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Editorial Board – ISG Newsletter

Editorial

We are happy to bring out yet another theme-centred newsletter and hope that the members of ISG will find it as informative as the previous special issues on themes like Agriculture, Urban Planning, Coastal and Marine Environment, Space-based Cartography, GIS: Education and Training in India, Water Resources, Location-based Services, Geomatics in India: Retrospect and Prospects, Impact of Climate Change, Spatial Data Infrastructure, etc.

This issue of newsletter marks the first newsletter to coincide with the first ever regional conference on Good Governance. Others were printed on the occasion of national conferences of Geomatics series.

The present issue covers multiple facets of Geomatics in good governance. As governments move towards increasing transparency and wider adoption of technology, the Geomatics, being synonymous with transparency and technology will keep on making deeper inroads in to the matters of governance. In fact so deep is this link that one would measure the goodness of governance by just looking at the penetration of Geomatics in the government departments. A picture is after all worth a thousand words.

The issue carries a collection of articles from leaders in the field and some compilations from Newsletter team. We begin with a compilation by Dr. Pathan et al to set the tone for the other articles. The most comprehensive range is presented by Prof Verma in his article on variety of applications Geomatics has been put to in the sate matters. The range covers health, agriculture, land records, panchayati raj and education. Dr Hooda and colleagues have documented the use of Geomatics in information needs of state in the area of agriculture. This includes not only the common information but some very challenging needs like burnt area estimates, power potential etc. Dr Rashid tells about how the use of space based monitoring can ensure responsible upkeep of the forests of Jammu and Kashmir. Dr Kimothi gives glimpses of Geomatics applications in the state of Uttarakhand. Article highlights various completed and ongoing activities related to good governance for schools, land record, electricity, telecom etc. Nishith and C P Singh outline how Geomatics can be used in environmental management. Finally Pushpalata and Puneet capture some more states in their compilation. And that takes us to a tally of 11 as the states featuring in this newsletter although we wished to cover all of them.

We would like to thank all the authors for the articles, editorial team for filling contributions, N S Mehta for ISG inputs and Puneet Swaroop / C P Singh for cover design and editorial support.

We look forward to your feedback and suggestions.

R P Dubey

Editor

Geomatics and Good Governance

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Governance

The concept of "governance" is not new. It is as old as human civilization. Simply put "governance" means: the process of decision-making and the process by which decisions are implemented (or not implemented). Governance can be used in several contexts such as corporate governance, international governance, national governance and local governance. Since governance is the process of decision making and the process by which decisions are implemented, an analysis of governance focuses on the formal and informal actors involved in decision-making and implementing the decisions made and the formal and informal structures that have been set in place to arrive at and implement the decision. Government is one of the actors in governance. Other actors involved in governance vary depending on the level of government that is under discussion. In rural areas, for example, other actors may include influential land lords, associations of peasant farmers, cooperatives, NGOs, research institutes, religious leaders, finance institutions political parties, the military etc. The situation in urban areas is much more complex. At the national level, in addition to the above actors, media, lobbyists, international donors, multi-national corporations, etc. may play a role in decision-making or in influencing the decision-making process. All actors other than government and the military are grouped together as part of the "civil society." In some countries in addition to the civil society, organized crime syndicates also influence decision-making, particularly in urban areas and at the national level. Similarly formal government structures are one means by which decisions are arrived at and implemented. At the national level, informal decision-making structures, or informal advisors may exist. In urban areas, organized crime syndicates such as the "land Mafia" may influence decision-making. In some rural areas locally powerful families may make or influence decision-making. Such, informal decision-making is often the result of corrupt practices or leads to corrupt practices.

E-governance in its strict sense is all about the governance with the help of computerization of most of the government offices, digitization of records for easy retrieval and dissemination. Whereas, the good governance is inclusive process and have may attributes but majorly can comprises of pertinent characteristics like - participatory, consensus oriented, accountable, transparent, responsive, effective and efficient, equitable and inclusive and follows the rule of law. It assures that corruption is minimized, the views of minorities are taken into account and that the voices of the most vulnerable in society are heard in decision-making. It is also responsive to the present and future needs of society. Good governance is an ideal which is difficult to achieve in its totality. Very few countries and societies have come close to achieving good governance in its totality. However, to ensure sustainable human development, actions must be taken to work towards this ideal with the aim of making it a reality. The role of Geomatics is immense in good-governance, as it deals with most of the characteristics of good governance underneath figure.

Figure Characteristics of good governance.

Geomatics based good governance applications

Geomatics, previously the preserve of specialists, today open to many users in various economic, environmental and social sectors and to any individual with access to internet. Geomatics encompasses a broad range of disciplines that can be brought together to create a detailed but understandable picture of the physical world and our place in it. These disciplines include:

- Surveying
- Mapping and cartography
- Photogrammetry and remote sensing
- Geographic Information Systems (GIS)
- Global Positioning System (GPS)

Geomatics is an indispensable knowledge and management tool. It was first used by government departments and agencies that dealt with natural resources, transportation, agriculture, and the environment, as well as land development and management. Today geomatics applications are used in many other fields, including civil security, health, education and tourism. Whether for agriculture, forestry, mines, energy, wildlife, environment, heritage, construction, or urban and regional zoning, dedicated geographic information systems (GISs) are used in management at the country, state, and local levels. These geographic information systems provide a steady source of reliable, up-to-date data, and they contribute to the governance with respect to the state's social, environmental and economic development. It assists in the integrated management of land and resources in keeping with the principles of sustainable development. The GISs that have been integrated into governance activities act as catalysts and lead to greater efficiency in emergency situations, land and resource management and development, socioeconomic development, etc.

The following are some typical scenarios where geomatics is used to facilitate business operations or improve decision-making. Using geomatics, the company can combine digital mapping, land use zoning, property registration, traffic flow information, and demographics information to locate and rank the most suitable properties for the new outlets. Emergency response officials can be assisted with geomatics in assessing the impact of rainfall forecasts on water levels, planning the evacuation of threatened homeowners, and identifying

which transportation routes are likely to be cut off by the impending flood. Geomatics can help municipal or transport officers to optimize the routing for vehicles to reduce equipment and operator requirements, and to forecast and plan maintenance needs. Using geomatics, the forest manager can model the visual impacts of harvesting alternatives from different vantage points in the surrounding region, identify the optimum locations for transportation routes, monitor harvesting and plan reforestation operations. A grain farmer is concerned about rising operational costs and the potential negative environmental impacts of pesticide and herbicide applications. Using modern "precision farming" approaches based on geomatics technologies, he can monitor soil moisture and crop health conditions, institute variable rate application of pesticides, herbicides and fertilizers, and forecast crop yields. Many more such applications in each sector are possible.

Conclusion

Geomatics can support various organizational missions by setting up a government-wide coordination and cooperation structure that promotes networking and partnerships in the gathering, production and distribution of Geographic Information and the creation of shared assets. The same structure facilitates transfers of expertise from one organization to another. In addition to training a qualified workforce, it plays an important role in developing disciplines related to land and natural resource management & to support industries and governments through - cartography, geodesy, surveying, photogrammetry, topometry and remote sensing. They offer a broad range of services, including consulting, data processing, sales and support, and geographic data acquisition for both traditional and emerging markets. To achieve the target, proper planning is required using a conceptual model. In order to address these considerations, it is necessary to integrate a large amount of spatial information and knowledge from several disciplines. Advances in Geographic Information Systems (GIS), multiple objective decision making and physical simulation make it possible to develop user friendly, interactive, decision support systems for good governance.

E-Governance in Madhya Pradesh

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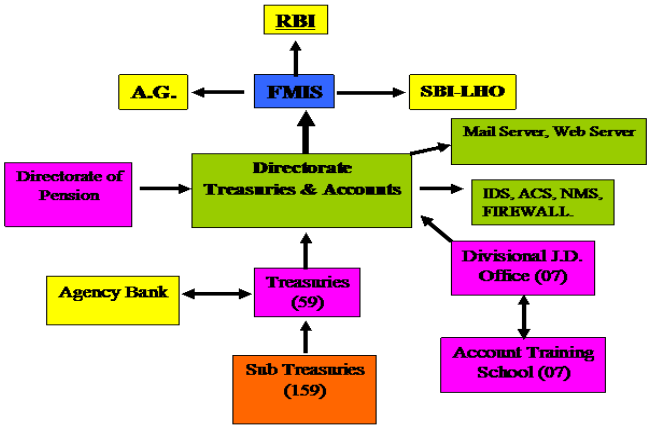
E-Governance is the use of ICT by different sections of the society aiming to improve information and service delivery, encourage citizen participation and make government more accountable, transparent and cost effective. The Govt. of India has launched the National e-Governance Plan (NeGP) to transform governance into e-Governance. E-Governance presents challenges and opportunities to transform both the mechanics of government, and the nature of governance itself.

Foreseeing the opportunity of growth in the Information Technology sector, Madhya Pradesh government had announced its IT policy way back in 1999. The policy ushered the state into the 21st century. Government of Madhya Pradesh in the last two to three years has implemented several e-governance projects. State's IT policy emphasizes induction of IT in all walks of government functioning with focus on masses and aims to leverage IT for transparency and better governance. The major initiatives undertaken in e governance are following :

On January 1, 2000, Dhar district began the new millennium with a mass-based information revolution named Gyandoot. The Gyandoot intranet community network was conceptualized and installed and made operational within less than two months in the tribal dominated, poverty-stricken Dhar district. Gyandoot in Hindi means "purveyor of knowledge". The four pillars on which the Gyandoot community network was established were People, Content, Services and Server. Computers in 21 major centres in five Blocks of the district were connected through an Inranet network. These computers have been established in Gram Panchayats. They have been called Soochanalayas. From the Soochanalaya, user-charge based services are given to the masses and at the same time the information technology related developmental needs of government departments and Panchayats are met free of cost.

Commercial Tax Department, the largest revenue-earning department of the government of Madhya Pradesh has a comprehensive computerization project offering instant information access of the dealers and also offers major processes of the department 'on-line'. Department's internal functions such as payroll, pension related activities, personal information processing has also been made on line.

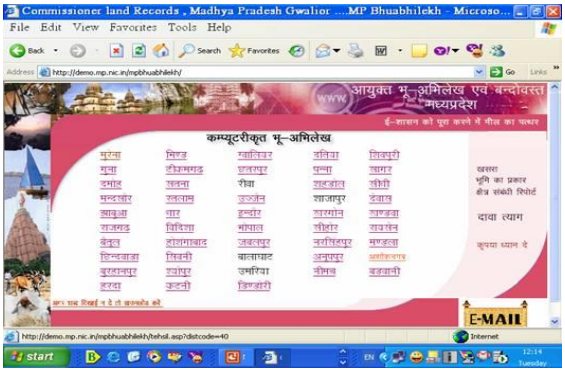


ORGANISATIONAL INFORMATION FLOW CHART

In Treasury and Accounts, Integrated Treasuries Computerization Project (ITCP) a major e-Governance initiative is extended to entire state (229 locations), through 53 district treasuries, 159 sub-treasuries, serving almost 8000

drawing and disbursing officers belonging to all departments of the State Government The project won Golden Icon Award for the exemplary Horizontal Transfer of ICT based Best Practice for the year 2007.

State of Madhya Pradesh has prepared a largest database of Land records in the country. In the State of M.P. the Land Records of all revenue villages have been computerized, i.e. the textual data of land records are 100% converted into electronic form. Computerized land records are modified on regular basis with the facility of automatic weekly backup. Thirty Five million Khasra (Plot/Survey) numbers comprising of Eleven million Landowners have been computerized.

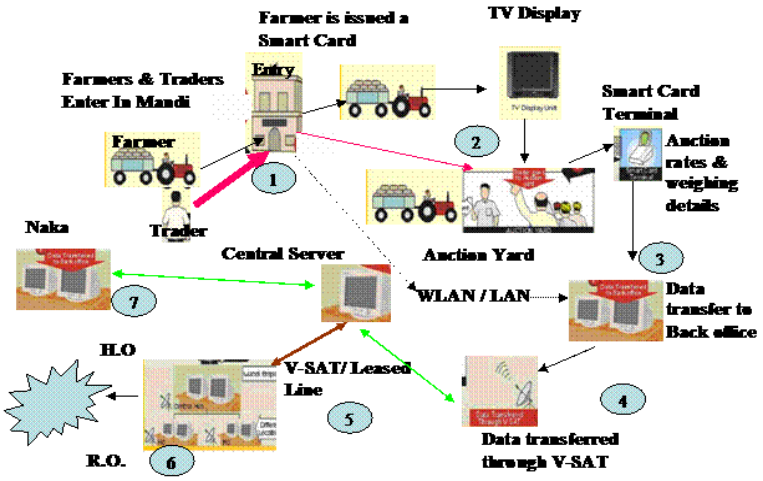


Bhu-Abhilekh is a G2C (Government to Consumer) and G2G (Government to Government) application software used by the Office of the Commissioner, Land Records and Settlement, Department of Revenue in the Madhya Pradesh government. Bhu-Abhilekh comprises a computerized master database of land records that stores plot-wise and owner-wise details on land,crops, revenue, irrigation, demand, collection, land type, tenancy, and so on. This data can be retrieved, changed and updated. The system also allows periodic reports to be generated and issued to landowners including the two important documents Khasra -the record of Rights (ROR)- and Khatauni. RoR of all 48 districts are hosted on www.mpbhuabhilekh.nic.in Directorate of Technical Education, Madhya Pradesh act as coordinating agency between Government, Industry and Institutions and to advice and assist the Government in the all round development of technical education. Letter entry system, Pay bill System, Admission Systems, Gradation System, Court System, MIS System and Budget System works towards the e-Governance initiative.

E-Sewa of M.P. Transport Department is a unique service to provide citizen centric services using Information Technology in its E-Governance. Records of all the vehicles have been made accessible through Internet and through SMS for the benefit of citizens and for improving the Management of Transport and Police Department. SMS and Internet based E-Sewa gives convenient access to authentic record about the ownership and year of make of vehicle. Citizens may check the record, verify and meet the owner before purchasing the old vehicle. This will protect them from forgery and purchasing stolen vehicles.

E-Krishi Vipanan (EKVI) involves use of ICT for automation of Mandi Board Head Office, 7 Regional Offices, and 231 Mandis and their associated Sub-market yards and Nakas (Interstate barriers) across the State of Madhya Pradesh. Most of the Mandis and Sub Mandis are located in villages having 6 million Farmers with 70,000 licensed traders. The various data being generated at Mandis with regards to agricultural produce sale etc. are captured and transmitted on a communication network to associated Regional Office and Head Office via VSAT and are accessible at the specified inter-state barriers (Nakas) etc. for verification of documents on 24 x 7 basis.

Krishinet project is developed for strengthening / promotion of ICT at the State, District, Agricultural Block and grass root level and departments for faster information exchange / dissemination. The State Government has implemented an Electronic Tendering solution, e-Tendering in Madhya Pradesh for use by all its departments/PSUs to standardize procurement process.



E-Krishi Vipanan Network

The Government of Madhya Pradesh has developed its online citizen services portal by the Joint venture company of Government of Madhya Pradesh and TATA Consultancy Services Limited. MPOnline on the lines of the Vision of the GoMP, provides citizen services in the areas of health, education, agriculture, government services, and business to the majority masses in the Rural Madhya Pradesh.

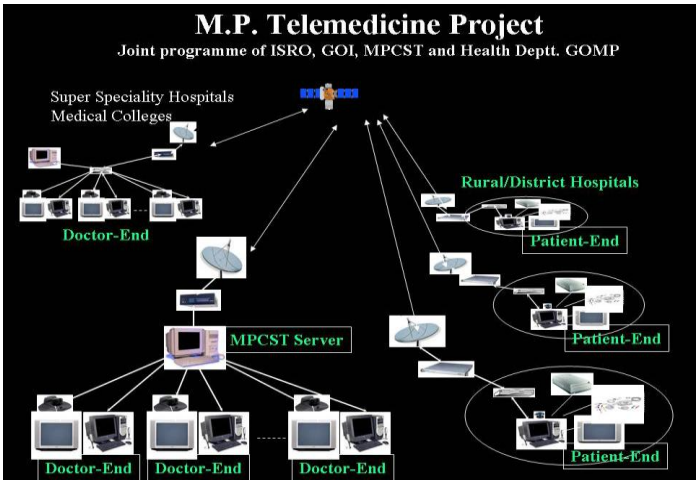
In collaboration with IGNOU and ISRO, initiative for Edusat supported elementary education program was started on December 17th 2005. Nearly 700 schools in Sidhi district and 30 schools in Jabalpur district have been provided ROT facilities. Establishment of State Wide Area Network (SWAN) up to block level in MP has been approved by Deptt. of IT Govt. of India which will be extremely helpful in providing reliable connectivity for various e-Governance applications of different departments. The project envisages connecting all block headquarters to the State Capital through districts & commissionaires. M.P. State Electronics Dev. Corporation Ltd has been designated as the implementing agency of the project.

National Informatics Centre (NIC) Madhya Pradesh State Centre has played a big role in providing e-Governance solutions to the state. It provides State-of-Art Networking Solutions for the establishment of Internet/Intranet/Extranet and providing specialized services over specialized technologies such as LAN/WAN/Wireless/VSAT/Leased Line/Dialup etc. NIC, Madhya Pradesh is connected over 2x4 Mbps Leased Line with Head Quarter (HQ) and 44 District locations are connected over 2 Mbps Leased Line with State HQ. Video Conferencing services are operational since September 2004. NIC has established Video Conferencing Studios at 50 District locations, Secretariat, CM Residence and State HQ. On an average 35 Video Conferencing sessions are held per month and Madhya Pradesh is the highest among all states in the utilization of VC Services. Utilization of Video Conferencing Services has been r2egistered in the Limca Book of Records. e-PROOFS (Electronic Processing of Firms & Societies) for Registrar, Firms and Societies, M.P., Bhopal deals with the computerization of the Registration process and other activities of Societies and Firms at the Registrar's office, M.P.

PANCHLEKHA, Panchayat Raj Institution Accounting System Software (PRIAsoft) designed, developed and implemented in most of the districts of Madhya Pradesh since 2005 aims at efficient management and monitoring of funds at Janpad Panchyat, Zilla Panchayat & State Head Quarters and is empowering the administrators to monitor the fund receipt, availability and expenditure at all four-tier administrative setup of PRIs. Result Processing System for Rajya Sikhsa Kendra, Bhopal has been designed and developed to Computerize basic students information, processing of results (for 5th and 8th class Board Examination) followed by subsequent dissemination of information on Internet and generation of Analytical Reports.

E-Gram Suvidha implemented in Collectorate / Zila Panchayats of 5 districts (Chhatarpur, Bhopal, Mandla, Dhar & Damoh) is a Geomatics-based Decision Support System towards creation and management of facilities at village level in rural areas. It covers about 20 facilities organized under 10 major sectors like Education, Health, Communication and Roads etc. Departmental Monitoring System in Mantralaya, M.P. is the Intranet based System which allows all the Departments at Mantralaya to access the information pertaining to CM letters, CS references, Cabinet Decisions, CM Announcements and other related information and update its status over the net. The information is retrieved by all the concerned for the monitoring purposes. Office of Chief Minister has been Computerized for keeping track of mail received from Public & its representatives, monitoring of CM Announcements and implementation of Manifesto, Maintenance of C.M. Relief Fund , Monitoring of Announcements made by the Hon'ble CM and petitions received during Jan Darshan Programme.

Office of Chief Secretary has also been Computerized for the purpose of monitoring. These includes Mail Monitoring System, Cabinet Decision Monitoring System and File Monitoring System. Computerization of Madhya Pradesh Mantralaya" bagged Excellent Project Award under the Best E-Governed Project in CSI-Nihilent e-Governance Awards2008-09, at New Delhi. The State has also bagged the Runners-Up Award under the Best E-Governed State. Web-based Rural Soft Monitoring System is a computerized Web-based monitoring system for monthly progress of various developmental schemes of Department of Rural Development, Government of Madhya Pradesh.Water Soft (PHEMIS) is a Web-based solution for effective management of Water Resources , Schemes/Programmes (Rural/Urban Water Supply Schemes), Equipment Information, Water Quality, Contractor Information, Material & Stores, Total Sanitation Campaign, Finance & Works Accounting.



M P Council of Science & Technology has also taken many initiatives in e governance. For making the official work faster and efficiently, state-of-art PCs and server with all necessary S/W has been installed. Biometric-Electronic attendance system is also installed. Almost all the mails and communication are made through email, internet facility provided to all staff. Purchase is being made through e-tendering system and payment through e-payment. All these have been introduced to encourage paperless work culture and happen the official work smooth, speedy and in a transparent manner. The EDUSAT hub of Vigyan Prashar and Telemedicine hub of ISRO are installed at MPCST HQ for providing community service to line Govt. Deptts. The Council is also developing State Spatial Data Infrastructure System (SSDI) to disseminate spatial and non-spatial digital data on natural and socio-economic resources generated at tahsil and district level (for all 50 districts) to all user and line departments of GOMP through web enabled service. Library of the Council is connected with DELNET to provide latest /recent journals, reference and articles to users.

The good governance is the key factor in the success of Madhya Pradesh Government. Ideation, execution and monitoring of developmental projects are mostly done through e-system. The growth of per capita income of Madhya Pradesh (Estimates of State Domestic Product – Madhya Pradesh, Directorate of Economics and statistics, M.P. 2010) during the period 2002-2003 and 2008-2009 from Rs.12303.00 to Rs.21648.00 itself speaks the utility of e-governance for good governance in the State.

Applications of Geo-informatics in Agricultural Resources Management in Haryana state

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1.0 Introduction

Haryana being an agrarian state, agriculture is accorded high priority right from the inception of the state. As a result state has made remarkable progress in the field of agriculture production and it has emerged as the grain bowl of the country. As per latest estimates of Agriculture Ministry, India's food grain production has reach to 232.07 million tonnes in the year 2010-11. Haryana state, though small in area, has contributed significantly in this achievement. There has been a record production of 116.30 lakh meteric tonnes of wheat in 2010-11 and the productivity has also reached the highest ever level of 4,624 kg. per hectare in the State, which is highest in the country. As a result the State was able to contribute about 70 lakh MT of wheat to the Central foodgrain pool, which is the second highest after Punjab. Haryana also ranks first in the country in export of basmati Rice.

Latest technologies like remote sensing and GIS are increasingly being used in the agricultural planning in the state. Remote Sensing Satellites provide a vantage point in space to get a synoptic view of the earth surface repetitively. This makes it possible to monitor our natural resources, both renewable and non renewable. Besides the operational use of remote sensing and GIS in crop acreage and production forecasting for a long time, the technology is also been used in the assessment of cropping patterns and crop rotations, monitoring minor crops like santhi (summer paddy), assessment of burning of crop residues, surplus crop biomass assessment for power generation agricultural drought monitoring and mapping of macro and micro nutrient availability in the soil etc. The present paper describes in brief some important applications of remote sensing and GIS technologies in agriculture in Haryana.

2.0 Monitoring area under santhi (summer paddy) using LISS-IV data

With the onset of intensive cultivation the farmers in Haryana started taking additional short duration crop called santhi paddy or summer paddy, besides the normal paddy during monsson season. As summer paddy is a short duration zaid crop grown during summer period from April to July, though a lot of inputs in terms of water and power are required, yet its productivity is low. This high demand of water and electricity coincided with the domestic demand during these summer months, creating a lot of problems. In view of this Government started discouraging growing of this summer paddy crop. As there was no field survey (Girdawari) data available for this crop with the State Department of Agriculture, they approached HARSAC to estimate santhi areas in the major districts of the state using space technology to assess the effect of their anti-santhi campaign.

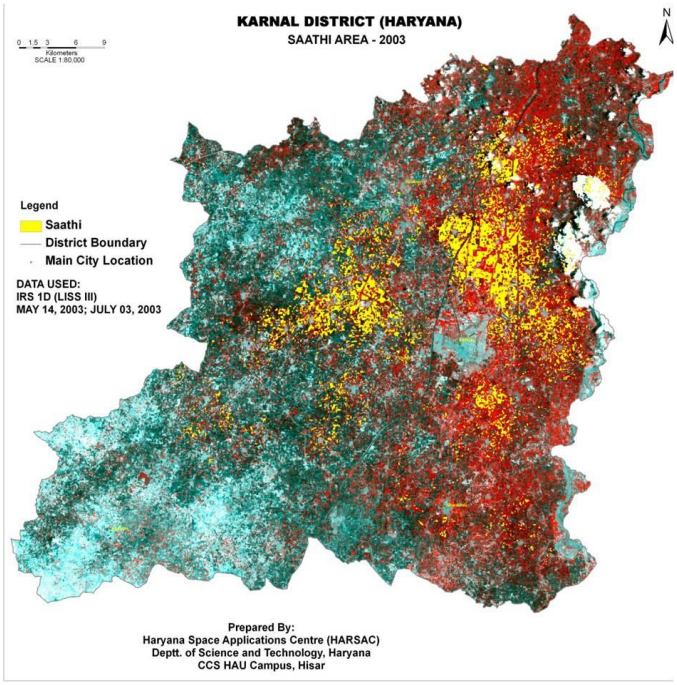

Fig. 1 Santhi Area (yellow) in Karnal District (2003)

Monitoring of summer paddy areas was done for four districts of Haryana namely Fatehabad, Kaithal, Karnal and Kurukshetra during the years 2006, 2007 and 2008.

The current estimates were compared with the summer paddy areas identified using 2000, 2002 and 2003 satellite data. District as well as block-level santhi was estimated for the year 2003 & 2008 while at district-level for rest of the study period. For the years 2006, 2007 and 2008 in-season LISS-IV and PAN merged LISS-III and multi-date IRS LISS-III data were used while for the previous years of 2000, 2002 and 2003 archived multi-date IRS LISS-III data were used for the four districts. Normalized Difference Vegetation Index (NDVI) was generated using the time series satellite data of the crop growing season. This NDVI profile study helped in the identification of training sites in the LISS-IV and PAN merged LISS-III data during supervised classification and to discriminate Santhi and other crops in unsupervised classified images. To improve the classification accuracy, the non-agricultural area were masked out and the remaining areas were classified. The area was estimated by computing pixels under the classified image mask. The identified paddy areas in Karnal District for the years 2003 are indicated in yellow colour in figure 1. Table 1 shows the santhi area estimates in different years in the four major crop growing districts which contribute more than 80% of the santhi crop in the state. The results indicated that the total area of santhi in the four districts has reduced drastically from 39802 ha. in 2000 to only 488 ha. in 2007.

Table 1: Santhi (Summer Paddy) Areas and Relative Deviation in the Project Districts

S. No.	District	Saathi Area (hectares)						
		2000	2002	2003	2006	2007	2008	RD % (2000-08)
1	Fatehabad	4981	2393	2274	383	21	Nil	-100.0
2	Kaithal	3228	3928	5017	197	183	312	-90.3
3	K/Shetra	9118	2683	1589	176	173	257	-97.2
4	Karnal	22475	14859	12582	493	111	1100	-95.1
	Total	39802	23863	21462	1249	488	1669	-95.8

It was concluded that multi-date LISS-III data between third week of April to last week of June found to be useful in identifying santhi patches. Santhi crop was discriminable in multi-date LISS-III and LISS-IV, PAN Sharpened LISS-III digital data after one month of planting.

3.0 Assessment of surplus agricultural biomass for power generation

Commonly used sources to generate energy are coal and gas, popularly known as fossil fuel. As conventional energy sources are depleting day by day, the new sources of power generation like solar, wind and biomass are being explored and exploited. Agricultural waste is a low-density biomass, scattered all over the country. As a result, in spite of its tremendous potential as a renewable source of energy, it has remained more or less neglected by the energy planners as well as technocrats. Every year, farmers in Maharashtra state alone are simply burning off millions of tons of sugarcane trash (dried leaves of sugarcane left in the field after harvesting of the cane.

Increasing attempts are being made at finding economically feasible ways of using biomass as a source of energy. Technologies and prototypes have now been developed for installing biomass based power plants of 1-5 MW capacity. In view of this Department of Renewable Energy, Haryana is exploring the possibility of putting such power plants as suitable locations. But before finalizing the sites for the establishment of such power plants, data as regards the availability of surplus biomass is a pre-requisite. Therefore, the Department sponsored this study for creating database of the surplus crop biomass in the state at block level using remote sensing and GIS.

Multi-date and multi-season IRS LISS-III digital data of 23.5 m spatial resolution along with various spatial and non-spatial collateral data was used to generate total cropped area during Kharif and Rabi season. Harvest Indices (HI) values of various crops were collected from literature survey and average yield data was collected from Department of Agriculture, Haryana. These figures were used to assess crop wise total agricultural biomass and total non-grain (NG)/non-economic (NE) agricultural biomass at the block level. Surplus agricultural biomass available for power generation was calculated using the field survey in about 200 village locations.

The crop-wise biomass requirement for generation of 1 MW electric power was also collected from the literature and used for assessing power generation potential of crop residue from different crops. Block level power generation potential was computed using the availability of crop-wise surplus agricultural biomass.

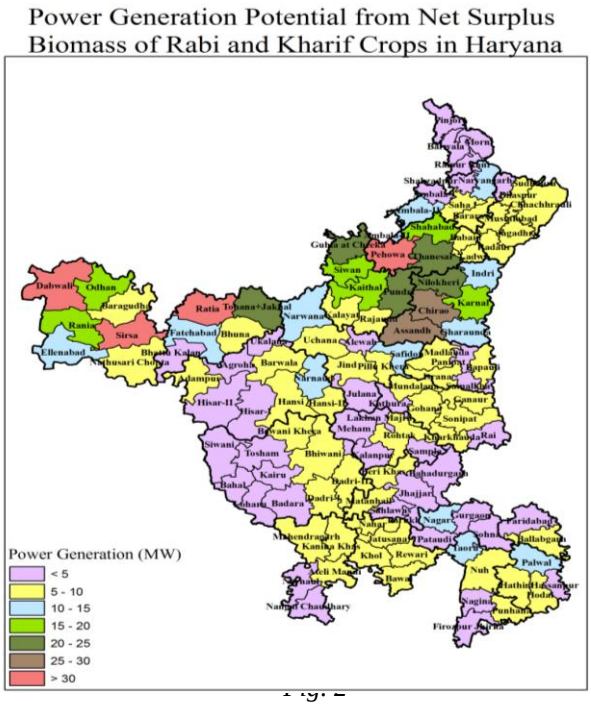

Fig. 2

Table 2. Crop area, biomass, surplus biomass and power generation potential

Crop Season/	Cropped Area (000 ha)	Crop Biomass (‘000 tons)	Non-grain Biomass (‘000 t)	Net Surplus Biomass (‘000 t)	Pow. Gen. Potential from Net Surplus biomass (MW)
Kharif	2509.75	24795.83	11108.54	6109.44	730.88
Rabi	3068.73	26604.28	15697.52	2307.04	288.07
Total	5578.48	51400.12	26806.06	8416.47	1018.95

The results suggests that state has three major crops Rice, Pearl millet (Pennisetum), Cotton (Gossypium) followed by Sugarcane, Sorghum in monsoon season and two major crops Wheat, Mustard followed by Black Gram, Barley during winter season. Total cropped area, crop biomass, non-grain crop biomass, net agricultural surplus biomass and power generation potential from net agricultural surplus biomass in the state was 5578.48 thousand hectares, 51400.12, 26806.06, 8416.47 thousand tones and 1018.95 MW respectively (Table 2). Figure 2 provides the block wise power generation potential from crop residue for all the 119 blocks of the state. It is expected that the maps and data will help in development planning, especially for setting up of power generation plants using surplus agricultural biomass.

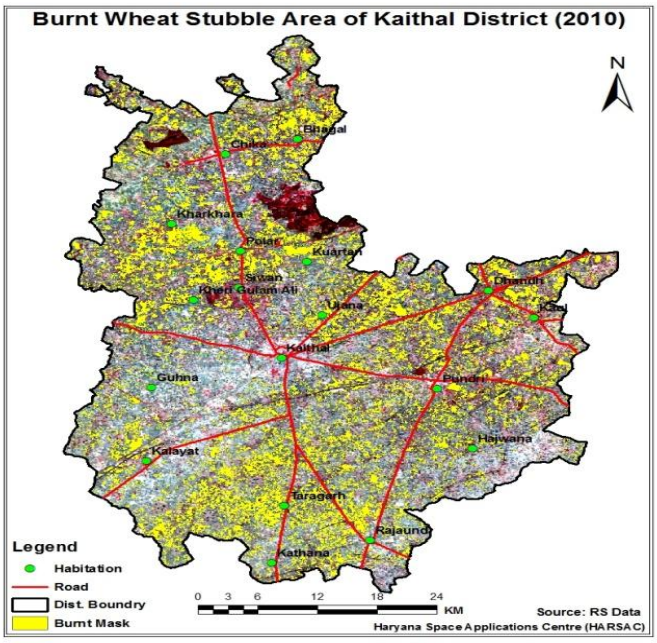

Fig. 3

4.0 Estimation of burning of crop residues

Wheat and paddy are the most important cash crops of India and Haryana has emerged as an important state for wheat and paddy production. Lack of availability of farm labour and introduction of combine harvesters has given rise to a bad practice of crop residue burning in Rice-Wheat System (RWS) in the major agrarian states of India like Punjab, Haryana and UP. This besides causing the loss of biomass and fodder for the animals, causes air pollution and also deteriorates the soil productivity by killing the soil microbes. Therefore, agricultural scientists and planners are discouraging farmers against this bad practice. In view of this the practice has been banned in the Haryana but there is no monitoring of such areas. As a result of a civil writ petition filed in the Hon'ble Punjab & Haryana High Court, State Department of Agriculture sought the help of remote sensing technology for assessment of the area where crop residue burning has been done. In season interpretation and analysis of the satellite images has made it possible to find out areas in various districts of the state where crop stubble burning is practiced.

The burnt wheat and rice stubble area estimation was done for three districts of Haryana namely Kaithal, Kurukshetra and Karnal for the year 2010 using satellite data. Multi-date IRS-P6 AWiFS and LISS-III data were used for the study. In season ground truth was collected in project districts using hand held GPS for use as training signatures and to identify area of burnt wheat/ rice stubbles, associated crops and land features. Complete enumeration approach was used. After geo-referencing the satellite images, district images were masked-out and multi-date image data stack was created. Normalized Difference Vegetation Index (NDVI) of each date was also generated and used at the time of classification along with other spectral bands.

Table 3. Burnt Crop Residue Areas in the major Districts of Haryana

Sr. No.	District	Burnt Crop Residue Area (000' hectares)					
		Wheat			Rice		
		Burnt Area	Wheat Area	% of Wheat	Burnt Area	Rice Area	% of Rice
01	Kaithal	46.15	172	26.83	24.69	159	15.53
02	Kurukshetra	16.85	116	14.53	29.66	121	24.51
03	Karnal	37.05	171	21.67	36.49	172	21.22
	Total (3 Dist.)	100.05	459	21.80	90.84	452	20.10

To improve the classification accuracy the non-agricultural areas were masked out and the remaining areas were classified using unsupervised classification with the help of Iso-Data Classifier. The area was estimated by computing pixels under the classified image mask. The area estimates are based on the available satellite data and the burnt wheat and rice stubble area available on the image.

Wheat stubble burning in the three project districts was done in a total area of 100.05 thousand hectares. Figure 3 indicate the burnt wheat residue area in Kaithal distirct of Haryana. Table 3 indicated the wheat and paddy crop residue burnt areas in the three project district. Total rice stubble burnt area in the three project districts was observed to be 90.84 thousand hectares. In season multi-date AWiFS data along with available single-date LISS-III data between third week of April to last week of May are found to be useful for wheat stubble burnt area estimation. The data between second week of October to last week of November is useful for rice stubbles burnt area estimation at district level. As the satellite data of rice season was not available between November 06 to 20 and November 20 to 30, 2010 due to cloudy conditions, it may be possible that the burnt area of the period may be resown for rabi crops and not picked on the satellite images of the later date. Therefore, the burnt paddy area may have been underestimated in the study.

5.0 Mapping Soil Nutrient status in Haryana

There are 17 essential nutrients which are required for growth and development of the plant. Carbon and oxygen are absorbed from the air, while other nutrients including water are obtained from the soil. The nutrients required in large quantities are called macronutrients. Primary macronutrients are nitrogen (N), phosphorus (P), potassium (K) and secondary macronutrients include calcium (Ca), sulphur (S), magnesium (Mg). While nutrients required in minute quantities are called micronutrients or trace minerals, e.g. boron (B), chlorine (Cl), manganese (Mn), iron (Fe), zinc (Zn), copper (Cu), molybdenum (Mo), nickel (Ni), selenium (Se), and sodium (Na)

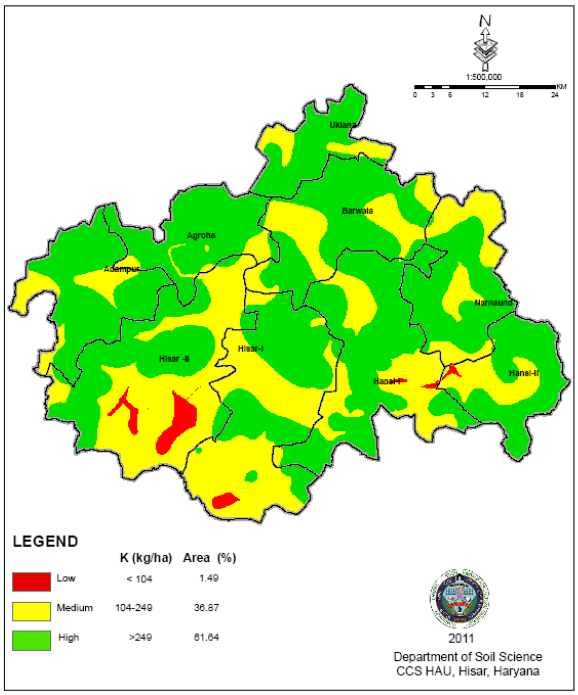

Fig. 4

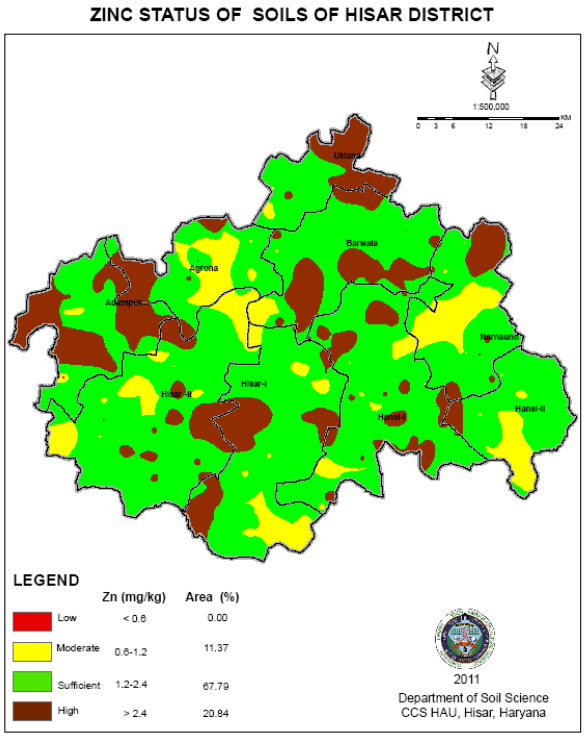

Fig. 5

Mapping the macro and micro nutrient status of the soils is essential for understanding the deficiency of these nutrients so that proper recommendations as regards the fertilizer applications can be made to the farmers by the agricultural scientists. Earlier approaches of preparing the maps using manual methods have not yielded good results as it was very difficult the draw the boundaries based upon the point data. The use of interpolation techniques in GIS has facilitated digital map preparation.

In the current study random soil sampling was done for the entire state by the scientists of CCS Haryana Agricultural University, Hisar. The samples were analyses in their laboratory using the standard procedures for organic carbon, N, P, K, S, B, Fe, Cu, Mn and Zn, the major nutrients reported to be deficient in Haryana soils. The point data for various nutrients was interpolated in GIS for preparing digital nutrient status maps for various districts in the state. As an example figures 6 and 7 show the nutrient status of K and Zn, respectively for Hisar district.

Role of Geo-Informatics in Good Governance of Forests

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Jammu & Kashmir state, the forests are mostly located in inaccessible areas where timely detection of damages to the forest cover and its assessment to fix responsibility of the concerned territorial staff is often found impracticable. By the time the damages come to fore, it becomes difficult for the authorities to fix responsibility as the concerned field staff start blaming their predecessors for the loss to forest cover in their jurisdiction. The transfer of territorial field staff also creates confusion while fixing responsibility for the damages to the forest cover. Reportedly, there is an organized timber smuggling going on in some areas of the State and collective efforts of the territorial staff and Forest Protection Force seem to be defeated due to connivance of some greedy officials with the timer smugglers. Therefore, in all those areas where reckless loss of forests is reported, we need to have a high tech system in place for closely monitoring the forest cover besides, having a judicious system of fixing responsibility of the concerned field staff.

Conventionally, the Forest Guard detects an illegal felling and reports same to his superiors. But, very often, such damages are not reported accurately. In some cases, the concerned Forest Guard may be in connivance with the timber smugglers and may deliberately try to prevent any ground information reaching his superiors. He may then get himself transferred to some other Division leaving his reliever to face the consequences. Under such circumstances, the newly posted Forest Guard on detecting damages in his area, may find himself in an embarrassing position to report damages having taken place during the tenure of his predecessor for fear of reprisals. When such problem comes in the notice of the authorities, they too are not in a position to fix responsibility.

In this back drop, the Geo-information technology has emerged as a powerful tool to closely map and monitor the forest cover of vulnerable forest areas economically, accurately and repetitively within a short period of time thereby increasing surveillance of the forest areas with a high degree of efficiency. In areas, where incidence of wanton deforestation owing to organized smuggling has virtually defeated the efforts of the government functionaries, the high resolution satellite imagery may prove to be very useful. The temporal high resolution imageries may be used to periodically detect changes in the forest cover in such areas. This may be as if, an eye in the Space which provides reasonably accurate picture of the ground reality at desired cycle of repetivity so that responsibility of the damages is properly fixed and action initiated against the delinquent field officials responsible for watch and ward of the forests at compartment level. The eye may be the sensor of the high resolution cartosat-2 satellite, Quick bird satellite or the world's latest Geoeye-1 or World View2 sensors. The digital administrative boundary of the compartments with detailed attribute information of the concerned field staff may be overlaid over the satellite imagery to easily fix responsibility of the concerned field staff.

Jenab Mian Altaf Ahmad, the Hon'ble Forest Minister of J&K took lead in appreciating the role of Geo-informatics in monitoring the forest cover of the State and sanctioned the launch of ***Space Based Forest Cover Watch Project*** in the State from 2010-11. Under this Project, the Department of Environment & Remote Sensing has initially identified Shopian and Pir Panjal Forest Divisions on model basis using temporal Cartosat-1, Quick Bird /World View 2 satellite imageries. One of the most important objective of the study is to keep the authorities abreast with the ground reality in these fragile areas so that timely actions are taken to fix responsibility of the field staff wherever damages are detected.

Role of Geospatial Database for E- Governance in the State of Uttarakhand

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The State of Uttarakhand is endowed with rich natural resources. Its cultural and religious uniqueness is finely embedded in the fabric of India. The region has a fragile ecosystem with marked differences in topography, vegetation and soil. During the last couple of decades, developmental activities and biotic interferences in the area have caused immense damage to ecology and natural resources of the area and making the life of hill people exceedingly difficult. Today the region is being identified as one of the most severely degraded area in the Himalaya. This has led to growing concern in national and international arena for conserving Himalayan ecosystems. Beside this mountainous regions are vulnerable to climate change and have shown above average warming in the 20th century. Hence there is an urgent need to study the implication of climate and environment change on natural resources and peoples livelihood in the mountains. The creation of regional and global mountain database therefore vital for launching programme that contributes to the sustainable development of mountain ecosystems which is the most challenging task of Government of the State. So there is requirement of using technologies which will lead to e-governance. E-Governance is increasingly being viewed as the route for governments to strengthen good governance, for it not only improves efficiency, accountability and transparency of government processes, but it can also be a tool to empower citizens by enabling them to participate in the decision-making processes of governments. Government is one of the main entity in governance. Other entities involved in governance vary depending on the level of government that is under discussion. Various departments formed incorporate secondary entities by strengthening itself for providing better services to the government. The role of GIS and Space technology like satellite communication is vital in the e-governance as they provide more reliable, precise and efficient channel for better information dissemination for decision making by creating a Geospatial Database and framework of the resources.

When we think of managing or planning and activity, we must plan it on spatial criteria first. Here geographical information plays a vital role. Satellite communication provides a reliable communication channel for the information sharing across the geographic domain avoiding all the ground based communication difficulties and restrictions. Thus to provide effective e-governance policies in the state all the aspects needs to be analyzed through these type of technologies. In every planning process whether it is regarding disaster management, health, agricultural, urban as well as rural development etc. all needs these types of technologies for the better allocation and utilization of natural resources. The basis for e-Governance is fusion of information with communication technologies (ICT) supporting and transforming the governance by processing and communicating data. Key innovation of e-Governance is computer networks, from intranets to the Internet, creating a digital network between various user nodes. As being one of the important input components is the data which is to be needed to provide the information for better planning and as per the standards evaluated, can be derived from various sources and various types of departments. Involving all these data within spatial domain makes a geospatial datasets which are much more effective to provide the information. So, spatial domain is to be kept on the core level of data providing entity as shown in figure 1.

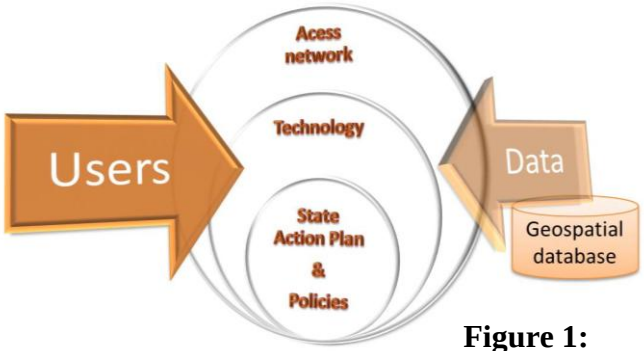

Figure 1:

The sustainable development of the mountain regions is a challenging task because these areas have highly diverse and fragile ecosystem. Considering Uttarakhand resource richness and the mounting problems, the state needs authenticated and reliable database to planners for generation of a sustainable resources development plan at grassroot level which otherwise is not available in one format. Towards this, mapping and monitoring of existing natural resources and forecasting the future scenario are highly important. Geospatial information comprising of remote sensing, geographical Information System (GIS) and GPS based has emerged as a most powerful tool for development of digital information system for monitoring and modelling of natural resources and disaster management for sustainable development at district and grass root (cadastral) level. The basic problem of the state is the lack of authenticated resource information system. District Information System will augment the needs of the district administrators to prepare and implement various developmental activities.

Viewing the inaccessibility and remoteness of the hilly terrain, gathering reliable information on its natural resources and infrastructure is a real challenge. For this purpose, RS, GIS and GPS with the support of collateral ground based information can prove to be a useful tool for planning and decision making. Geographic, geo-spatial or spatial data forms the foundation of all planned human activity. Management and Conservation of Natural Resources, Land Use Planning, Infrastructure planning and development and Disaster management etc are just a few examples of areas in which decision-making is contingent on availability of accurate and high quality spatial data. Developments in digital technologies, particularly the rapid advancements in Geographic Information System (GIS) and Global Positioning System (GPS) have now made it possible to correlate and use diverse map information, in conjunction, at the click of a mouse.

Uttarakhand Space Applications Centre (USAC) with the support of ISRO, has created and is updating comprehensive digital database of the state on natural resources, topographical, infrastructure, household, amenities, health, education, tourism, drinking water, power distribution, population census, cattle census, climatic data etc. of the State using remote sensing, GIS and GPS technique. Various thematic maps viz. Land use/land cover, Vegetation (density and types), Agriculture, Soil, Waste Land, Wetland, Land Degradation, Snow and Glacier, Drainage, Geology, Hydro-geomorphology, Ground water prospect mapping, slope, aspect, Road network etc. and settlement location, administrative boundaries like village, block, tehsil, district are

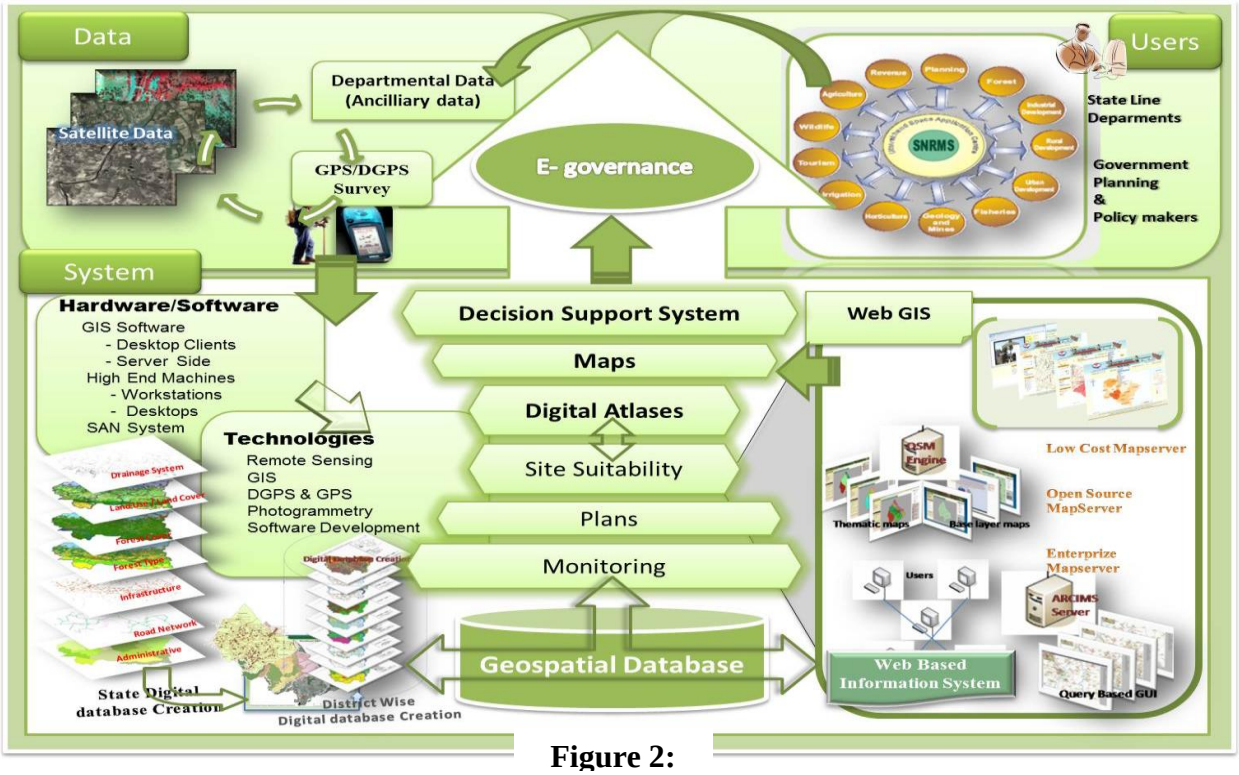

Figure 2:

generated on 1:50 K and in process to cadastral (1:2500 - 1:10000) scale. Non-spatial database like household data, amenities, health, education, drinking water, market amenities, power distribution, population census, cattle census and climatic data etc. have been collected and linked to the village vector layer. Further this database is going to be utilized for establishment of village information system centre through Kiosks with touch screen monitors in Hindi & English languages in different villages and will also be helpful for generation of land, water, and disaster management plan at district and grass root level. Development of village information system will help in identification of target groups in the society, participation of stakeholders in preparation of action plans and effective implementation plans at village level. Centre has developed its infrastructure with high performance hardware/software system that helps in providing efficient Geospatial enabled information to the Government. With the creation of Geospatial database with perspective to the state, a system is being maintained for the proper dissemination of information by the geospatial data which is being generated at the centre of the State natural resources, for their conservation and utilization. A SAN System is being established at the Centre for preparation of Geospatial Data Warehouse, which will provide the temporal information of the State Horizon. Web enabled Information System are being developed to provide information to the users in a proper format, in this respect various line departments are being collaboratively provided technical help in providing better services to the Government like EMRI 108 Services of the Health Department were provided with the Geospatial data and Information System for the Haridwar District of the State to provide better service. Periodic Training facilities are being provided to the various line departments by the Centre regarding role and use of RS/GIS Technology in various horizons.

Under the Right to Education program of Government of India and State Government a major work with respect to state School Mapping Project is being carried out with collaboration of State Sarva Sikhsa Abhiyan .Under this project a wide information of all the School facilities available in the State is collected and a Geospatial database with respect of the school have been created in GIS domain. This will help for the proper management of State Educational units and proper decision making regarding Education. These types of collaborative programs help in creating an information network of reliable knowledge base for Decision making of State Action Plans.

Satellite communication infrastructure for the Education in the name of EDUSAT, a Government of India program to promote distance education in much more interactive way and providing quality education to the in-accessible region of the state has been established by the Centre and is operational for the purpose it is being developed. In this regard the communication network is on the process of expansion in a form of Uttarakhand SATCOM network by providing other services such as Health facilities and establishment of Village resource Centre for connecting villages each other and to the Nation to share information through a reliable channel for the Village development. The works undertaken by USAC are as follows:

- GIS enabled School mapping information system
- GIS enabled Health information system
- GIS enabled Water information system
- GIS enabled Road information system
- GIS enabled Wetland mapping information system
- GIS enabled SILK (Sericulture information linkage knowledge based information system)
- GIS enabled Electrical information system
- GIS enabled Early warning system for forest fire
- Development of suitable sites for parking vehicles in alongside of Ganga river in Haridwar district during kumbh April, 2010

Due to difficult terrain condition accessibility across the geography of state is not so fast. So in order to transfer valuable information a satellite communication structure is essentially needed. So the dataset which prototypes

the actual scenario of the terrain can be obtains in the GIS domain. Only getting information in terms of maps is not sufficient, this information should be disseminate to the people because this information should not use only for the static purposes but use for dynamic purposes such as for decision making. For the development of the society, such type of new concept should be adopted. E-Governance is an emerging new concept through which individual feel their responsibility which make them happy and greatly improve every single person's productivity. High quality services will make positive sociological impacts on the people of the State and make people feel honored by their government and they will feel the joy of being served well. This will make them happy and greatly improve every single person's productivity. However, to ensure sustainable human development, actions must be taken to work towards this ideal with the aim of making it a reality.

Some case studies for e-Governance using Geomatics

A number of applications of USAC have already been developed in Uttarakhand state and are used beneficially by the respective organization. Some of these are given here as examples to demonstrate the efficacy and strength of the concept. Some case studies for e-Governance using Geomatics in USAC are as follows:

SNo	Area	Work Completed	Work is in progress	Beneficiaries
1.	**School Mapping**	• School mapping information system in Dehradun district.	School mapping information system in whole 13 districts of Uttarakhand state.	• Education dept.
2.	**Land Record Management**	• Mapping and updation of land parcels using high resolution Remote Sensing data and field surveys in Deoria and Mukantpur village of Udhamsingh Nagar district of Uttarakhand state.	• Mapping of land parcels using high resolution remote sensing data and field surveys for the entire Uttarakhand state. • Web based information system for land parcels for the entire Uttarakhand state.	• Land Registration • Revenue Department • Land Settlement
3.	**Disaster Management**	• Mapping of disaster prone areas (flood, landslides, forest fire etc.). • Integration with network technology for Exchange of information.	Web based Information system for forest fire.	• Administration • Rehabilitation Cells • NGOs working in the Disaster Management
4.	**Integrated Development**	• Mapping of Land use/Landover and Ground Water Potential etc. • Water information	• Landuse/Landcover Information system for the entire Uttarakhand state. • Wetland information	• Agriculture dept. • Ground Water Development Agencies

		system in Dehradun district. • Web based Health information system in Dehradun district. • Mapping of Surface water body in Uttarakhand state.	system for Uttarakhand state.	• District Rural Dept.
5.	**Telecom network planning and management**	• Mapping of Roads. • Web based Road Information system for Dehradun district.	Road Information system for the entire Uttarakhand state.	• Organizations like BSNL, MTNL and private telecom companies • Citizens
6.	**Electricity distribution and transmission network**	• Web based information system for load on Transformers in Vasant Vihar phase-1 & 2 in Dehradun district of Uttarakhand state.	Load management system	• SEB. • Agencies responsible for Electricity transmission.
7.	**Transport network development**	• Mapping of roads and other transport network. • GIS based Road Information System in Dehradun district.	Mapping of roads and other transport Network GIS based Road Information System to entire Uttarakhand state.	• PWDs • Citizens
8.	**Sericulture Project**	• Thematic layer generation for site suitability analysis for Mulberry cultivation in 5 districts of Uttarakhand state.	Development of SILK (Sericulture information linkage knowledge based information system)	• State silk dept • Central silk board.

Environmental Governance in India

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Introduction:

The ecological degradation and economic deprivation generated by the resource intensive conventional model of development have resulted in environmental crisis and conflicts across the world. The various environmental problems such as depletion of ozone layer, acid rain, green house effect, soil erosion, deforestation, water pollution, air pollution and noise pollution have had devastating impacts on human well being and are also culminating into a spectrum of irreversible long term damages to ecosystems. We have polluted our planet in every ways as we can and in its efforts to protect the environment we have got variety of outcomes. Ambient air quality has improved in many cities, acid rain has been reduced, cases of smog has also reduced and sewage treatment has been extended to an increasing fraction of the population. At the same time, the list of threatened and endangered species continues to grow up, average levels of ground-level ozone have increased, and emissions of green house gases have continued to increase even as scientists have reached consensus that, anthropogenic activities have had a visible impact on the biodiversity. India is trying to get away with this threat to the biodiversity by managing biodiversity through environmental governance. The Geomatics is playing a big role in assessing the status of biodiversity. However, the need for a holistic and effective model of environmental governance in India has been realized which is evident from the strong willingness for setting up the new agencies like National Environment Protection Authority (NEPA).

Environmental Governance:

Managing our natural resources has become one of the most potential phenomena for ensuring environmentally a better world for the variety of plants and animals and national development in which the Government of India evince interest. Environmental governance is all about ensuring the delivery of ecosystem services-clean water, clean-air, organic food, healthy fish stocks, genetic resources, medicines and assets for industry (eg. Eco-tourism, pharmaceutical etc.). It also keeps us to regulate the climate, reduce the risk of floods and disease and cope with environmental change (eg. Climate change, drought, crop disease). Perhaps most significant for a developing countries like India is safeguarding its biodiversity for millions of people who depend heavily on natural resources. Environmental governance focuses on finding strategies to ensure a better world for the variety of plants and animals in ways that avoid environmental degradation, over-exploitation of resources, or pollution. The attribute and functions of general environmental governance can be visualized in figure.1.

Environmental concerns in India:

- Rivers, lakes and reservoirs pollution in varying degrees, particularly waters in industrializing towns.
- Near-shore pollution has not been effectively controlled.
- Soil erosion as a result of desertification and deforestation makes ecological environment in some regions more fragile and fragment the natural habitats. Loss of biodiversity threatens some endangered species.
- India's economy is expected to grow, which means more pressure will be placed on the environment, especially in the less-developed regions (mostly forested regions).
- Rising air pollution including GHGs emission level per capita is lower, total emissions are expected to increase more.

Geomatics and Environmental Governance:

Geospatial techniques are must for handling the vast database/records being prepared under different projects and by different organizations. The need of the hour is to make available all these databases towards Environmental Governance, which must focus on finding strategies to promote economic and social development in ways that can avoid environmental degradation, over-exploitation and pollution. In this direction, a collaborative move is critically required to generate awareness among local NGOs, relevant government agencies, policy makers, ministerial officials, and stakeholders. Towards this, there is a need to have a national geospatial database as all the datasets available at one place will help the concerned agencies in the process of planning. There should be a decision support system in place with capability to integrate many of this information so that they can be utilized effectively for various planning processes and applications. The Planning Commission in India is working towards this direction to realize such fundamental component of India's planning and developmental infrastructure, providing visibility into various aspects of the national economic and governance process, development process, etc and at the same time also bringing value to enterprise commerce and citizen services.

Figure.1: Schematic representation of functions and attributes of Environmental governance.

There would be challenges like to keep the GIS data/information 'always' updated and establish a mechanism for this to happen regularly. Moreover, developing a real time decision making system – is required, for which capability lies in organizations like Indian Space Research Organization. The system should be able to respond very quickly, like in case of a fire event in a large area of a forest, the system should be able to get the data from satellite at near real time and information is conveyed rapidly in an easy format to support the firemen in planning and operations by providing them the insights of area, roads, water bodies, etc. The country has already certain system in place like, fire warning results are made available to forest beat guards in Madhya Pradesh, and we have a Tsunami Warning System in place. But, still there is significant need to identify and work on the gap areas and integrate the whole system at national level. Also, we have lots of data prepared and updated on various environment sensitive areas like wetlands, coastal regulation zones, mangroves, coral reefs, forest maps, desertification status maps and biodiversity richness, biodiversity disturbance maps etc. We do have coarse resolution data on atmospheric trace gases from foreign satellites, which gives us some idea about the status of atmospheric pollution over the country. There are lots of *in situ* database being collected through automatic weather stations (AWS) and also by central pollution control board on the various environmental parameters. Scientists are also working towards

realization of various environmental products at spatial level. It seems very necessary to pool these datasets at one platform and format to make it useful for the proper environmental governance.

Green Courts:

Like any other social, economic and political problems, these environmental problems have caught the attention of policy makers, intellectuals and social activists. To deal with these environmental problems, efforts have been made since 1970s both at national and international levels. Improvement in institutional arrangements to provide easy accessibility to environmental justice to people is a part of the international agenda highlighted in instruments like Rio Declaration on Environment and Development, 1992 and the Aarhus Convention, 1998. Such institutional changes carry a greater significance in case of emerging market economies like India where trade and development issues are set to clash with environmental imperatives.

The Indian judiciary is all set to turn 'green' with the Law Commission of India recommending, in its 186th Report, that the constitution of specialised Environmental Courts to strengthen and revitalise environmental governance. The proposal has its roots in the call that emanated from the corridors of the apex Constitutional Court, that is, the Supreme Court of India, in numerous significant cases. The Supreme Court has elevated the 'right to healthy environment' to the status of a fundamental human right under Article 21 of the Constitution in the process of progressive enrichment of the environmental jurisprudence with principles like sustainable development, polluter pays, public trust doctrine, precautionary principle and intergenerational equity. This extension of constitutional umbrella over environmental issues through dynamic judicial activism has promised well for environmental governance in India. The constitution of a 'green' branch of judiciary to arbitrate environmental matters will be a further significant step towards improving the quality of environment at a time when India has been caught in a tussle between developmental and sustainability issues. There are many cases being fought and won for the sake of environmental justice using geospatial techniques. The historic satellite data sets are actively being used and recognized as the unbiased information in various encroachment cases. However, with increasing technological advancements we may face several issues of fake imageries or maps in near future. Towards, that the separate need for forensic experts in satellite imageries and mapping segment would be felt. The law needs to be stringent for punishing the offenders in all walks of environmental polluters, like industries or societies engaged in water pollution, air pollution, solid waste and noise pollution. There is a need of mechanism of compensation for the affected people. With better spatial resolution data made available to public, the geospatial techniques are going to take lead in fixing the responsibilities to such offenders.

Conclusion:

The challenges in environmental governance are as large and diverse as India. Over the years, legislation has evolved. With the enactment of the Environment (Protection) Act 1986, the various rules and notifications, and the National Environment Policy 2006, reliable legislative and policies has been formulated. But still there are gaps in the institutional mechanisms and implementation has not kept pace with the legislative and policy evolution. The institutional structures in their current form are inadequate for responding to the emerging environmental challenges, including river cleaning, management of wastes, hazardous substance and plastics management, dealing with chemical contamination, monitoring compliance with environmental clearances, etc. There is no suitable authority to comprehensively and effectively implement the green policies. The lack of data on various environmental scenarios further aggravate the problem. Therefore, the need of a decision support system powered by updated datasets for certain parameters and real time spatial data on other critical environmental phenomenon are required for backing the green courts and organizations envisaged like National Environment Protection Authority (NEPA).

Geomatics in Good Governance – *Across various states of India*

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Introduction

No theory of governance would be intelligible unless it is seen in the context of its time. In the beginning of the 21st century, it has become evident that those who want minimal government are having an upper hand against the advocates of the paternalist welfare state. But there is no run-away success in sight. One thing has emerged clearly. An efficient, effective and democratic government is the best guarantor of social justice as well as an orderly society. Similarly, there is also emphasis on the fact that the administrative system has to be country specific and area specific taking in view not only the institutions of governance and its legal and regulatory mechanisms but also its market, its civil society and cultural values of the people. The government would, therefore, have the singular responsibility to create an enabling environment where development programmes get properly implemented and that creative minds do not get stifled or their energies diverted from undertaking new initiatives or enterprises. The principal response of the state, therefore, would be to facilitate, to enable, and to coordinate. Neither the market nor the civil society can perform this role as effectively as the government and thus they cannot become substitutes for the government. India is not excluded from this global debate or transition from socialist order to capitalist growth models. Fortunately, the Indian State does not have the monopoly of the public sphere. The civil society is increasingly more concerned with public sphere issues and government intervention is considered necessary to provide welfare schemes to cover social safety needs, upgrade health-care to protect children, and help provide opportunities for women and the minorities.

With this background let us now cover a brief overview of current situation across various regions in our country namely Kerala, North-Eastern states, Madhya Pradesh, Andhra Pradesh & Gujarat.

Kerala

The e-governance project of State of Kerala involves setting up around 5000 multi purpose community technology centres called Akshaya e-kendras across the state. It includes services like-e-payment, e-krishi, content development and computer aided learning for students. The state has received National Awards for e-Governance 2010 for the Sulekha Decentralised Plan Formulation and Monitoring System, Kerala.It was conceived by the Local Self Government Department, the State Planning Board and Information Kerala Mission (www.infokerala.org) as a comprehensive e-governance initiative for the formulation of annual decentralized plan projects of local governments, their appraisal and approval, and monitoring. The decentralized planning, which is in itself a unique initiative of Kerala, had started with the devolvement of nearly 40% of the State's plan funds to the local governments in 1997 (Ninth Five Year Plan). Nearly 1.9 to 2 lakh projects are formulated every year. This covers projects amounting to about Rs.1800 crore every year. From 2008-09, all the 1223 local governments prepare and submit the projects in the prescribed format in Sulekha installed in their offices. The decentralized planning programme itself is a re-engineering of the planning process up to the grass roots level. Process re-engineering is also in terms of redesigning formats. This involves capture of nearly 37 main parameters (some with over 20 sub-parameters) for each of the projects. The re-engineered process has brought in transparency and efficiency into the system.

The state of Kerala also received an award in the Category: Outstanding Performance in Citizen Centric Service Delivery for the Project - Sevana Civil Registration System and Hospital Kiosks, Kerala. The Sevana Civil Registration System and Hospital Kiosks project aims at electronic registration of births, deaths and marriages directly from select hospitals and issue of the mandatory certificate within 24 hours

after the occurrence of the event. Pilot implementation of the Sevana system for registration of births, deaths and marriages was initiated in the year 2000 in a few gram panchayats. State wide rollout was taken up from 2007 and covers almost all locations having more than 500 births a year. Prior to this system, the registration of births, deaths and marriages was handled in the 1057 local governments of Kerala. The registrations were handled manually using standard reporting formats. The decentralised deployment of the Sevana application covers nearly 800 local governments and 256 hospitals. Registration and other processes are now completed in a few minutes, which otherwise used to take days. This has led to the improvement in quality of data and convenience for the citizens. The Sevana system handles over 10 lakh transactions a year and covers almost the entire State.

A special award in the Sectoral category of Education was awarded for the Higher Secondary Centralised Allotment Processing System. Higher Secondary Centralized Allotment Processing is a single window web-based System. It supports one application for admission in any school in the District. Candidate can fill single application form and give any number of options (school-course combinations) in the order of preference. The data is fed to the system in the schools and uploaded to the central server by the school authorities after verifications. Once the data is ready for allotment, centralized allotment is done off-line based on the rank, reservation category and options. The result of allotment is published provisionally for verifications. Based on the final result the admissions are done. The application covers 1260 schools. More than 4 lakh applications were received in the year 2009 for admissions. The student is not required to contact multiple schools for admission and does not have to submit separate application forms to every school. The number of vacant seats has reduced over the years. The representation of OBC, SC/ST categories has also improved considerably with the introduction of this system. Overall, the system brings in transparency and credibility to the higher secondary admission process in the State of Kerala. Centre for Geo-informatics Applications in Rural Development (C-GARD) is one of the major institute spreading good-governance with aims to design and develop Geomatics Applications for Rural Development Sector and develop the skill and knowledge levels in Geomatics technology and tools among the development functionaries from the Government, Non-Government, State Institute of Rural Development, National and International Agencies.

Services Offered include:

- Generation of Action Plans/Detailed Project Report for Watershed Development
- Comprehensive District Development Plans
- Development of Customized GIS Software for Spatial Analysis
- Preparation of Geo Spatial Digital Databases and Image processing
- GIS based Resource Analysis
- Comprehensive Development Plan of Tribal Area
- GIS Based Development Atlas, Tribal Atlas
- Change Detection and Environmental Monitoring studies
- Village GIS Participatory Planning
- Precession Agriculture

Kerala is a pioneer in good governance in the country following decentralisation of power and people's participation in the planning process at the grassroots level.

North Eastern States:

A recent project on Integrated land use planning for Serchhip district highlights that land available for planning as per NLUP norm constitutes - 37.19% (528.83 sqkm) of the district area where the Planned areas

(settlements, reserved forests, private/Govt plantations, Government lands etc) constitutes 62.81% (829.77 Sqkm). A total of 459 numbers of water resource structures distributed within the district were also proposed that will go in tandem with the land use plan. Survey on Wastelands in Mizoram under the National Wasteland change analysis project indicates that there was a 0.08% increase of wastelands in 2009 when compared to the wastelands mapped in 2006. A major factor contributing to this is the prevalent shifting cultivation being practiced in the state and also due to bamboo flowering coupled with erroneous land utilization. Such techniques using Geomatics are used for optimal utilisation and planning of land utilisation.

Dharitree Managing Land Records successfully in Sonitpur district, Assam with the objective of the DHARITREE Governance project is to apply Information Communication Technology (ICT) to provide a web-based Land Records system to the Revenue Department of Government of Assam. This project has facilitated and maintained information on Record-of-Right, Tenancy/Transformation and cultivation, other essential services related to land records without involving any intermediaries. This e-governance project has addressed key administrative and governance challenges: reduced administrative hassle in the Department of Revenue and Disaster Management and removed manual documentation of land records. *It has helped to deal with corruption thereby ensuring transparency and accountability.* Better planning and management of projects have been made possible through relevant land records information. Overall, there has been an overall improvement in the service delivery mechanism to the citizens.

Andhra Pradesh

The state received an award for the Reservoir Storage Monitoring System in the Category: Innovative Usage of Technology in e-Governance. The System aims at capturing real time data and its automated dissemination to predefined authorities for regulating in and out flows of water in the reservoirs of Andhra Pradesh. This helps in proper regulation of water supply to various sectors such as irrigation, power generation, drinking water and industrial use. It helps in assessing impending flood danger and minimizing the damages. The system covers 17 reservoirs and an area of 3 million hectares. Earlier water regulation was done by getting the reservoir information manually like the inflows to the reservoir and outflows from the reservoir, level and capacity at the reservoir. This resulted in improper distribution of water resulting into low water use efficiency in terms of agriculture area per unit of water and productivity per unit of area. In the new system, the process of data up-dation is mobile enabled through SMS. The reading at field level is sent through SMS to the central database which in turn generates all the required reports. The information so generated is sent by automated SMS and FAX to the concerned officials and stakeholders on daily basis. The process is supported by digitized maps and geo-spatial data. The new system also helps in resolving water disputes between farmer associations and brings in transparency and accountability.

Forest Fire Risk Zonation Using Geomatics is a new innovative initiative of the AP Forest Department for fire risk zonation in forest areas of entire Andhra Pradesh using latest technology such as Satellite Remote Sensing, Global Positioning System, and Geographical Information system. The Andhra Pradesh Fire department has developed the Satellite Remote Sensing and Geographical Information Technology to prepare on fire management and mapping the fire risk zones. These maps are useful in delineating vulnerability of the areas to fire; helps in locating and creating fire lines to combat fire hazard. In addition, the department has proposed fire-protecting measures as an integral component of fire management. It includes controlled burning, fire line cutting, and firewatcher engagement. This model can be applied to other forest areas in the country under similar environmental conditions. Digital Atlas, at district level for the following SECTORS has been made available online (‘http://www.ap.nic.in/gis/latestmaps.html’) – Demography, Water,Forest, Health, Communication, Education, Soil, Post & Telecom.

Gujarat

This state has adopted geo informatics as a decision making tool in all governance related matters. Thw state has been awarded for e-governance initiative The E-Gram Viswa Gram Project module "e-Gram Panchayat Monitoring System" is for maintaining record of village information of all family's data and issue of necessary certificates to citizens. It is based on the on survey form of each individual family of the village, which contains the detailed information of each member of family. This is used to provide many certificates to citizens such as Income, Caste, Domicile, birth, Death, Character, below poverty line (BPL) etc. The database of property of each family is also maintained to provide necessary certificate and to use in panchayat tax collection property wise. (*www.revenuedepartment.gujarat.gov.in*)**.** Some of the available services include:

- Computerized copies of land-holding documents
- Issuance of Right of Record (ROR) to farmers
- Mutation records
- Detailed reports of land use, crops taken, source of water, type of electrical equipment fitted, trees etc

State Wide Attention on Public Grievances by Application of Technology (SWAGAT) is an innovative initiative that enables direct communication between the Gujrat's citizens and the Chief Minister. In Gandhinagar, the fourth Thursday of every month is a SWAGAT day wherein the highest office in administration attends to the grievances of the man on the street. During the session -

- Grievances are logged in, transmitted and made available online to the officers concerned who have to reply within 3 to 4 hours.
- The departments concerned then have to be ready with the replies, before 3 p.m., when the Chief Minister holds video conference with all the districts concerned.
- Applicants are called one by one and the chief minister examines each complaint in detail.
- The information sent by the department is also reviewed online in the presence of the complainant and the Collector/District Development Officer/Superintendent of Police and other officials concerned.

Attempts are made to offer a fair and acceptable solution on the same day and no applicant has ever left without any firm reply to his grievance.

City Civic Centre [e-City (AMC)]: Information on all the following citizen services (Satellite based education through GSAT/ INSAT) can be availed from any counter in any of the six city civic centers:

- Birth Registration
- Building Plan,
- Primary Health and Education
- City cleanliness, water supply, sewage, road, street-lights, parks and garden
- Payment of utility taxes
- Help Desk for necessary documents, forms and other assistance

This provides speedy delivery of services beyond office hours also; in order to facilitate citizens.

Conclusion

India's political leadership, policy makers and business brains are actuated by a strong desire to make the country an economic super-power in the 21st Century. The high rate of economic growth coupled with comfortable foreign exchange reserves and rising sensex figures have imparted in them a growing confidence. India is aiming to have a high growth rate with focus on equity. Although these two objectives are not always contradictory but the conflict arises when scarce resources are diverted to meet the demands of the growing middle class or business houses by ignoring the needs of the poor; which is where Geomatics can play a bigger role.

Regional Conference – 2011

G – GOVERNANCE – 2011
Regional Conference on "Geomatics For Good Governance"

September 13 – 14, 2011
Venue : University of Kashmir, Srinagar

Organised by
Indian Society of Geomatics (ISG), Ahmedabad

Hosted by
University of Kashmir and ISG - Kashmir Chapter, Srinagar

Regional Conference – 2012

Regional Conference on "Geomatics in Disaster Risk Management: Special Reference to Eastern India"

February, 2012
Venue : T.M. Bhagalpur University

Organised by
Indian Society of Geomatics (ISG), Ahmedabad

Hosted by
T.M. Bhagalpur University and ISG - Bhagalpur Chapter, Bhagalpur

New Website of ISG Inaugurated

Front view of ISG – Web site (New)

Dr. Shailesh Nayak, President, ISG inaugurating the new web site of ISG

Indian Society of Geomatics web site (new) was inaugurated on 20th May, 2011 by Dr. Shailesh Nayak, President, ISG. The highlights of the new site are:

Highlights of new web site:

1. Feel and look of the website is changed totally.
2. Search mechanism for getting the information of ISG members with respect to name, city, life membership number and type of member.
3. Image gallery is added. This shows the photographs of events conducted by ISG.
4. ISG-EC details from its inception.
5. Important news/announcements are put in the opening page itself.
6. Links to other professional societies provided.
7. All ISG newsletter database and copies of newsletter in softcopy provided.
8. All ISG chapters' activities included.
9. Separate links provided to access AGM minutes and Symposium recommendations.
10. Look of the feedback has been modified.

FROM ISG SECRETARIAT

- **Change of Address of Members**

  Members are kindly requested to inform us your changed mailing address as well as current email address to update our database.

- **Active Chapter of Year Award (2011-12)**

  Each chapter Chairman/Secretary is requested to send the applications for this award in the prescribed format to the President/Secretary, ISG. The prescribed format for this award is available on ISG website.

Chapter Reports and Audit Statements

The chapter Chairman/Secretary are requested to send the report on the activities of the chapter during FY 2011- 2012 for publication in the ISG newsletter.

All the ISG Chapters are requested to get their accounts audited at the earliest and send them to ISG HQ to includein the audited report of the Society.

ISG FELLOWS

1) ISG-F-1: Shri Pramod P. Kale, Pune
2) ISG-F-2: Dr. George Joseph, Ahmedabad
3) ISG-F-3: Dr. A.K.S. Gopalan, Secunderabad
4) ISG-F-4: Shri A.R. Dasgupta, Gandhinagar
5) ISG-F-5: Dr. Baldev Sahai, Ahmedabad
6) ISG-F-6: Dr. Prithvish Nag, Kolkata

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P-1	Director, SAC, Space Applications Centre (ISRO), Room No. 3344, Jodhpur Tekra, Satellite Road, Ahmedabad-380015
P-2	Settlement Commissioner, O/o The Settlement Commissioner & Director of Land Records-Gujarat, Block No. 13, Floor - 2, Old Sachivalay, Sector-10, Gandhinagar-382010
P-3	Commissioner, Mumbai Metro. Region Development Authority (MMRDA), Bandra-Kurla Complex, Bandra East, Mumbai-400051
P-4	Commissioner, Land Records & Settlements Office, MP, Gwalior-474007
P-5	Director General, Centre for Development of Adv.Comp. (C-DAC), Pune Univercity Campus, Ganesh Khind, Pune-411007
P-6	Chairman, Indian Space Research Organization (ISRO), ISRO HQ., Dept. of Space, Antariksh Bhavan,, New BEL Road, Bangalore-560231
P-7	Director General, Forest Survey of India, Kaulagarh Road, P.O. IPE, Dehradun-248195
P-8	Commissioner, Vadodara Municipal Corporation, Vadodara-390001
P-9	Director, Centre for Envir. Planning & Tech. (CEPT), Navarangpura, , Ahmedabad-380009
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L-1360	**Shri Murali Krishna Gurram** H/o. K. Nooka Ratnam Asst. Prof., Dept. of Geoinformatics, AKNU, Rajahmundry, C/o. G. Venkateswara Rao, Retd. Engg., H.No. : 24-13-6, R.V. Nagar, Godavari (E)- 533105

INDIAN SOCIETY OF GEOMATICS (ISG)

(www.isgindia.org)

MEMBERSHIP APPLICATION FORM

MEMBERSHIP APPLICATION FORM

To: The Secretary Indian Society of Geomatics

Building No. 40, Room No. 17,

Space Applications Centre (SAC) Campus

Jodhpur Tekra, Ambawadi PO, AHMEDABAD – 380 015

Sir,

I want to become a Life Member/ Sustaining Member/ Patron Member/Annual Member of the Indian Society of Geomatics, Ahmedabad from ----------Month of --------- year. Membership fee of Rs./US$ _____ /- is being sent to you by Cash/ DD/ Cheque (In case of DD/ Cheque: No._____, drawn on Bank _____ payable at Ahmedabad. For outstation cheques add clearing charges Rs 65.00/US$ 10.00). I agree to abide by the constitution of the Society.

Date: Place:

Signature

1. Name: (Dr / Mr / Mrs/ Ms) _____
2. Address: _____
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3. Date of Birth: _____
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6. Designation: _____
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8. Membership in other Societies:
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Proposed by:
(Member's Name and No) Signature of Proposer

For Office Use

ISG Membership No: ISG- -
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MEMBERSHIP SUBSCRIPTION				
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2. A Member of the Society should countersign application of membership.

3. Subscription in DD or Cheque should be made out in the name of '**INDIAN SOCIETY OF GEOMATICS'** and payable at Ahmedabad.

4. Outstation cheques must include bank-clearing charges of Rs. 65.00/US$ 10.00.

5. For further details, contact Secretary, Indian Society of Geomatics at the address given above.

6. Financial year of the society is from April 1 to March 31.

7. ISG has chapters already established at the following places: Ahmedabad, Ajmer, Chennai, Hyderabad, Indore, Mangalore, Mumbai, New Delhi, Pune, Tiruchirappalli and Vadodara. Applicants for membership have the option to contact Secretary/Chairman of the local chapter for enrolment. Details can be found at the website of the society: www.isgindia.org

8. Journal of the society will be sent only to Patron Members, Sustaining Members and Life Members.

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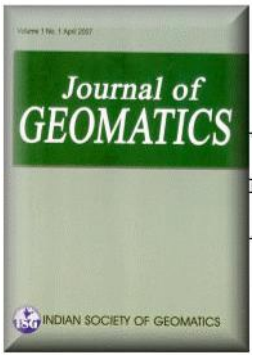

The interested scientists are requested to submit their contributed papers on the following email address: **ajai@sac.isro.gov.in, drajai1953@gmail.com.**

Instructions for authors to submit the paper are available on ISG website www.isgindia.org

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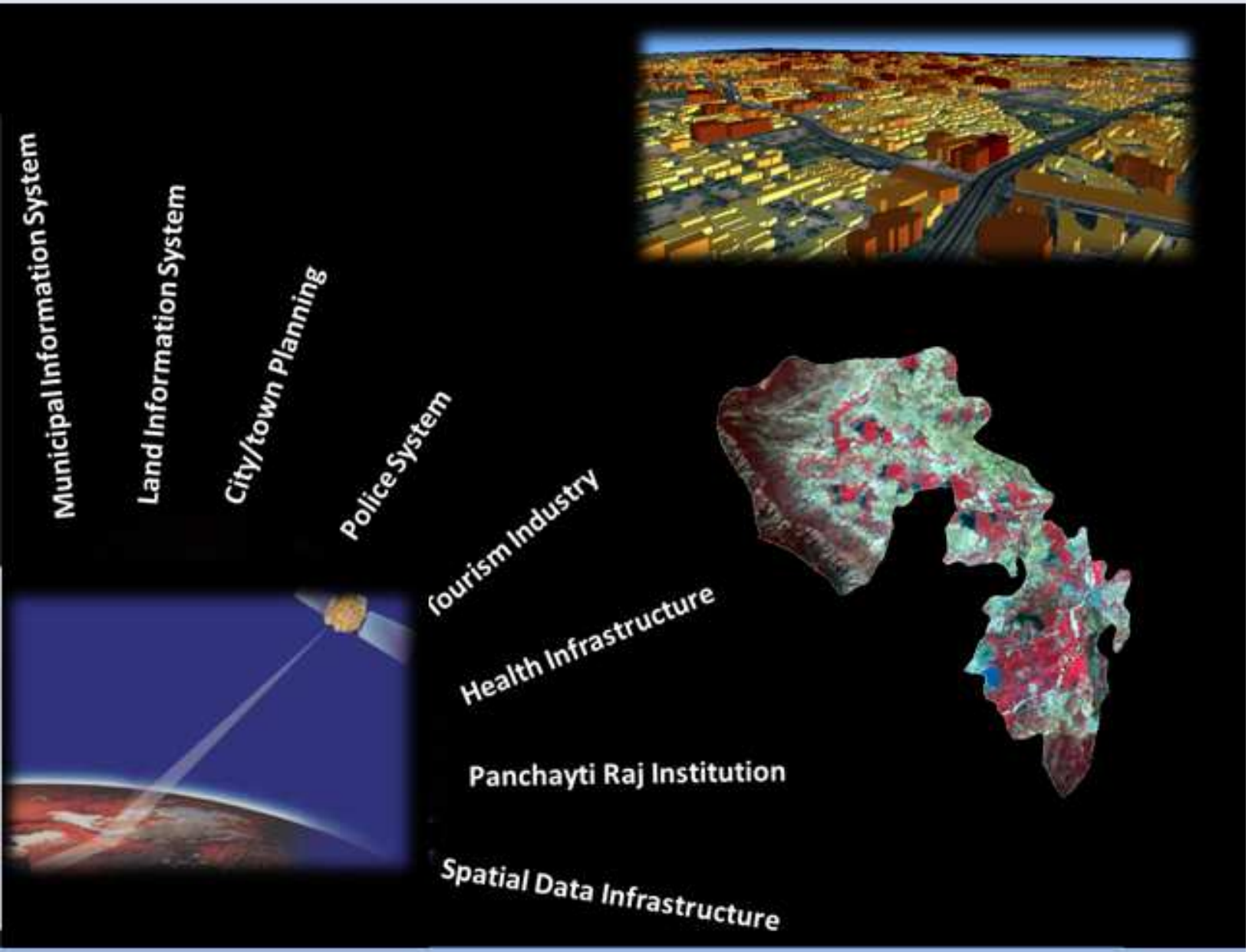

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