

# Science and Technology Reporter

A Quarterly Newsletter of the Haryana State Council for  
Science and Technology



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## EDITORIAL

A decline in number of students opting for science stream in Haryana is being observed, thus creating shortage of science graduates / post graduates for jobs in this sector particularly teaching. To bring back the glory that the pure sciences once held in the minds of the students, an urgent restructuring of the entire system is needed. As students advance in their studies, whether school going, undergraduate or graduate, they should be frequently exposed to people who are immersed in solving serious problems in global change, energy and environment, pharmaceuticals, biology and biotechnology, and various other field of science – again without dilution of standards. At the school and undergraduate level, this can be done through popular science lectures. Also from time to time there is need to provide understanding of Science and Technology to common man.

Keeping this in view Department of Science & Technology, Haryana in collaboration with National Council of Science Museums, Delhi had organized a State level workshop on Astronomy on 8<sup>th</sup> April 2010 at Govt. College for Girls, Sector 14, Panchkula. During this workshop Prof. Mayank N Vahia, from Tata Institute of Fundamental Research, Mumbai was invited to deliver lecture on "How big and how small our Universe is". Approximately 900 students, academia and general public attended the workshop and widely appreciated it.

Seeing the immense response from all quarters, a new scheme namely "Science Workshops" has been initiated from Haryana State Council for Science and Technology, Science and Technology Department, Haryana where eminent scientists who are also excellent speakers will be invited to address a group of students on a topic of current interest with aim to popularize science among the general public at large and students in particular and to achieve scientific literacy in the state. These lectures will be organised at district level and will cover all districts of the state.

Department has also initiated a new scheme on promotion of science education in the State namely Haryana Science Talent Search Scheme in order to motivate the students and nurture their science talent by way of awarding them with scholarships. For year 2010-11, 1000 scholarships will be awarded to selected meritorious candidates. Selection will be based on single combined written examination conducted by SCERT, Gurgaon for Stage 1 National Talent search, NMMS and HScTS for Haryana State which is going to be held on 21<sup>st</sup> November, 2010. Merit will be prepared based on scores obtained in mental ability (MAT) & scholastic aptitude (SAT) having science and maths subjects only.

Besides this call for proposals for various programmes like Collaborative Science and Technology Programme and Dissemination of Innovative Technology has been made the details of which can be accessed on website [www.dstharyana.org](http://www.dstharyana.org).

(Renu)

## STATE LEVEL WORKSHOP ON ASTRONOMY

Department of Science & Technology, Haryana in collaboration with National Council of Science Museum, Delhi organized a State level workshop on Astronomy on 8<sup>th</sup> April 2010 at Govt. College for Girls, Sector 14, Panchkula. During this workshop Prof. Mayank N Vahia, a renowned astronomer of Tata Institute of Fundamental Research, Mumbai delivered an extensive and popular lecture on "How big and how small our Universe is". Approximately 900 students, academia and general public took part and benefited from this rare opportunity. Prof. Vahia also answered the curious questions asked by the participants. Sh. S.M.Khened, Director, National

Science Centre was also present on this occasion. After the workshop Sh. S.S. Prasad, IAS Principal Secretary and Financial Commissioner, Science & Technology Department, Haryana flagged off the Observatory on Wheels cum Science Exhibition Van, which covered entire Haryana over 45 days during 9<sup>th</sup> April 2010 to 22<sup>nd</sup> May 2010. This van equipped with various interesting scientific exhibits, portable planetarium, the telescope, etc. made a halt of two days in each district of the State. The activities like demonstration on fascinating science, demonstration on liquid nitrogen, introductory lecture on astronomy, astronomy quiz and night sky observation etc. were carried out on daily basis.



Sh. S.S. Prasad, IAS, Financial Commissioner and Principal Secretary, DST, Haryana addressing the participants of workshop



Flagging off the Observatory on Wheels cum Science Exhibition Van by Sh. S.S. Prasad, IAS, FC & PS, DST, Haryana

## HANDS ON OBSERVATIONS BY SH. BHUPINDER SINGH HOODA HON'BLE CHIEF MINISTER, HARYANA THROUGH CELESTRON TELESCOPE

On 13<sup>th</sup> April, 2010 night, Sh. Bhupinder Singh Hooda, Hon'ble Chief Minister, Haryana made observations of various celestial bodies like Saturn rings, Mars, Venus, Sirius star, Pole star, etc. through the 11" Celestron telescope put by the Department of Science & Technology, Haryana at his residence. Besides these, different constellations like Ursha major, Orion the hunter, etc. were the main attraction during this event organized by the department. On this occasion, scientists from the department of Science & Technology, Panjab University and National Council of Science Museum were also present. Sh. S.S. Prasad, IAS, FC&PS, S&T department briefed about the details of programme of Observatory on Wheels in Haryana being organized by the department to the Hon'ble Chief Minister, Haryana. He further elaborated that this telescope will be installed in the office building of the department at Panchkula very soon and this facility will be open to all. After enjoying the star-gazing, Hon'ble Chief Minister appreciated the steps taken by the department of Science & Technology towards promotion of astronomy among the general masses and particularly students of the State.



Hon'ble Chief Minister, Haryana, Sh Bhupinder Singh Hooda observing sky through 11" Celestron telescope

## SIGNIFICANCE OF FORENSIC DIATOMOLOGY

Diatoms are aquatic unicellular organisms that represent a major taxonomic division of the phytoplankton. The most distinctive feature of diatoms is their extracellular coat or frustule, which is composed of silica. On the basis of a vast structural diversity of the frustule, there are remarkable numbers of morphologically-distinctive varieties of diatoms. Diatoms are most often encountered in naturally occurring bodies of water such as lakes, rivers, oceans, seas, ditches and puddles. Diatoms for this reason have great forensic significance in drowning and other crime cases involving water bodies.

One way of determining medicolegal value of the diatom test for drowning is to show its value to determine if drowning was the cause of death. Many times skeletons of human body are recovered from the river beds or fields having some connection with water. At this stage of total or partial decomposition doctors fail to diagnose the reason of death by drowning or otherwise dumping of the dead body in water. Though some diatoms studies have already been made by scientist, but its forensic value in crime cases has not been investigated properly. Till now no data for retrospective analysis of diatom flora from various water sites (lakes, ponds, wells, canals, ponds, etc.) from Haryana state in particular has been obtained.

The Diatom Research Project from, Haryana State Council for Science and Technology, Department of Science and Technology sanctioned to Forensic Science Laboratory Haryana [FSL(H)], Madhuban (Karnal) Haryana, therefore, plans to study the complete flora of diatoms and also develop DNA fingerprinting of diatoms to study crime in case of putative drowning because of limited homology between human and plant DNA. This study will enable the medicolegal investigation of human corpse in water and their manner of death. Unlike, most homicidal attacks, the post-mortem findings in homicidal and accidental drowning are indistinguishable. A body recovered from water need not have died in water and drowning may not be the cause of death even if the death occurred in water. In the drowning process, water is inhaled and distends the alveoli. The diatoms that are present in the drowning medium perforate the alveolar-capillary barrier and enter the pulmonary venous circulation. Therefore the presence of diatoms in the femoral bone marrow is an indication of antemortem

inhalation of water. Diatom test not only determines manner of death but also tells drowning during various times of the year. The present investigation plans to examine bloom dynamics of genetically distinct populations under changing environmental conditions during times of the year. Widespread distribution of diatoms in water and their morphological specificity in water bodies of Haryana will make diatom an important forensic marker of drowning.

Lately Dr. Vandana Vinayak, Senior Scientific Officer of FSL (H), Madhuban, Diatomology Division has solved the most sensational SHOPIAN RAPE AND MURDER CASE refers to the alleged abduction, gang rape and murder of two young women, Asiya Jaan and Neelofar Jaan in mysterious circumstances on the intervening night of May 29 and 30, 2009 at Bongam, Shopian district of Jammu and Kashmir, India. The case was brought by CBI to FSL (H), Madhuban and on the basis of diatom test conducted at FSL, it was reported and confirmed that the diatoms were detected in the lungs and sternum of Neelofar Jaan and Asiya Jaan. These diatoms were similar to the diatoms found in the water samples collected from the place of recovery of the dead body of Neelofar Jaan and Asiya Jaan in the Rambiar Nallah<sup>1,2</sup>, Dec 14, 2009. On the basis of this report two months after the CBI ruled out rape and murder of the two women in Shopian, a Srinagar court on Feb 17<sup>th</sup>, 2010 granted bail to the 13 persons accused of trying to manufacture evidence against police and paramilitary personnel and inciting public protests<sup>3,4</sup>.

FSL (H) Madhuban is receiving 15 to 20 cases of drowning every month and the number is increasing every year. In yet another case four friends had gone to a river side to take bath. One of them slipped into river and got drowned. On this the rest of the friends ran away to their homes out of fear. On enquiry they disclosed that the fourth boy had drowned. Parents of the deceased alleged it to be a case of homicidal drowning. The body of the deceased boy was sent to the PGIMS, Rohtak for post-mortem examination. The doctors could not conclude anything and depended only on diatom test to be conducted at FSL. Diatom test was conducted at FSL (H) which revealed the presence of *Stauroneis*, *Hantzschia* and *Nitzschia* diatoms both in water sample and in bone marrow and the diatoms from both sources were found to be similar. Parents were got convinced that their son lost his life accidentally indicating a case of ante-mortem drowning.

## GLIMPSES OF DIATOMOLOGY UNIT AT FSL(H), MADHUBAN, KARNAL



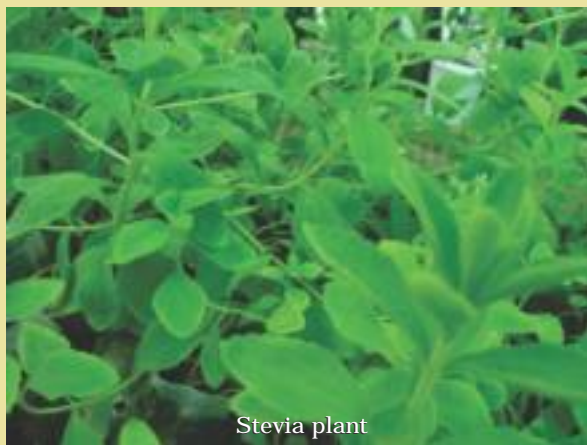
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Vandana Vinayak,  
Diatomology Division, Forensic Science Laboratory  
(Haryana),  
Madhuban, Karnal  
Email- kapilvinayak@gmail.com

## STEVIA REBAUDIANA BERTONI AN IMPORTANT NATURAL BIOSWEETNER

India is the largest consumer of sugars in the world and country has a fairly high population of diabetic patients (about 20%) in the age group of 25-50 which is increasing at an alarming pace. The worldwide demand for high potency sweeteners is expected to increase especially with the new practice of blending different sweeteners whereby the demand for alternatives is also expected to increase. The discovery of great number of sweeteners during the last decade has triggered the development of sugar free products, particularly for diabetic and obese people. Sweeteners are alternative substances to sugars, which give food a sweet taste and are used to partially or totally replace sucrose. Sweeteners such as nutritive (polyols) and non-nutritive/ intense sweeteners (artificial and natural) have become alternatives to replace sucrose and have been widely used in various food products. Natural sweeteners are mainly plant constituents. Plants have contributed to about 75



Stevia plant

highly sweet compounds. These sweet compounds fall mainly within the terpenoid, flavonoid and protein compound classes, although altogether nine distinct structural groups of potently sweet molecules have been derived from plants. The sweet herb of Paraguay, *Stevia rebaudiana* Bertoni, is the new emerging alternative source of calorie free sweetener having no carbohydrate and fat. It is commonly known as sweet leaf, sugar leaf, or simply stevia and is widely grown. It is 20 to 30 times more sweet than cane and beet sugar, highly nutritious, delicious, non-toxic and non-additive sugar. Stevia is an herbaceous perennial plant of the Asteraceae family. It also enhances the flavour, is helpful in digestion, weight reduction, anti-oxidant, prevents dental caries and having antimicrobial properties, increases energy levels but does not effect the blood sugar level, therefore key-source sweetener for diabetic world. Stevia is self-incompatible in nature; hence propagation through seeds is a difficult proposition. Therefore, vegetative propagation or micro propagation is the means of propagation.

Advantages of Stevia are the following:

- It is a completely natural non-synthetic product.
- It has got ZERO sugar. Stevioside (the sweetener) contains absolutely no calories.
- The leaves can be used in their natural state.
- The plant is non-toxic.
- The leaves as well as the pure stevioside extract can be cooked.
- No aftertaste or bitterness.
- Stable when heated up to 200 degrees.
- Non fermentative.
- Flavour enhancing.
- Clinically tested and frequently used by humans without negative effect.
- Stevia does not increase the blood sugar therefore can be used by diabetics without adverse glycemic responses
- Due to its almost negligible calorie contribution, it is useful for overweight, obese and health conscious individuals.
- It has anti-bacterial properties, prevents tooth decay and promotes oral health and used in skin care.



Stevia Liquid Extract

*Kamla Malik*  
Centre for Plant Biotechnology,  
CCS HAU New Campus, Hisar  
Email – [kamlamalik@rediffmail.com](mailto:kamlamalik@rediffmail.com)

# HYDROGEOLOGICAL, ECOLOGICAL AND SOCIO-ECONOMIC SIGNIFICANCES OF WETLANDS



Biodiversity-Badkhal Lake, Faridabad



Rainwater Harvesting-Damdama Lake, Near Gurgaon



Habitat for Migratory Birds-Sultanpur Lake, Near Gurgaon

Wetlands are the natural or man-made surface water bodies exist either ephemeral or perennial like swamps, marshes and bogs. According to Ramsar Convention the wetlands are defined as areas of marsh, fen or peat land whether natural or artificial, permanent or temporary with water which is static or flowing, fresh, brackish or salty including areas of marine water the depth of which at low tide does not exceed six metres. Wetlands are considered one of the most biologically diverse ecosystems. Wetlands are the storehouse of both fauna and flora of diverse types. Major floras found in wetlands are mangrove, water lilies, cattails, sedges, tamarack and black spruce while fauna includes amphibians, reptiles, birds, insects and mammals.

Hydrogeologically, ecologically and socio-economically, wetlands are highly useful for natural as well as anthropogenic systems. The major hydrogeological, ecological and socio-economic significances of wetlands are given below:

## A. Hydrogeological significance

- Rainwater harvesting sites
- Recharge of groundwater
- Groundwater quality improvements
- Drought proofing
- Flood control
- Water availability in lean period
- Soil moisture maintain
- Microclimate maintain
- Reduce soil erosion
- Sediment retention

## B. Ecological significance

- Habitats for migratory birds
- Habitats for local birds, animals and aquatic organisms
- Food resources for flora and fauna (land and aquatic)
- Biodiversity maintains
- Aquatic and land ecological systems maintain
- Absorbing greenhouse gases (slowdown of global warming)

## C. Socio-economic significance

- Tourist sites
- Pisciculture
- Medicinal plants
- Dry season fodder for animals
- Employment to local community

Haryana state has major wetlands like Bhindawas Bird Sanctuary, Sultanpur National Park, Bhadkhal Lake, Kotladhar, Damdama, Karn Lake and Bibipur Lake which are rich in flora and fauna. Except Bhindawas and Sultanpur wetlands other wetlands requires restoration and management so that their potential can be harnessed for hydrogeological, ecological and socio-economic development for respective areas.

*Anup Kumar and R.S.Hooda*  
Haryana Space Applications Centre,  
CCS HAU Campus, Hisar,  
\*E-mail: anup0106@yahoo.com

## SCIENCE QUIZ CONTEST

In order to bring scientific temper among the school students of Haryana State, HSCST has been conducting science quiz contest in the state of Haryana since the year 1998-99 under science popularisation activities. The science quiz contest is organised at three levels i.e. district level, zonal level and state level. The district level science quiz contest is organised in each district of the State by the concerned District Education Officer/District Science Specialist. The zonal level and state level quiz contest are organised by HSCST with the help of experts/quiz master from reputed academic institutions. From 1998 to 2005 the quiz was organised jointly for school students affiliated with CBSE and Haryana Board of School Education. From the year 2006-07, the science quiz contest was bifurcated in two groups i.e. group 'A' for the school students affiliated with CBSE and ICSE and group 'B' for the school students affiliated with Haryana School Education Board.

The Science Quiz Contest for the year 2009-10 was initially organised at district level by the concerned DEOs and zonal level science quiz contest were organised at Hisar, Yamuna Nagar, Rohtak & Gurgaon districts in the month of November/December 2009. The best four teams from each group and each zone participated in the state level science quiz contest which was organised at Gita Niketan Awqasiya Vidyalaya, Kurukshetra on 28.6.2010. At zonal level for first, second, third and consolation prize consists of prize money of



Sh. S.S. Prasad, IAS, Financial Commissioner and Principal Secretary, DST, Haryana giving prize to winner team

Rs 5000, Rs 4000, Rs 3000 and Rs 2000, respectively. At State level for first, second, third and consolation prize winner prize money is Rs 20000, Rs 16000, Rs 12000 and Rs 8000, respectively, alongwith a trophy for 1<sup>st</sup> prize winning school. Ruby Dhek, Anju and Rahul from Colonel's Central Academy, Gurgaon won 1<sup>st</sup> prize in group 'A' and Mohit, Krishan & Dinesh from Arya Sr. Sec. School, Narwana (Jind) were winner of 1<sup>st</sup> prize in group 'B' category.

Sh.S.S.Prasad, IAS, FC&PS, Science and Technology Department, Haryana, the Chief Guest of the state level Science Quiz function, awarded the prizes and certificates to the zonal and state level winners

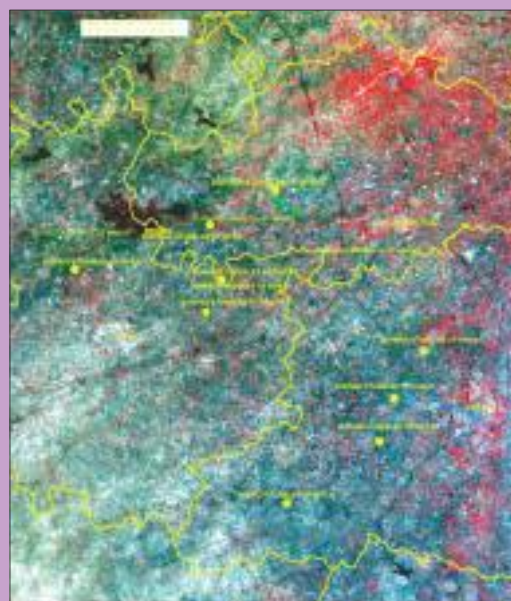
## NEW PROJECT

HARSAC to estimate burning area of wheat/Rice Stubbles in Haryana using satellite data on the request of Department of agriculture

HARSAC has undertaken the project to estimate the area of burning of crop residues in various districts (Kaithal, Karnal, Kurukshetra) of the state using satellite data. Burning of crop residue has been banned as it not only creates environmental pollution but also kills helpful soil microbes and destroys biomass and organic matter.

Several meetings have been scheduled during April to June, 2010 between several Govt. Departments and HARSAC accordingly. HARSAC will actively involve in the following activities:

- Providing database for rainwater harvesting site selection in Gurgaon.
- Potential site selection and acquisition for establishment of Nuclear power plant at Gurkhapur Fetaibad with NPCIL using Remote Sensing Techniques.
- Preparation of Digital Elevation Models (DEM) for Hansi Butana Canal as supporting document with reference to a suite in the Hon'ble Supreme Court of India by Interstate & Liaison Division, New Delhi.



Satellite image showing wheat stubble burning areas

## CENTRE OF EXCELLENCE

A scheme on *Setting up of Centre of Excellence/Common Research, Training & Education Facility in emerging areas of Science & Technology* has also been initiated from Haryana State Council for Science and Technology and following two Centres of Excellence are being set up:

1. A Centre of Excellence on “DNA Testing and Diagnostics Facility for Research and Application in Haryana” at a cost of Rs. 233.85 lakhs was sanctioned to Centre for Plant Biotechnology (CPB), Hisar. First year grant of Rs.143.37 lakhs is already released to CPB. This facility will be developed by Dr. Rajwant Kaur Kalia, Senior Scientist who is the Principal Investigator of this project with the support of Dr. Ashok Dhawan, Director (T) and Dr. Subhash Kajla, SSO-II from CPB, Hisar as Co-Investigators and Dr Renu, Senior Scientific Officer-1 as nodal co-ordinator from Haryana State Council for Science and Technology, Panchkula. A state of the art research and development facility will be developed which will house latest equipments worth Rs. 82 lakhs for DNA testing. In addition a transgenic green house costing approximately Rs. 40 lakhs will be erected at CPB premises under this project. This facility will be commercially available to the end users for testing purity and identity of seed material, uniformity of tissue culture raised planting material, authenticity of hybrid origin of the seeds being supplied to the farmers and testing transgenic planting material like Bt cotton. Also, other disputes relating to authenticity of varieties, planting material and consumer products will be solved using DNA diagnostics. In addition, various diseases affecting the crops of Haryana will be identified in this facility using DNA based tools. This facility

will also be available for use by other universities and institutes for research purposes.

2. A Centre of Excellence on setting up of Renewable Energy Test Centre (RETC) at a cost of Rs.100.00 lakhs was sanctioned to Deenbandhu Chhotu Ram University of Science & Technology, Murthal. First year grant of Rs.50.00 lakhs is already released to the University. Dr. S. K. Singh is the Principal Co-ordinator and Head of RETC. The proposed Renewable Energy Test Facility (RETF) will be the independent technical division of the University for providing technical inputs for their policy and planning decisions for executing their programmes throughout the state. The management of the Renewable Energy test centre will be committed to carry out the testing activities in accordance with the international standard ISO/ IEC 17025 [‘General Requirement of the competence of testing and calibration laboratories’] for qualification testing of PV Modules a per international standards IEC 61215/BIS 14286. The RETC will be adequately equipped all the required technical information and the infrastructure for carrying out qualification testing of modules. The RETC will also be fully equipped to provide required technical information to the satisfaction of its client’s requirements with high precision and accuracy by maintaining and adhering to the high standards of quality in its area of operation. A quality manual be prepared for this purpose and will be available to all the personnel’s of its laboratory for reference. It will also provide consultancy and advisory service on PV systems etc. for a variety of application such as lighting, pumping and power plants. Also it proposes to undertake projects of its own for study of long – terms performance of various PV applications and systems for the benefit of the PV industry in general.

## CPB SCIENTIST APPLAUDED IN THE INTERNATIONAL SEMINAR



Dr. Subhash Kajla, SSO-II, CPB Hisar attended 3<sup>rd</sup> International Seminar on “Crop Science for Food Security, Bioenergy and Sustainability” held at Szeged, Hungary from June 1-3, 2010. He delivered an oral presentation on the research paper entitled, “Polymorphism among

*Saccharum* species and Commercial Cultivars of Northern India” co-authored by Dr. A.K. Dhawan and Dr. S.C. Goyal. He also presented a poster on the research paper entitled, “Assessment of Genetic Diversity using RAPD Markers in Sugarcane Germplasm” co-authored by Dr. A.K. Dhawan and Dr. S.C. Goyal. The organizers applauded the research work and awarded appreciation certificate.

## CPB AS A POPULAR TRAINING CENTRE

CPB has been imparting training to B.Sc., M.Sc., B. Tech., M.Tech. students on “Plant Tissue Culture and Biotechnology” since 2006 with an initial strength of 10 trainees only. The number of trainees increased every year and during the year 2010 one hundred and seventeen students from all

over the country got training on “Plant Tissue Culture and Biotechnology” inspite of increase in training fee from Rs. 500 per month to Rs. 3000-4000 per month since 2008. It included the trainees from far off places like Mumbai, Pune, Lucknow, Jodhpur, Jhunjunu, Bikaner, etc.

## TRAININGS ORGANIZED BY HARSAC

### Six Weeks Summer Training Program on "Remote Sensing & GIS"

HARSAC organized a six weeks summer training course on "Remote Sensing and GIS" from 14<sup>th</sup> June to 23<sup>rd</sup> July, 2010. Twenty nine students from various universities / colleges of the state participated in this course. The main objective of this course is to train the post graduate students in the field of

Remote Sensing and GIS. The training was coordinated By Dr.V.S.Arya, Senior Scientist SG (Soil Survey and Land Evaluation). Dr.J.S. Dhankar, Director Extension, CCS HAU, Hisar inaugurated the program.



Participants in training programme



Chief Guest at valedictory function

### Technology awareness and promotion program

As a part of technology awareness and promotion program HARSAC organized user interaction with Saint Paul School and D.N. School students on 19<sup>th</sup> and 23<sup>rd</sup> May, 2010, respectively

## MoU SIGNED BETWEEN HARSAC, NRSC AND HARYANA FOREST DEPARTMENT

An MoU was signed between Haryana Space Application Centre (HARSAC), Hisar, Haryana Forest Department and National Remote Sensing Centre (ISRO) with the following objectives.

1. Technical and Scientific guidance to facilitate the establishment of Geo-Informatics facility at Haryana Forest department.
2. Technical and Scientific guidance to facilitate the

establishment and quality assurance of spatial data based on remote sensing data analysis and interpretation, field data collection GPS / DGPS surveys

3. Implementation of pilot projects in Yamunanagar, Bhiwani, Karnal and Rewari forest divisions, to develop remote sensing and field data base spatial data bases.
4. Education and training of staff of Geomatics faculty at Haryana Forest Department



## BROCHURE

A Brochure of Department of Science & Technology Haryana highlighting the various schemes and new initiatives was published and circulated to all the senior officers in State Government.

Haryana State Council for Science & Technology,  
Bays 35-38, Sector 2, Panchkula, Haryana  
Ph. : 0172-2561339, 2560339, Fax : 0172-2560018  
Website : <http://dstharyana.org/>

Kindly send us your feedback to [renuari@rediffmail.com](mailto:renuari@rediffmail.com)  
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