

CONTACT

INDIAN INSTITUTE OF REMOTE SENSING

(National Remote Sensing Agency)

Dehradun

e-mail : dean@iirs.gov.in

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iirs newsletter

Editorial

Hello alumni!

You must have noticed that a new editorial committee has been constituted w.e.f Jan 2001. Its first task is to reach out to all alumni of IIRS, past or present. Naturally, committee would look forward to whole-hearted support from all of you to help it create data bank of your current addresses. The basic idea is to keep you in touch with the activities of IIRS and about the thrust areas of R. S. and GIS, and its applications to natural resources survey and environmental monitoring. In turn IIRS (and your friends elsewhere) would be equally interested to know about your achievements and activities in the realm of photogrammetry, remote sensing, GPS and GIS. So please keep in touch.

A few matters of your immediate interest are : (a) during last three years 4 IIRS students of Post Graduate Diploma Course have carried out their project work in France under IIRS-GDTA collaborative programme, (b) under IIRS-ITC collaborative project, new courses in "Geoinformatics for Environmental Assessment & Disaster Management" have been introduced in July 2001 for 2 weeks, 4 Months, and 10 Months' duration, and (c) M.Sc. in Geoinformatics and M. Tech. in all thematic areas would be a reality from year 2002 onwards. Course calender on pages 8, would give you an idea about all the courses to be conducted next year. Choose one to be in touch with recent advances in your discipline.

-Editor

IIRS introduces new courses in

"Geoinformatics for Environmental Assessment and Disaster Management"

In recent times India has witnessed large scale disasters such as the frequent floods in the Indo-Gangetic and Brahmaputra plains, the cyclones of the east and Gujarat, the earthquakes of Uttarkashi, Latur, Jabalpur, Chamoli and Bhuj and small scale hazards such as landslides in the



Dr. R.R. Navalgund, Director NRSA
inaugurating the course

Himalayan range, forest fire, soil erosion and desertification. These events are stark reminders of the fact that natural disasters can cause crumbling impact on economy and take a huge toll of human lives. Although the natural disasters cannot be prevented fully, their impact can be minimized with sound disaster management strategy aided by latest technological development.

One such technology, geoinformatics offers a powerful toolbox to create maps, integrate information, visualize scenarios,

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EDITORIAL COMMITTEE

EDITOR

V.K. Jha

MEMBERS

*B.S. Sokhi,
Ms. Meenakshi Kumar
Debashish Mitra
Ms. Mamta Verma
Sameer Saran
P.K. Joshi*

solve complicated problems, and develop effective solutions. Advanced techniques like Remote Sensing and Global Positioning Systems, if integrated with Geographic Information Systems, can provide valuable information on earth surface features and processes involved. In the last decade there has been a spectacular growth in the field of geoinformatics, primarily due to revolution in IT and success of the earth observing systems.

- In general remote sensing, GIS and GPS provide database which can be interpreted and analyzed to produce hazard maps, which have immense value in any kind of activities related to disasters.
- Secondly many types of disasters have precursors, which can be detected at an early stage by orbiting satellites, and can be used for the prediction of both rapid and slow disasters.
- When a disaster occurs, the aerospace media are the quickest mode of information collection and can be utilised for monitoring during the event.
- Finally, Geoinformatics can also assist in damage assessment and aftermath monitoring, providing a quantitative base for relief operations.



Realising the tremendous potential of emerging geoinformatics technology to meet the challenges of sustainable development and disaster management, IIRS has gone into a historic collaboration with International Institute for Aerospace Survey & Earth Sciences, (ITC), International Institute for Infrastructural, Hydraulic and Environmental Engineering (IHE), and Wageningen University, The Netherlands to evolve a comprehensive "millennium" plan for capacity building in disaster management. As a part of the comprehensive strategy for human resource development and capacity building, IIRS has introduced the following courses.

- **Awareness Course** on "Geoinformatics for Environmental Assessment and Disaster Management (EADM)" of 15 Days (July 23, 2001 - August 3, 2001) duration.
- **Certificate Course** on "Geoinformatics for Environmental Assessment and Disaster Management (EADM)" of 4 Months (July 23, 2001 - November 16, 2001) duration.
- **Post Graduate Diploma** on "Geoinformatics for Environmental Assessment and Disaster Management (EADM)" of 10 Months (July 23, 2001 - May 17, 2002) duration.

The course curricula has been designed and developed by IIRS and its collaborative institutes and has been approved by Indian Advisory Committee, set up by Director, NRSA. The long term courses offer three optional streams on three broad categories of natural hazards.

The courses were inaugurated by Dr. R.R. Navalgund, Director, NRSA on July 24, 2001 with a keynote address on Remote Sensing in Disaster Management. The courses began with a workshop on "Geoinformatics for Environmental Assessment and Disaster Management" of two weeks duration, which was attended by 25 participants of various courses (6- Awareness course, 8- Certificate course and 11- PG Diploma course). Apart from the institute faculty, various eminent guest faculties delivered specialized lectures on main theme of the workshop.

- PKC Ray

Refresher Course in Groundwater Studies For Central Ground Water Board

Water is one of the most important commodity for the survival of mankind on the earth's surface. Since streams/ponds are not perennial in many areas, one has to depend on the groundwater for irrigation and drinking purpose. As groundwater is not distributed evenly in different geographical locations, remote sensing and GIS techniques assume great importance for targeting of groundwater prospective zones. In fact, hydrogeology is one of the important geoscientific field where some direct indications of groundwater prospective zones can be seen in Remote Sensing Data.

The Indian Institute of Remote Sensing (formerly known as IPI) has been conducting hydrogeology oriented diploma courses 1974 onwards. Central Ground Water Board (CGWB) is the nodal agency in the country responsible for survey, mapping and monitoring of groundwater and its quality regularly. Since 1974, CGWB deputed several hydrogeologists annually to develop expertise in Remote Sensing aided groundwater exploration. Similarly, several state governments have also trained their personnel at IIRS in groundwater prospecting and exploration.

CGWB deputed its eight officers to attend a special 2-weeks refresher course during 19-30th March, 2001. The scientists came from various regional offices of CGWB, e.g., Allahabad, Belgaum, Chandigarh, Chennai, Hyderabad, Jodhpur, Nagpur and Trivandrum. Briefly the course consisted of 11 lectures on fundamentals of RS, Sensors, data products, GIS, GPS, hardware/software, DEM generation, spatial analysis and data integration etc. with 9 hrs of corresponding practicals. The application and modeling module consisted of 24 lectures on groundwater exploration, climatic water balance and groundwater quality supported by practicals, demo and hands on experience in RS & GIS techniques for 15 hrs; and 7 hours of field excursion.

The IIRS does conduct such tailor made/user requested courses in all disciplines but for long-term capacity building in the user organization it is recommended that regular course programmes offered by IIRS will have long-term impact. Similar views were shared by the course participants during feedback session.

Adaptive Filter For Removal of Noise In the Interferometrically Derived Digital Elevation Models

SAR Interferometry (InSAR) is being studied in recent days for its potential in generating accurate Digital Elevation Models (DEM) from the phase information of the signal received from the target in addition to the amplitude, which otherwise is used in general for natural resources evaluation applications. InSAR DEM is generated by processing a pair of SAR data that contains phase and amplitude. Theoretically, DEM derived from such a data is highly accurate, as the phase difference between the pair is highly sensitive to the small differences in height of the terrain targets. However such interferometrically derived DEM contain noise, which prevents the InSAR DEM to be put to direct use. The level of noise has a significant effect on the accuracy of the InSAR DEMs.

Phase noise can be reduced by multi-look processing at the expense of spatial resolution, or by combining two or more independently-derived InSAR DEMs as the noise in the DEMs is not correlated. When only one InSAR DEM is available, filtering is the preferred approach. Noise filtering is commonly applied on the interferogram before phase unwrapping using edge-preserving filters. Filtering can also be applied directly on the DEM using a simple low-pass filter such as the median filter. Noise in the InSAR DEM occurs both as single isolated pixels and also as clusters of pixels. The median filter is effective in removing spike noise but tends to smooth out details such as summits if the window size is large. The median filter is thus not effective in removing clustered noise pixels such as those surrounding "zero holes". A low-pass filter that adapts the window size by detecting isolated as well as clustered noise in the DEM is developed and tested in this study. A *modified sigma filter* approach is tested for its efficiency in removing such noise in the digital elevation data. Results of this study are reported in Table 1 and Figure 1.

Table 1- RMS error, in meters, estimated for InSAR DEMs for the filtering experiment-

	Unfiltered		Median	Adaptive
	At 100%	At 99%	Filtered (at 100%)	Filtered (at 100%)
Pair 1	64.57	39.46	38.91	37.11
Pair 2	59.34	30.18	32.65	31.58
Pair 3	51.86	24.40	31.12	28.78

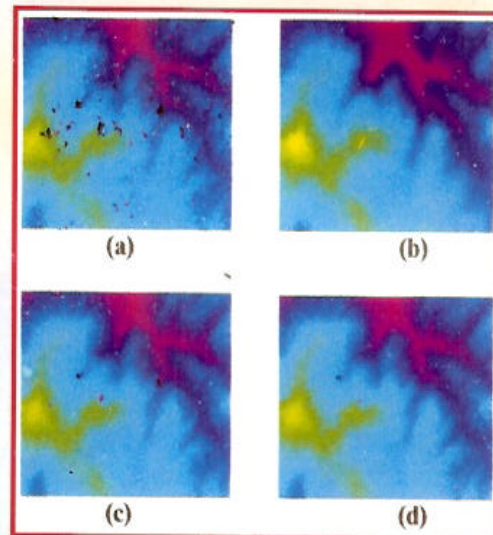


Fig. 1 Low-pass filtering the noise in InSARDEM
(a) Unfiltered InSAR DEM (b) reference DEM,
(c) filtered InSAR DEM using a 5x5 median filter
(d) filtered InSAR DEM using adaptive filter

A region growing adaptive low-pass filter developed to remove the noise in the interferometrically derived DEMs effectively reduces the noise in the DEM, either it is isolated or clustered. Zero holes and border pixels to these hole are also reduced by this filter as it considers these locations as clustered noise. It is important to mention here that the main purpose of designing this adaptive filter is to evaluate the suitability of the idea of optimum window selection process to detect the isolated and clustered noise in the InSAR DEM and to evaluate the *modified sigma filtering* method to remove such a noise. The filter meets the purpose for which it was designed. The filter is not tested for its computer efficiency. This study was supported by an intensive literature review.

Remote Sensing Day Celebrations

Remote Sensing Day was celebrated on August 10, 2001 at Indian Institute of Remote Sensing organized by Indian Society of Remote Sensing, Dehradun-Chapter. To mark the occasion of Remote Sensing Day, a popular lecture on "Bio-diversity concerns and conservation strategies with particular reference to the Indian Himalayan region" was delivered by Dr. L.M.S. Palni, Director, GB Pant Institute of Himalayan Environment & Development, Almora. A debate on the topic of "Space-Technology and Socio-Economic Development" was organized for school children, which was followed by a quiz competition. An exhibition for the school children and citizens of Dehradun regarding use of remote sensing in various resources area was also organised. Live GPS demonstration was also given. In addition to this, various satellite & launch vehicle models were also kept in the exhibition for display. Dr. P.S. Roy, Chairman of the society welcomed the audience present during the function and emphasized the need of similar activities to bring awareness regarding the development and application potential of remote sensing technology for the betterment of mankind. Various leading schools of Dehradun and members of Indian Society of Remote Sensing, Dehradun-Chapter attended the function.

Dr. L.M.S. Palni addressing the gathering



Prize distribution



debate participant



Audience



NCR Project on Groundwater Prospect/ Hydrology/Quality Parameters

The Water Resources Division and the Geosciences Division of IIRS are currently involved in the creation of digital database of groundwater prospects, hydrology and quality parameters at 1:50,000 scale for the National Capital Region Planning Board, New Delhi. The study area comprises of Union Territory of Delhi, Parts of Rajasthan, Haryana and Uttar Pradesh covering a total area of 35,000 sq. kms falling in 68 Survey of India topomaps. The main actions on the part of the Water Resources Division is the creation of the pre and post monsoon groundwater table maps, isohyetal map and groundwater quality map of the entire study area. For this purpose a rigorous field work was carried out during the month of May-June & October-November 2000 towards the collection of the well water level data for the pre & post monsoon period respectively. The field strategy involved collection of ground water levels at a minimum of twenty wells per topomap distributed over all geomorphological units. Ground water level data for Delhi area (NCT) has been obtained from Central Ground Water Board (CGWB). Using the data, the ground water table contours at 1m interval for pre and post-monsoon periods and the difference in water table maps were generated in GIS (ARC/INFO) environment. The meteorological data from 96 stations located within the study area, obtained from India Meteorological Department and Agriculture Research Institutes were used for the generation of the isohyetal maps at 25mm interval. Analysis of the water quality data collected from the CGWB for Haryana & National Capital Region (NCT) area is in progress.

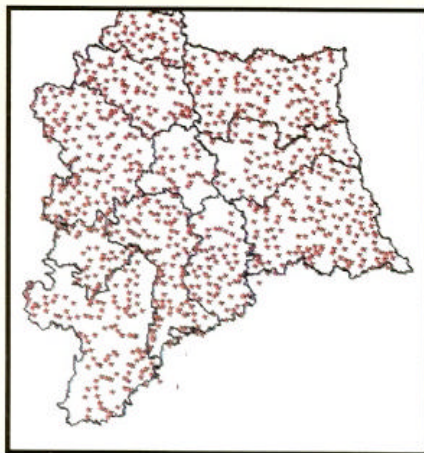


Fig. 1 Point Map showing Well Locations

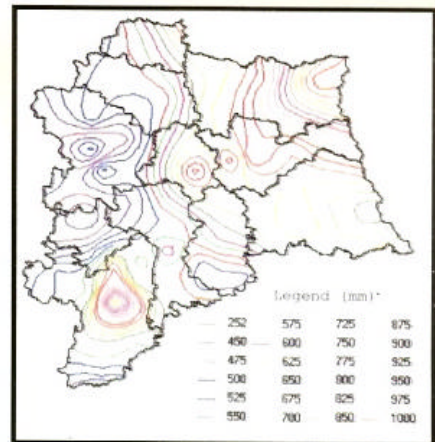


Fig. 2 Isohyetal Contours at 25 mm interval

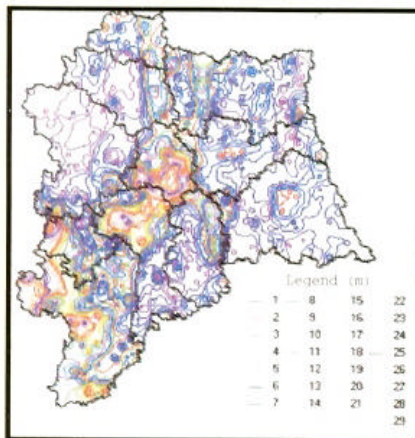


Fig. 3 Pre-monsoon water table Contour at 1m interval

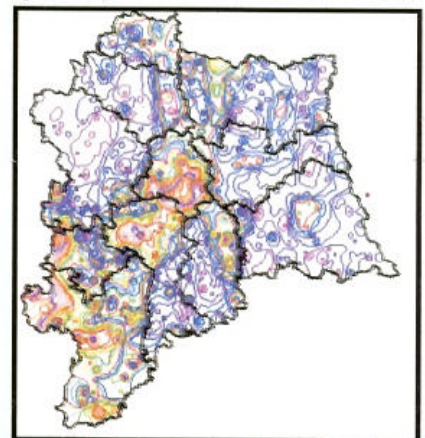


Fig. 4 Post-monsoon water table Contour at 1m interval

Alumni Response

Dear Sir,

You know NEC have a Remote Sensing Unit (Geographical Information System) under Director (S & T) NEC and very recently Department of Space has established the North Eastern Space Application Centre (NE-SAC) as an autonomous body in collaboration with NEC. The Centre is a joint initiative of Department of Space and NEC.

It appears from this issue of IIRS News Letter that it will be very important and useful for our visitors as well as the scientists who are attached to NE-SAC and G.I.S.

Thanking you,

(D.P. Bhagawati)
Librarian, NEC

Dear Sir,

CONTACT is very informative and has many useful information on GIS, Remote Sensing etc.

I would like to know whether you have any website created which will be very useful to the Remote Sensing user community. This can be in the tutorial form similar to that of CCRS, ESA and many other international institute like ITC etc. I am sure you will consider my suggestion and do the needful in this regard.

K.P.R. Menon
NRSA, Hyderabad. 500037.

The Editor

As a Visiting Faculty of the Department of Space Sciences, I may express that we have considerable common interest in the items included in the newsletter.

We also have some interest in the lead article viz. "Managing Disasters through Remote Sensing and GIS."

There are mention of several short and long term courses and modules of common interest. This department and the university will be able to help to run programmes of common interest at the National and International levels.

Thanking you

Prof. Arun D. Tillu.
Department of Space Sciences
Pune University,
Pune-411007 (India)

Dear Sir,

The IIRS News Letter "CONTACT", Vol. 2(2) of October 2000 is in hand. A News Letter of this kind was much awaited from an institution like IIRS with multidimensional activities. The outlook, content, style and size of the newsletter are well. It successfully conveys to the interested readers about remote sensing related training, research and other activities, of course, in brief. The section on Trainee's Pilot Projects is interesting. The IIRS should evolve a mechanism as to share the project reports with the interested teachers, researchers and planners. Better if these reports are made available online in a downloadable format.

It is interesting to note the provision for M. Tech. (Remote Sensing and GIS) through research project. The University is looking forward for partners for professional courses useful for the scientific community and the society, as well. It will be appreciated, if the University receives any such information from the IIRS for furtherance of the partnership.

Pramod K. Verma
School of Studies in Geology
Vikram University, Ujjain (M.P.) India

Dear Sir,

I was a participant in the first NNRMS training course that was conducted at IIRS Dehadun and TCPO New Delhi. It was a very excellent course. Based on the exposure I had there, a pilot project on GIS was successfully completed and our organisation has invited tenders for first phase of GIS in our organisation.

I am working in Development Plan department of Mumbai. There we specify land use of each and every parcel of land in City and Suburbs of Mumbai. We have basic need of GIS in our organisation. The training I got at institute did greatly help in finalising the need of GIS for our organisation.

I would like to study GIS and its application in detail, and I hope it will be IIRS which will enhance my further knowledge. I therefore request you to send the course schedule for next year so as to plan the things.

Thanking you,

Hiren C Daftardar

Dear Sir,

This is to bring to your notice that I am alumni of IIRS and I regret to say that I am not getting any of the booklet on publication from you like 'CONTACT' which is being sent to all alumni of IIRS.

I wish to inform you that I completed my training in Dec.2000' & got job as GIS analyst in March 2001 which shows the value of this course.

Ms. Jessica P. Karia
F-7 Devakinandan Complex
Makarapura Rd., Baroda 390010

Important News

Dr. R.R. Navalgund, Dy Director (Applications), Space Applications Centre, Ahmedabad, took over charge of Director NRSA from Dr. D.P. Rao w.e.f. 30th April 2001

Dr. D.P. Rao retired on superannuation after serving as Director NRSA for four years.

Sir,

As an officer-trainee during 1978 I attended the lectures of, and had useful discussions with the pioneers in Remote Sensing Programmes like Professors T. Natarajan, D. P. Rao and A. K. Roy - the IIRS campus at Dehradun has the best atmosphere for quiet study and quality research. Hostel facilities are excellent. Needless to say that after my training my colleagues and myself have been actively involved in using Remote Sensing Data for useful interpretation of field geological characteristics.

I sincerely wish that the IIRS would one day bloom into a National University for the study, understanding and development of our country's Natural Resources.

Regards,

Prof. S. Viswanathan, I.I.T., Mumbai

Dear Sir,

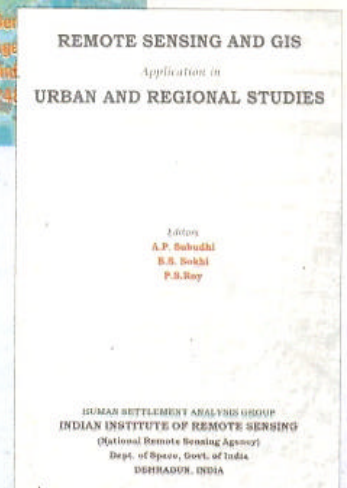
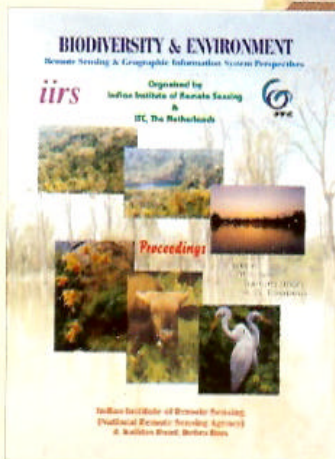
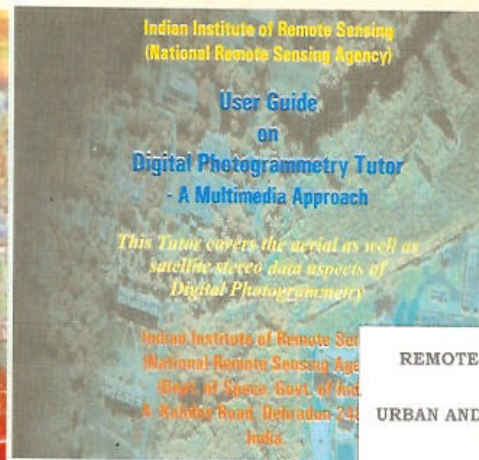
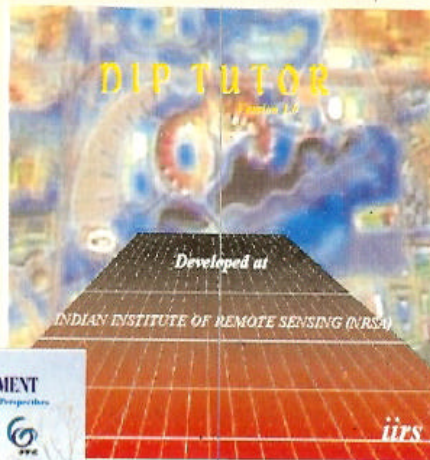
It is a fine experience in receiving "Contact". The colourful newsletter is not only providing 'news', but through its splendid items (like "Retrieval of suspended sediment.. using IRS-IC WiFs data", Spatial Decision Support System... Model" contact, Vol. 3, No. 1) doing a continued education job wonderfully. I wish it will keep on enlightening the readers with latest developments in the areas of space research, earth observation, natural resource management and so on. Congratulations!

Dr. S.S.Mukhopadhyay
Punjab Agricultural University
Ludhiana (Pb.)

IIRS publications

The details of new study/reading material are given as follows -

1. Multimedia (CD) - "Digital Image Processing (DIP) tutor" - Rs. 1000/-
2. Multimedia (CD) "Digital Photogrammetry" - Rs. 500/-
3. "Biodiversity & Environment - RS & GIS system Perspectives" - Proc. volume of workshop organised by IIRS & ITC - Rs. 425/-
4. "RS & GIS application in Urban & Regional Studies" - Rs. 350/-.



The cost includes postage charges. Above material can be purchased by sending a D/D in favour of "Accounts Officer, IIRS", payable at "Dehra Dun."