



Volume 12 No.2

September 2010

Indian Institute of Remote Sensing
(National Remote Sensing Centre)

4 Kalidas Road, Dehradun, Tel : 91-135- 2744518
email : dean@iirs.gov.in, web : www.iirs-nrsc.gov.in

...on mission for transferring technology through education, research and capacity building

Geoinformatics and Spatial Information for Disaster Management

A Special Training Programme on “Geoinformatics and Spatial Information for Disaster Management” was organized jointly by SAARC Disaster Management Centre (SDMC), New Delhi and Indian Institute of Remote Sensing (IIRS), Dehradun, during August 2–7, 2010. It was the second course conducted at IIRS in collaboration with SDMC, and was attended by 21 participants from 7 SAARC Member Countries (Afghanistan–2, Bangladesh–3, Bhutan–1, India–8, Nepal–4, Pakistan–2, and Sri Lanka–1).

The course contents, designed by IIRS and SDMC, essentially addressed three major disciplines of natural hazards and disaster management, i.e. geological, agrometeorological and environmental hazards. The topics covered included – Earth Observation (EO) techniques, geospatial analysis and internet GIS for natural hazards and disaster related applications and services; international framework for disaster risk management; GPS applications to crustal movements and earthquake studies; landslide hazard modeling and risk assessment; seismic hazard assessment; flood mapping, monitoring and damage assessment; agricultural drought monitoring and assessment; detection, mapping and monitoring of forest fires, cyclones and glacial lake outburst flood (GLOF); geospatial technologies for Tsunami Early Warning System; multi-hazard and multi-risk assessment in urban area; groundwater pollution and hazard analysis; and DInSAR technique for detecting land subsidence and crustal movements. Comprehensive lecture/practical/demonstration notes prepared by the course faculty on all these topics were provided to the participants along with supplementary reading material.

The inaugural function was presided over by Dr. V.

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Editorial Committee

Editor: Minakshi Kumar

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Jayaraman, Director, National Remote Sensing Centre (NRSC), Hyderabad, while valedictory function was presided over by Shri P.G. Dhar Chakrabarty, Director, SDMC, New Delhi as Chief Guests. Apart from IIRS faculty, subject experts from premier institutions like Indian National Centre for Ocean Information Services (INCOIS), NRSC, Survey of India (SOI), Wadia Institute of Himalayan Geology (WIHG) also shared their knowledge and experience with the participants.

It is hoped that the knowledge gained by the participants in this course will be useful in applying the RS & Geoinformatics technology to address various issues related to natural hazards and disaster management.

As a Course Coordinator, my sincere thanks to Dr. P.S. Roy, Dean, IIRS and all the faculty/staff of IIRS for their help and support in making the course successful. Thanks also to Dr. O.P. Mishra, Dr. Deepak Chamlagain and other officials of SDMC, New Delhi for their support in organizing this training programme.



S.K. Srivastav

Remote Sensing: An Overview of Decision Makers

Decision makers course on “Remote Sensing: An Overview of Decision Makers” is organized every year at Indian Institute of Remote Sensing for Senior level officials who are involved in decision making in their respective departments. This year the course was organized from 15th to 18th June 2010. Total 18 senior officials from 14 Departments from all over country, namely Kerala Forest Research Institute, Kerala; Narmada Water Resources & Water Supply Department, Gujarat; Irrigation Research Division, (WRD) PUNE; Rain Forest Research Institute(ICFRE), Jorhat; NCR Planning Board, New Delhi; Fishery Survey of India, Chennai; Directorate Of Agriculture, Haryana; Karnataka State Remote Sensing Application Centre (KSRSAC), Bangalore; Uttarakhand Space Application Centre; Dehradun, Himachal Pradesh Irrigation & Public Health Department, Shimla; Irrigation and CAD Dept. Hyderabad; Indian Agriculture Research Institute (ICAR), New Delhi; Mumbai Metropolitan Region Development Authority (MMRDA) joined the course.



The Course was organized such that first day was devoted to overview of RS and GIS technology this includes: overview of Remote Sensing, Overview of GIS, GPS, Current Trends in Geoinformatics, Policies and Institutions of RS and Open Source Software and Data. On second day, emphasis was given to RS GIS applications to natural resources management and high resolution data & field scale implementation. Theme specific exposure on remote sensing application in Agriculture & Soils; Water Resources; Forest & Ecology; Urban Settlement Analysis and Marin Science, were arranged for all the participants separately as per their discipline and interest. On third day participants were given exposure to RS GIS application to geological, hydro-meteorological and environmental disaster. Field excursion to

Mussoorie was organized in the afternoon session. Last day was devoted to Data assimilation, RS input to various models, course feedback and valedictory function. All the lectures were taken by senior faculty from IIRS & NRSC which includes Dr. V.K. Dadhwal, Associate Director, NRSC and Dr. P. S. Roy, Associate Director Capacity Building (NRSC) and Dean IIRS

A reference material in the form of training lecture notes was brought out through the sincere efforts of the faculty. Training lecture notes along with book on 'Remote Sensing Applications' edited by Roy et al., and published by NRSC Hyderabad were provided to all the participants. The course was concluded on 18th June 2010; Dr. S.P. Singh, Advisor Planning Commission Uttarakhand and former Vice-Chancellor Garhwal University, delivered Valedictory address; Dr. P. S. Roy, Associate Director Capacity Building (NRSC) and Dean IIRS, emphasized the importance of such type of courses for Decision Makers and commitment of IIRS towards capacity building among user departments.

Dr. S. P. Aggarwal

PG Diploma Geoinformatics 2009-2010

The 8th batch of PG Diploma Geoinformatics successfully concluded on 23rd July, 2010. This is the 4th batch of joint IIRS-ITC Joint Education Programme (JEP). The diploma started on 28th Sept., 2009 for a duration of 10 months. The diploma was modular in structure and was divided into two blocks covering core modules, and domain specific modules. There were 10 theoretical modules of 3 weeks duration each covering various aspects of Geoinformatics. After theoretical modules, student started their project work for 3 months period and the project work was evaluated by the evaluation committee jointly constituted by IIRS-ITC and chaired by Prof. S.K. Saha, Head, Agriculture & Soils Division. The diploma followed the European Credit System. Around 15 specialized guest lecture's on various topics of geoinformatics were also organised. The students have successfully completed their pilot project work on the following topics:



Group Photograph with dignitaries during the convocation

- Mapping dominant forest species using hyperspectral data (Mr. Gurbakshish Chahal);
- Specific crop mapping - Soft Multi-spectral Temporal data Approach (Mr. Prabhat Semwal);
- Close range digital photogrammetric technique for monitoring spatial phenomenon (Mr. Sandeep Sudi);
- Uttarakhand Tourist Information System (Ms. Sonalee Biswal);
- 3D modeling using Cartosat – 1 stereo data for IIRS Campus (Ms. Swati Sharma)
- Network based geo-visualization in Mobile GIS (Mr. Kapil Oberai)

Valedictory function was organized on 23rd July, 2010 at IIRS Lecture Theatre. Prof. S. K. Saha, Head, Agriculture and Soils Division, Mr. Michel Damen from ITC, The Netherlands and Course Coordinator, Geohazards, Shri. P.L.N Raju, Head Geoinformatics Division, Dr. P.K. Champati Ray, Head Geosciences Division, Dr. Suresh Kumar, Programme Coordinator, Geohazard and Dr. Sameer Saran, Programme Coordinator, Geoinformatics grace the occasion. The diploma certificates were awarded by Prof. S.K. Saha along with a customary ITC momento.

Sameer Saran and P.L.N Raju

Performance Evaluation of Canal Irrigation Projects Using Remote Sensing & GIS

A Special training programme on “Performance Evaluation of Canal Irrigation Projects Using Remote Sensing & GIS” was organized for consortium of National Agricultural Innovation Project – Decision Support System (NAIP-DSS) on a request from consortium coordinator from CSSRI, Karnal. Total 20 officers joined this course on 15th April 2010, from Central Soil Salinity Research Institute Karnal; Water Technology Centre, Indian Agricultural Research Institute (ICAR), New Delhi and National Institute of Hydrology, Roorkee.



The training programme was designed such that participants should acquire working knowledge of remote sensing and GIS technologies and their application in fields of irrigation water management, agriculture crop yield monitoring & predication, irrigation project evaluation, etc. The detailed topics covered are Fundamentals of Remote Sensing; Visual and Digital Image Processing; Overview of GIS; Coordinate Systems and Projections; Introduction to GPS, DGPS Survey and Post Processing; Database Requirement & Creation for Irrigation Command; Spatial Data Analysis of a Irrigation Command; Crop Inventory and Monitoring Using RS Data in Irrigation Command; Estimation of Evapotranspiration Using Remote Sensing Data; Crop Yield Estimation In Irrigation Command Using RS & GIS Techniques; DEM and its Application in Irrigation Management; Waterlogging and Soil Salinity Assessment in Irrigation Command using RS Data and Performance Evaluation of Irrigation Command. One day field excursion was conducted to Mussoorie for demonstrating use of DGPS in ground truth collection and field Survey.

A reference material in the form of training lecture notes was brought out through the sincere efforts of the faculty. The lecture notes, practical handouts and reference materials were also provided to course participants in both hard as well as soft format.

Knowledge gained in the course will benefit the course participants in various aspects of water management and decision making process in irrigation projects.

Bhaskar R. Nikam and Dr. S. P. Aggarwal

GIS database creation and utilization for Mining Applications with emphasis on Web GIS

The Indian Bureau of Mines (IBM), Ministry of Mines, Government of India will be executing a project on “Computerised online register of Mining Tenement System”. The GIS component of the project will be implemented in collaboration with ISRO. On request of The Controller of Mines, IBM, IIRS conducted a special course in GIS for training their personnel’s for understanding GIS database creation, textual data linking and web enablement of 2 weeks duration for 15 participants at Indian Institute of Remote Sensing, Dehradun. The first programme was organized during 16-27 August, 2010. The programme focused on GIS and



Web GIS component and also covered some basics of remote sensing, GPS and Digital Image Processing. Apart to the regular lectures, two special lectures on Mineral Resource information system and Role of RS & GIS for mineral exploration have been organized for the officer trainees. The practicals were given more emphasis during the entire programme. The practicals were conducted on ArcGIS 9 software, Two map servers both commercial and open source map server (ArcIMS and UMN Open source Map server) were covered for web rendering of GIS datasets. The students have developed a prototype of Mining Tenement Register Information System using ArcGIS, ArcIMS and UMN Open source map Server. They have also linked the spatial database with textual data in dbf format. The officer trainees have also prepared a report on the pilot study.

Dr. Sameer Saran

Application Of Space Technology for Disaster Management Support with Emphasis on Geological Risk Management

An International training course on “Application of Space Technology for Disaster Management Support with emphasis on Geological Risk Management (DMS-GRM)” was organized by Centre for Space Science and Technology Education in Asia and the Pacific (CSSTEAP) at Indian Institute of Remote Sensing (IIRS), NRSC, Dehradun during April 12 – May 07, 2010. The course was inaugurated on April 12, 2010 by Padhma Bhushan Dr. George Joseph, former Director CSSTEAP, Dehradun, who had conceptualized the program during his tenure as Director, CSSTEAP. This course was also supported by Faculty of Geoinformation Science and Earth Observation of the University of Twente and UN University ITC School, the Netherland.



Fourteen professionals from 10 countries, i.e. India, Kazakhstan, Kyrgyzstan, Lao PDR, Maldives, Mongolia, Nepal, Sri Lanka, Uzbekistan and Vietnam participated in this program. The participants came from different organizations such as operational agencies, research institutes, Universities etc. The course was designed keeping in view of the background of the course participants and utilization of space technology using remote sensing and also communication technology effectively for Disaster Management Support with emphasis on Geological Risk Management.

The lectures were delivered by expert faculty drawn from various ISRO centers such as Space Applications Centre (SAC), Indian Institute of Remote Sensing (IIRS) and also from various other national organizations and International NGO.

Topics related to Landslides, Earthquake, Glacial Lake Outburst, Mining and Volcanic hazards etc. were presented by experts. At the end of this training program, the participants were provided with a CD ROM consisting of the lectures notes, presentations materials and public domain software (PostgreSQL, QGIS, ms4w) for their future use.

As a part of the program, the participants visited Wadia Institute of Himalayan Geology, Dehradun to see advance instrumentation and for interaction with Himalayn geology experts. They were also taken for a field trip to Dehradun-Mussoorie and adjoining areas to get an understanding of Himalayan geology, neo-tectonic features and related hazards. The course was successfully concluded with valedictory address and distribution of certificates by Prof. S K Bhattacharyya, Director, Central Building Research Institute (CBRI), CSIR, Roorkee. Overall, the course has received very good feedback and suggestions on improvement in future.

Dr. P. K. Champati Ray

RS and GIS the State Forest Service Probationers

The seventh special orientation course for 44 State Forest Service probationers from the Central Academy of State Forest Service (CASFOS), Dehradun was organized from 19-24 April, 2010 by Forestry and Ecology Division, IIRS. This course on basics of Remote Sensing, GIS and GPS and Applications is organized on request from the CASFOS every year for six days, which includes five days of intensive lectures and practical and one day of examination. Lectures were delivered on: Introduction to remote sensing, Aerial photograph utility in forestry, Aerial photo measurements, Introduction to GPS, Spectral properties of vegetation, Visual image interpretation, Digital image interpretation, Introduction to GIS, RS and GIS in biodiversity characterization, RS and GIS in growing stock assessment, and RS and GIS in wildlife habitat evaluation. Practical were organized on: Forest cover mapping using aerial photographs, Visual image interpretation, GPS usage, Digital image interpretation, and Database creation using RS and GIS. The course provides the CASFOS probationers an opportunity to join IIRS and learn the applications of remote sensing and GIS technologies in forest resources assessment, monitoring and the management. In addition to Forestry and Ecology Division, the Photogrammetric and Remote Sensing and the Geoinformatics Divisions of IIRS also participated in the course.



Dr. S.P.S. Kushwaha & S. Nandy

National Remote Sensing Day Celebration

The National Remote Sensing Day Celebration was celebrated on 12th August 2010 by Indian Society of Remote Sensing, Dehra Dun Chapter (ISRS-DC). This event was associated with the extended programs of Earth Day Celebration which started in 22nd April 2010. The drawing, debate and quiz competition were organized for school, college and post graduate students at Indian Institute of Remote Sensing (IIRS). The topic of the debate competition was "Climate Change Reality or Myth". The theme of the drawing competition was on "Earth and Environment". At the outset, Dr. S. K. Saha, Chairman, ISRS-DC had told the significance of the occasion to the participants. Large number of students from different school and colleges of Dehra Dun had participated in the events. Dr. S. K. Saha and Dr. George Philip distributed the prizes to the winners of the events.



A popular lecture was organized at Wadia Institute of Himalayan Geology (WIHG). Dr. George Philip, Vice Chairman ISRS-DC had given the welcome address and Dr. S. K. Saha, Chairman, ISRS-DC had introduced Prof. S. P. Singh, Advisor to the Planning Commission, Uttarakhand, to the audience. Prof. S. P. Singh had given his lecture on "Climate Change & Himalayan Forest Ecosystems". The lecture highlighted the various aspects of climate change on Himalayan ecosystems with respect to sustainable agricultural productivity; forest



productivity & biodiversity, environmental protection etc. Adaptation and mitigation strategies to adjust negative impacts of climate change on Himalayan ecosystem are also included in the lecture. This popular lecture was attended by ISRS-DC members, students and scientists of IIRS and WIHG.

Site Selection for Water harvesting Structures

The drastic growth in population and consequent human development activities have shown to aggravate the problem of water scarcity. At the same time, more area should be brought under irrigation to feed the escalating population of the country, which needs more water. A need has arisen to implement field measures to trap rain water falling over a region as much as possible. Since the dawn of civilisation, human being is trying to harness water by collecting rain water locally in ponds and large manmade containers; diverting and storing water from local streams/springs. These basic techniques have been successfully applied in many different ways by the people in different parts of the country depending upon the land forms, climate and type of soils. These traditional methods, called “Water Harvesting” in modern time, are environment-friendly and can be easily adopted at affordable cost.

Water harvesting structures (WHS) would be effective, if it will be chosen in accordance with specific site conditions of geo-technical parameters. In the present study, the suitable sites for WHS (viz. Farm Pond and Check Dam), which will provide water for maintaining soil moisture level in agriculture areas, drinking water in rural areas and recharge to ground water, are identified for Solani watershed using Geo-Spatial techniques. Initially, the slope modified Soil Conservation Services Curve Number (SCS-CN) method with different antecedent moisture condition, was applied over sub-watersheds of Solani River to quantify runoff potential of the watershed. The maps of daily, monthly and seasonal surface runoff potential of total 34 sub-watershed of Solani watershed were generated in ArcGIS.

Later, an analytical hierarchy process approach was adopted for assigning weight to different geo-technical parameters that influence performance of site for water harvesting structures such as soil, land use/land cover, slope, etc. Therefore, the highest weights were assigned to soil, followed by slope and lowest weights were given to land use/land cover. Internal weights are given to each class of all geo-technical parameter according to their response to water harvesting process for surface storage. In case of soil, the ranking is done based on its hydrological soil group (HSG). The highest ranking was given to HSG-D and lowest ranking was given to HSG-A. In case of topography, highest ranking was given to steep slope (> 35%) and lowest ranking was given to nearly level class (0–1%). While considering land use/land cover factor, preference was given to river and water bodies and least importance was given to built-up areas. The guidelines laid by IMSD (1995) and FAO (1977) were adopted while structuring decision rules of weighted overlay analysis for selection of suitable farm ponds and check dams sites.

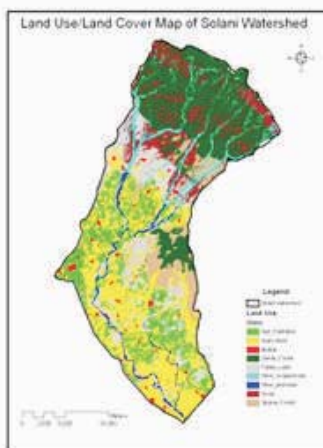


Fig. 1 LULC

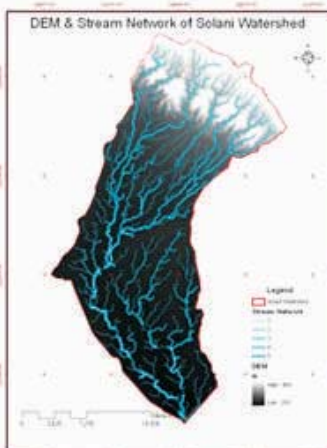


Fig. 2 DEM



Fig. 3 Location of Sites Suitable for Check Dam



Fig. 4 Location of Sites Suitable for Farm Ponds

The selected sites are then ranked based on their overall weights and runoff potential of their catchment. Out of seven sites found suitable for check dam, one site is classified as 'Most Suitable' as its overall weights and runoff potential of catchments is much higher than remaining six sites, which are classified as 'Suitable'. Similarly, sites for farm ponds are classified based on its overall weights, catchment runoff potential and proximity to agricultural area into five classes (Most Suitable, Suitable, Most Favorable, Favorable, Less Favorable). This classification will help in prioritization of construction of these structures.

The LULC, DEM, Stream Network map and Sites Found Suitable for Check Dam and Farm Ponds are shown in Figs 1 to 4

Development of a high resolution coastal ocean model for the Gulf of Khambhat and surrounding region on the west coast of India

The continental shelf on the west coast of India is widest off Mumbai, leads in to a strongly converging channel, the Gulf of Khambhat (Fig. 1). Historically, a number of harbors and business centers were established around this region. India's largest offshore oil-field, the Bombay High is located at the center of this region. Tides in the gulf are among the largest on the coast. It receives many rivers including Narmada, Tapti and Mahi. Winds over the region are mostly monsoonal. Circulation of the water in this region is primarily governed by tides, winds, and riverine fresh-water fluxes in to the system. Understanding and modeling the dynamics and thermodynamics of the Gulf and surrounding region is the interest of several reasons: environmental management, navigation, fishery etc.

A high resolution coastal ocean model for the Gulf of Khambhat and surrounding region on the west coast of India was established based on Princeton Ocean Model which is a terrain following 3D ocean general circulation model. Using the model, tide and wind driven circulations in the Gulf and surrounding region during a year were studied. For the purpose, time varying sea surface height due to the major tidal constituents and wind field was supplied to the model at every time steps as the lateral and surface open boundary conditions respectively. Data of tidal elevation used as open boundary condition at the western and southern boundary of the estuary were taken from the global tide simulator FES-99, while the data of daily wind field used as surface boundary condition in the model were taken from NASA QuickSCAT observations. The bathymetry data based on ETOPO-2 were used to construct the grid system for the study region which has 16 vertical sigma layers and 121 x 163 horizontal levels/boxes within

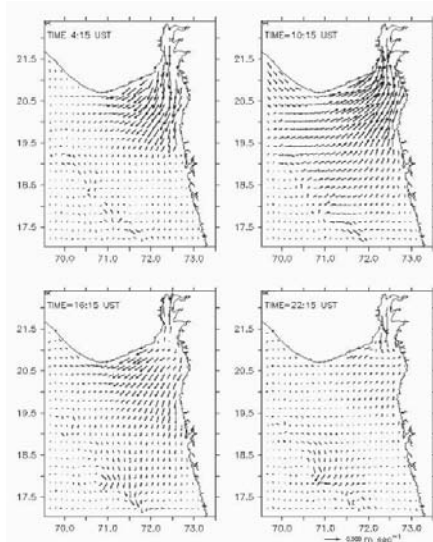


Fig. 2 Residual monthly vertical averaged currents in the estuary during January, March, July and October of a year.

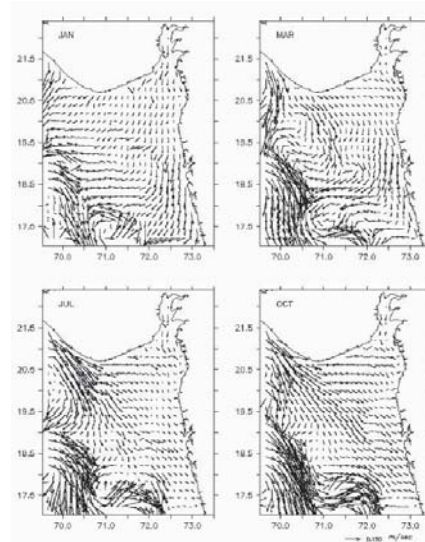


Fig 1 . Typical spatial feature of vertical average currents in the estuary at four times of a day corresponding to two low (at 4:15 and 16:15 UST) and two high (10:15 and 22.15) water at the open ocean end.

69.5 - 72.30E and 17 - 22.2 ON.

Two model runs were carried out. In the first run, the model was forced with sea surface elevation due to major tidal constituents at the open ocean boundary for the period of one year during 2003; another run was carried out with the wind forcing at the open surface together with tides at the open ocean boundary for the same duration. The simulated sea levels were compared with the estimated sea levels by the global tide simulator FES99 and with in situ measurement of sea levels at 3 coastal stations: MURUD, HAZIRA, and KHAMBHAT. The results suggest that the tidal solution derived in the present study is much closer to the observation than the global tidal solution. Gradual increase of phase differences between the global tidal solution and tidal solution based on present study from Open Ocean towards the coast in the estuary has been observed. Much better solution than the present study could be obtained by use of better and realistic bathymetry data for the study region.

The diurnal circulation pattern in the study region is largely dominated by the tidal forcing while winds play the secondary role (Fig 1). Difference between the currents during spring and neap tides has also been noticed in the study area. Diurnal currents on the continental shelf during spring tides were relatively stronger than the neap tides. The residual monthly currents in the estuary were largely controlled by the combined effect of tide and winds (Fig. 2). Asymmetry between residual currents during the day of the spring and neap tides has also been observed.

R. K. Nayak and D. Mitra

Awards

Dr. Vaibhav Garg, Scientist/Engineer 'SC' has been awarded with "Excellence in Thesis Work" award for the year 2009-2010 by Indian Institute of Technology Bombay, Mumbai on its 48th Convocation held on 06th August 2010.



New Faculty



- Mr. Indukuri Srinivasa Raju joined in IIRS Library on 14 June 2010 as Library Assistant 'A'. He is MLISc from Alagappa University, Tamil Nadu.



- Kamlesh Karki joined in IIRS Library division on 3 May 2010 as Library Assistant 'A'. She is MLISc from Kurukshetra University, Haryana.



- Hari Shankar : Joined Geoinformatics Division on 6th May, 2010 as a Scientist/Engineer 'SC'. He is M.Sc (Physics) with specialization in Electronics from M.J.P.Rohilkhand University, Bareilly (U.P.).



- Pooja Jindal joined IIRS on April 20, 2010 as Scientist / Engineer 'SC'. She is M.Sc. (Physics) from IIT Delhi. Prior to join IIRS, she has worked at LPU, Jalandhar for 5 months.

CALENDAR OF TRAVEL COURSE 2011

Sl. No	Course Code	Course Name	Entrance Requirements	No. of Seats	Starting Date dd.mm.yy	Passing Out Date dd.mm.yy	Govt. Sponsored	Course Fee Open Candidates	Foreign Trainees US \$	Apply by Date
POST GRADUATE DIPLOMA COURSES										
1.	D-AS	Agriculture & Soils	M.Sc in Agriculture/B.Sc. Agriculture (4 years)/B.E./ B. TECH in Agriculture Engg./M.Sc. Geograph/ M.Sc. Environmental Science	6	23.08.2011	15.06.2012	Nil	60,000	6,000	20.05.2011
2.	D-FE	Forestry & Ecology	M.Sc in Forestry/ Environmental Science/Ecology/ Botany/Wildlife Science/ Life Science/ Zoology / B.Sc. Forestry (4 years) / Forest Officers – B.Sc. + 2 years experience	6	23.08.2011	15.06.2012	Nil	60,000	6,000	20.05.2011
3.	D-GG	Geosciences	M.Sc./M.Sc.(Tech.)/M.Tech. in Geology/Applied Geology/ Geophysics/ Earth Sciences/ Geography (Specialization in Geomorphology) or B.Tech. / B.E. in Civil Engineering.	6	23.08.2011	15.06.2012	Nil	60,000	6,000	20.05.2011
4.	D-MS	Marine Sciences	M.Sc. in Marine Sciences/Earth Sciences / Geography/ Natural Science / Physics/ Atmospheric Science	6	23.08.2011	15.06.2012	Nil	60,000	6,000	20.05.2011
5.	D-UR	Human Settlement Analysis	Master in Planning / B.E. (Civil) / B. Architecture / B. Planning / M.Sc. in Geography	6	23.08.2011	15.06.2012	Nil	60,000	6,000	20.05.2011
6.	D-WR	Water Resources	B.E. / B.Tech. / M.E. / M.Tech. Civil Engineering / Agricultural Engineering / M.Sc. in Geology	6	23.08.2011	15.06.2012	Nil	60,000	6,000	20.05.2011
7.	D-PR	Photogrammetry and Remote Sensing	BE/B.Tech./M.Sc./M.Tech. Physics, Maths, App. Maths, Statistics, Geophysics, Meteorology, Oceanography, Geology, Geography or any Natural/Environmental Sc. or MCA (with B.Sc. degree). The candidates should have mathematics as one subject upto 10 + 2 level.	6	23.08.2011	15.06.2012	Nil	60,000	6,000	20.05.2011
M.TECH. COURSE										
8.	+M-RG	M.Tech. in RS & GIS	M.Sc. in Natural/Physical Sciences / Geography/ B.E. or B.Tech. (Civil Engg. & Agricultural Engg.) Elec. And Electronics Computer Sciences/Computer Engg. / B.Arch./ M.Planning / B Planning/ Master in Computer Applications (with B.Sc. degree) / B.Sc. (Forestry / Agriculture, both with 4 years duration course).	20	23.08.2011	16.08.2013	Nil	1,44,000 + 10,000 (Andhra Univ.Regn. Fee)	14,400 + 250 (Andhra Univ.Regn. Fee)	13.05.2011
Note: <ul style="list-style-type: none"> • Master degree should be with Bachelor in Sciences. • Preference will be given to Mathematics in 10+ 2 standard. • Candidates should have secured a minimum of 55 % marks in the qualifying examination. • M.Tech. is accredited by Andhra University, Visakhapatnam and from 2nd module onwards the students admitted to this course will have to select one of the following disciplines: Agriculture and Soils, (ii) Forestry and Ecology, (iii) Geosciences, (iv) Marine Sciences, (v) Human Settlement Analysis (vi) Water Resources and (vii) Photogrammetry & Remote Sensing. • The admission for M.Tech. course is based on entrance test and interview. The candidates with valid GATE certificate having score of 90 percentile or more will be given extra weightage, they will also be assessed through entrance test followed by interview along with other candidates. IIRS does not provide any fellowship/ financial assistance to any of its students. 										
9.	D-GI	Post Graduate Joint IIRS Diploma in -ITC Geoinformatics Program	M.Sc. / M.Tech. Degree in Physics, Mathematics, Applied Mathematics, Statistics, Geophysics, Meteorology, Oceanography, Geology, Agriculture, Geography, Urban and Regional Planning / Remote Sensing OR any Natural/Environmental Sciences / B.E. / B. Tech. (Civil Engineering / Electronics and Communication, Computer Science/ Computer Engineering / IT/Agricultural Engineering / MCA (with B.Sc. degree). Applicants should have studied Mathematics and Basic Science up to 10 + 2 standard.	10	26.09.2011	20.07.2012	Nil	80,000 *(Rs. 65,000 payable to IIRS + Euro 200 payable to ITC)	Euro 3000	24.06.2011

10.	M-G Joint IIRS-ITC	M. Sc. in Program Geoinformatics	M.Sc. / M.Tech. Degree in Physics, Mathematics, Applied Mathematics, Statistics, Geophysics, Metereology, Oceanography, Geology, Agriculture, Geography, Urban and Regional Planning/ Remote Sensing OR any Natural/ Environmental Sciences OR BE/B. Tech. (Civil Engineering / Electronics and Communication/Computer Science / Computer Engineering / IT/Agricultural Engineering /B. Tech. in Geoinformatics / B.Sc. (4 years) Agriculture /Forestry or equivalent OR MCA with Science Gradua studied Mathematics and Basic Science up to 10 + 2tion or M.Sc. in IT.Applicants should have standard.	10	26.09.2011	22.03.2013	Nil	1,20,000 *payable to IIRS + Euro 1250 payable to ITC + {Rs. 2,00,000 own expenditure for visit to ITC}	Euro 6250	27.05.2011
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Note:

- The candidate should have secured a minimum of 60 % marks in the qualifying examination
- Applicants should have studied Mathematics and Basic Science upto 10 + 2 standard.
- The candidates with valid GATE certificate having score of 90 percentile or more will be given extra weightage, they will also be assessed through entrance test followed by interview along with other candidates. IIRS does not provide any fellowship/ financial assistance to any of its students.
- The M.Sc. degree is awarded under Joint Education Programme of IIRS-ITC by Faculty of Geoinformation Science and Earth Observation of the University of Twente, The Netherlands.

11.	D-NH DRM Joint IIRS-ITC Program	PG Diploma in Natural Hazards & Disaster Risk Management(3 Optional streams): Hydrometeorological / Geological/ Environmental	M.Sc. in Natural Sciences / Earth Sciences / Physical Sciences or B.Arch/B.Planning/ M. Planning or B.E. / B.Tech. / M.E./M.Tech. in Civil Engineering Agricultural/ Engineering or B.Sc. (Forestry/ Agriculture, both with 4 years duration course) or M.Sc. Geography or Forest Officers (Graduates in Science with 2 years experience). Applicants should have studied Mathematics and Basic Science up to 10th standard. The course will be conducted only if there are minimum 5 participants.	10	26.09.2011	20.07.2012	Nil	80,000 *(Rs. 65,000 payable to IIRS + Euro 200 payable to ITC)	Euro 3000	24.06.2011
12.	M-NH DRM Joint IIRS-ITC Program	M. Sc. in Natural Hazards & Disaster Risk Management (3 Optional streams: Hydrometeorological / Geological / Environmental)	M.Sc. in Natural Sciences / Earth Sciences /Physical Sciences / Agriculture or M.Sc. in Geography / P.G.in Urban and Regional Planning / B.Arch/ B.Planning/ M. Planning or B.E./ B.Tech. / M.E. / M.Tech. in Civil Engineering / Agricultural Engineering or B.Sc. (Forestry / Agriculture, both with 4 years duration course) or M.Sc. Geography. Applicants should have studied Mathematics and Basic Science up to 10 + 2 standard.	10	26.09.2011	22.03.2013	Nil	1,20,000* payable to IIRS + Euro 1250 payable to ITC + {Rs. 2,00,000 own expenditure for visit to ITC}	Euro 6250	27.05.2011

Note:

- The candidate should have secured a minimum of 60 % marks in the qualifying examination
- Applicants should have studied Mathematics and Basic Science upto 10 + 2 standard.
- The candidates with valid GATE certificate having score of 90 percentile or more will be given extra weightage, they will also be assessed through entrance test followed by interview along with other candidates. IIRS does not provide any fellowship/ financial assistance to any of its student .
- The M.Sc. degree is awarded under Joint Education Programme of IIRS-ITC by Faculty of Geoinformation Science and Earth Observation of the University of Twente, The Netherlands.

***Fee likely to be revised for the courses mentioned at Sl. Nos. 9,10,11 and 12.**

REMOTE SENSING APPLICATIONS : THEME SPECIFIC ORIENTATION COURSE

13.	O-DM	Remote Sensing –An Overview for Decision Makers	Decision makers in organizations (with 10 years experience in service).	10	14.06.2011	17.06.2011	7,000@	7,000@	700@	13.05.2011
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INTERNATIONAL PROGRAMMES

14.	S-RS	Short Course on Remote Sensing with special emphasis on Digital Image Processing (ITEC Sponsored)	Post Graduate degree in natural sciences, graduate in any engineering discipline, or graduate in natural sciences with sufficient knowledge of mathematics/statistics at high school level. Middle level resources managers and professionals from Govt., NGOs, Universities with 2 years work experience relevant to natural science/management /data-map handling. Age: Upto 45 Year s or so.	20	03.01.2011	25.02.2011	20,000	20,000	\$ 2000	26.11.2010
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15.	S-GI	Short Course on Geoinformatics (ITEC Sponsored)	Post Graduate degree in natural sciences, graduate in any engineering discipline, or graduate in natural sciences with sufficient knowledge of mathematics/statistics at high school level. Middle level resources managers and professionals from Govt., NGOs, Universities with 2 years work experience relevant to natural science/management /data-map handling. Age : Upto 45 years or so.	10	26.9.2011	25.11.2011	20,000	20,000	\$ 2000	29.08.2011
Dates of course at Sl. No. 15 are subject to change										
CERTIFICATE COURSE										
16	C-RS	Short Course on Remote Sensing and Image Interpretation	Science/Engineering Graduate with mathematics up to higher secondary school level / Post Graduates in Science and Geography & 2 years experience (in service) /Post Graduates in Science and Geography.	5	03.01.2011	25.02.2011	Nil	12,000	1200	25.11.2010
NNRMS – ISRO SPONSORED CERTIFICATE COURSES : FOR UNIVERSITY FACULTY ONLY										
17.	N-GI	GIS Technology and Advances	P.G. in Science/Engineering Graduate. The candidates should have 2 yrs. teaching experience at PG level.	8	02.05.2011	24.06.2011	Nil	12000	1200	04.02.2011
18	N-WR	RS & GIS Applications to Water Resources	B.E. / B. Tech., M.E./M. Tech.(Civil & Agricultural Engineering)	8	02.05.2011	24.06.2011	Nil	12000	1200	04.02.2011
19	N-FE	RS & GIS applications to Forestry/ Botany / Ecology / Wildlife / Environmental Sciences	P.G. in Botany/Ecology/Forestry/ Environment/ Zoology / Wildlife Science/ Life Science. The candidates should have 2 yrs. teaching experience at PG level.	8	02.05.2011	24.06.2011	Nil	12000	1200	04.02.2011
20	N-UR	RS & GIS Applications to Urban & Regional Planning	M. Planning/ B.E.(Civil)/B. Arch. / B Planning / Master in Geography. The candidates should have 2 yrs. teaching experience at PG level.	8	02.05.2011	24.06.2011	Nil	12000	1200	04.02.2011
21	N-CM	Cartography and Mapping	P.G. in Science/Geography. The candidates should have 2 yrs. teaching experience at PG level	8	02.05.2011	24.06.2011	Nil	12000	1200	04.02.2011
22	N-GG	RS & GIS Applications to Geosciences	P.G. in Geology/ Applied Geology/ Geophysics/ Geography. The candidates should have 2 yrs. teaching experience at PG level.	8	02.05.2011	24.06.2011	Nil	12000	1200	04.02.2011
23	N-GA	RS & GIS Applications to Agriculture and Soils	P.G. in Science / Agriculture / Geography / Environmental Sciences . The candidates should have 2 yrs. teaching experience at PG level.	8	02.05.2011	24.06.2011	Nil	12000	1200	04.02.2011
24.	N-MA	RS & GIS Applications to Meteorology & Atmospheric Sciences	P.G. in Science / Marine Sciences / Meteorology / Atmospheric /Environmental Sciences. The candidates should have 2 yrs. teaching experience at PG level.	8	02.05.2011	24.06.2011	Nil	12000	1200	04.02.2011

Note : Please note the following important information:

- If the date of commencement falls on holiday, course will start from next working day.
- Sponsoring organizations are required to meet all expenses viz., traveling allowance, daily allowance, contingent expenses, medical expenses etc., for their candidates EXCEPT course fee. **However Courses at Sl. Nos. 13, 14 & 15 are paid courses for all** including Govt. organizations also. In case of NNRMS sponsored course, the candidates admitted are paid TA/DA by IIRS as per DOS rules applicable for this course.
- The Govt. Organizations (Central / State Government bodies / Autonomous Institutions and State and Central Govt. funded Universities) can **sponsor only permanent staff**. Private Universities & self sponsored candidates have to pay full course fee prior to joining the course.
- Security deposit : Self Financed candidates, have to deposit/ remit security deposit one month prior to the commencement of the course, failing which seats would be offered to the waitlisted candidates, as mentioned further: (i) @ **Rs. 4000/-** in respect of Certificate Courses (ii) @ **Rs. 6000/-** in respect of PG Diploma Courses and (iii) @ **Rs. 10000/-** in respect of M.Sc./ M.Tech. courses.
- Boarding and lodging charges at IIRS Hostel comes to Rs. 2500 p.m. (approx.). **Local candidates will be considered for hostel accommodation, only if available.**

@ Includes boarding and lodging charges for the course mentioned at S.No.13.

For further details, contact: Dean / Programme Coordinator (Academic) / Indian Institute of Remote Sensing (NRSC), ISRO, Dept. of Space, Govt. of India, 4, Kalidas Road, Dehra Dun Pin- 248 001, UTTARAKHAND (INDIA). FAX: 91-135-2741987; 2748041; PHONE: 91-0135-2744583, 2524105, 2524106, 2524107, 2746798.

E-mail: dean@iirs.gov.in HYPERLINK "mailto:dean@iirs.gov.in" & HYPERLINK "mailto:dean@iirs.gov.in" pca@iirs.gov.in; also, please log in : www.iirs-nrsc.gov.in for details and application form.

