradun, India

The study aimed to create an geo-information database for water supply to urban centre through the use of satellite and related data. A watershed based contribility to the city was studied and its adequacy was examined to estimate prospective sueface water and ground-water potential for future water supply to the urban centre.

Watershed prioritization and management needs using Remote Sensing and GIS techniques

Supervisor

Mr. Jagjeet Chand Sharma   Dr. Jitendra Prasad, ASD
India   IIRS, Dehradun, India

Prioritization of micro watersheds was done on the basis of estimates of spatial erosional soil loss following silt yield index model and universal soil loss equations. For the assessment of terrain conditions satellite data, topographic maps and meteorological data were used. The conservation measures could be taken up on the priority basis so that further degradation of natural resources is checked.

Decision Support System for route selection on suitability, ranking and networking analysis of rail link between Rishikesh and Dehradun

Supervisors

Ms. Ainura B. Nazarkulova   Dr. K.P. Sharma, RRSSC-D,
Kyrghyzstan   Mr. Promod Kumar, RRSSC-D
                                                                       Dehradun, India

Using the methods of terrain classification and evalution with parameters like Geomorphological, Geological and Soil information, buffer zones were defined. Finally the information was interpreted for route alignment of rail link subject to constraints specified in the zone.

Forest fire risk modelling using Remote Sensing and GIS in temperate forest

Supervisor

Ms. Narangerel Davaasuren   Dr. A.K. Tiwari, RRSSC-D
Mongolia   Dehradun, India

Remote Sensing data linked with GIS techniques were used for prioritization of fire risk zones in a forest area and analysis was done using linear model. The result is applicable in temperate countries.

Evalution of Chilla sanctuary for mountain goat habital using Remote Sensing & GIS

Ms. Sharav Munkhtuya
Mongolia

Supervisor
Dr. SPS Khushwaha, FED
IIRS, Dehradun, India

Four important factors affecting the colonization and distribution of wild animals are food availability, shelter, water and terrain characteristics. Remote Sensing data was used to delineate these parameters and assess the fragmentation and degradation of mountain goat habitat.

Crop inventory with reference to soil and terrain suitability using Remote Sensing and GIS - A case study of Eastern Doon Valley

Ms. Kyi Kyi Thet
Myanmar

Supervisor
Dr. S.K. Saha, ASD
IIRS, Dehradun, India

Paddy and sugarcane crops inventory in the form of acreage and yield was studied using IRS-1C LISS-III digital data alone and also in combination with ERS-1 SAR data. Crop inventory in relation to soil and terrain suitability of these crops, for suitable agricultural development was also investigated using GIS based integrated analysis.

Satellite Remote Sensing & GIS for developing forest resource management plan of Lachhiwala forest range, Dehradun

Mr. Nyunt Maung
Myanmar

Supervisor
Dr. Sarnam Singh, FED
IIRS, Dehradun, India

Using multi-spectral data, stratification of forest types was made while several ground parameters were also simultaneously collected. Further, GIS techniques were used to map several other ground parameter resource management plan including total volume of existing and harvestable wood stock.

Physical aspects of urban environments - A case study of Saharanpur city

Mr. Hriday Lal Koirala
Nepal

Supervisor
Mr. B. Ramesh, HUSAG
IIRS, Dehradun, India

Environmental impact study was carried out using the catchment zone for four positive parameters like school, hospital, garden and road in relation to the population and enviromentally affected zones were delineated using negative parameters like open drain, dumping site and noise population. Both the parameters were analysed in making environmental stress map.

Urban Expansion trend - A case study in Saharanpur city and its surrounding

Mr. Trilok Man Tamrakar
Nepal

Supervisor
Mr. B. Ramesh, HUSAG, IIRS
IIRS, Dehradun, India

Data obtained from topographical map, guide map and satellite remote sensing data were used to prepare digital maps for evaluation of urban growth and related loss of productive agricultural land.

Land evaluation for pasture development in eastern part of Doon valley

Mr. Khurshid Ahmad
Pakistan

Supervisor
Mr. L.M. Pande, ASD
IIRS, Dehradun, India

Physiographic soil, slope, and land use maps derived from Remote Sensing and GIS techniques were integrated to generate land suitability maps for development of pastures in the wasteland categories such as barren areas, degraded forest and scrubs.

Analysis of short term global climate change in weather using satellite data and GIS technique

Mr. Salvador G. Quirimit
Philippines

Supervisor
Dr. R. Sudarsan, MSD
IIRS, Dehradun, India

Global data obtained through the internet on sea surface temperature, water vapour and wind were used in six oceanic areas to understand the behaviour of thermal equator and related oceanographic and meteorological circulations. The work envisaged to produce monthly trends in these parameters.

Fire risk modelling : An evalution of forest fire risk in tropical country using Remote Sensing & GIS

Mr. Joseph Florano Lita
Philippines

Supervisor
Dr. A.K. Tiwari, RRSSC-D
Dehradun, India

Using terrain modelling and satellite data, fire risk zones were delineated in a forest region where the fire risk is enormous. Raster files aspect, slope, forest cover type roads and habitation and ground based observations were used for this purpose.

Identification and selection of new location for development of urban in Saharanpur city and its environs using satellite data & GIS

Mr. Sumith Kodikara
Sri Lanka

Supervisor
Mr. B Ramesh, HUSAG
IIRS, Dehradun, INDIA

Evaluation of suitability of land for future urban development was made by analysis of satellite data using several assisting parameters like slope, soil, water table, drainage and accessibility and further identification of suitability was carried out within the framework of master plam proposals.

Delineation and evaluation of ground water potential zones in the eastern part of Doon valley with the aid of Remote Sensing and GIS

Supervisor

Mr. Udaya Gamini Senarath
Sri Lanka

Mr. D.K. Jugran, GSD
IIRS, Dehradun, India

Remote Sensing data was used to delineate information on geology, geomorphology, hydrogeology and landuse to assist in delineation of ground water potential zones. Isomaps of tube well water quality parameters were also used and integrated with the thematic maps to realise the objectives.

Analysis of short term global climate change in weather using satellite data and GIS technique

Supervisors

Mr. Aroon Sankwan
Thailand

Dr. R. Sudarsan, MSD,
Dr. A.K. Mishra, MSD
IIRS, Dehradun, India

Global data obtained through the internet on sea surface temperature, water vapour and wind were used in six oceanic areas to understand the behavior of thermal equator and related oceanographic and meteorological circulations. The work envisaged to produce monthly trends in these parameters.

Mapping and monitoring of salt affected soils in Karnal, Haryana using Remote Sensing and GIS techniques

Supervisor

Ms. Ruzieva Gulbakhor
Uzbekistan

Dr. Jitender Prasad, ASD
IIRS, Dehradun

The work presents the results of a study of salt affected soils dealing with the identification, delineation using remote sensing data. Potential productivity of these soils and crop suitability were also evaluated and suitable management practices were recommended.

Application of Remote Sensing and GIS for land-hazard zonation and environmental impact assessment

Supervisor

Ms. Nguyen Thi Bich Thuoc   Mr. R.C. Lakhera, GSD
Vietnam   IIRS, Dehradun, India

Study of various terrain parameters which influence the landslide and erosion process were delineated using satellite data and correlation methods. Based on the results, landslide hazard and erosion intensity mapping were made

Digital image processing for land use/land cover mapping and monitoring

Supervisor

Mr. Do Xuan Lan   Dr. Sarnam Singh, FED
Vietnam   IIRS, Dehradun, India

Using multi-spectral multi-date RS data and digital image processing techniques like normalisation, NDVI derivation, principal component analysis, post classification comparison and image regression, lanuse/landcover changes were delineated and estimated.

Application of Remote Sensing and GIS for land-hazard zonation and environmental impact assessment

Supervisor

Mr. Tran Tuan Dung   Mr. R.C. Lakhera, GSD
Vietnam   IIRS, Dehradun, India

Study of various terrain parameters which influence the landslide and erosion process were delineated using satellite data and correlation methods. Based on the results, landslide hazard and erosion intensity mapping were made.

Optimal Land use planning by integrated use of satellite Remote Sensing and GIS technology

Mr. Sukumar Dutta
Bangladesh Space Research &
Remote Sensing Organisation (SPARRSO)
Dhaka, Bangladesh

Supervisors
Mr. L.M. Pande, ASD,
Dr. Suresh Kumar, ASD
IIRS, Dehradun, India

The study was undertaken in part of Saharanpur and Haridwar districts comprising diverse landforms with the objective of optimal landuse planning by integrated use of Remote Sensing and GIS. Land use map of Kharif and Rabi seasons were prepared by visual interpritation using temporal IRS-1C LISS III satellite data. Soil and geology map are taken as ancilliry data and digitized. The spatial and non spatial data of the required themes are stored in ILWIS version 2.1 GIS package. Cropping intensity map was generated by integration of Rabi and Kharif season map in GIS environment. Thus soil and land suitability of dominant Rabi and Kharif crops, forest and mango plantation are evaluated following FAO (1976) land evaluation approach. Optimal crop rotation was analyzed against existing cropping pattern to generate optimal landuse plan using GIS.

Crop inventory using Remote Sensing and GIS techniques

Md. Abdus Salam
Bangladesh Space Research &
Remote Sensing Organisation (SPARRSO)
Dhaka, Bangladesh

Supervisor
Dr. S.K. Saha, ASD
IIRS, Dehradun, India

This study aims to prepare Rabi (winter) crops inventory of part of Solani watershed (Parts of Saharanpur & Haridwar districts, U.P.) using IRS-1C LISS III digital data. Crop discrimination, acreage estimation and yield prediction based on yield models using satellite derived spectral vegetation indices, Leaf Area Index (LAI) and ancillary agro-meteorological data as inputs, were carried out in this study. Crop inventory in relation to soil and terrain suitability of major Rabi crops for suggesting sustainable cropping pattern of the area was also investigated using GIS based integrated analysis.

Evaluation of remotely sensed data for landslide hazard zonation using GIS techniques

Mr. M.K. Pradhan
Division of Geology & Mines
Ministry of Trade & Industry
Thimphu, Bhutan

Supervisor
Dr. P.K. Champati Ray, GSD
IIRS, Dehradun, India

The slope failure and mass-movement processes in young mountain ranges such as Himalayas play havoc, affecting socio-economic life and natural environment of the region. The study is mainly concentrated in developing the landslide hazard zonation map for a part of East Sikkim using geo-environmental factors and statistical modelling techniques for delineating the areas susceptible to mass-movement. Visual interpretation of IRS-1C-PAN and LISS-III FCC were carried out for extracting information on landslide distribution, landuse, tectonic features, geology, geomorphology and roads aided by intensive field traverses for ground truth data collection. Some of the geo-environmental parameters show a bearing on recent landslides, and the study aims to exploit this subtle relationship to assess hazard potential and produce a landslide hazard zonation map using GIS modelling techniques.

Mapping and monitoring of forest cover in Corbett National Park using Satellite Remote Sensing and Geographic Information System

Mr. Ouk Chan Dola
Environmental Technical Advisory Project, UNDP
Phnom Penh, Cambodia

Supervisor
Dr. I.J. Singh, FED
IIRS, Dehradun, India

The study aims: (1) to prepare the forest cover density map of the national park area using visual interpretation and digital image processing technique; (2) to monitor the changes within the forset cover for the period from 1988 to 1994 and 1988 to 1998; (3) to identify the best band combinations for forest type discrimination using unsupervised and supervised classification techniques. Results showed the role of using remote sensing and GIS techniques in mapping and monitor the changes of forest cover for short-term and long-term changes.

Remote Sensing & GIS application for vegetation mapping in district Almora with emphasis on biodiversity prioritization

Mr. Subrat Sharma
GB Pant Institute of Himalayan
Environment & Development
Almora, India

Supervisors
Dr. P.S. Roy, FED,
Dr. D.N. Pant, FED
IIRS, Dehradun, India

The satellite remote sensing has been used for identification and analysis of different forest types and their further subdivision as density class. Six major forest types (one species dominated) and several subclasses of natural vegetation along with different land uses in non-forest area have been identified. Pine (Pinus roxburghii) shows a preponderance of evergreen needle shaped forest in the study area as apparent from landscape units belongs to this species (91% of forested landscape). In general, evergreen forests (Pine and different Oak) have a common appearance and deciduous forest types (mainly sal, Shorea robusta) are confined to a small area in south-west of district which has a low altitude topography (between 500 and 1000m amsl). The study has been further extended to landscape ecology by using remote sensing derived vegetation/landuse map as a basic input and GIS as a tool for landscale analysis. The path characteristics of vegetation area assessed to bring out disturbance regimes (as a function of fragmentation, porosity, patchiness, and buffer analysis) and its impact on vegetation as well as landscape diversity.

Environmental impact assessment for sustainable development in mountainous terrains of a part of Nainital District (U.P. India) using Remote Sensing and GIS

Mr. Alok Mukherjee
NPL Centre for Global Change
New Delhi, India

Supervisor
Mr. R.C. Lakhera, GSD
IIRS, Dehradun, India

Evaluation of the effect of terrain conditions has been carried out, as to how they have affected land cover/land use and social economy of the region and strategies have been suggested for sustainable production and livelihood using improved characerization of the biophysical and socio economic attributes. For this purpose remote sensing data, IRS-1C; LISS II, Aerial photographs supplimented with ancillary dara like toposheet and socio-economic attributes have been studied. Various thematic layers like land use land cover, landslide, tectonic, lithology, rock type map etc. have been generated and integrated with socio-economic attributes of the region under GIS environment.

Water balance of Errakalava catchment- A Remote Sensing and GIS Approach

Supervisor

Mr. S. Jane Mithra   Mr. V. Hara Prasad, WRD

Andhra University   IIRS, Dehradun, India

Visakhapatnam, India

The study depicts the importance of water balance in catchment areas and the role of remote sesing and GIS as an integrated tool for such hydrological studies. Thornthwaite-mather method has been used in conjuction with remotely sensed data such as geomorphology, land use/ land cover, and other ancillary data in GIS environment. The results can provide adequate information for further planning and developments of available water resources in the Errakalava catchment area.

Flood study in the Dikrong Sub Basin, Assam- A RS & GIS approach

Supervisor

Mr. Mohammad Forouhar   Mr. P.L.N. Raju, GID

Iranian Remote Sensing Centre   IIRS, Dehradun, India

Tehran, Iran

GIS and Remote Sensing (RS) play a major role to assess and monitor the actual flood affected areas in near real time basis. A study has been carried out for flood event accurred on July 29, 1989 in Dikrong sub-basin, Assam. The flood-inundated map was prepared using neighborhood analysis in ILWIS 2.1 GIS software. IRS-1A LISS-I digital data was used to prepare both the preflood and post-flood landuse maps. Overlaying flood-inundated map with the landuse map, the flood damage was assessed.

Soil erosion modelling using Remote Sensing and GIS techniques

Supervisors

Ms. Kamilya A. Kelgenbaeva   Dr. S.P. Aggarwal, WRD,

Kyrghyz Irrigation Research Institute   Mr. C. Jeganathan. GID

Bishkek, Kyrghyzstan   IIRS, Dehradun, India

Remote Sensing data linked with GIS techniques were used to determine soil loss and prediction of soil erosion. The analysis was done based on Universal Soil Loss Equation (USLE). Satellite image was classified and landuse/landcover map was prepared. Various factors were determined by using topographical and hydrological information and linked in GIS environment. This mathod can also predict soil loss in future if there is any change in climate and landuse/landcove. RS and GIS are very effective tools to monitor time variant phenomena.

Land use planning using Remote Sensing & GIS in a parts of Solani watershed

Mr. Phouvienglith Thandabouth
Science Technology and Environment Organisation
Vientiane, Lao PDR

Supervisors
Dr. Jitendra Prasad, ASD,
Dr. N.R. Patel, ASD
IIRS, Dehradun, India

Astudy was undertaken in a part of Solani watershed of Haridwar and Saharanpur district, U P with the aim of generating action plans for soil conservation and land use adjustment as per requirements according to present land use status using Remote Sensing and GIS approach. Thematic information on soil, land use and slope were generated from remotely sensed data, Survey of India toposheets and ground field survey. These spatial information were integrated into GIS environment for generating basic resource maps such as composite land use and land capability. Later on existing land use and land capability maps were integrated and suitable criteria was framed according to FAO (1990). These criteria were used to prepare land use adjustment plan for appropriate soil conservation needs and proper land utilization in parts of Solani watershed.

Traffic and road network study in Jaipur city

Ms. S. Mantainorov
Research and Production Corporation
Ulaanbaatar, Mongolia

Supervisors
Mr. B.S. Sokhi, HUSAG,
Mr. S. Maithani, HUSAG
IIRS, Dehradun, India

The study aimed to find the existing traffic volume along major roads using Remote sensing data and GIS. Also by integrating traffic accident data landuse map with traffic volume data, the most effected areas were identified and recommendations and proposals were given for these areas.

Fire risk analysis of Corbett National park using Remote Sensing and GIS

Mr. Dondog Enkhbayar
Ministry of Nature and Environment
Baga Toiruu, Mongolia

Supervisor
Dr. M.C. Porwal, FED
IIRS, Dehradun, India

The study aims to identify areas which are susceptible to forest fire in Corbett National Park. IRS-1B: LISS II and SOI topomaps were used to generate different thematic maps and DEM. Input to GIS (digitization), overlay analysis and modelling has been done using Arc-Info software. Results reveal that by using Remote Sensing and GIS techniques mapping and forest fire risk analysis is more easy and accurate.

Mapping and monitoring of forest cover in Corbett National Park using satellite Remote Sensing and GIS

Supervisor

Mr. Sein Aung   Dr. I.J. Singh, FED
Forest Department   IIRS, Dehradun, India
Yangon, Myanmar

Corbett National Park is one of the Tiger Reserves in India. This project is aimed to monitor the forest cover and density changes in the park using visual interpretation and digital image processing techniques. The resulting maps depict status of forest cover types and density as input to wild life management plan for the national park. The study involved two time satellite data (1988 to 1994), in the form of geocoded imageries and (1994-1998) digital data. This project will help in conservation of those values which make Corbett National Park a priceless part of Indian National heritage.

Land use/land cover change and urban growth analysis of Jaipur city using Remote Sensing and GIS

Supervisor

Ms. Tin Tin Aye   Mr. A.P. Subudhi, HUSAG
Yangon Institute of Technology   IIRS, Dehradun, India
Yangon, Myanmar

In developing countries, urban areas as well as their population are growing at a very fast rate and the growth of the cities is not observed in planned manner rather haphazard in the core area. The main cause of such rapid urbanization is due to natural-growth and due to continuous migration of rural population to urban centers /settlements. This rapid and haphazard growth of urban area and increasing population pressure is resulting in deterioration of environmental quality, traffic problems and infrastructure facilities. Therefore, accurate and updated urban landuse/ landcover information is indispensable for urban development planning and management. This study demonstrates the use of repetitive satellite data for landuse/landcover change and urban expansion studies of Jaipur City.

Water balance study- A RS & GIS approach

Supervisor

Mr. Roshan Man Singh Pradhan   Mr. K.H.V Durga Rao, WRD
Department of Water Supply & Sewerage   IIRS, Dehradun, India
Kathmandu, Nepal

Integration of satellite remote sensing & GIS techniques with hydrological data provides reliable, accurate and updated database on land and water resources. Bandal watershed, tributary of Song River has been taken as a study area for the present investigation. IRS-1C LISS III satellite digital data of two seasons are used in the present study. Water balance is computed for the year 1997 using Thornthwaite & Mather's model & SCS model, and the results were compared. Rainfall and runoff relationship has been developed.

Terrain evaluation for slope instability analysis of Sikkim himalayas - A case study of Gangtok area, Sikkim

Supervisor

Mr. Motilal Ghimire   Dr P. K. Champati Ray, GSD
Central Department of Geography   IIRS, Dehradun, India
Tribhuvan University
Kathmandu, Nepal

Gangtok area of East Sikkim in India is a densely populated area of Sikkim Himalayas, characterised by the steep slopes, weak racks and high incidence of tectonic activities causing slope instability at number of places. The litho logy of the study area as dominated by soft phyllite schist, quartz-schist and gneiss.This study reveals that slope instability processes as evidenced by landslides, subsidence, and gully erosion are common in the old landslide zone, and in areas of higher relief and steeper slopes with land use/land cover of shrubs/fallow land and on the rock types of schist, phyllite and gneiss. On the basis of comprehensive terrain analysis using GIS, slope stability is assessed at various locations including known landslides and stable slope areas to come out with a clear understanding of hill slope processes causing mass wasting in this fragile mountainous terrain

Habitat characterization of Corbett national park with special emphasis on corridor analysis

Supervisor

Mr. Jose Aguilar   Dr. S.P.S Kushwaha, FED
National Mapping and Resource Information Authority   IIRS, Dehradun, India
Makati City, Philippines

Habitat characterization and corridor analysis are imperative in any wildlife conservation effort. The present study concentrates on Corbett National Park and its surroundings in view of the fact that the corridors linking Corbett National Park with Rajaji National Park in west and Haldwani Forest Division in the east have been either lost or fragmented significantly. Survey of India toposheets pertaining to 1965 period, IRS 1C LISS III imagery of 1998 on 1.250,000 scale and GIS were used for this purpose conjunctively. A patchiness/ fragmentation map using forest map by merging all forest classes into one single class to be called as forest was prepared.

Process of built form and environment impact assessment in Jaipur city and its environs

Mr. K. B. Herath
Survey Department
Kandy, Sri Lanka

Supervisors
Mr. B.S. Sokhi, HUSAG,
Mr. S. Maithani, HUSAG
IIRS, Dehradun, India

The study aims to find the population affected by positive and negative environmental factors using remote sensing data and GIS The areas which are most affected by these environmental factors are found out and comments have been made for various measures to be taken.

Site suitability analysis for residential development, Jaipur city and its environs using Satellite Data and GIS

Mr. H. K. Sunil
Survey Department
Anuradhapura, Sri Lanka

Supervisor
Mr. A.P. Subudhi, HUSAG
IIRS, Dehradun, India

The study aimed at identification and selection of new locations for future residential development using Satellite data considering several site parameters such as slope, accessibility, flood hazard, soil, ground water table depth etc. The analysis was carried out in GIS environment. Resultant suitable areas in different land uses compared with the Master Plan to derive suitable areas within the proposed frame work. Comparison of present land use and Master Plan for the decade had been done and comments have been made for the proper implementation and violations.

Landscape ecological analysis of the Corbett national park using Remote Sensing and Geographic Information System

Mr. M J J Fernando
Natural Resource Management Division
Central Environment Authority
Colombo, Sri Lanka

Supervisor
Dr. Sarnam Singh, FED
IIRS, Dehradun, India

The present study aimed at characterization of the landscape of the Corbett National Park based on the landscape ecological principles. Remote sensing offers new ways of conceptualising pattern in the landscape. GIS is a tool that helps in creating database and multi criteria analysis in the computer domain. The IRS-1B: LISS II data had been used to identify the vegetation types. Landscape characteristics like interspersion, juxtaposition and patch characteristics like size, shape, porosity & patchiness have a relationship with biodiversity. The present study carried out using the above parameters showed that there was not much disturbance to the park. This can be attributed to the state of strict protection provided by the park management and the high-density forest with least disturbance.

Habitat characterisation of Corbett national park with special emphasis on corridor analysis

Mr. Iskandar T. Muminov
State Scientific Research Institute of Space Engineering
Tashkent, Uzbekistan

Supervisor
Dr. S.P.S Kushwaha, FED
IIRS, Dehradun, India

Habitat characterisation and corridor analysis is imperative for any wildlife conservation effort. The present study concentrates on Corbett National Park and its surroundings as corridors around this park. Survey of India topomaps of 1965, IRS LISS-III FCC of 1998 on 1:250,000 scale and GIS were used for this purpose conjunctively. A forest area change map was prepared from the two-period maps on which roads and settlements were superimposed. The results showed that the forest cover in the study area has decreased considerably. A similar trend was noticed in corridor areas too.

Monitoring the land transformation

Mr. Orifjon Kholboev
Institute of Applied Physics
Tashkent State University
Tashkent, Uzbekistan

Supervisor
Mr. B.S. Sokhi, HUSAG
IIRS, Dehradun, INDIA

Major objective of this study was to monitor urban landuse pattern resulting due to land transformation in Jaipur city and its environs by using satellite data and GIS. Landuse/landcover maps of 1975, 1986 and 1988 periods were prepared. All maps were based on visual interpretation of images acquired from LANDSAT, IRS-IA and IRS-1C. The work shows that satellite image can serve as a useful and handy data source for quick and overall assessment of urban growth trends and land transformation of environs (quantitative and qualitative). However, urban development - is a complex phenomenon that includes social and economic aspects etc. Thus the interpretation for urban and regional planning of any presently available remote sensing data should not be done in isolation but should be integrated with socio-economic aspects of the community.

The process of built form and environmental impact analysis of Jaipur city using Remote Sensing and GIS

Ms. Thoe Thi Kim Le
Department of Geography
Ho Chi Minh city, Vietnam

Supervisor
Mr. A.P. Subudhi, HUSAG
IIRS, Dehradun, India

Urban growth is experienced by the most of the developing countries due to economic development opportunities in town areas. Cities, suburbs, exurbs and agricultural areas compose an integrated network of relationships. Jaipur city of Rajasthan State has an age old history of settlement since 1727AD. Being the headquarters of State, the city accommodates all types of activities viz., education, trade, commerce, etc., and serves as regional service centre. A high rate of urbanization has given rise to serious degradation of the environment and the city has faced various problems. This study was to identify, record and analyse the process of built form and their impact on urban environment. Using Remote sensing data, qualitative and quantitative approaches, extracted information from IRS, 1B, IRS 1C and non spatial data were integrated under Arc/info (GIS) software for analysis and modelling. The resultant products, especially the combination of Remote sensing data and non spatial data, provided a great deal of information that can be useful for urban planning and management.

Urban facilities mapping and analysis of Dehradun city using Remote Sensing & GIS

Mr. Shah Nural Quadir
Local Government Engineering Dept.
Dhaka, Bangladesh

Supervisors
Mr. S. K. Govil, PRSD,
Mr. Anil Kumar, PRSD
IIRS, Dehradun, India

Adequacy of facilities for the present population of the area shall be investigated using Remote Sensing and GIS technique. Part of Dehradun city has been taken as study area and urban facilities e.g. Post Office, bank, Hospital/Clinic/Medical Centre, Play Ground, Bus Stand/Taxi Stand have been taken in consideration for investigation. IRS-PAN image with 1:12500 scale is used for this study. GPS was used to locate accurately the location of urban facilities. Analysis of availability and accessibility of facilities to the inhabitants in the area, depending upon the population, road network and level of satisfaction is carried out.

Integrated use of satellite Remote Sensing and GIS in optimal land use planning for agricultural development

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Supervisor
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The study was undertaken with the aim of generating optimal landuse by using Satellite Remote Sensing and GIS techniques in Najibabad Block, Bijnor district of Uttar Pradesh, India. Temporal Satellite data of IRS 1C: LISS III pertaining to Rabi (Winter) and Kharif (Rainy) seasons were used to delineate dominant agricultural crops and other landuses following visual analysis with limited field checks. Various spatial digital databases of soils and terrain characteristics were created using GIS and these were used for land evaluation following FAO framework (1976) by adopting GIS aided integrated analysis. Finally suitable landuse plan of this study area was suggested by GIS aided integration of land qualities/land characteristics, crop suitability and existing landuse/land cover information.

Site suitability analysis for urban development around Dehradun city using RS and GIS

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Mr. Hong Suil
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Urban planning is a complex process. For proper planning and decision making accurate and timely data is the prerequisite. Conventional survey method are neither cost-effective nor time effective. Therefore, application of remote sensing and geographical information system is the only alternative to fulfill these requirements. In this project work 196.4sq.km of contiguous urban area of Dehradun city was selected. Using IRS-1C PAN data, land use/land over map was prepared. A data base was created by using the thematic maps like land use/land cover, soil depth, soil texture, ground water potential, flood hazard, road accessibility and slope. Finally the site suitability map was generated. The map showed the suitable land site for the future urban development.

Snowmelt runoff estimation of Jiwa river basin, H.P., India

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Mr. Om Gumchol
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The study demonstrates the estimation of snowmelt runoff of Jiwa river basin, Himachal Pradesh, India by using Remote Sensing and Geographic Information System Techniques. The satellite data of IRS 1C LISS-III multidate for seasons of 1997 has been used for identifying the snow covered area and landuse/landcover types of the study area. SOI (Survey of India) toposheets based DEM (Digital Elevation Model) and meteorological stations data such as daily temperature, rainfall were used in the study. The study area has been divided into elevation zones to study the effect of snow melt runoff from each elevation zone. Finally, the snowmelt runoff is computed for each season such as summer, monsoon autumn, winter, which is compared with the observed data. Since more number of temporal satellite data could not be used, the difference of computed and observed runoff values are more. If more temporal data are used the results will be better.

Application of Remote Sensing and GIS for soil resources inventory and evaluation

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A soil resources inventory of part of Bijnor district in Uttar Pradesh has been prepared by monoscopic interpretation of false colour composite of IRS 1 C LISS III and PAN data supplemented by field investigations on 1:50,000 scale. The soil map was prepared following physiographic approach indicating soils association at family level and a total of sixteen soil mapping units were identified. Digital Land use/Land cover map was prepared by following unsupervised digital classification indicated Wheat, Sugar cane and Forests vegetation as dominant land use. A subset of IRS 1C LISS III and PAN data were merged to enhance Soilscape features and fileld management informations. GIS Analaysis was carried out to interpolate contour and point data to generate slope map. The soil mapping units were assessed in GIS environment for Land Capability and Land Productivity Index to suggest proper Land use in the area.

Study of coastal sedimentary environment and processes of Godavari delta east coast of India, using Remote Sensing & GIS Techniques

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Supervisor
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The present study is mainly concentrated on the sedimentary process of Godavari river near Kakinada Bay, which is the biggest river in Andhra Pradesh, East coast of India. The sediment influx coming from the River Godavari causes the growth of the sand spit towards Northwest. Present study is focused on the growth of the sand spit by change detection analysis using IRS-1C satellite LISS III imageries of 1997 and 1999. It has been found that a tremendous growth of the sand spit occurs at the Godavari point and there is a substantial erosion and accretion at the southern side. Extensive erosion has taken place at Uppada village situation at northern side of the Kakinada port. The amount of the erosion/accretion has been quantified by temporal analysis using imageries of two dates.

Application of Remote Sensing and GIS in soil resource mapping and land evaluation for optimal land use planning

Supervisors

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NBSS & LUP   Mr. L.M. Pande, ASD
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Sustainable development of land resources requires comprehensive inventory of soils and their characterisation. In this study, soil and land resource maps were prepared by monoscopic visual interpretation of FCC of IRS 1C LISS III data and PAN data on 1:50,000 scale in conjunction with field checks in part of Bijnor district of Uttar Pradesh. Sixteen physiographic soil units were identified in the area. The soil mapping units were assessed for soil productivity (Riquier et al. 1970) and their suitability for various land utilisation types viz. wheat, sugarcane, paddy, maize and mustard following FAO framework of Land Evaluation, (1976) in GIS environment. GIS analysis was carried out to suggest sustainable land use plan by integrating present land use and suitability of crops in relation to soil productivity.

Rainfall - runoff modeling using Remote Sensing and GIS - A case study of Sukhna lake catchment

Supervisor

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Optimal planning and utilisation of surface water resources require estimation of the runoff from the catchment areas. The present study demonstrates the use of remote sensing and GIS in delineation of these hydrological units for runoff estimation in the 42 sq. km Sukhna Lake catchment in the Shiwaliks. IRS - 1D LISS III image has been used for the digital landuse/landcover classification. Using the SCS curve number method runoff potential map has been prepared by integration of daily rainfall, hydrologic soil group (HSG) and classified landuse/landcover maps in the ARC/INFO GIS. Potential erosion areas have also been mapped further by using DEM derived slope, aspect and flow length information in order to prioritize the sub watershed of the lake catchment.

Studies on ground water salinity, related impacts and mitigation plans in Bhavnagar coastal region

Supervisor

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Increase of population has many effects such as, rapid growth of settlements and urbanization. In the coastal region, degradation of water quality due to salt intrusion affects the land use pattern people need fresh water to the extent of 35 liter to 100 liter/day/person. They usually pump these water from the ground. Remote Sensing Technique with digital image data processing immediately gives information about surface features. From these features, using key interpretation techniques rapid growth of settlement, land use change, salt affected area on coastal region and salt water intrusion can be detected. There is a good agreement between digital image processing results and analyses of field data. Waters having chloride content beyond 250 mg/l are not advisable for drinking purpose, however these water can be used for other applications like irrigation etc. Salt water-intrusion can be classified in a qualitative manner with the help of digital image processing and ground truth information.

Evaluation of land use/land cover categories in different scale using Remote Sensing and GIS Technology of Dehra Dun city

Supervisor

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The evaluation of landuse and landcover categories is needed for the planning, controlling and monitoring of the urban area. Urban planner and decision makers need such kind of information. This study is focused on the evaluation of landuse/landcover types derived from various 1:12,500, 1:25,000 and 1:50,000 scale PAN and LISS III images from IRS 1-C. The evaluation of Landuse/landcover types is carried out using raster based ILWIS s/w. The selection of grid cell size in different scales of raster data has influenced very much for the information we obtain. The evaluation of landuse/landcover are influenced by the scale, spatial resolution, and different bands of the imagery.

Land use change along major roads in Dehradun city

Supervisor

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The growth of urban areas is a continuous process. Also, land use planning is a continuous, dynamic and a cyclic process in which monitoring of cover change plays a vital role. In the region, land use changes have, a significant effect on biodiversity and landscape. Remote Sensing and Geographical Information System are the promising tools for land use change detection studies.

Land use / land cover change detection urban sprawl mapping and growth analysis of Dehra Dun city using Remote Sensing and Geographical Information System

Supervisors

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Ulaanbaatar, Mongolia   Mr. K.C. Bhagra, PRSD
       IIRS, Dehradun, India

Land use change. is major problem in growing urban areas. Land use change is also an indicator of economic transformation of any urban area. Conventional methods of recording land use changes are not reliable and time-effective. Therefore Remote Sensing technique is useful to map the land use changes. The present study incorporates this technique to detect the land use changes in Dehra Dun City. Satellite images of IRS-IA: IRS-1C & IRS-1D of year 1989, 1996, 1998, respectively and topographical maps of year 1965 were used for mapping. The images were visually interpreted on a scale of 1:50,000 and then checked in the field. An urban sprawl map from 1965 to 1998 was prepared. Nine number of maps depicting the Urban Sprawl of Dehra Dun city in non-continuous manner, showing that the dispersed development were also prepared.

Land use planning for forestry in Lachhiwala forest range, Dehradun, Uttar Pradesh

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IIRS, Dehradun, India

The forests of this study area is facing very high amount of biotic pressure. Remote sensing and GIS based techniques have been used for forestry, land use planning of this area. The temporal Remote Sensing data of IRS-1C LISS III and Landsat TM FCC on 1:50,000 scale were visually interpreted for the preparation of forest vegetation and land use change maps for the period 1978-99. The spatial and non-spatial database were-created under GIS environment for the analysis of changes in different locations/physiographic conditions and the amount of biotic pressure on the forest area. The different forestry land uses and their suitable sites have been suggested.

Geological hazard zonation around Chamoli, Rudraprayag district of Garhwal Himalayas using Remote Sensing and Geographical Information System

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The Garhwal Himalayas of northern India was rocked by an earthquake 6.3 body wave magnitude on Richter Scale in early hours of 29th March 1999. This study mainly focuses on the potentiality of remote sensing data for the evaluation of change in terrain `condition brought by this event. LISS-III and PAN hard copy and digital data were used for the present study. Lineaments, fresh landslides and reactivation of pre-existing landslides were interpreted by visual interpretation. Pre and Post analysis of PCA, NDVI, and FCC were prepared for the comparative study and other thematic layers like Lineaments, Geology, Geomorphology were digitized for analysis in GIS environment. On the basis of ancillary data collected in the field by observing terrain condition and interview with local people an earthquake intensity map is produced. Finally all the thematic layers were integrated in GIS environment with proper weightage according to their contribution to arrive at seismic hazard zonation map.

Growing Stock estimation in Lachiwala forest range using Remote Sensing and GIS

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The study demonstrates the potential of Remote Sensing applications relevant to forest coyer types and growing stock estimation of Sal forest, using IRS-1C LISS III FCC of Lachhiwala forest range; Dehra Dun. In this study, the IRS-1C LISS III (FCC) imagery of March 14, 1999 has been visually and digitally interpreted on the basis of tonal and pixels characteristics. The forest has been classified into seven different forest types and four density classes. Stratified random sampling method has been used to determine the number of sample units of different species in different forest types by collection of ground inventory data. Using volume table and volume equation per hectare growing stock of each forest cover types and density classes has been calculated.

Satellite Remote Sensing and Geographaical Information System technology in agro-ecological zoning for sustainable agricultural development

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Agro-Ecological Zoning (AEZ) help to identify agricultural land resource management priorities for sustainable development and to implement strategies for future food increase. The satellite data such as IRS-1B LISS II & IRS-1C LISS III images have been used to derive physiographic soil, landuse/landcover and irrigation regime maps. The other ancillary data are terrain information, soil attribute maps and agro-meteorological inputs. Agro-climatic zones are delineated through GIS aided integration of LGP (Length of Growing Period), rainfall and available water capacity and irrigation regime whereas agro-edaphic zones are integration of soil depth, texture and terrain slope map. Final agro-ecological zonation map is prepared by GIS aided integration of agro-edapic and agro-climatic map layers. Optimum agricultural landuse plan based on delineated agro-ecological zones is suggested for sustainable agricultural development of areas for Malin watershed in a part Kotdwar & Bijnor Districts, Uttar Pradesh..

Integrated use of multispatial resolution satellite data and GIS technique in crop inventory - A case study

Supervisor

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This study was undertaken with the objectives of acreage estimation and yield prediction of major Rabi (Winter) crops using GIS, utilizing multi-spatial resolutions satellite data, ancillary soils and agrometeorological data. The study area was the Najibabad Tehsil of Bijnor district, Uttar Pradesh, India. Area and growth conditions of major Rabi crops were assessed following digital classification of multi-spatial resolutions satellite data (IRS-1C : LISS III, WiFS and PAN). Crop yield of wheat crop was predicted by agromet and LAI (Leaf Area Index) based spectral models.

Flood mapping in Barhalganj block, Gorakhpur district, U.P.

Supervisor

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Flood mapping study has been carried out in Barhalganj block, Gorakhpur, district, U.P. RADARSAT data was used in near real time during 1998-flood period. Visual interpretation technique was adopted for estimating flood affected area. The magnitude of this flood was severe and there were heavy loss to human life, property and livestock. The affected area was 775 km^2 (80.8%) out of 959 km^2 total area. We have also studied and able to classify the flood damage using IRS 1 C LISS III digital data of Sept, 16, 1998 acquired after 15 days of major flood in order to get the magnitude of flood damage. The present study reveals that microwave remote sensing satellite data can be used effectively for flood damage assessment studies in real time as clouds are main obstructions while using optical satellite data. The causes of floods in this study area are due to improper flood protection measurements and the impact is further magnified by the influence by human activities.

Integrated use of satellite remote sensing and GIS in optimal land use planning for agriculture development

Supervisor

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Dr. Jitender Prasad, ASD
IIRS, Dehradun, India

This study focuses on optimal land use planning for part of Bijnor district of Uttar Pradesh in India. To carry out the optimal land use plan, satellite remote sensing and GIS techniques have been used. Land use and land cover analysis for Rabi and Kharif seasons were carried our using temporal satellite data of IRS 1C LISS III following visual as well as digital analysis. Cropping intensity map was generated by integration of Rabi and Khrif land use maps in GIS environment. Land Capability classification and Land Suitability analysis were carried out using USDA and FAO approaches respectively which were worked out in terms of soil-physiographic units. Suitable land use plans were generated based on maps related to land use and land cover, land use intensity, land capability and land suitability.

Geomorphological mapping and ground water targeting using RS and GIS technique

Supervisors

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Mr. R. S. Chatterjee, GSD
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This study highlights the Geomorphology and hydrogeological study of Chamoli and Rudraprayag district in Garhwal Himalayas. Satellite data of IRS 1C (LISS III) - FCC, PAN and aerial phtograph were used for the present study. The study was conducted in three phases comprising the pre-field interpretation, field check and post field compilation. Topographically the area is divided into four classes like higher, medium, low and very low geomorphic units, according to their position from river valley to top of hill. Different landforms like alluvial fan, colluvial fan, river terraces, structural hill and denudational hills were identified. The study have been further extended for geomorphology based on remote sensing and GIS analysis.

Site suitability analysis for industrial development in Dehradun city and its surroundings using Remote Sensing and GIS technology

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The study demonstrates the use of-Remote Sensing data and Geographic Information System in urban analysis. Database was created using Remote Sensing data and GIS for site suitability analysis for industrial development. Remotely sensed data product was used for deriving landuse/landcover map and road network map. Other maps like slope map, soil map were taken from secondary sources. ILWIS, ArcView GIS software were used for urban analysis. By applying various techniques a suitability map was created. Then out of suitable lands, patches which were larger than a specified size were considered for industrial development.

Assessment of urban environment, utilities & services in Bhubaneswar municipal area

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Mr. B.D. Bharath, HUSAG
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The rapid growth of population as well as expectation for better quality of life deserve better provision and management of urban utilities and services and healthy environment. To mitigate these problems, good planning is essential. Before going to planning stage, it is needed to assess the existing utilities and services and ambient environmental conditions. Hence the objective of the study is to find out the existing facilities and environmental conditions in Bhubaneswar Municipal Area using RS & GIS. IRS ID merged FCC (PAN + LISS III) data on 1:25,000 scale was used to prepare Land use map with field check. In addition, various spatial digital database for population density, Ward boundary, school, slum, road etc. were created using GIS and these were used for spatial analysis to find out how much area or how many people are being served by the existing strength of facilities in the area; and also effect of lack of facilities and other parameters have been considered to assess the environmental condition.

Remote Sensing application for lithological mapping and targeting Laterite and Bauxite deposits in Koraput district, Orissa

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The economy of a developing country depends on the Mineral wealth. To evaluate geological wealth of an area, Remote Sensing techniques have already been proved more useful in geological mapping than conventional field mapping. The present study was undertaken to find out different lateritic / bauxitic areas of Koraput district of Orissa using Remote Sensing techniques. Laterite in the eastern part of Peninsular India is a weathered product of metamorphic rocks like Khondalite and Charnockite. In India most of the bauxite deposits are associated with laterite. IRS- 1C PAN and Landsat TM data were used to delineate laterite/bauxite deposits using visual and digital interpretation. Number of laterite/bauxite deposits have been confirmed during the field work. Laterite/bauxite areas are easily delineated from the fused image of PAN and TM data also. The nature of laterite/bauxite deposits in the study area are : Flat top barren hills with dwarf date palm tree.

Integrated use of RS & GIS for optimal location of MSW landfills in Bhubaneshwar city, Orissa

Supervisors

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The study deals with the investigation of feasible sites for the location of sanitary landfills for disposal of the Municipal Solid Waste (MSW) generated in the city of Bhubaneshwar from domestic, institutional, commercial and industrial entities. PAN+LISS III merged data product (February 2000) of Indian Remote Sensing Satellite (IRS-1D), on 1:25,000 scale is used to generate the basic land use/land cover map of the Bhubaneshwar Municipality Area. The visually interpreted land use/land cover map forms the primary input to the spatial database assembled. The other layers used for the GIS based analysis of the problem includes the slope-map, soil-map and groundwater potential map. The suitability criteria is designed taking into consideration the specific requirements and local conditions as evaluated from the field-visit to the area and other relevant information collected. The final suitability map shows the areas having various suitability rankings.

Study of ground water resources using Remote Sensing and GIS specific to ground water modeling of Visakhapatham, A.P, India

Supervisor

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Mr. K.H.V. Durga Rao, WRD
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The impact of urbanization and industrialization on ground water resources such as contamination and depletion of water table has become very serious for any growing city. In this present study it has been attempted to model the groundwater flow to simulate various scenarios of pumping and recharge rates and to arrive at optimum pumping rate and to suggest the necessary actions to be taken for recharge to keep groundwater table in safe limits. Water table and aquifer depth information collected from the field are used to create various thematic and spatial data layers in GIS environment and used as input to M0DFL0W software to run the ground water model of the study area. Recharge values are estimated using ancillary data. Runoff has been calculated using SCS model using R.S. derived inputs and meteorological data. Results are indicating that the water table is depleting by 0.2 m for the present water year, which has rainfall nearly 20% less than the normal. The pumping rate in the study area is exceeding the recharge rate by more than 100%.

Groundwater targeting and its pollution zoning of Visakhapatnam urban and industrial area using Remote Sensing & GIS techniques

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Groundwater forms very little quantity when compared to the total water available on the earth. Therefore it is very vital for all living beings especially for human beings. The groundwater quality of Visakhapatnam urban and industrial area has been subjected to intense deterioration due to pollution caused by various chemical industries. Also saline water intrusion problem is increasing due to over exploitation of groundwater resources within city area. The present study is aimed to evaluate groundwater occurrence, and demarcating the polluted zones. For present study IRS-IC (March 99) and ID (November 99) LISS-III digital data have been used for comparative land use/ land cover classification, hydromorphogeological features identification, lineament study. The layers created from Remote sensing data and available ancillary data i.e. hydrochemical data of different parameters have been used for overlay operations for identification of groundwater potential zones and demarcation of polluted zones in the study area using GIS.

Site suitability analysis for solid waste disposal: A Remote Sensing and GIS approach

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Indian cities have a striking similarity when it comes to heaps of garbage and overflowing bins. Dehradun, a popular city for tourism and education also has a similar view with roadsides being piled up with solid wastes. The governmental organisation, the Dehradun municipal board is faced with the problem of locating suitable land sites for sanitary landfill and composting. Present study aims at locating suitable places using satellite remote sensing and GIS. IRS-1C PAN and LISS- III data were digitally processed to derive the present Land use/Land cover information. Care is taken to ensure that the potential sites are away from rivers, lakes, flood plains, less leaky geological foundation, on gently or moderately sloping terrain and are accessible even in wet conditions. Overlay analysis in GIS was performed using land use soil, the ground water prospects, the drainage, roads and the slope maps. The analysis resulted in potential sites suitable for landfill operations.

Soil erosion modeling using Remote Sensing and GIS

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The study was undertaken with the aim of assessing annual soil loss by using Satellite Remote Sensing and GIS techniques in Bata river basin, Himachal Pradesh, India. Morgan, Morgan and Finney (MMF) model was used for soil erosion modeling. Temporal Satellite data of IRS 1D PAN and LISS III pertaining to Rabi (Winter) and Kharif (Rainy) seasons were used to obtain required input parameters to the soil erosion model through delineating dominant agricultural crops (wheat, paddy, sugarcane) and other land use. Various spatial database of rainfall, soil and relief information such as rainfall erosive energy map, slope map, soil properties maps etc. were created using GIS and these parameters were used for predicting annual soil loss from the study area. Finally, annual soil loss map was prepared and factors affecting soil erosion and mechanism of the erosion process were analyzed, which will help in adopting proper soil conservation plan.

Assessment and monitoring of diseased sal forest in Thano range

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The study has been carried out with the objective of generating diseased sal forest map and its management plan by using remote sensing and GIS techniques in Thano Forest Range of Dehdradun forest division, Uttar Pradesh, India. Temporal remote sensing data of Indian Remote Sensing Satellite (IRS) were used for digital image processing. The database with respect to forest blocks / compartments, drainage, village and road network were created using GIS. All the digital maps were integrated and analysed in GIS domain. It was feasible to identify and map diseased sal under different categories through supervised digital classification technique. The diseased sal categories within different compartments management units indicate the need for the strategy of management practices with respect to prevention and control of the disease. Field investigations revealed that the insect called Sal heartwood borer (Hoplocerambyx spinicornis) has caused the disease.

Urban sprawl and land use change for Bhubaneshwar city

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The study was undertaken with the aim of generating a urban sprawl and land use change map for Bhubaneswar the capital city of Orissa state, using Satellite Remote Sensing and GIS Techniques. The city, being very close to places of tourist interest and principal commercial centres, is experiencing rapid growth. Keeping this in view an attempt has been made to map the urban sprawl of the city. Merged data products (LISS III+PAN) are used to prepare the current land use map of 2000 year. The maps are scanned, georeferenced and mosaiced in Erdas Imagine. Spatial database for years 1930 to 2000 are created for the analysis. These georeferenced layers are used in Arcview software for on screen digitizing and database creation. These layers are then imported in Arc/Info software for labelling and editing. These final layers are then overlayed, using overlay commands for analysing urban sprawl mapping.

Drought monitoring using NOAA AVHARR data in north Gujarat

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Drought is the single most important weather related natural disaster and thus has a serious impact on regional food production. Earth observation satellite data are often necessary for the provision of synoptic, wide-area coverage and frequent information for monitoring of drought conditions. Especially those which have coarse spatial resolution and high temporal resolution satellite data such as NOAA AVHRR data offers immense potential for studying terrestrial drought conditions and its real time monitoring. This study was aimed to investigate relations between the AVHRR NDVI and drought severity using concurrent measured meteorological and satellite data. Palmer crop moisture index was used for determining the drought severity in this study. The study area comprise some parts of three drought prone area in Northern Gujarat including Mehsana, Sabarkanta and Banaskanta districts. NOAA AVHRR data for 1997-1999 were used for NDVI analysis and the result shows Satellite derived NDVI can be a useful tool for monitoring drought condition and its severity.

Growing stock estimation using Remote Sensing & GIS

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This study was carried out in Barkot forest Range (30° 02' to 30°12'N, 78° 07 ' to 78° 19 ' E), covering an area of 72.91 km^2. Satellite remote sensing data of IRS 1C LISS III (Path 96, Row 50 of 21 March, 1999) was used for the study. Growing stock estimation was done by visual interpretation of satellite image and stratified random sampling in the field. Various theme layers, viz. forest cover type map, forest density map, contour map, drainage map, digital elevation model were used and growing stock map with respect to forest type, forest density and compartment was prepared. Total growing stock and mean volume per hectare were found to be 1226514 cu m. and 184.63 cu m., respectively.

Monitoring development plan Implementation of Bhubaneswar city by using Remote Sensing and GIS Techniques

Supervisors
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The study aimed to find out the deviations of the development plan proposals of Bhubaneswar city, Orissa. The unauthorized developments are relatively easy in a new town as the area is vacant. But the urban development authorities have no such system to check or monitor the implementation and violation of the development plan on a regular basis. Merged satellite data FCC of IRS-1D (LISS III +PAN) images (scale of 1:25,000) were visually analyzed to make land use/land cover map considering different spatial parameters. Spatial databases were generated using GIS. Thus various thematic layers are created such as land use/land cover map, master plan map, road map, etc. These maps were used for the analysis process by adopting GIS technique. Finally the deviation of the different classes were monitored and recorded.

Forest cover and density mapping using Remote Sensing and Geographic Information System in Barkot forest range, Dehradun forest division (U.P.)

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Forest cover type mapping is a prerequisite for management of forest. Present study is an attempt to characterize forest into type and crown density classes in predominantly Sal (Shoria robusta) forest in Barkot Forest Range, a part of Dehradun Forest Division. FCC of IRS 1C, LISS III of mid March, 1999 providing better contrast within different forest categories were chosen to visually interpret and map different forest types and their crown density with limited field check. Road, drainage, forest block maps were also prepared, integrated and analyzed in GIS. Result shows Sal as the most dominant class followed by forest plantation. Other forest categories i.e., miscellaneous forest, forest blank and scrub cover less area. Among the three forest crown density classes, medium crown density forest (density range 40% to <70%) is dominant and constituting significant area in Bibiwala and Ghamandpur forest blocks. This study will provide valuable inputs to forest managers for assessment of wealth and condition of forest and update management plan.

Application of Remote Sensing and GIS for watershed prioritization with respect to soil erosion intensity

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Remote sensing is a vital tool for soil erosion inventory. Bata river which is one of tributory of the Yamuna river, located within Doon valley. The present study, application of remote sensing and GIS for watershed prioritization with respect to soil erosion intensity, has been carried out in this Bata river basin. Modified Universal Soil Loss Equation (MUSLE) was used to estimate soil loss for prioritization. Study area was further subdivided into 23 subwatersheds to find out the priority in terms of soil erosion risk. Each subwatershed was analyzed individually in terms of soil type, average slope, drainage length, drainage density, drainage order, height difference, land use/land cover and average NDVI with soil erosion to find out the dominant factors leads to higher erosion.

Hydrological modeling using Remote Sensing and GIS: A case study of Bata river basin

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A Hydrological model is developed for the Bata River basin, which is one of the tributaries of the Yamuna River. Infiltration and losses, Unit hydrograph and River routing are the main model components. ILWIS and Auto CAD software were used for hydrological modeling. Satellite Remote Sensing and GIS techniques are used to estimate the relevant spatial parameters, which is used as input to the hydrological model. SOI topomap, data collected from the field work, IRS LISS-III temporal satellite data for rabi and kharif seasons and IRS PAN data are used as input for the model. Complete watershed is divided to 10 sub areas. Ten hydrographs are developed one for each sub area. Characteristics of the watershed are evaluated by modeling the watershed as a whole as well as sub area basis by routing the unit hydrographs along the river reach. Muskingum hydrologic routing method is used for river routing. Model is capable of forecasting the runoff for the particular event of rainfall and derives hydrographs for required time duration.

Land use/Land cover mapping and identification of suitable sites for future development - Cuttack city

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The study deals with utility of satellite remote sensing and GIS tech niques for land use/land cover mapping and identification of suitable sites for future development in Cuttack city, Orissa. Merged false color composite satellite imageries dated Feb 16th, 2000 of IRS-1D (LISS Ill+PAN) in the scale 1:25,000 are visually interpreted and used to delineate spatial features viz. built-up, non built-up area as well as other important features to make land use/land cover map. Physical location, landscape pattern and availability of land, etc. are considered to identify suitable sites for future expansion of the city. Finally, best suitable location for new sites for future development are suggested using GIS techniques in the study area.

The application of IRS-1C streo and IRS-1D Multi-spectral data in wireless communication system design

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DEM data and land use/land cover have a very important role in predicting the coverage of radio signal by using mathematical algorithms. Both of them can be conveniently generated from Remote Sensing data. The objective of this work is to predict the coverage of radio signal from a transmitter based on DEM generated from satellite stereo data, using satellite photogrammetric technique and land use/landcover map prepared from Remote Sensing multispectral data. IRS-1C stereo PAN and IRS-1D LISS III multispectral data of Nainital area had been used to carry out this study.

Landform analysis from structural fabrics influenced by poly phase deformation due to tectonic movement and implication to stability due to "Creep Tectonic" phenomena in Giri and Bata river (H.P.) - A Remote Sensing and GIS based study

Supervisor

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Geologically Himalayan region is in very complex phase. On the other hand due to different orogenic movements and other earth movements it is extensively affected by folding, faulting, thrusting etc. To consider this concept, present study has arrived with the objective delineation of land form based on structural fabrics and potentially active tectonic plane - 'creep tectonic' leading to unstability, using Remote Sensing and GIS. Major faults, Lineaments, were interpreted by visual interpretation. Band combinations, Directional filter, NDVI, PCA, and resolution merge of LISS + PAN data were prepared to enhance various geological feature for comparative study in Digital Image Processing. Other thematic layers like contour, drainage, spot height, major faults, minor faults, lineaments, geology, geomorphology, slope maps were prepared with topo-sheet and remote sensing data and later digitized for analysis in GIS. Finally all the thematic layers were integrated with proper weightage according to their contribution in nature to arrive at regional stability in tectonic plane structure.

Hydromorphogeological studies for ground water exploration and arsenic contamination problem in 24-Parganas, West Bengal

Supervisor

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Water is the more dynamic renewable natural resource, its availability with good and proper quality in appropriate time and space is significant. IRS-1D (Feb 2001) LISS-III and PAN digital data has been used for mapping geology, geomorphology, hydromorphology, drainage etc. The layers created from Remote Sensing Data and available ancillary data as well as GIS technique have been used for demarcating the ground water prospecting zone and arsenic contaminated area. Arsenic in ground water above the WHO maximum permissible limit 0.05 mg/l has been found in six districts of West Bengal including 24-Parganas covering an area of 24000 sq. km. with a population of 30 million. The affected zone of the study area of West Bengal lies on the flood plain of the Bhagirathi-Hugly River.

Generation of tourist information system for Haridwar city using Remote Sensing, GPS and GIS

Supervisor

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The study was undertaken with the aim of generating Tourist Information for Haridwar city using Remote Sensing and GIS. Haridwar city is a famous religious tourist place. IRS-1D PAN and LISS III imagery, Topographic map, ward map, guide map and GPS points were used as input data. The point coverages, included were, hotels, Ashrams, places of worship, banks, hospitals, police stations petrol pumps and post offices. Thereafter land uses, roads, contours and drainages were digitized in Arc/info. Buffer analysis was made around railway station, Mansa Devi and Har ki Pairi and along the main road to find the location of touristic points and land uses. The pictures of important touristic spots were also scanned and hot-linked. For perspective view, Digital Elevation Model was created and overlaid with LISS-III. Based on the findings, recommendations were made for the betterment of Tourism.

Resource utilization pattern in Pali Gad watershed (Aglar sub-watershed) - A geospatial analysis

Supervisor

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Watershed Management requires spatial knowledge of resource attribute along with socio-economic parameters. Pali Gad watershed (Aglar sub-watershed), which drains in the river Yamuna, is situated in a socio-economically backward region. The study was undertaken with an aim of generating the database of resource utilization pattern in the watershed. The land use/Land cover pattern of the watershed has been studied using the merged data set of IRS-1D LISS III + PAN. A geospatial technique has been used to determine the disturbance regimes in the watershed and the resource utilization pattern. The critical areas of the resources have been determined. This watershed has been identified as forested having distinct resource distribution.

Application of RS and GIS techniques for detecting changes in terrain conditions due to Kutch earthquake on 26th January 2001

Supervisor

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The study aims to carry out changes in terrain condition of the area around Bhuj, Gujarat on the aftermath of 26th January 2001, Kutch Earthquake (M 6.9). Pre and Post earthquake IRS LISS III and PAN data were compared for detecting the earthquake induced changes on surface. Significant variations in terrain conditions were detected by rationing, differencing and principal component analysis of pre and post data. Liquefaction features like lateral spread, sand blow and ground deformation have been identified both in the field and in the imageries and these are owed to the Kutch Earthquake. The rocks exposed the region are dominantly sandstone, shale, limestone and the Decan Traps of Mesozoic and Tertiary age. The landforms of the region have been evolved both due to endogenic and exogenic processes. Cuestas and hogback are noticeable geomorphic features both in Mainland and Katrol hill ranges.

Application of Remote Sensing & Geographic Information System for water and soil quality assessment in Sagar island, East coast of India, Bay of Bengal

Supervisor

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The study area, Sagar Island, at the mouth of Hugli estuary in eastern India extends from 21°37'21" to 21052'28"N latitude and 88°2' 17" to 88°10'25"E longitude. It cover an area of about 216 km^2. The present study aimed at the near shore and offshore water (up to 800m toward sea from high tidal line) and soil (CRZ) quality assessment in Sagar Island using the Remote Sensing, GIS and GPS techniques. For this the water and soil samples in near shore of study area were collected and analyzed. IRS-IC-LISS III Digital data were processed and analyzed using various software such ERDAS imagine and ARC/INFO. The processing and analysis resulted in various parameter distribution maps and productivity zone map.

Seismotectonic study of Kutch earthquake using Remote Sensing and GIS techniques

Supervisor

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Causes and relevant seismotectonic processes responsible for triggering Kutch Earthquake of 26th January 2001 and the accompanying swarm of aftershocks that took toll of more than 70,000 human beings have been studied using Remote Sensing, GIS and field based studies. Isoseismal map was prepared on the basis of the damage assessment in the field while theme maps of geology, structure, lineament, geomorphology and soil were integrated in the GIS environment to prepare seismotectonic hazard map of Kutch region. Pre and Post-Earthquake satellite data (IRS 1D LISS III and PAN) were utilized for studying the ground changes due to the earthquake. Many features indicating widespread liquefaction and lateral spreading of the soil have been detected through these studies. Based upon the population distribution in the region, seismic risk has been assessed.

Application of remote sensing and GIS for crop inventory in the mixed cropping region: A case study of Karveer Tehsil, Kolhapur district, Maharashtra state

Supervisor

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Karveer taluka is the most intensively cultivated mixed cropping region of the Maharashtra State. The present study is an attempt to discriminate and estimate areas of crops grown in summer season in the area by digital image processing of satellite data; to predict their yields using Leaf Area Index (LAI), spectral and agrometeorological indices and historical trend index; and suggesting optimal summer cropping pattern of the area. Classification accuracies of more than 90% were obtained for crop covers by digital classification of LISS III data. Significant positive relationships were observed between crop yield, NDVI and Leaf Area Index. These relationships were utilized for generating spatial distribution of crop yields. Optimum cropping pattern for the summer season for the tehsil was also suggested by GIS aided integrated analysis using soil, terrain slope and satellite derived existing crop inventory information.

Distribution of water supply system in Haridwar city using GIS-Network analysis

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Greater concentration of population in the city leads to increased demand of public utilities such as water supply. The water supply system is a network connection between source of supply, pipe and reservoir for distribution to demand. The aim of present study is to analyze the existing water supply network and its ability to meet the demand of new settlements, to investigate application of GIS through Network Analysis technique. The satellite data such as IRS-1 D: PAN image have been used to derive landuse/landcover map and road network map. Other maps such as Water supply map, Master plan and Ward map were taken from secondary sources. The inventory of the existing water supply system was made and future population were forecasted for evaluating the adequacy of the existing water supply system to meet the present and the future water requirements.

Study of existing public facilities in Haridwar using network analysis

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The study attempts to apply the Remote Sensing and Geographic Information System (GIS) technology for analyzing existing urban facilities in Haridwar. The main objective of this study is to identify the service coverage provided by existing facilities in the city. Road network and urban land use as the inputs for study were derived from IRS-PAN data and had been cross-referenced with the Topographic Map and Guide Map. Location relating to facility was collected using hand held GPS and demographic data relating to Ward Boundary was obtained from Local Municipal Office. GIS techniques such as network analysis, overlay analysis and buffer analysis were adopted to identify and calculate the service coverage given by existing facilities. Analysis of this study led to the conclusion that not all area and population get served from existing facilities therefore additional facilities is recommended.

Crop inventory and soil suitability assessment for land use planning - A Remote Sensing and GIS approach

Supervisor

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Dr. N.R. Patel, ASD
IIRS, Dehradun, India

The present study investigated crop inventory, crop yield modeling and assessment of soil suitability for efficient land utilization in Karnal tehsil, Haryana State. The acreage estimation and crop discrimination of wheat and sugarcane were carried out for two rabi seasons of 1997 and 2001 years, through supervised classification of IRS-1C LISS III data using MXL algorithm. Interestingly, it was observed that sugarcane cultivation is reduced over period of five years due to lack of adequate payment policy and crushing capacity of sugar mills. For development of models for wheat yield prediction, one or several variables like agrometeorological parameters and time trend representing technological advancement were related to historical crop field. In addition existing NDVI based model developed for northern Indian states was used to derive spatial yield variability of wheat in Karnal tehsil. Soil suitability analysis has been done for wheat, vegetable, sugarcane and maize for efficient land utilization in the study area.

Forest change detection and environment analysis in Tehri Dam, Uttaranchal

Supervisor

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Dr. Sarnam Singh, FED
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The study aims to find out the changes in forest cover and assessment of environmental condition around Dam, to study its impact on vegetation composition by using remotely sensed digital data. Indian Remote Sensing Satellite False Colour Composites (FCC) of IRS-1 B LISS-II of January 1989 (time-1) and IRS-1D: LISS-III of February 2001 (time-2) were selected. Data were developed, rectified and registered to each other using ERDAS IMAGINE software. To detect the changes in forest cover different change detection techniques, such as post-classification comparison (unsupervised classification), Principal Component Analysis (PCA) and Normalized Difference Vegetation Index (NDVI) were used. Results indicate that there is increased in abandoned agricultural fields. At the same time arable land has been converted into source of raw material for the Dam. Vegetation is mainly scrub of Euphorbia, Lantana etc.

Analysis of Aglar watershed in relation to terrain, soil and vegetation

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Aglar constitutes an important watershed of Yamuna basin in Garhwal Himalayan range This study was undertaken to investigate the relationship between forest vegetation types and soil using satellite data (IRS-1D LISS-III) and GIS techniques. The altitude in the study area varies from 1160 to 2986 m above mean sea level. The satellite FCC on 1:50,000 scale was used to prepare forest land use land cover type and density maps following visual anlysis. Field visits were made for ground truth collection as well as geomorphological and soil survey. Soil sampling was done to determine the physical and chemical characteristics of soils. ArcInfo, ArcView were used for database creation and analysis. A land capability map was generated using aspect, slope, geomorphology, soil depth and soil properties and this was combined with vegetation map to find out the relationship correspondence between land capability and vegetation types.

Travel route pattern for tourist places in Haridwar town

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The transportation system is one of the keys to rapid modernization, particularly in developing countries. Irrespective of whether roads act as a catalyst for development or play a more passive role in development. Haridwar is a major tourist place of Uttaranchal state, it is necessary to have a smooth to provide fast and comfortable access to various tourist places, as this will help a lot in promoting tourism in the state. Processing and analysis resulted in the optimum route for visiting various tourist places in Haridwar town by auto, walking and ropeway.

Soil erosion modeling in Pali watershed using Remote Sensing and GIS

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Forest clearing, overgrazing, poorly maintained marginal arable lands and fire have greatly altered the natural vegetation, leaving the soil open to degradation due to soil erosion. Thus the assessment and monitoring of the problem has a great importance for management of watershed for sustainable development. The present study of soil Erosion Modeling has been carried out in Pali watershed. It is the biggest sub-watershed of Aglar river, which is the one of the major watersheds of Yamuna river. SOI toposheets, merged image of IRS-1D (LISS III + PAN) is used for visual interpretation of the area. Empirical and process based models namely; Modified Universal Soil Loss Equation (MUSLE) and Morgan models are used to estimate the annual soil loss in the watershed. Out of those two models Morgan model gives better results than MUSLE.

Land evaluation for land use planning by integrated use of Remote Sensing and GIS

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Land evaluation is a prerequisite for land use planning for sustainable agriculture development. The study aims with generation of existing agricultural land use and cropping intensity and soil erosion inventory, and watershed prioritisation and land evaluation for land use planning by integrated use of satellite remote sensing (RS) and GIS in the part of Bhogabati watershed Kolhapur district, Maharastra. In this study, three seasons (Rabi, Summer, Kharif) IRS 1D LISS III data were used for generating cropping intensity information following visual Analysis method. The soil loss was estimated by Using Universal Soil Loss Equation (USLE) method. Optimal land use planning for the watershed was also carried out by GIS aided integrated analysis using soil, terrain, existing cropping intensity information.

Fire risk zonation in Aglar watershed (Part of Western Himalayas, Uttaranchal)

Supervisor

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Repeated fires, which are causing a great loss to our forest resources every year needs special attention to save our green wealth and the diminishing biodivesity. The study area is located in Aglar watershed (part of Western Himalays) in Tehri Garhwal administrative unit of Uttaranchal State in India covering an area of 119.90 sq km. IRS 1D LISS-III image was used as basic data for interpretation of forest and other land resources and SOI topographic map was used as supplementary data to obtain contour and roads etc. Using ERDAS and Arc-view software different layers were generated for fire risk modeling. Through GIS all the layers were integrated and final fire risk zone map was generated. Out of the total four fire risk classes, 1764.38 ha is under very high risk. 2587.40 ha is under high risk', 5979.15 ha under medium risk and 1659.89 ha is under low risk categories. It is also observed that the areas identified under these zones are matching with the ground observation and the fire history.

Change detection and assessment of salt affected soils using Remote Sensing and GIS techniques

Supervisor

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The study was taken up to assess the salt affected soils in Nisang Block of Karnal district, Haryana, using satellite Remote Sensing and GIS techniques. IRS LISS II data for 1989 and LISS III & PAN data for the years 1996 and 2000 were used. The main objective of this project was to study the changes in these soils over a period of 11 years. Soil profiles were studied in salt affected lands as well as reclaimed lands that are being cultivated. The laboratory data on pH and E.C. reveal that most of the soils have high pH (>8.5_) and low E.C. values (< 2 mmhos/cm). This is true for reclaimed as well as non-reclaimed soils at least in the lower layers. ILWIS software was used for digital image processing as well as for integration of data. Landuse overlays for the years 1989 and 2000 were prepared. Change detection has been studied. Since the salt affected lands were reclaimed before 1989, there is little difference in the area affected by salinity/alkalinity. The study has revealed that, the salinity/alkalinity still persists in the lower layers. Therefore, suitable management practices have to be followed regularly to get good crop yields from these lands.

Application of Remote Sensing and Geographic Information Systems for coastal zone management in Sagar island, East Coast of India, Bay of Bengal

Supervisor

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Remote Sensing, Geographic Information System and GPS techniques have been recognized as a powerful means in monitoring and assessing the natural environment and resources of different coastal part of the world. Today coastal zone management is studied by environmentalists, decision-makers and researchers to a greater extent. The present study was taken up with the aim of application of Remote Sensing and Geographic Information System for coastal zone management in Sagar Island, East Coast of India, Bay of Bengal. The major objective of the study is to generate and analyse the coastal database of Sagar Island using both spatial data and non-spatial data such as multi-temporal satellite data and field information for coastal zone management purpose.

Change detection study of Sagar island, Bay of Bengal using Remote Sensing and GIS

Supervisors

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Sagar island is the largest estuarine island system at the confluence of River Hooghly, the Bay of Bengal. Coastal zone of Sagar Island is very active in nature and environmentally very sensitive. Various physical features of land and water quality using remote sensing techniques have been carried out. The present study compared image differentiation, image rationing, principal component analysis, classification techniques (supervise and unsupervised), vegetation index (NDVI) and post classification comparison. This study also describes the problems created by the process of changes- natural and man-made around of Sagar Island and remedial measure have been suggested using Remote Sensing and GIS techniques.

Geological risk analysis using Remote Sensing and GIS of Rishikesh and surrounding areas, Uttaranchal, India

Supervisor

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Earthquakes, Flash floods and Landslides are the major and common geological hazards in the Himalayan region. For the current study Rishikesh area of the Uttaranchal district, India has been considered. Geomorphological, Geological study have been carried out using IRS-LISS III and PAN images and GIS software. Liquefaction plays an important role among earthquake related hazards. Riverbanks are very prone for erosion especially due to the effect of mighty river Ganges. Geologically Chandpur slate phyllite formation is very vulnerable to landslides. Subathu formation is also very prone to the landslides. Several themes were prepared and with the support of GIS software, hazardous and risky areas have been identified.

Geomorphological set-up and geological hazards in Doon valley area

Supervisor

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Doon Valley is located in the southern part of Himalayan mountain ranges and to the north of Indo-Gangetic plain. Geologically the study area comprises of pre-cambrian, Subathu, Siwaliks and Quaternary period. Two major thrust zones the main Boundary thrust and the Krol thrust lie within the study area. Geomorphologically the study area comprises of Structural Hills, Piedmont, river terraces and alluvium. In the present study three kinds of Goelogical Hazards (landslide, erosion & silting) have been considered. The hazard data have been derived from satellite image and field investigation. Various thematic layers such as geology, geomorphology, structure etc have been prepared and analyzed under GIS environment. On the basis of integration analysis the geological hazard map of Doon vallley have been prepared. The output obtained can be very helpful for infrastructure construction and hazard mitigation in the Doon valley.

Remote Sensing and GIS for mineral exploration in Pur-Banera area, Rajasthan

Supervisors

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The present study has been carried out in the Pur-Banera area of Rajasthan State, India to evaluate the potentials of Remote Sensing and GIS techniques in mineral exploration. The results have been compared with the known locations of mineral occurrences, to choose the most favorable zone for detailed investigations. The IRS-PAN and Landsat TM data have been digitally processed to enhance the ferruginous quartzite, which is the host rock for mineralization. Ground-based temperature measurements have been also made to map the Apparent Thermal Inertia (ATI). The high thermal inertia zones fall within the ferruginous quartzite and may also indicate the concentration of ore minerals. These ground-based observations match well with the thermal infrared data (TM band 6).

Retrieval of Sea Surface Temperature (SST) and phytoplankton concentration using NOAA (AVHHR)and IRS-P4 (OCM) data, and their utility in fishery oceanography

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Fishing zone forecasting methodology has been applied successfully in many countries. However, most of the forecasting and detecting methods are possible only when there are sufficient data receiving stations which receive various satellite data. But there are very few developing countries which has satellite receiving stations. The primary aim of this study is to retrieve SST from NOAA AVHRR and utilisation of Phytoplankton concentration map of Sea-WiFS available from internet websites. The Potential Fishing Zone (PFZ) has been delineated using SST and Phytoplankton concentration map derived from IRS-P4 (OCM) around Bay of Bengal. The derived SST from NOAA-AVHRR data is shown in figure. The limitations of low resolution data for PFZ forecasting has been discussed.

Remote sensing and GIS application in the erosion/accretion modeling, prediction and semi- automated delineation of the coastal boundary along the Sagar island, Bay of Bengal

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The eroded and accreted portions along the coast of the Sagar Island, Hooghly estuary, Sundarbans region were detected and calculated. A mathematical model was used for the estimation of total volume of erosion as well as accretion during a 32-year period between 1968 and 2002, through the study of multidate toposheet and IRS-1C/1D: LISS-III imagery. Further IRS P4 OCM data were used to map the Suspended Sediment Concentration (SSC) around the Sagar Island. A Digital Bathymetry Model (DBM) was generated and the Depth of the Longshore Transport (DLT) was calculated. The changes in the areal extent as well as linearity of the coastline were identified. Based on this erosion/accretion model, suggestion are made for protecting the existing groins and embankments and also for the construction of new structure as per the required specifications at the erosional hot spots along the shoreline of Sagar Island.

Forest type and density mapping in the part of Timli and Badkala forest ranges using high resolution satellite Remote Sensing data

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Forest cover type mapping is a prerequisite for management of forest. Present study is an attempt to characterize forest into type and crown density classes using high resolution Satellite data. For forest type classification temporal data set of two different dates have been used (IRS-1D LISS-III ,March, 2001 & IRS-1C October, 2000) while visualizing fused data of LISS-III and PAN. For crown density classification single data IRS-1D PAN data March, 2001 has been used to derive four crown density classes. Results show that Sal forest is the dominant category covering 38.73 sq.km. of the study area. Sal mature, middle-aged and young cover 5.35 sq.km, 16.64 sq.km and 16.74 sq.km respectively. Scrub formation inhabiting in the southern aspect covers 2.35 sq.km.

Dynamic approach of agro ecological zoning using Remote Sensing and GIS

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Agro-ecological zone is a major area of Land that is relatively uniform with respect to crop production possibilities. The study area is kumaon region of Uttaranchal comprising viz., Almora, Nainital, Champawat and Udham Singh Nagar Districts. Multi-temporal satellite data of IRS-WIFS were analyzed for agricultural land use and cropping system map, physiographic soil maps, topographical map dereved terrain slope map, ancillary data of soil characteristics, agro-meteorology (rainfall and temperature) and NOAA AVHRR derived monthly vegetation indices. Agro-edaphic zones map depicting soil and terrain potentiality for agriculture was generated by combining soil characterstics (soil texture and soil depth), agricultural land use and slope maps. Agro-climatic zones maps depicting climate favorable for agriculture was prepared by GIS aided union of rainfall, temperature regime, moisture regimes and vegetation productivity. Agro-ecological zones map was generated by GIS aided integration of "Agro-edaphic" and "agro-climatic" map layers.

Application of Remote Sensing and GIS in land use planning

Supervisor

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The present study has been carried out in part of Nainital and Udhamsingh Nagar Districts, covering an area of 567.75 sq.km. Present land use/land cover map was prepared by both visual and digital methods using IRS 1C LISS-III satellite data of March 2002. The dominant land use/land cover identified by visual method, are crop land (wheat/sugarcane) (33.48%), fallow land (14.72%) and forest/plantation land (43.12%). The forest /plantation area was discriminated into various forest types viz. eucalyptus (25.97%), teak (13.61%), popalar (2.46%) and sal (1.08%) due to its distinct image characteristics on march month imagery. The area is comprised of alluvial plain (tarai), piedmont and hills. Contour map was prepared to prepare digital elevation model (DEM). The slope map derived from DEM showed that 66.46% area are nearly level while 31.00% are gently sloping.

Crop inventory by digital processing of multi-spatial resolution satellite data - A case study

Supervisor

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Crop discrimination and area estimation is one the vital component of crop production forecasting system of a region. Satellite Remote Sensing technique is an effective tool for discrimination/identification and estimation of crop area of a large region, because of its multi-spectral, multi-spatial and multi-temporal data availability. The objective of this study was to evaluate various digital classification approaches and study the effect of spatial resolution of satellite data on crop discrimination and acreage estimation. Several digital classification approaches viz: supervised (maximum likelihood, minimum and mahalonobis distance); sub-pixel classifier; spectral vegetation indicies based threshholding and image texture based classification were evaluated for Rabi (winter) crops discrimination in Kichha tehsil of Udham Singh Nagar district, Uttaranchal, India. IRS-1D: LISS-III and WiFS digital data were used in this study.

Ecological assessment of Timli forest using Remote Sensing and GIS

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Sustainability of forest ecosystem is an essential component of the environmental conservation efforts and any degradation of forests will have an adverse impact on various systems such as water resources, agriculture, biodiversity, environment, climate and human health, besides, the subsistence living of tribals and other communities living in and around forest areas. Therefore, the functions with respect to conservation of soil, water and biodiversity are vital for the welfare of present and future generations. Present Study is aimed at-(a) preparation of forest type and density map, (b). ecological assessment of forest vegetation and c) preparation of forest degradation map. The study area falls in the Timli Forest Range of Kalsi Forest Division. It covers an area of 73.6 sq. km., between 30° 20' to 30 °25' N and 77°40' to 77°45' E. Field data, for phyto sociological analysis of forest vegetation, were collected from 41 samples. The digital data of IRS-ID LISS-III, PAN merged IRS ID LISS-III and PAN data of IRS ID were analysed using PC based ERDAS IMAGINE for preparing forest type and density maps. The Digital Elevation Model (DEM) was generated by electronic scanning of Survey of India (SOI) map and the subsequent preparation of data base and slope map under ArcView. Similarly a village point map was generated from SOI map for the preparation of village buffer map. The final map, showing forest degradation, was prepared by integrating, indexing, assigning the weightages and the subsequent analysis cum modeling of above maps. Maximum degradation was estimated in dry deciduous mixed forest followed by sal-mixed and sal. Dry deciduous forest shows high diversity in comparison to others. Fuelwood and fodder value of a particular forest and the distance from the settlement have been the main components of forest degradation in the study area.

Developing urban infrastructure indicators for Saharanpur city

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Municipal facilities and services are important components of a city and play a vital role in the quality of urban life. This study is concerned with municipal services comprising of schools, colleges, parks, hospitals, post offices, and cinema halls. Saharanpur is one of the major city of Uttar Pradesh and is located in the central part of Saharanpur District. The main aim of the study is to develop urban ifrastructure indicators and analyse the distribution pattern of municipal services / facilities in Saharanpur City. To prepare the land use / land cover map, IRS 1C : LISS-III + PAN data (November 2001) and IRS 1C PAN (February 1996), ancillary data such as SOI toposheet (1973) and SOI guide map (1986) of the city including

various secondary data were utilized. Field visit for ground truth collection and verification of land use / land cover interpretation was made during which various services and facilities were also verified with the help of G.P.S. Data base of the facilities and services were generated using Arc INFO 3.5.1 and ArcView GIS. The urban indicators and other analysis were done in arcview using the above database generated.

Site suitability analysis for solid waste management and disposal using RS & GIS technology : A case study of Saharanpur city, India

Supervisor
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Solid waste management is a burning issue that has caused environmental degradation especially in urban localities. The key elements of solid waste management are three Rs (reduce, reuse and recycled) and primary environmental care that will make a zero-landfiling goal in the long term. The RS & GIS technology provides an opportunity to integrate the resources and analysis to make effective scientific decision. The study area of Saharanpur city is the third largest dense populated city of Uttar Pradesh, India and more prosperous industrial city of Uttar Pradesh. The objective of the study was to study the potential application of RS&GIS technology to find-out the site suitability area for solid waste disposal in Saharanpur city. IRS-1C : LISS-III and PAN merged satellite data has been used to identify the suitable land for site selection.

Study of urban growth and site suitability analysis for the future expansion of Saharanpur city

Supervisor
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This study has been carried out in three parts. Part-I deals with the study of 'Continious Built-up area' of Saharanpur city of years 1973, 1966 and 2001. Part-II deals with the study of change in urban land use between 1996 and 2001. Part-III analyses suitable land available for future growth of Saharanpur city. Satellite data IRS-1C : LISS-III FCC + PAN (Nov 2001), LISS-III +PAN (Feb 1996), Topography map - 1973, master Plan 1985-2001 and Guide map - 1983 along with secondary data collected from field work have been used in the analysis of this study. This population growth is slower for Uttar Pradesh with 20.78% as compared with the countries average growth of 27.78% of the total population for Uttar Pradesh with 27.78% as compared with the countries average growth of 27.78% of the total population as recorded by the census between years 1991 and 2001.

Study of environmental degradation in and around Cherrapunjee, Meghalaya and identification of the trend of environmental changes from multi-temporal information

Supervisor

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An area covering approximately 200 sq. Km and forming a part of Shillong Plateau around Cherrapunjee, in East Khasi Hills district of Meghalaya, North East India has been undertaken to study land degradation caused due to the sequential changes arising from mining and mass wasting processes. Remote sensing data namely IRS-LISS III, PAN and Landsat TM data have been used to quantify the changes by automated change detection procedure. Based on the above study, an attempt has been made to project the future scenario of Land degradation using multiple information layers on terrain parameters derived from Remote sensing data and integrating under GIS environment.

Analysis of environmental variables and land surface processes using Landsat- TM temporal NOAA AVHHR data

Supervisor

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Monitoring, mapping and quantifying the changes in ecophysical and agro-hydrological environments are having a major role in the study of global environmental change. Temporal NDVI and LSTs were obtained from the NOAA 14 AVHRR. Landsat TM data were used to derive various surface state variables such as albedo, surface temperature, net radiation and surface energy balance components. The spatial variation of net radiation suggests high values (9820-900 W/m^2) for moist fallow lands. The regression analysis of LST and NDVI shows a strong negative correlation found between LST and NDVI during different growth stages of winter crop growing season for Udham Singh Nagar district. However, relative humidity with NDVI shows the positive trend while with LST it shows the negative trend over agricultural areas. The trend is varying among the respective districts in response to vegetation cover and hydric deficit.

Growing stock estimation using high resolution remote sensing data and GIS in Timli forest range (part), Kalsi soil conservation division, Uttaranchal

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Supervisor
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In forestry, growing stock estimation is an important parameter required for forest management. In the present study, satellite remote sensing data has been digitally classified to generate forest cover type and density classes using hybrid classification technique. ERDAS Imagine 8.4 and Arc View software were used to generate thematic layers viz., compartment map, roads and fire lines, drainage map, contour map, slope map, aspect map and digital elevation map to highlight the distribution of growing stock in the study area.

Remote Sensing & GIS based curve number estimation for rainfall runoff modeling

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The objective of this study was to develop curve numbers and sensitivity analysis of them, comparison with the observed runoff data and creation of spatial data using PAN and LISS III data and GIS techniques. The Bainkhala watershed is located in Doon valley, Uttaranchal state. Land cover is mainly homogeneous Sal forest and agriculture. A supervised classification of IRS: LISS III image was done to get land use and land cover map of the watershed. The soil texture information was obtained from soil association map. ERDAS and ILWIS software were used to generate those maps. The rainfall runoff modeling was done using SCS method. With the observed runoff data, curve number for different features in the watershed was estimated.

Assessment of crop water requirements in Chagalnadu lift irrigation scheme

Supervisor

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This study was undertaken in Chagalnadu lift irrigated Scheme in Andhra Pradesh to investigate the capability of satellite remote sensing data in crop inventory and computation of crop water requirements. The data used are multi temporal and multi-sensor satellite data such as multi-spectral data IRS-IC LISS III (September 2000), high resolution data of IRS-IC, PAN (August, 2001) and merged data of IRS-1C LISS III and Panchromatic (December, 2000). Using these data land cover mainly crop inventory was made. The main categories of crop covers are double crop (paddy), single crop (paddy), sugarcane, dry crops, fallow and plantation. Crop water requirements for these crop types are calculated in the command area. Since project is under construction, the computed crop water requirements are compared with the design discharges of the canal system. It was found that the canal design discharges are higher than the actual crop water requirements.

Groundwater targeting using Remote Sensing and GIS in part of western Doon valley

Supervisor

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Groundwater targeting has been carried out in part of western Doon valley spread over an area of $500km^2$. A series of map on various themes have been generated from satellite imagery with the help of digital image processing. Doon valley is an asymmetric syncline formed during middle to late Pleistocene period. Geomorphologically the North-eastern most part is covered by denudo-structural hills, made up of hard and compact Pre-Tertiary rocks. Structural hills are marked in beside and adjoining to denudo-structural hills and in the small area in the Southern part of the study, made up by Subathu and Siwaliks formations. Several residual hills made up of boulders and gravels embedded in clayey and sandy matrix are located in northern part. The central syncline zone is marked by thick fan deposits, whereas number of river terraces occur on the band of Yamuna and Asan river. Drainage pattern and density slope, geological and geomorphological maps have been interpreted for preparation of groundwater prospects zone map with the help of GIS technique.

Assessment of environmental impacts due to coal mining in a typical Gondwana coalfield of India from optical, thermal and Interferometric SAR data

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Jharia coalfield, Jharkhand, is characterized by a prolonged mining history and aggravated environmental conditions due primarily to unplanned and unstable mining activities before nationalization and the inherent environmental impact of coal mining during its entire mining history. In this work, an attempt has been made to develop a satellite remote sensing based technology for this purpose using synergistically optical, thermal and interferometric SAR data. Findings a deeper understanding about the nature of the coal fires has been sought and finding out the possible future measures to extinguish or minimize them. Finally, a potential hazard map based on the present mining status and environmental situation was prepared.

Spatial Decision Support System: To identify suitable site for small hydro power station

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Remote areas are benefited by Small Hydro Power (SHP), which cannot be connected through the national grid, over a long period of time. Conventional knowledge of hydropower with the geo- spatial data has been used to identify more suitable areas. The Song watershed in the Doon valley, which has the greatest potential for hydropower, has been taken as a study area. The conventional knowledge of hydropower is transformed into decision rules in the GIS environment. The main thematic information considered in the knowledge base are drainage, slope, non-floodplain, perennial rivers, proximity to rural settlements and Stream/River, proximity to existing roads, geology, and width of the river. The above- mentioned thematic layers have been generated using panchromatic and multi-spectral images of IRS-1D, topographic maps and ground truth. Suitable sites for hydropower stations have been identified using Spatial Decision Support System tools by using the set of derived criteria. This method will help in deciding locations for the hydropower elsewhere in hill region.

Monitoring of non-conforming land use along major roads using RS And GIS - A case study Jaipur city

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The Detection of non-conforming land use plays a vital role in urban management and the environment. In this study using Remote Sensing and GIS the detection of non-conforming land uses as per master plan was done along major roads for Jaipur city, Rajasthan State, India. The result showed that most of the violation took place within a distance of 500 meters of main roads. The major violations were from residence to industry and open space to industry and in the centre and south parts of the city. The results obtained in this study show the usefulness of RS and GIS in master plan monitoring, and their efficacy in the hand of urban planners. IRS-1D: LISS-III digital data were used in this study.

Remote Sensing and GIS for tectonic enhancement and analysis in the West of Doon valley

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Remote Sensing techniques have been found to be of utmost importance in tectonic activities. Present study has been carried out in the Poanta area, west of Doon valley, India to evaluate tectonic activity by using aerospace data with selective ground verification. IRS-LISS III and PAN data have been digitally processed to enhance the geological and geomorphological characteristics. Out of all the digital image enhancement techniques FCCS of ratio 4/3, PAN, LISS-III, respectively has given the best results for tectonic activity and geomorphological features. The study of erosional and depositional landforms modified by tectonic process in the study area has been helpful in analyzing the activity of related tectonic structures. Morphometric analysis of fault generated mountain front and related alluvial fan system in terms of mountain front sinuosity index, fan slope, sweep angle etc, have provided valuable information about the tectonic regime of the study area.

Cropping pattern change analysis and optimal land use planning by integrated use of satellite Remote Sensing and GIS -A case study

Supervisor

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This study was undertaken with the aim of analyzing changing cropping pattern and suggesting optimum land use plans .The area study is a community development block, namely Barwala, in Panchkula district, Haryana. IRS-ID LISS III and Landsat TM digital data acquired in 1997-1998, 2001 and 2003 have been used for the analysis. A supervised digital classification approach was adopted for the preparation of a temporal crop and land use inventory. Cropping pattern analysis was carried out by GIS aided integration of temporal crop inventory information. The FAO land evaluation approach using GIS based integration has been exercised to emphasize the possibility of raising the suitability of different cropping areas for a particular use with suitable management practices. Finally, optimal land use plan for the area were suggested by GIS aided integrated analysis.

Use of RS and GIS for change detection due to conservation measures in integrated watershed development plan

Supervisor

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In an integrated Watershed approach, planning and monitoring using RS and GIS techniques have been accepted as the optimum for sustained outputs from the watershed. A case study of Dangri river watershed, has been taken up which is located in Ambala district, Haryana State, India. The integrated watershed development project(IWDP) funded by external agencies such as the World Bank and the European commission has been implemented in this watershed. An attempt has been made to evaluate some of the watershed conservation measures using satellite and field information. The satellite data IRS-1C/1D LISS-III of February 1997, and February 2003 were used. Change detection of Land use from 1997 to 2003 in some of the villages had been carried out.

Asian elephant habitat analysis and suitability modelling in Kamengsonitpur elephant Reserve using Remote Sensing and GIS

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Illegal encroachment on natural habitats is one of the most critical issues in wildlife conservation today. This phenomenon is very prominent in Sonitpur district of Assam. In this study, an effort has been made to explore the potential for remote sensing and GIS to study the Asian elephant habitat loss in the Kameng-Sonitpur Elephant Reserve and to determine the habitat suitability for elephants. Data pertaining to three periods (1994, 1999 and 2002) of Landsat-TM, and IRS-1D LISS-III were used to quantify the habitat loss and to generate the input for the habitat suitability analysis.

Application of Remote Sensing & GIS in evaluation and monitoring integrated watershed development programmes (IWDPS) in India: A case study of Dangri watershed, Haryana

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This study is an attempt to develop an analytical framework, aided by remote sensing and GIS, to monitor and evaluate the watershed development programme (WDP) in Dangri watershed in Panchkula district in Haryana, where the programme has been implemented since 1998-99. A crop and land use inventory for two points of time, both for Kharif and Rabi season, had been carried out based on LISS III, IRS ID and Landsat TM data from which monitoring of WDP performance was attempted in terms of changes in cropping pattern, cropping intensity, cropping system, livelihood status and natural resource management status for the implementation and non-implementation villages. The findings of the study indicate that in terms of increase in cultivable area, soil erosion status and priorities of villages, the WDP has made a positive dent even within such a short span of year years.

Study of erosion/accretion and bathymetry using Remote Sensing and GIS towards coastal zone management of Goa coastal region, West coast of India

Supervisor

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In the present study, IRS ID LISS III data of 1997 and 2003 with PAN 2003 were used to find out the extent of erosion and deposition, and an attempt had been made to discover their probable causes. Here, the IRS-ID LIIS III satellite data also had been utilized to map the near shore coastal bathymetry. The green band of the sensor is suitable for studying the depth profile in the shallow coastal water, because of relatively minor absorption in this channel, which helps the green light to reach the bottom surface and return to satellite sensor after reflection. Coastal bathymetry can be estimated using statistical method. Qualitative estimation of suspended sediment concentration, which has a role in navigational purposes, had also been found out in the study area. Finally, an attempt had been made to create a suitable coastal management plan, for the Goa coastal region by putting all this information together.

Application of Remote Sensing and GIS for studying urban sprawl: A case study of Jaipur city

Supervisor

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Jaipur, capital of Rajasthan State and an important tourist centre of India experienced rapid growth in the urban area and increasing population pressure resulting in deterioration of the quality of life. The object of the study was to detect the change in distribution of land use / land cover in different time periods and study the direction of urban expansion from multi-temporal satellite data. In the present study SPOT (FCC) of 1988, IRS-1C (PAN) of 1998 and IRS-1C (PAN+LI SS-III Merged) of 2003 have been used. The inventory of land use and land cover is carried out by visual interpretation with the help of local knowledge, and analysis carried out using GIS. Analysis of the temporal and spatial changes in land use and land cover led to quantification of change with the trend of the expansion process, which clearly demonstrates the usefulness of Remote Sensing and GIS techniques for Urban & Regional Planning.

Land capability and land use adjustment analysis for land use planning

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To ensure sustained productivity through scientific planning, the watershed needs basic knowledge on appropriate land resource status and a scheme for analysis of land use capability with risk of land degradation as the main criterion. The study was carried out in Tons watershed, Dehra Dun district of Uttaranchal state. FCC of IRS-1C LISS III data acquired on March,2003 was visually interpreted and variant land use/land cover classes were delineated. An existing Physiographic-Soil map was used to obtain soil type, soil depth and erosion conditions. Thematic information on soil depth and erosion class were integrated with the slope map to define a land capability map based on that criterion of FAO(1990). The spatial themes on land use and land capability were then integrated to generate a land use adjustment map depicting the watershed area as lying under-used, over-used with capability, or used with capability needing conservation measures. Agronomic and engineering soil conservation measures were suggested, considering erosion status, land capability and land use adjustment.

Geomorphic parameter for past Himalayan crustal deformation leading to geodynamic evolution and its effect on present instability in trans Yamuna Giri sector Poanta (HP) India - RS and GIS based study

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Aerial photographs and digital data of IRS I D LISS-III & PAN were used for visual and digital image analysis. 'Kiarda Doon' a continuation of Doon Valley in Himachal and partly its eastern part Dakpathar side was considered for the present study. Two major thrusts (1) MBF separating upper (youngest) with lower (younger) tertiary rocks, (2) Krol thrust separates lower tertiary from Pre-tertiary (oldest) rocks, are identified. These thrusts/faults are as such the weaker planes developed due to shearing and in case of fresh tectonic/seismic activity, considered to be vulnerable zone for releasing of energy. Secondly in normal case-back slope area may experience landslides, rock fall, debris slide where as dip slope side may face rotational slide, slumping, creep tectonic and mudflow.

Soil spatial variability and land capability assessment using Remote Sensing and GIS

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Soil variability can exist in both undisturbed and intensively managed ecosystems because of complex interactions between time, parent material, topography, climate and organisms and different human management practices. Land capability classification is of prime importance for assessing suitability of land for general crops, forestry and grazing. The study was taken up to assess the soil spatial variability of the terrace cultivated lands in a micro watershed part of the Sitlarao watershed and land capability classification in the Sitlarao watershed using satellite Remote Sensing (IRS-1C LISS-III) data and GIS techniques. This study examines the spatial variability of pH, electrical conductivity (EC), soil organic carbon (SOC) and soil texture at soil profile. All land capability classes are recognized based on the criterion for land capability classification proposed by USDA. Various soil and terrain factors maps were integrated in GIS environment for land capability assessment.

Integration of ocean color data, thermal sensor data & environmental parameter for assessment of productivity of the coastal water

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Satellites are used as an important tool for understanding the marine processes, ecology, and the coastal environment. In the present study the in situ data collected of Goa, west coast of India, the World Ocean atlas data and the satellite data have been used for analysis. The main database consists of phytpplankton, nitrate, phosphate, silicate, temperature, Oxygen and pH. The NOAA-AVHRR data of the month of April 2003 has been used for retrieval of sea surface temperature. The phytoplankton concentration map of the same day from IRS-P4(OCM) data has also been used for analysis. The OCM data and AVHRR data have been analysed for identification of Productive Zones of the coastal regions. The integrated in-situ and the world Ocean atlas data for chlorophyll concentration map and the final analyzed productive map of Goa, west coast of India have been produced.

Assessment of growing stock and evaluation of socio-economic implication using Remote Sensing and GIS in Timli and Malhan forest range (Part), Kalsi soil conservation division, Uttaranchal

Supervisor

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In the present study, satellite remote sensing data was digitally classified to generate forest cover type and density classes using a hybrid classification technique the area. The socio-economic data was collected using the RRA technique and its influence on growing stock was evaluated by analysis of data and maps. ERDAS Imagine 8.4 and Arc GIS software were used to generate thematic layers viz, forest cover type and land use map, forest density map, compartment map, roads and fire lines map, drainage map, settlements map, and buffering of settlements to assess the implication of socioeconomic influence on the growing stock in the study area.

Groundwater recharge estimation using Remote Sensing & GIS

Supervisor

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The study has been carried out in Chhindwara district, Madhya Pradesh, India to estimate the groundwater recharge with the help of remote sensing and GIS techniques. In this attempt, the water balance equation is used to estimate the recharge in the study area with the changing of land use and land cover. A database was created from various sources including remote sensing and GIS. The data layers generated were rainfall, evapotranspiration, land use, land cover and water level of the wells. Temporal remote sensing data were used (IRS 1C/1D LISS 3) along with groundwater level data. Subsequent to the field investigation it was understood that the recharge in the monsoon period in agricultural fields is significant, and discharge is also high due to draining out to the river system with usage during Rabi season and inter- seasonal cultivation period. The NDVI was used to classify the land use and land cover, and shows that there are significant changes in land use and land cover during Karif and Rabi seasons, particularly in agriculture, fallow and barren land with temporal data.

Remote Sensing and GIS applications in irrigation water management

Supervisor

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Remote sensing and GIS have become promising tools to meet the challenges in irrigation water management. The present study is carried out to prepare the crop inventory within the irrigation command area, to identify the cropping dynamics in the study area, to estimate the crop water requirement based on ET, and to compare the irrigation water requirement with the canal supply. Keshavrai Patan branch irrigation command area, a part of the Chambal Irrigation Project in Rajasthan, Western India, is selected for the study. Landsat TM February,1987 and IRS-1C:LISS-III January, 1999 satellite images are used for the analysis. Climatic data, soil data, canal discharge data and other required data were collected during the field visit. The satellite data were digitally classified using various classification algorithms for making a crop inventory. CROPWAT model developed by FAO was used for assessing the crop water requirement. Water demand and supply analysis showed a clear gap between crop water requirement and the canal water supply.

GIS based method and software customization for landslide susceptibility analysis along Shillong Shilchar highway, North East India

Supervisor

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Landslides are one of the natural hazards, occuring particularly in developing countries which cause immense loss of human life and property. The present study has been carried out in parts of Shillong-Silchar Highway that is in the Cherupi - Lumshnong - Sonapur area of Meghalaya and Assam States, India. Various thematic layers such as lithology, geomorphology, structure, land use, slope, slope aspect, weathering, soil texture and soil depth, anthropogenic factors, dip-slope relationship, drainage and landslide incidence have been prepared by analysis IRS LISS-III and PAN merged satellite image, topographical maps, literature and field observation. The whole data processing chain has been customized using Avenue programme which enables easy calculation of information value for each geo-environmental factor and multiple layer data integration using both methods. The customized software extension can be used for organization and modeling of spatial data of any area for landslides hazard analysis.

Terrain characterization for landslide susceptibility analysis along Shillong Silchar Highway, North East India

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Landslide hazard/susceptible zone maps are a pre-requisite for any developmental planning in hills/mountainous terrain. In the present study, a part of the Shillong-Silchar Highway corridor in the Cherupi-Lumshnong-Sonapur area of the Meghalaya and Assam States, India, has been used for a landslide susceptibility analysis using RS and GIS techniques. The IRS PAN and LISS-III merged FCC on 1:25,000 scale have been interpreted in conjunction with ground checks and collateral data to prepare thirteen evidential theme maps, such as lithology, structure, geomorphology, slope, slope- discontinuity relation, rock weathering and drainage. These maps have been analysed with reference to the existing landslides to understand the factors causing, and the mechanism involved for landslide occurrence. Finally, GIS has been used to prepare the landslide susceptible zone map, which will help the local government in taking appropriate steps while planning the developmental activity in the area.

Remote Sensing and GIS for urban green space analysis: A case study in Jaipur city, Rajasthan state

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Greenery has an important role, as well as indicating the environmental condition of urban areas. This study tried to analyze, 1) the green spaces and their change in a time frame, 2) the concentration and distribution of green spaces, and 3) the identification of green relief areas. Jaipur city was focused upon with these objectives, the changes of green spaces were analyzed over three time periods. The change in green space in the city became clearer by using data on land use classification and the N D V I. Green relief areas where places are crowded but closed to green spaces, density and proximity the analysis function in GIS was carried out. Finally, the above methods can be applied to conserve the existing green spaces and assess the requirement for new green spaces in the urban area.

Snowmelt runoff modeling and its customization in GIS environment

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Runoff resulting from snowmelt is of vital importance for a number of countries in the world. Most of the great rivers start either from glaciers or snowmelt. In this work an attempt has been made to estimate snowmelt runoff using the Martinnec-Rango Snowmelt Runoff Model. Primary inputs for SRM are Snow cover Area, Rainfall Distribution and Temperature. Using recent advances of Informational Technologies, a programme that makes hectic work somewhat easier, was developed. ArcView 3.2 was used as a starting platform and built in avenue language was used for the development of "SRM tools" Arcview extension using multi - temporal satellite images of IRS 1D, WIFS sensor, snow cover has been delineated. An elevation zones map was then retrieved from DEM. Applying "SRM Tools" all required information was derived and the discharge for the 2000- 2001 season was estimated, with reasonable accuracy.

Retrieval of agro-meteorological and crop bio-physical parameters using IRS-WiFS data

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Satellite derived agromet parameters have several advantages over conventional measurements of agromet data in ground meteorological network. The objective of this study was the retrieval of several agro-meteorological and crop biophysical parameters using IRS-WiFS satellite data. The study consisted of four districts of Uttar Pradesh and Uttaranchal States. The AHAS (AVHRR Hydrological Analysis System) customized software with ILWIS software interface was used in this study. Crop and other land use inventory was carried out by digital classification of satellite data. Several agro-meteorological parameters, viz. Broad band Planetary and Surface Albedo,FPAR and Absorbed PAR (APAR), Crop transpiration Co-efficient (Kc), ET were retrieved using IRS-WiFS data with AHAS. Bio-physical parameters (LAI-leaf area index) and Fractional vegetation cover (Vc) of the dominant crops in the study area, were also derived using WiFS data. The relationships between spectral indices and agro-meteorological parameters were also investigated.

Evaluation of biophysical sustainability of rained agriculture using Remote Sensing & GIS

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Modern crop growth models account for the dynamic nature of the land use system for assessing their sustainability. The study area consists of the Doon Valley, Dehradun. Uttranchal .Satellite and ancillary data used in this study include IRS-IC LISS-III FCC on 1:50,000 scale, digital data of February 2003, March 2003 and Oct 2002, ground measurements on LAI, monthly agro meteorological data, Soil mapping unit and their characteristics, and SOI toposheets. Present cropping pattern of the study area was generated by integration of Kharif and Rabi inventory. SAVI was used to generate crop coefficient (Kc) of wheat for mapping crop water requirement. Soil map, land use map, contour map and ancillary data (soil attributes, rainfall) were used to calculate soil loss and evaluate land suitability based on FAO methods. Water limited production potential was calculated for the current land use system using CROPWAT model and the impact of the current rate of soil erosion on this production potential after twenty years evaluated for arriving at a biophysical sustainability level of a different land use system.

Delineation of unstable slopes in a part of Song river watershed using RS & GIS

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The slope failure and mass-movement processes in young mountain ranges such as Himalayas play havoc affecting socio-economic life and natural environment of the region. The study is concentrated using geo-environmental factors and statistical modeling techniques for delineating the areas susceptible to instability. The topographical map of the area, IRS-1C-LISS-III FCC carried out for extracting information on land use, geology, geomorphology and roads aided by field traverses for ground truth data collection. The present study aims to utilize the potential of remotely sensed data for extracting geo-environmental and integrating the same in GIS.

Mapping and monitoring of land use/ land cover and lake boundary using Remote Sensing and GIS techniques: A case study of Udaipur city, Rajasthan

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The present study is undertaken to demonstrate the potential of use of integrated Remote Sensing and GIS technique for determining the change in Land use/Land Cover pattern using a temporal Remote Sensing data of IRS (IRS-P6 LISS III Feb 2004, IRS-1D PAN Feb 2004, IRS-1C LISS III Feb 1997, IRS 1C PAN Dec 1997).The study has been carried out in Udaipur city, popularly known as city of Lakes in Rajasthan state located in Western India. The temporal data of 1997 and 2004 PAN and LISS III were merged using HIS transformation which aids in efficient interpretation of the land cover features. The analysis show that the total lake area has receded by 38.7% since 1997. The Land use pattern however has not changed around the lakes due to water getting logged during monsoon. From the land use/ land cover change detection it is found that major change has been in built-up. It has increased by 9.22 % and open space has decreased by 5.97 %. Such an analysis is very useful for the urban and regional planners as it provides them handy information about the type and trend of change of Land use pattern.

Flood inundation mapping and damage assessment using Remote Sensing and GIS

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The availability of SAR data from the RADARSAT satellites offers an opportunity for continuous observation of flood events. The main objective of this study was to monitor flood by using multi temporal SAR data of RADARSAT satellite (September 04, 11, 13 & 20 of 2003) were used in this study. The study area was Puri district, Orissa State. For flood hazard assessment a pre-flood land use/land cover map was prepared by digital classification of LISS- III data. By overlaying flood-inundated map with land use/land cover map, flood damage was assessed. The study revealed that the pick flood affected area was about 102963 ha. which was 29.63% of the total area and 1000 villages were affected due to flood in the study area. The study also depicted that 65991.39 ha. area (37.60% of the total crops area) of crops were affected/damaged and 746 km road which was 33.82% of the total length of the road network were also affected due to flood.

Land use - land cover change analysis in Pali Gad watershed (Aglar Sub-watershed) and its impact on soil erosion process - A geospatial approach

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The present work focuses on changes in landscape pattern and resource exploitation in the Pali Gad watershed for year 1963 -1983 and 1999 - 2004 respectively. The results of this study report that the land cover dynamics is dependent on the aspect due to sun illumination. The altitude and slope is no more a barrier for resource extraction and the human activity zone is shifting towards higher altitudes and slopes. Estimates of the rate of soil loss have also been carried out using process based Model. It envisages the impact of land use/land cover change on the soil erosion processes. This study contributed examples form human shaped ecosystems in mountainous regions where fragmentation of natural resources is added. An increase in resource requirement has been noticed in the less productive lands of the region. Thus increased resource extraction from the entire watershed may not be sustainable in the long run.

Coastal landform and land use study and their changes using multi-temporal Remote Sensing data in the South Andaman Island

Supervisor

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The present study uses multi-temporal remote sensing data to identify coastal landform and Land use and its change in the South Andaman Island. Landsat image (1997) and IRS 1D LISS III image (2000) were used for this study. Analysis of the two images identifiy typical coastal land form features like mangrove, estuaries, coral reefs, mudflats, sea grass that are identifiable to coastal island topography. Various digital image processing algorithms were tried for mangrove identification and delineation. Change detection analysis revealed significant changes of various coastal land form and land use classes. Conservation efforts especially on mangrove swamps have significantly improved largely due to the islands conservative approach headed by the local forest and fishery department, resulting in greater awareness by the local community and foreigners. However coastal erosions are also quite apparent along the visited beaches during field sampling.

Biodiversity characterization in Panna National Park (part), Madhya Pradesh using RS and GIS

Supervisor

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In the present study efforts have been made to identify bio-rich areas in Hinauta Forest Range of Panna National Park using remote sensing & GIS. Phyto-geographically this area has immense significance due to the presence of northern most limit of teak forest well known for their economic value. Analysis of the data (Shannon-Wiener Index) shows that Northern Dry Mixed Deciduous Teak Forest. Species richness of the Open Thorny Dry Deciduous Forest with grasses is found to be the lowest. This is followed by Acacia catechu savannah. Various levels of disturbance due to human activities on biodiversity has been studied both qualitatively and quantitatively. The number of trees per unit area is the lowest in the Savannah which are still grazed and are easily accessible to human population. A very clear evidence of impact of accessibility have been seen where species richness and number of trees per unit area is very high in inaccessible areas. Main forces causing disturbance are search for diamonds, dams in Ken river, grazing and resource utilization by villagers in the form of fodder, grazing and resource utilization by villagers in the form of fodder, grazing, fuel-wood, timber etc. The area has a great potential for biodiversity conservation, both flora and fauna.

Crop and soil water balance study using Remote Sensing & GIS- A case study of Sirsa district Haryana state, India

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Integrated use of Satellite Remote Sensing and GIS is found to be very useful for sustainable agricultural water management. The objectives of the present study were to prepare Rabi (winter) crop inventory using multi-temporal satellite data; and to estimate various components of soil and crop water balance using FAO. Sirsa district of Haryana State was chosen for this study. Temporal IRS-P6 AWiFSdigital satellite data belonging to December, 2003; and January, February and March, 2004 covering various phonological stages of crop were used. Digital supervised classification approach and temporal NDVI information derived from multi-date satellite data were used for generating spatial distribution maps showing dominant crops viz. wheat and mustard grown in the district and their growth conditions. FAO CSWB model components such as PET; Crop Maximum Evapo-transpiration (Crop Water Requirement); Actual Crop ET; Soil Moisture Deficit; Irrigation Requirement. The basic inputs parameters used in CSWB model were areal extent of crops; soil and climatic characteristics.

Application of Remote Sensing for coral reef habitat mapping and their variation with Bathymetry South Andaman, Andaman Island

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Increasing anthropogenic activity in coastal zone especially in coral reef area will increase the impact on this fragile environment. Industrial activity, tourism and increased in population adds unwanted pressure. This study aims to find the relationship of coral reef habitat distribution and bathymetry in South Andaman island, where protected areas for coral reefs has been set by the government.IRS-1D LISS III data and the bathymetry map were used to make bathymetric image. DN value of the satellite image was correlated with the corresponding depth on the bathymetry map. From this correlation an algorithm was developed. Supervised classification for coral reef from LISS III was superimposed with the bathymetric image to get the habitat distribution of coral reef with respect to depth.

Mapping and analysis of green/open spaces in Udaipur city using Remote Sensing and Geographic Information System

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The study evaluates the potential of satellite remote sensing and GIS technology for mapping and analysis of green / open spaces of Udaipur city, which is decreasing due to population as well as developmental process of the city. Multi-date, merged satellite data (IRS - P6 LISS III Feb. 2004, IRS-1D PAN Feb. 2004, IRS - 1C LISS III Feb. 1997, IRS - 1C PAN Dec.1997) of IRS series have been analyzed for the calculating the depreciation of green / open spaces areas during last 7 years. Fusion of PAN and LISS imagery improves the efficiency in mapping of the green / open spaces. Analysis of the relationship between demographic picture of the city with the green/open spaces during 1997 and 2004 provide a simple but important output. Such type of analysis would be of immense value for any city to take up necessary control measures to maintain the beauty as well as greenery of cities for healthy environmental conditions of its habitants.

Snowmelt runoff model of Beas basin

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The Beas Basin drains about 5402.74 Km^2 up to Pandoh Dam. The filed data was collected as 10 daily average values for precipitation, temperature and discharge during September 2003 and April 2004. The Snow Melt Runoff Model (SRM) was used in this study on a 10 daily basis during September 2003 and April 2004. The input parameters for the model were derived from existing maps, satellite data, and metrological and hydrological data. Snow covered area in the basin was determined using IRSIC/ ID, WiFS data. The runoff from the snow covered area and snow free area was separately calculated on a daily basis for each elevation zone.The values of parameters representing runoff coefficients have been decided on the basis of calibration of the model in three sub-basins. Finally model computed discharge was compared with actual discharge. There was a good agreement between the observed and computed runoff. The coefficient of determination between observed and computed runoff is found to be 0.85 when calibrated values of Parbati at Bhuntar were incorporated into entire Beas Basin up to Pandoh Dam.

Classification of near shore substrate types of South Andaman, using optical Remote Sensing data

Supervisor

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This is a study on coral reefs of South Andaman based on retrieval of bottom reflectance of near shore substrates from remotely sensed data. Handheld spectroradiometer, was used to measure spectral signature from 400 -750nm, 1m above the water surface in North Bay south Andaman between 29 March to 10 May 2004. Bathymetric maps of the area together with the satellite image and the optical characteristics of water quality parameters were used to obtain the bottom reflectance after doing atmospheric and water column correction. Using this method, the study was able to map five substrate types (i.e. deep sand, shallow sand, coral, rubble, and mixed sand and coral) within south Andaman Islands. The study revealed that the methodology applied here is useful to discriminate bottom substrate types, and the frequency and timing of ground measurements are significant to make instantaneous field measurement synchronous to satellite pass, to take account of environmental condition prevailed during the time of image was taken.

Characterization of wheat Growing environment using Remote Sensing and GIS
A case study of Sirsa district, Haryana

Supervisor

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Accurate and timely information of wheat growing environment and mapping of different environmental factors namely soil, climate, hydrology etc are of great importance that for management, planning and increase in production of wheat per unit area. This study uses Remote Sensing and GIS applications to characterize crop growing environment and optimum land use planning to enhance agricultural production in Sirsa district of Haryana state India. IRS-P6 AWIFS data of January and February 2004 were used for crop discrimination and field data and agro meteorological data were also used in this study. Based on yield per unit area the study enabled to classify wheat growing areas into four major classes (40-50 q/ha), (30-40 q/ha), (20-30q/ha) and (<20q/ha). Soil characteristics, water quality, salinity, frequency and amount of irrigation, depth of ground water table, rainfall etc are significant environmental parameters that control yield per unit area.

Characterization of ERS SAR Interferometric tendem data for terrain analysis

Supervisor

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In this study, attempts have been made to characterize interferometric phase and coherence information of ERS SAR tandem pair data and backscattered amplitude information of ERS SAR and Envisat ASAR data for land use-land cover, geomorphology and structural analysis. For this purpose, three test sites characteristically from diverse physiographic and geological environment have been studied: (i) Kolkata City and surrounding areas (Urban test site). (ii) Part of coastal region of West Bengal (coastal test site) and (iii) Part of Shillong plateau in and around Cherrappunjee (mountainous test site). In case of urban test site landuse-landcover elements have been characterized with respect to backscattered amplitude information of ERS SAR and ENVISAT ASAR data and interferometric coherence information of ERS SAR tandem pair data. In case of coastal test site land use-land cover and geomorphological elements have been analyzed with respect to backscattered amplitude information of ERS SAR and Envisat ASAR data and interferometric coherence information of ERS SAR tandem pair data. In case of mountainous test site land use-land cover, geomorphological and structural elements have been analyzed with respect to the backscattered amplitude information of individual ERS SAR image and phase and coherence information of the ERS SAR tandem data pair.

Irrigation water management using Remote Sensing and GIS - A case study of Parbati reservoir command area, Rajasthan

Supervisor

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This study has been carried out to calculate the irrigation water requirement using Penmen Montieth model and also to analyze the irrigation water demand and supply status in the Parbati reservoir command area using RS & GIS to suggest an optimum water scheduling. Using IRS 1D, LISS III satellite data of February 2004, the cropping pattern under the command area was studied On the basis of irrigation water requirement using CROPWAT model developed by FAO (1992) & data available from the concerned authority it was found from fortnightly Irrigation Water Demand vs Supply curve that although the irrigation water was required from 15th of October, it was released from November 3. In future the canal should be operated as per the suggested crop water requirement

Utilization of satellite derived Sea Surface Temperature and sea surface chlorophyll for identification of productive zones in the Bay of Bengal

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Studies on the spatio-temporal behavior of ocean productivity gives an idea not only where fish is abundant but from a sustainability point of view, it helps to point out areas that need protection. In this study, the productive zone index map for Bay of Bengal was generated by using zooplankton growth rate derived from sea surface temperature map, sea surface chlorophyll map and surface nitrate concentration. The monthly mean SST data of 4.89 km resolution was taken from 2001 World Ocean Atlas Data. All 12 months data of the above mentioned 3 parameters were analyzed to generate productive zone index maps. The analysis for the whole Bay of Bengal showed high indices in the summer months and towards the onset of winter. The most productive months are April, October, November and December. The west coast of the Bay of Bengal was observed to be the most productive area based on 2003 mean productive zone index map.

Management of torrential watershed using Remote Sensing & GIS: A case study of Dangri river watershed, Haryana, India

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This study has been carried out for temporal change detection of torrential areas and their surroundings; to prepare torrent vulnerability map and to propose an action plan for management of torrent affected watershed. Landsat TM (1987) and IRS-1D PAN sharpened LISS-3 (2003) data have been used. Land use in torrential areas and surroundings were categorized in four groups such as bare, grass/scrub land, plantation and under agriculture. It was observed that due to conservation activities ongoing in the watershed on torrent beds and surroundings, 325.2 ha of land has been reclaimed which were earlier categorized as barren or under grass/scrub cover. The torrent vulnerability map was prepared by integrating land use/land cover characteristics, channel geometry, bed slope, bed gradient, upstream characteristics and buffer area under conservation activities in GIS.

Geological hazard assessment of a part of Shillong-Sichar-Aizawl highway route corridor using Remote Sensing and GIS

Supervisor

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The main aim of the study is to assess the effect of geological hazard due to landslide and earthquake along the selected route corridor of Shillong-Silchar-Aizwal Highway covering an area of about 350 sq. Km. For this purpose, visual interpretation of IRS-LISS III and PAN merged satellite data on 1:25,000 scale have been carried out to generate thematic layers on geology, geomorphology, deformational structure, landslide occurrences, land use/land cover, soil type and slope aspect and amount etc. having some influence on slope failure process and seismic activity of the region. Supplementary information has been acquired through digital image enhancement. Integration of thematic layers on geo-environmental parameters in GIS has helped to generate landslide susceptibility zone map. The effects of earthquake on terrain condition have been analyzed by assessing the response of terrain parameters with respect to earthquake magnitude and intensity. The final geo-hazard map has been generated by integrating landslide susceptibility and seismic hazard maps.

Spatial crop water requirement estimation using satellite and agro-meteorological data

Supervisor

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Remote sensing and GIS based approach have been attempted in this study to map seasonal crop water requirement of wheat in Haryana, a major wheat growing state of India. Daily meteorological data, IRS AWiFS image (February, 2004) and 8-day composite surface reflectance from MODIS covering entire wheat crop life cycle are used as inputs. Land use/land cover and crop types were mapped from A-WiFS satellite data by supervised classification. The crop coefficient (Kc) map for each composite period was obtained by means of existing NDVI and SAVI based empirical formulae developed for wheat crop under Indian condition. Daily ETo was computed using Jenson and Haise method for eight meteorological station falling within and surrounding Haryana state. Further, spatial estimates of ETo and Kc were multiplied and summed over entire wheat crop cycle to obtain seasonal crop water requirement of wheat in Haryana state. The seasonal crop water requirement is computed by summing up crop water requirement of each 8 day period over wheat crop cycle.

Regional evapotranspiration mapping using satellite data - A case study of Hisar district, Haryana

Supervisor

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The present work has been carried out in the Hissar district of Haryana state to explore and study the possibility of use of satellite data /information in the studies related to Energy balance. IRS P6 AWiFS data of February and March 2004 are used to study and map the various LU/LC of the area. An attempt has been made to derive emissivity, albedo from NOAA-16 AVHRR data for the same period.. Surface emissivity has been calculated using NDVI. Split window algorithm has been used for the estimation of surface temperature. The results show that the temperature in the area has increased in the month of March which is due to the harvesting of the crops in the field and is validated in the ground during March. This is also confirmed with the proportional vegetation cover. The results of the study indicates that the regional scale mapping of ET could be carried out by integrated modeling approach using satellite derived surface emissivity, surface temperature, albedo on pixel basis and agrometeorological data.

Flood information system of Puri district, Orissa, India in 2003

Supervisor

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The study aims to develop a customized information system using Arcview Avenue language and Structured Query Language for providing easy user friendly information access about the Flood, which occurred in 2003, in Puri district, Orissa, India. This flood information system will help in extracting vital flood related spatial and non-spatial information for effective decision making. It includes two major components: integrated database management and customization. The diverse data were collected from field and through organizations involved in Puri district and were geo referenced for integration into spatial domain. The custom tools were written in Arc view to extract basic information and to calculate various aspects associated with flood. The work also tries to analyze flood hazard zones and predicts the locations of flood when water level on the river increases using elevation data derived from SRTM. Finally, the Customized Information System can also act as Decision Support System (DSS) by providing possibility to deduce 10 customized questions from database, which are often asked in the flood related study.

Slope stability analysis of A part of Shillong - Silchar - Aizwal highway route corridor using Remote Sensing and GIS techniques

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The study area lies in the states of Assam and Mizoram. It is a part of the Shillong- Silchar-Aizwal highway route corridor. Slope stability analysis in relation to terrain parameters has been carried out to decipher the influence of these parameters on landslide occurrence. High resolution satellite image products IRS:LISS III & PAN merged data on 1:25,000 scale have been used to extract information on causative terrain features namely rock type, geological structure, geomorphology, land use /land cover, lineament, landslide incidence etc. To carry out spatial data analysis, these parameters have been integrated in a GIS environment applying Index Overlay Method. The potential slope instability map shows four classes namely: high, moderate, low and very low to nil. In order to validate the results, the potential slope instability map has been crossed with the active landslide map. This map shows that most of the slides (about 90%) are falling within high to moderately instable zone.

Assessment of growing stock and evaluation of socio-economic implication using Remote Sensing and GIS in Thano Range (Part) of Dehradun forest division

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Quantification of growing stock is necessary for better management and planning of forest resources. In the present study LISS III digital data of March 2005 has been digitally interpreted into different forest cover types and canopy density classes. With the help of GIS different layers were generated viz., block map, forest cover type map, forest canopy density map, village and settlement map, infrastructure map, drainage map, slope map, aspect map. The entire forest was categorized into four density classes: class I (more than70%), class II (40-70%), class III (20-40%) and class IV (<20%).The large extent of the forest area falls on the density class II. Total growing stock was estimated as 7.31 lacs cum. In the study area per hectare average growing stock estimated only 178.10 cum which is lower than growing stock of all adjacent forest ranges. It was found that 52% people are fully dependent on forest for fuelwood and sixty percent people are fully dependent on forest for fodder of their cattle.

Urban sprawl and its environmental impact assessment of Hyderabad-Secundrabad area using Remote Sensing and GIS techniques

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In this pilot project an attempt has been made to study the urban sprawl dynamics, to study the change detection mapping of surface water bodies, surface run off, demand, supply and depletion of ground water resources, and the impact of air pollution due to urbanization. To study the urban sprawl and its EIA of Hyderabad-Secundrabad area, the twin capital city of Andhra Pradesh and its surrounding has been taken up because it is one of the fastest urbanized city of India. Shannon's entropy approach was used to monitor the urban sprawl from 1971-2005. SOI topo-sheets Landsat TM-1989, ETM+2001, and IRS P6, LISS-III & 1D PAN merged data of 2005 was used for this study. SCS model was used to calculate runoff and moving average interpolation technique for point source air pollution data, and ground water data. Wetland mapping was done using normalized difference water index (NDWI).

Hydrogeological characterization in Asan catchment, Uttaranchal, India

Supervisor

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Remote sensing and GIS have emerged as powerful tools in groundwater studies. The present study has been taken up in Asan River catchment, part of Doon valley, in Uttaranchal, India with a view to (i) characterize the hydrogeomorphological and hydrogeological condition (type of aquifers, their spatial and vertical disposition, water table etc.) and (ii) prepare groundwater prospects map based on integration of geomorphology, lithology, structure, drainage, slope, land use /land cover themes in GIS environment. PAN and LISS III data from IRS have been digitally fused together and visually interpreted for mapping hydrogeomorphological units and their characterization. The land use / land cover of the area has also been mapped using the merged FCC. The slope map has been prepared form SRTM DEM, while drainage has been prepared from satellite imagery and SOI toposheets. The prospective groundwater zones mainly lie in the lower part of the piedmont zone (NPZ and SPZ) and the river terraces of Yamuna and Asan rivers. The depth to water table in these zones ranges from about 3 m to 25 m below ground level (bgl) as measured during mid- to end of April, 2005.

Terrain characterization and soil erosion risk assessment for watershed prioritization using Remote Sensing & GIS

Supervisor

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The present study has been taken as watershed (Nawagaon and Maskara Rao) in Saharanpur district of Uttar Pradesh in India. The objective of the study was (i) to prepare land use/ land cover map using LISS IV digital satellite data, (ii) to characterize morphometric and hydrological terrain parameters and to study soil hydrological characteristics of soils (iii) to assess soil erosion risk using Morgan, Morgan and Finney model and qualitative methods, and (v) to prioritize sub watershed for conservation planning. The annual rate of soil loss based on MMF model was classified into five soil erosion risk classes for soil conservation measures. Sub-watersheds (11nos.) were prioritized based on average soil loss for soil conservation planning.

Wetland change dynamics: A case study in Unnao district of Uttar Pradesh

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Satellite remote sensing has several advantages for monitoring wetland resources, especially for large geographic areas. The Area of Unnao district is 4589 km. Visual interpretation and digital image processing techniques of data analysis was used to extract resource related information independently and in combination with collateral ground truth. Landsat 5, TM data, Landsat 7, ETM and ASTER data used for identifying the change in study area during the periods of 21 Nov, 1989 and Nov 2000, and October 2004 respectively, which is post monsoon data. For pre monsoon season, Landsat MSS (February, 1973), IRS 1C WiFS (April 1999), IRS P6 LISS III (February, 2005) data were used. All data sets were used for generating spectral indices to extract information regarding wetlands. Satellite images were used in unsupervised classification algorithm to get land use/land cover map with the special focus to wetlands, the change detection of wetland was also performed. Forecasting the land use/land cover pattern of 2010 (Decadal Map) based on Markov Chain Transition Rate was also investigated.

Characterization of geomorphic indices along Himalayan, frontal fault, Poanta Sahib and surrounding, H.P

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The study area being a part of Lesser Himalayan has been selected to carry out study on tectonic activities of the region since secondary epicenter of Kangra Earthquake in 1905 was located in this zone. In this study, drainage basin asymmetry, stream length gradient index, mountain front sinuosity, the hypsometric integral and ratio of valley floor width to valley height (Vf index) were calculated. High resolution IRS LISS III & PAN merged image data has been used to extract information on active tectonic features as well as to generate thematic maps on geology, geomorphology, drainage and slope. The study demonstrates that the most active mountain fronts those associated with active, range bounding faults generally have mountain front sinuosity (Smf) between 1.49 and 1.76 Mountain fronts with lesser activity, but still reflecting active tectonics have sinuosities between 1.98 and 3.16. This was further confirmed by drainage basin asymmetric factor (AF) index. Calculated Asymmetry factor values viz 33%, 48%, 63%, 49.9% and 62%, indicate tectonic tilting down to either to left or right of drainage basin. The lowest mountain front sinuosity was indicted in Smf-13 area is more prone to active tectonic. Stream length-gradient index (SL) is correlates to stream power. Therefore calculated values of Stream Length-gradient Index further confirmed the study area is more prone to active tectonics.

Characterization of desertification status by integrated use of satellite Remote Sensing and GIS: A case study of Eastern part of Rajasthan state

Supervisor

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Desertification is one of the serious environmental-problems faced by many countries in the world. The major objective of this pilot project is to map, assess and characterize desertification status using satellite derived desertification indicators. The study area consists of 22 districts of eastern part of Rajasthan State, India. Digital data of IRS-1D WiFS sensor belonging to Kharif (rainy) and Rabi (winter) crop seasons (October, 2004 and February, 2005) of normal rainfall year were used as major data source. Desertification status map showing various degree of desertification induced ecosystem degradation was generated by GIS aided integration of satellite derived cropping system and land use, climatic water balance and soil desertification indicator characteristics viz. texture, soil available moisture, salinity/sodicity and erosion hazard. Various MODIS biophysical parameters monthly data products (May, 2004 to April, 2005) viz. albedo, vegetation indices (NDVI, EVI), land surface temperature, LAI (Leaf Area Index), NPP (Net Primary Productivity) etc. are also used for characterizing district-wise and desertification status zone-wise bio-physical conditions for the current crop seasons.

Comparative evaluation of digital change, detection techniques for urban areas

Supervisor

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The study area is Saharanpur, situated in the northern part of Uttar Pradesh state in India. Land use /land cover change detection analysis has been carried out using the satellite data of 1998 ,2004 and 2005. For this purpose, IRS 1D LISS III of 1998, IRS P6 LISS IV of 2005 and IRS 1D PAN image of 2004 are used to identify all new urban developments within these periods. The study has been undertaken keeping the main objective to compare the ability of different change detection methods of land use/ cover changes over different time periods in the study area. Three digital change detection techniques are compared in this study .In first method, post classification comparison is done on each date of imagery and changed area is detected. In second method, before classification change detection, image differencing is done. In third technique, all images are superimposed and principal component analysis is carried out and output PCA image is classified. As a result, first technique has much accurate than other two techniques.

Crop yield estimation of wheat by integrating RS, land and management factors

Supervisor

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This study, propose to investigate the relationship between space-borne Satellite based NDVI and wheat yield at field level, and combining NDVI with land and management factors for yield prediction at field level. The study was carried out in Saharanpur district Uttar Pradesh, India. LISS-III of IRS-P6 has been used for crop discrimination and area estimation. Crop yield information was gathered by actual crop harvest at randomly selected crop cutting experiments (CCE). Soil types map from NBSS & LUP is used to investigate relationship between NDVI, soil types and wheat yield. Land/soil productivity indices (LPI and Sys Index) representing dominant pedons and corresponding to CCE sites are calculated and used in regression analysis. The results showed that there exist a significant positive correlation (0.01% level) of field level wheat yield with NDVI, land factors (LPI or Sys Index) and management inputs, particularly, number of irrigation applied.

Forest land use planning, a precursor to Decision Support System

Supervisor

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In this study geo-spatial tools for forest land use planning, in scientific management, have been used. The study area was Thano Forest Range, Dehradun Forest Division (Uttaranchal) covers 160 km. The study was aimed at the assessment of forests of the area, human dependency on them and the identification of potential areas for different forest land uses so that the different silvicultural techniques and management practices could be planned to meet the local requirement. The methodology consists of geo-spatial analysis of database generated from the PAN merged IRS 1C LISS III satellite images, ancillary database and socio-economic information collected through PRA and RRA techniques. Thematic maps were integrated in GIS for generating the map showing potential forest land uses viz., Community forestry, Agro-forestry, Protection forestry, Production forestry, Recreational forestry and Social forestry. It was further combined with AHP for identifying the local priority. The outputs are useful for the formulation of strategic action plans concerned to forest land use planning with respect to mobilize, allocate and utilize the resources

Landslide hazard zonation and delineating debris flow susceptible zones in the Himalayas: RS and GIS approach

Supervisor

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In order to understand the landslide and debris flow phenomena in the Himalayas, the present study is carried out around the Chamoli-Joshimath area, lying in the northernmost belt of Garhwal Himalaya. The landslide and debris flow zones have been identified in aerial photographs and in satellite images that were verified during the field survey. The detailed information of selected landslide sites have been collected in field and the potential sites of debris flow has been studied with respect to topographic slope, lithology and the thickness as well as the properties of the material overlying the rocks. Further, this study will make an approach to identify the areas of initiation, propagation and deposition of debris flows, including the source areas and the associated upslope water contributing areas. Rainfall is considered as one of the vital triggering factor for both the landslide and debris flow. Therefore, a correlation between the rainfall intensity and landslide/debris flow occurrence was established for the study area. In order to achieve the above mentioned goal, the extensive use of remote sensing and GIS has been applied.

Land use/land cover change detection due to soil and water conservation measures in Karso watershed using Remote Sensing and GIS

Supervisor

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The area selected for the study is Karso watershed, which is in the Tilaiya catchment of Damodar river valley within Jharkhand. The study was carried out with the objectives of mapping soil and water conservation measures of the watershed and finding out the effect of these measures on land use/land cover in the watershed using high-resolution satellite remote sensing data. Accordingly, IRS LISS IV P6 Satellite imagery of 2005 February was digitally analyzed and the map showing soil and water conservation practices in Karso watershed was prepared. Check dams, aforestation and bunded agriculture are the prevailing soil and water conservation practices in the watershed. The effect of these conservation measures on the development of land use/cover, village wise basis was analyzed using Change Detection technique. Landsat TM 1992 November (pre conservation), Landsat TM 2000 October and IRS LISS IV P6 2005 February (post conservation) were visually and digitally analyzed with the same land use/cover classes and statistically found out the changes during this period.

Study of environmental impact of non point pollution sources on the water bodies of Saharanpur city

Supervisor

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Non point sources contribute considerable pollution and are much more difficult to identify and regulate because its origin is diffuse. The Vegetation-Impervious Surface-Soil (V-I-S) model of Ridd describes the biophysical composition of an urban area as a function of three components: vegetation, impervious surface and soil. The aim of the study is to determine the biophysical relationship of municipal wards of Saharanpur city, Uttar Pradesh, India using remote sensing data / GIS based analysis and to determine surface runoff associated with non point source pollution. Satellite data of IRS LISS-III (year 1998 and 2005), LANDSAT-7 (year 2000), LISS-III+PAN (year 2001) and IRS P6 LISS-IV (year 2001) were used for the analysis. Data of Sewage Treatment Plant (STP) and solid waste management procedures were also recorded along with the water quality of two rivers Dhamuala and Pandhoi, flowing through the city. GIS analysis indicated that highly populated municipal wards have not been served by the STP and the Biological Oxygen Demand (BOD) load in STP unserved areas is nearly 7350 kg/day. Increased runoff, inadequate capacity of STP and improper solid waste disposal contribute to high pollution levels .

Delineating groundwater potential zones in Giri valley catchment, Himachal Pradesh, India - Remote Sensing and GIS approach

Supervisor

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The main objective of this project is to generate a groundwater prospecting map and assess the quality of the ground water for human consumption as well as basin morphometry studies for groundwater resource evaluation of the study area. The study area is spread over about 2684km inthe district of Sirmur, Solan and Shimla of Himachal Pradesh. Satellite images of IRS LISS III and PAN as well as LANDAST 7 TM FCC and PAN data were merged separately and Aerial photographs, topo sheets and other existing data were used to generate the various theme maps such as Lithology, Geological Structure, Geomorphology, Drainage, Lineament, Slope and Land use / Land cover map. Index over lay method was used to generate the Hydrogeomorphology map. Based on final hydrogeomophological map about 3.6% area representing valley field deposits offers very good groundwater potential.

Flood inundation mapping and 1-D hydrodynamic modeling using Remote Sensing and GIS technique

Supervisor

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Estimation of flood inundation mapping is increasingly a major task for world's natural resource managers. This study is an attempt to develop an integrated methodology for flood mapping using combination of RADARSAT, IRS LISS-III satellites images and GIS, and Hydrodynamic modeling for September 2003 flood event of Puri District, Orissa, India. The main objective of this study is to generate flood inundation maps using DEMs (ASTER), flood modeling using hydrodynamic models and comparing with the flood extent maps derived from RADARSAT SAR satellite images (4, 11, 13 September 2003). Hydrodynamic models were used to find the longitudinal profile, water level and routed discharge along Bhargavi, Khushabhadra rivers and flood mitigation canal at upstream of Khushabhadra river. This information was further used in GIS to find out the flood inundation area. The result of this study shows that integration of GIS and hydrodynamic modeling is an efficient way to predict and map the flood areas.

Spatial analysis of facility distribution in Saharanpur municipal area

Supervisor

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The aim of this project is to study the Spatial Analysis of Facility Distribution in Saharanpur Municipal Area. An attempt has been made to study and to make use of application of remote sensing and GIS technology for facility mapping. The results of this study shows that most of the facilities are located in the north (old part of the city) while the new areas which are mainly residential are in the south and do not have a good level of social infrastructure. The central part of the city has better facilities ranging from very good to moderately good while the outer most parts are having bad to moderate infrastructure level. The railway line, which divides the city in two parts, is a physical barrier for the development of the city as the bridge joining the parts is very narrow. Most of the banks, hospitals, and cinemas are located along the Court road and Ambala-Dehradun road. The spatial statistical analysis is very helpful for finding the trends and pattern in distribution of facilities.

Study of water quality parameters of coastal shelf waters using IRS satellite sensor data and GIS techniques

Supervisor

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The present study area is the West Coast of India, which includes coastal waters of Goa and Bombay coast. The study of coastal water quality parameters using satellite image products like IRS P-4 aims to monitor the coastal processes and features effectively. In this study water samples were collected, filtered and processed in laboratory for determination of phytoplankton and suspended sediment concentration. The Laboratory analyzed data were correlated with the atmospherically corrected satellite data. Finally suspended sediments concentration and chlorophyll concentration retrieval algorithm were developed for the coastal waters of west coast of India. These algorithms have been developed taking into account two data sets pertaining to two different areas and two different seasons.

Identification cropping system dynamics in the irrigation command area through RS & GIS techniques

Supervisor

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The area of study is Left Main Canal of Chambal irrigation command system, in the south-eastern part of Rajasthan. Multi-temporal IRS and LANDSAT TM of December 1986 and March 2005 on rabi season coupled with GIS software were applied to determine type and area of cultivated crops as well as land use/cover in this study. Change detection technique applied for classified images to extract dynamics of cropping pattern. CROPWAT model was used to calculate actual evapotranspiration and net irrigation water requirement based on local climatic data and derived crop data on satellite digital image processing. This model calculated net irrigation water requirement for some dominant crops such as: wheat, mustard in the study area. Calculated irrigation water requirement were compared with canal supply data in irrigated area, which, are equipped with hydrometers gauges.

Application of Remote Sensing and Geographical Information System (GIS) for coastal zone management of Goa coastal region, India

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Coastal areas are isolate, vulnerable, fragile and dynamic in nature. The remote sensing techniques are being use for continuous monitoring of coastlines as they are deeply connected to the welfare and the well being of people. The study area lies in the state of Goa, West Coast of India. The project area under investigation is confined within the latitude $15^0 00'42.55''$N to $15^0 31'20.26''$ N and longitude $73^0 44'10.40''$E to $74^0 04'24.80''$E. High resolution satellite image products viz IRS LISS III & LISS IV and Landsat TM & MSS merged data on 1:50000 scale have been used to extract information on coastal land use/land form, bathymetry, erosion/accretion and define a coastal zone management. Remote Sensing data and GIS techniques can be used as a powerful tool for addressing various coastal issues and helps for defining coastal zone management plan.

Land subsidence study of Kolkata city, India from in SAR-based and ground-based techniques

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The study area Kolkata city from a part of Bengal Basin. In this work, attempts are being made to study ground subsidence from InSAR-base technique using ERS SAR interferometric data pairs. Due to the problem of temporal decorrelation in InSAR data pairs and difficulty in differentiating deformation fringes from atmospheric artifacts, post processing of interferogram viz; filtering of interferogram, summing of interferograms in complex domain and estimation of correlation rate between unrelated but overlapping interferometric pairs have been carry out to highlight and differentiate ground subsidence fringes from the interferograms. Also, from the available data on station-temporal changes piezometric level in the inelastic deformation will be estimated. Finally, a correlation between actual and potential ground subsidence will be assessed and deeper insight will be grained regarding role of the thick surface clay layer (50 m) in the ground subsidence scenario of Kolkata city in relation to ground water over drafting during the part few years.