Annual Report

2015-16

ODISHA SPACE APPLICATIONS CENTRE
ORSAC

Odisha Space Applications Centre

Department of Science & Technology, Govt. of Odisha

www.orsac.gov.in

IMPORTANT APPLICATION PROJECTS UNDERTAKEN DURING 2015-16

NATIONAL LEVEL PROJECTS

- Space based Information Support for Decentralized Planning (SIS-DP), Odisha
- Desertification Status Mapping
- Natural Resources Census (NRC) Landuse Project
- FASAL (Forecasting Agricultural output using Space, Agro-meteorology and Land based observations)

CENTRAL & STATE JOINT PROGRAMMES

- NLRMP- (National Land Records Modernisation Programme) - Cadastral Resurvey & Updation
- Dissemination of Educational Services through EDUSAT
- Interactive training through GRAMSAT network

STATE SPONSORED PROGRAMMES

- Geo-spatial technology for rural & urban development programme on web-GIS platform
- Study on interoperability GIS softwares and its interface with Digital Image Processing softwares
- Cadastral level Geo-spatial Database generation (1:4K) for Odisha
- RS & GIS inputs for Comprehensive Development Plan (CDP) preparation of towns
- Odisha Land Bank Development
- Web GIS 'Odisha Sampad'
- Optical Fiber Cable (OFC) route plan for BBNL in Odisha
- GIS based Stage Carriage Permit Management System
- Survey and GIS referencing of Roads
- Odisha Police Information System
- Mining Lease Boundary survey through High-Tech method
- DGPS survey for Forest Diversion Proposals
- DGPS survey, Infrastructure and Land use mapping of OTELP/Power-GIS project
- GOiPLUS- Govt. of Odisha's Portal for Industrial Land Use Services
- Plantation monitoring of Odisha State
- LIS-Land Information System for GA Dept. Govt of Odisha
- Property Tax Assessment of Bhubaneswar and Puri Municipal area
- Pradhan Mantri Krishi Sinchayee Yojana (PMKSY), District Irrigation Plans

IMPORTANT INITIATIVES 2016-17

- Web services for Land Bank data dissemination
- Cadastral level Geo-spatial Information Dissemination
- Geo-coordinate Library of Landmarks/important Locations of the State
- Updated Odisha Sampad on Internet
- Odisha Spatial Datasets Availability through 'BHUBAN'
- Utilisation of 'RISAT' all weather data & ISRO 'GAGAN' Network
- Urban Cadastral GIS databases for GA Dept. Odisha
- Extension of Edusat Network
- GPS based Tracking system for mining sector
- Establishment of Odisha State Spatial Data Infrastructure (OSDI)
- Industrial infrastructure data supply services through GOiPLUS
- GIS database of Irrigation Infrastructure of Odisha
- Climate Change-Assessment of erosion prone areas of Odisha State and Study of effects of erosion on coastal roads and settlement
- Database for implementing Crop Technology Mission
- Survey and Mapping using Unmanned Aerial System (UAV)

Hon'ble Minister of State(Ind.charge)
Higher Education, Science & Technology
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Phone: +91-674-2532428

MESSAGE

I am happy to present the Annual Report 2015-16 of ORSAC which reflects upon the significant achievements and contribution of the Centre in assisting the state administration in its mandated objective of appropriate resources management along with accelerated economic growth and sustainable development.

As a multidisciplinary organization and in line with its mandate, the center provided various types of decision support solutions to State Government for effective governance using remote sensing, satellite communication, geo-informatics, Geo-ICT, satellite navigation and computer technologies.

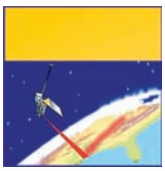
Significant contribution of the center in last year is to establish a platform in the state to facilitate collation of standard spatial data in an inter-operable and open protocol for development planning and e-governance purposes. The state cabinet has approved the Odisha State Data Policy and the center is designated as the implementing agency for operationalization of "Odisha State Data Policy" to establish "Odisha Spatial Data Infrastructure" in the line of National Spatial Data Infrastructure for leveraging this platform as Data warehouse of the state.

I take this opportunity to record my appreciation for the efforts and activities conducted by the staff of the centre and wish all success to the organization.

19.7.2016

(Dr. Pradeep Ku. Panigrahy)

Technology Footprints of ORSAC



Geomatics

- **REMOTE SENSING :**
  Information generation relating to natural resources and infrastructure at a scale ranging from 1:250000 to 1 : 1000 using multi - platform, multisensor temporal datasets.
- **GIS :**
  Database generation, multi-variable data integration & analysis, trend analysis, scenario creation and modeling relating to natural resources management & environmental monitoring.
- **Geo-ICT :**
  Development of web- enabled database, data dissemination, data mining, solution for data infrastructure & interoperability Decision Support System Development, User need software development and ICT based training etc.

Hightech Survey

- **GPS (Global Positioning System)/TS (Total Station) :**
  Topographic survey, network establishment, control establishment, spatial & attribute data acquisition and determination of geo-coordinates.
- **Photogrammetry :**
  LPS systems and stereo viewing facilities for undertaking photo-grammetric block adjustment of stereo pairs, Digital Terrain Model (DTM) creation, Digital Elevation Model (D E M) creation , contour slope and orthoimage generation.
- **LIDAR / UAV application :**
  Disaster mapping, Infrastructure database creation, environmental monitoring, utility information system development.

Chief Secretary, Govt. of Odisha
and ***Chairman, ORSAC***
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Fax: +91-0674-2396348
E-mail- csodi@nic.in

MESSAGE

It gives me immense pleasure to present the Annual Report of Odisha Space Applications Centre (ORSAC) for the year 2014-15, which incorporates its activities and achievements during the year.

ORSAC is the nodal centre for space technology applications in Odisha state. The Centre is engaged in harnessing space technology and geo-informatics for providing inputs to number of Government departments for various development planning activities and societal benefits. The major activities at present include projects related to mining joint survey; land bank development for industrial development planning and compensatory afforestation; survey and mapping of urban land utilization; water source targeting and quality monitoring; cadastral map preparation for revenue administration; survey for forest diversion proposals; canal network spatial datasets for irrigation, input generation for forest Working Plan preparation, plantation monitoring, spatial database generation of police infrastructure, rice crop acreage and yield estimation and stage carriage database for transport etc. The Centre has proved its excellence in the country in the area of web-enabled data services for planning and governance; high-tech survey and micro-level resource mapping besides implementation of satellite communication programmes through the GRAMSAT and EDUSAT projects. At present the centre is providing required database as per the need of various state departments i.e. Forest & Environment, Public Works, Water Resources, Steel & Mines, Industries, Commerce & Transport, Education, Agriculture, Energy, Housing & Urban, Revenue and Disaster Management, Rural Development and Panchayati Raj etc.

The centre is now identified as an implementing agency for operationalization of "Odisha State Data Policy" approved by Govt. of Odisha. It is also establishing "Odisha Spatial Data Infrastructure" to attain ease of sharing of geo-spatial data and enhanced application of such geospatial data in development planning of the state.

The focus of the Centre in space technology application programmes will remain on generating micro-scale geo-spatial datasets and making them available to different state agencies for developmental planning, internal security strategies and also in building State Spatial Data Infrastructure.

I take this opportunity to record my appreciation for the dedicated work rendered by the scientist, technical staff and all personnel of ORSAC.

(A.P. Padhi)

Technology Footprints of ORSAC

Satcom

SATCOM- Satellite Communication:- for establishment of hub & network infrastructure for GRAMSAT, EDUSAT & Vigyan Prasar trasmission, Interactive training and development broad cast activities. During 2015-16, SIT (Satellite Interactive Terminals) are operated in different schools for two way audio-video EDUSAT transmission between state hub at ORSAC with 216 schools. During the year, classroom programs are conducted for school students. Under the Development Broadcast Programme, programs are transmitted through **Swapnara Odisha** and **Sunar Odisha.**

Training / Awareness

ORSAC provides its services in disseminating knowledge on Remote Sensing & GIS and on hi-tech surveys to the students of different universities and technical institutions through summer training. Students from different universities are also allowed to carry out their project work/ dissertation work for partial fulfillment of M.Phil./M.Sc/ B.Tech /PG Dip. degree for a period up to six months.

Orientation Training provided by ORSAC to the officials of Government departments to enable them to use RS & GIS datasets and to handle the data in GIS environment. Centre is providing project based data, SW and portal handling training to user and project sponsoring departments and agencies.

The scientists of ORSAC paid visit to different Universities of Odisha. Scientists delivered lectures at Gopabandhu Academy of Administration, Revenue Officers Training Institute (ROTI) and IMAGE Administration, regularly on topics related to technology use for development planning and decision support system development. Scientists, engineers and technical support staffs of the centre are trained on advance application areas relating to CAD, GIS, DGPS operation, spatial data management, image processing, web service applications and Geo-ICT developments.

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MESSAGE

It is my privilege to present the Annual Report 2015-16 of Odisha Space Application Centre, an agency under Department of Science and Technology, Govt. of Odisha. Use of Remote Sensing and Geographical Information System for supporting public and program administration is gaining importance in recent times. Generation and analysis of Geographical information is vital to plan and implement the developmental program of the State. The rport depicts summary of activities undertaken and significant achievements of the Centre in assisting the state administration. The center has done a commendable job in collection, analysis and dissemination of geographical information for the benefit of the Line Departments and people of Odisha.

ORSAC is the nodal agency of the state in the matters of providing Remote Sensing, GIS and GPS application solutions to all the departments/offices and agencies of the state. The center acts as nodal center of state for the purpose of DGPS and ETS survey to facilitate digitization and Geo-referencing of mining maps and for submission of Geo-referenced digital data for proposal submission to central and state Govt. for diversion of Forest land for non-forest use. It also acts as focal point for ISRO, Dept. of Space, Govt. of India towards implementing the ISRO/DoS projects in Odisha state with survey and mapping specifications and standard as per the guidelines / instructions of NRSC/SAC/ISRO, Dept. of Space, Govt. of India. The center is now indentified as the implementing agency for operationalization of "Odisha State Data Policy" approved by state cabinet and for maintenance of "Odisha Spatial Data Infrastructure" under Dept. of Science and Technology.

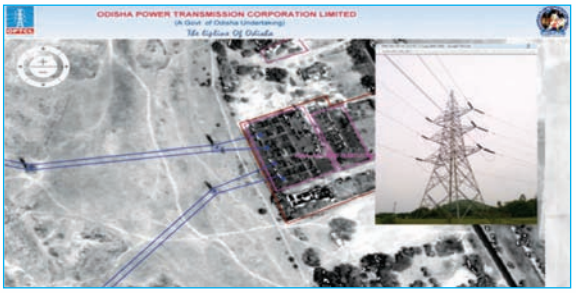
Some of the projects such as mining joint survey; land bank development, water source targteing, cadastral map preparation, input generation for forest Working Plan preparation, plantation monitoring, rice crop acreage and yield estimation, road network survey, power network database, vehicle tracking system and state carriage database for transport etc. stand evidence to the commitment of the center towards development of the state. The Centre has proved its excellence in the country in the area of web-enabled data services for planning and governance; high-tech survey and micro-level resource mapping.

I take this opportunity to record my appreciation for contribution and commitment of the center and its staffs in using space technology and geo-informatics application for the developement of the State.

(C.J. Venugopal)

ORSAC Initiatives in Development Planning Activities of State

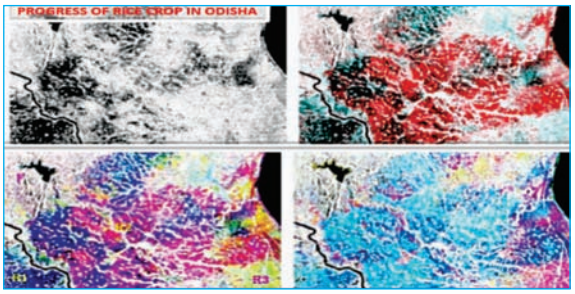
URBAN



POWER / TELECOM

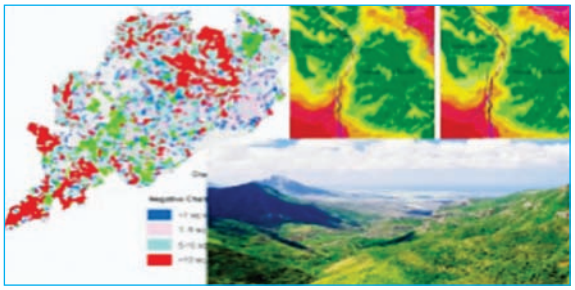
INDUSTRY

TRANSPORT



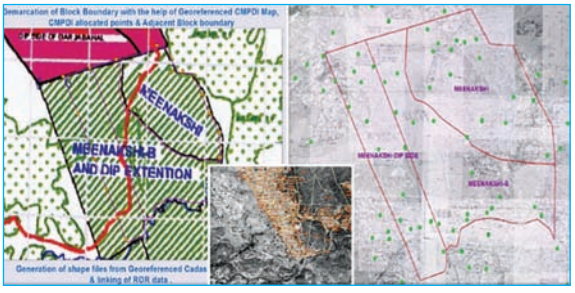
AGRICULTURE

BANKING

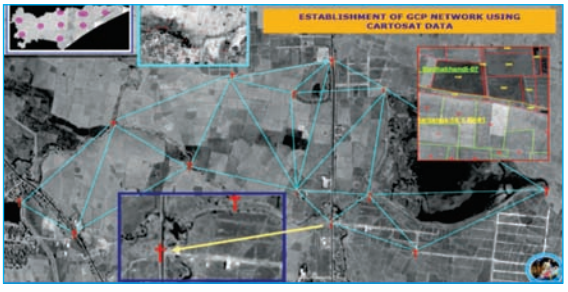


FOREST

IRRIGATION



MINING



REVENUE

From the desk of Chief Executive

It is my privilege to present the Annual Report of 2015-16 which reflects upon the significant achievements and contribution of the Centre in assisting the state administration in providing required geospatial data inputs for resources management along with accelerated economic growth and sustainable development. The year 2015-16 will go down in the annals of the history of the centre as a remarkable year for approval of Odisha State Data Policy by state cabinet and the Centre being declared as nodal agency for operationalization of "Odisha State Data Policy" and to establish and maintain "Odisha Spatial Data Infrastructure".

As a multidisciplinary organization and in line with its mandate, the center is continuously engaged in providing support solutions for effective governance using remote sensing, satellite communication, geo-informatics, geo-ICT, satellite navigation and computer technologies. During 2015-16, the center provided datasets to state departments like Revenue and Disaster Management, Industries, Steel and Mines, Water Resources, School and Mass Education, Energy, Forest and Environment, Higher Education, SC/ST Development, Agriculture, Commerce and Transport, Housing and Urban development, Women and Child development, Rural Development, Planning and Coordination and Panchayatiraj Department etc. Besides the above, the center is engaged in various projects of ISRO/SAC/NRSC, Dept. of Space, Govt. of India and major public sector undertaking of the country involved in resource management.

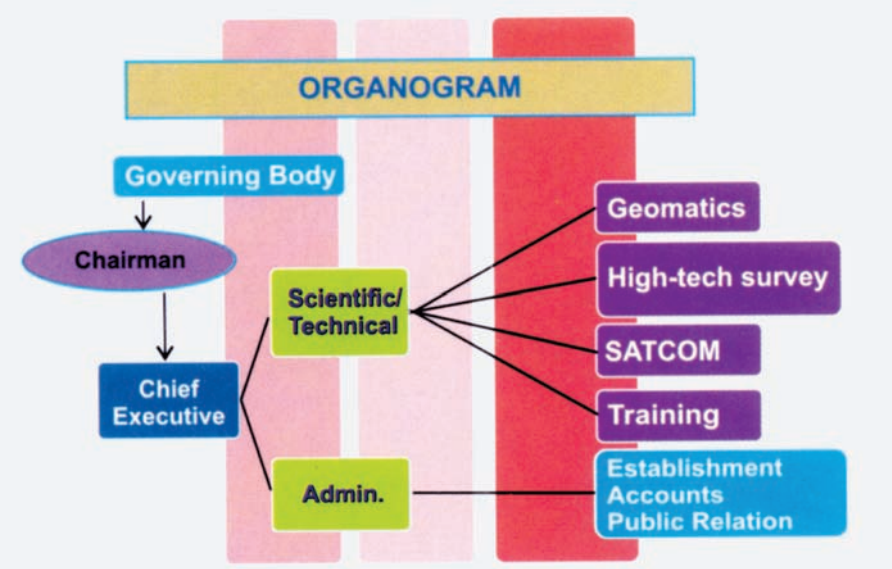
Some of other important achievements are development of dedicated web-based services in public domain for land bank and industry census (GOiPLUS-Govt. of Odisha's is Industrial Portal for Land Use and Services); Power distribution network management for OPTCL; Banking facilities network for RBI; DGPS based survey, mapping and geo referencing of mines, forest boundary and roads; GIS based Planning and Permit Management System for State carriage permits in Odisha, Geospatial Technology for Rural and Urban Development, Cadastral Level Geospatial Database Generation, Monitoring of Afforestation/Plantation areas, GIS based maps for towns and Resurvey of Cadastral maps etc.

I take this opportunity to record my gratefulness to Shri A.P.Padhi, IAS, Chief Secretary who in his capacity as Chairman of the Centre has provided much needed direction and guidance for the growth of the center. I also thank the staff of the center for their contribution to the success of the organization in 2015-16.

(Dr. Sandeep Tripathi)

Administration

Odisha Remote Sensing Application Centre (ORSAC) was set up in 1984 at Bhubaneswar under Dept. of Science & Technology. This centre has been renamed as ODISHA SPACE APPLICATIONS SCENTRE with the acronym ORSAC since 2009. The centre is acting as the apex body of the State for space technology applications and comprises of a pool of multidisciplinary application scientists to undertake remote sensing, GIS, GPS and communication technology applications. ORSAC has been appointed by the State Government vide resolution No.3765/ST dated 30th July' 2009 of the Science & Technology Department as the sole Nodal Agency for providing remote sensing and GIS application solution to all the offices including public sector undertakings, Govt. departments, Govt. societies as per their requirement



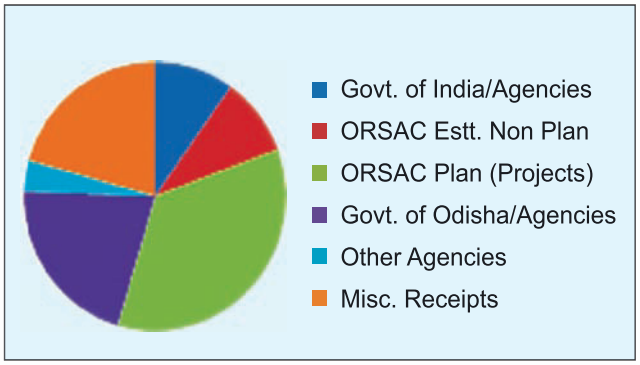
Mandate / Objectives

- Establishment of up-to-date library of satellite data, topomaps, cadastral and Geo-coordinates.
- Demonstration and operationalisation of space technology applications in State for several development planning activities.
- Supply of up-to-date accurate and geo-referenced database to all users of the state.
- Operationalisation of district / block / village level GIS database through internet / Web services.
- Participation in Remote sensing and SATCOM programmes of Indian Space Research Organization ISRO / NRSC / SAC.
- Reaching quality teaching to school students uniformly across the state through EDUSAT network.
- Popularization of space technology through Space Information Centre and Vigyan Prasar program.
- Capacity building of Government employees in the use of Remote Sensing, GIS & DGPS.
- Implementing agency for "Odisha State Data Policy "and maintenance of Odisha Spatial Data Infrastructure.
- Demonstration of multi-disciplinary application projects for mapping, monitoring and management of natural resources and environment.

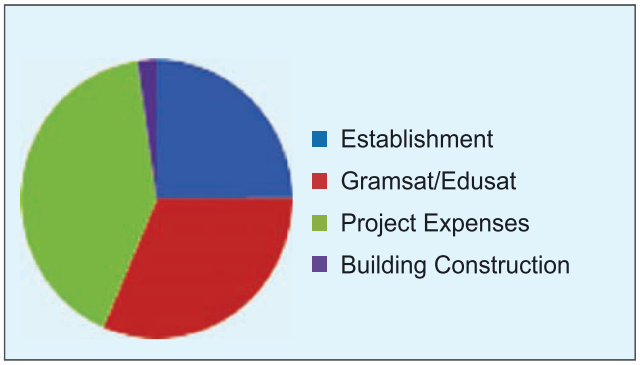
Accounts

Financial status 2010-16						
Year (Rs. in Lakhs)	**2010-11**	**2011-12**	**2012-13**	**2013-14**	**2014-15**	**2015-16**
RECEIPTS	3581.58	2382.95	2971.28	3112.57	3246.00	6211.46
EXPENDITURE	1442.99	1759.09	2912.83	1761.25	2645.29	1588.67

Receipts : 2015-16



Expenditure : 2015-16



Receipt (Rupees in Lakh)

Schemes	Nature of funding	2011-12	2012-13	2013-14	2014-15	2015-16
ORSAC Esst. Non Plan	Grant-in-aid	48.00	309.00	309.00	309.00	309.00
ORSAC Esst. State Plan	Grant-in-aid	112.00	0.00	0.00	0.00	0.00
ORSAC Plan (projects)	Projects	488.00	580.42	900.00	1146.12	1063.53
Govt. of India/ Agencies	Projects	295.73	117.10	195.28	318.86	595.70
Govt. of Odisha/ Agencies	Projects	515.06	163.52	492.48	679.95	2339.71
Other Agencies	Projects	223.44	1149.39	560.45	120.09	1157.19
Misc. Receipts		700.72	651.85	655.36	671.98	746.33
Total		2382.95	2971.28	3112.57	3246.00	6211.46

Expenditure (Rupees in Lakh)

Head of expenditure	2011-12	2012-13	2013-14	2014-15	2015-16
Establishment	654.32	724.54	660.53	658.33	831.64
Gramsat/ Edusat	557.72	299.98	135.31	835.30	205.61
Project expenses	547.05	1888.31	869.18	1092.00	503.59
Building construction/Repair	0.00	0.00	96.23	59.66	47.83
Total:	1759.09	2912.83	1761.25	2645.29	1588.67

Resources & Infrastructure

Satellite Data Library

SATELLITE DATA	Area/Scale	Year
Landsat-4, MSS; TM B/W	Entire State (1:250000)	1985-86
IRS 1A LISS-I FCC	Entire State (1:250000)	1988-89
Landsat-TM FCC	Entire State (1:50000)	1986-87
SPOT FCC	Bhubaneswar, Cuttack, Paradeep, Chilika (1:25000)	1988-89
IRS 1B LISS-II FCC	Entire State (1:50000)	1996-97
IRS 1C LISS-III FCC	Entire State (1:50000)	2003-04
IRS 1C/1D PAN	Entire State (1:50000)	2002-06
IRS 1C/1D LISS-III FCC	Entire State (1:50000)	2005-06
IRS Resourcesat LISS-IV FCC	Entire State (Digital)	2007-09
IRS Resourcesat LISS-IV FCC	Entire State (Digital)	2010-12
Cartosat - 1	Entire State (Digital)	2009-11
IRS Resourcesat LISS-IV FCC/Cartosat 1	Six towns (Digital data)	2008
Quick Bird	Bhubaneswar-Cuttack(Digital data)	2005-06
World View 1 & 2	Four districts (Digital)	2010
World View 1 & 2	Fifteen towns(Digital)	2010-11
Awifs	Entire State (Digital)	2012
Cartosat 2	Fourteen towns (Digital)	2014
Resourcesat-2, R-2, Cartosat-1	Eight districts (Digital)	2014
(R-2) LISS IV MX, W.V.-2, (PAN + MX)	Eight State of Odisha	2011, 12, 13, 14
World view - 2 (PAN + MX)	Entire State (Digital)	2014-15

Hardware

System	Nos.
Blade servers (2 x Intel Xeon Ten Core E5-2660 V3 @ 2.6 GHz)	3
Blade servers (2 x Intel Xeon Eight Core E5-2650 V2@ 2.6 GHz)	4
Rack Server (2 x Intel Xeon Processor E5-4620 v2@2.6GHz)	6
Xeon based Tower Servers	6
High-end Workstation for Digital Photogrammetry	4
High-end Desktop (Intel core-i5) with Graphics and 24" LCD Monitor	50
Desktop - Intel core-i5	22
Desktop - Intel core-i3	2
Desktop - Pentium Quad core	50
Desktop-Pentium IV	35
Storage	
On -Line Storage (36 TB) with Tape Backup System	1
Mini - Storage attached with Blade servers (9TB)	1
Scanner	
(VIDAR) AO Size (Titan H36) (1 - colour, 1 B&W)	2
HP - A4 size	3

Hardware

Printer/MFP	Nos.
Inkjet / Deskjet / Laserjet - A4	15
Multi Function Printer (Print, Scan & Copy)	3
HP Colour Lasser Jet 5550dn - A3	1
Plotter	
HP Design Jet 4000 —A0 (36 inch)	1
HP Design T 7100 — EA0 (42 inch)	1
GPS/DGPS	
Hand GPS (Garmin — 12)	21
Palm Top GPS /GIS	1
DGPS (Base) + ROVER (Trimble/Leica)	4+10
ETS (Total Station)	2
GPS Based Hand Held Device	3

Software

GIS	Nos.
Arc GIS (Workstation + Desktop) Version 10.3	24
Auto CAD + Auto CAD Map	1+1
Geomedia Desktop	2
Terrago Geo PDF (2D & 3D)	1
Image Processing	
ERDAS WITH LPS (Leica Photogrammetry Suite)	2+4
ENVI +TNT MIPS	1+1
Intergraph Geospatial Server 2015	2
Arc GIS (Server 10.3)	1
Others	
ORACLE 11g R2/12c	1
OfficeStd 2013 SNGL OLP NL	3
VMware Virtualization Kit	1
SYMC ENDPOINT PROTECTION 12.1	11
EMS Tool (CA UIM)	1
RDBMS (+) MS SQL 2008 (2) ORACLE	1
Client Supporting / CITRIX	70
Exchange Server 2013	1
Operating System (Window Vista/7/8/2000/2003/2008/2012 SERVER)	

Odisha State Data Policy (OSDP) - 2016

Odisha State Data Policy-2015 has been approved by Odisha State Cabinet on 13th August, 2015 and subsequently it has been published in Odisha Gazette No.3446-ST-III-ORSAC-5/2015/ST dated 22nd August, 2015.

In the state, most of the data generated using public funds remain inaccessible to common citizen although majority of such data may be unrestricted and non-sensitive in nature. Government Department generated data, specifically spatial data, do not have compatibility and interoperability due to lack of common standards and non-interoperability. The State Government felt that there is an urgent need to make all the data accessible and shareable to augment use of such data in planning as well as good and inclusive governance in the state.

The Odisha State Data Policy is, therefore, developed on principles like Non-Redundancy, Openness, Flexibility Standards, Interoperability, Quality, Efficiency, Accountability, Intellectual Properly Right (IPR) and Right to Information. The Odisha State Data Policy aims to facilitate the accessibility of authentic data and information of all the Government departments to all the stakeholders through a electronic network within the framework of various related policies, Acts and Rules of Government of Odisha from time to time with a view to empower the citizen. Odisha State Data Policy covers aspects such as data storage at one platform, easy access of data, a common protocol of data standardization / cataloguing / updation / access / dissemination, easy quality control and use of open source technology and SMAC (Social, Mobile, Analytic and Cloud). Datasets of the Government departments shall be classified into open, registered and restricted categories. All spatial data in the state shall be stored in open WGS-84 datum with WGS-84 spheroid formats.

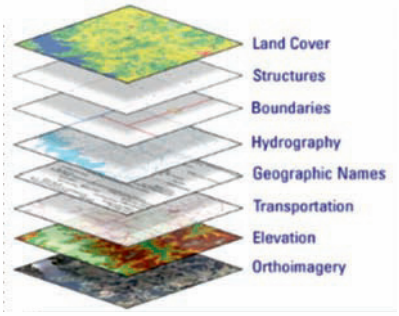
For implementation of OSDP-2015 in the state, the Science & Technology Department is declared as the nodal department and Odisha Space Applications Centre (ORSAC) shall act as the nodal agency. A “State Data Steering Committee (SDSC)” is constituted under the Chairmanship of the Chief Secretary to Govt. of Odisha with Chief Executive, ORSAC as the Member Secretary, comprising officials of the State Government, experts having experience and qualifications in the field of Remote sensing/GIS & IT as well as representatives from industries and intelligentia, for taking up policy level issues. A 'State Data Executive Committee (SDEC) under the Chairmanship of Principal Secretary, Science & Technology Department, Government of Odisha with Chief Executive, ORSAC as the Member Secretary and officials from Government departments and experts from RS and GIS, Information Technology and industries as members is constituted to facilitate day-to-day issues in implementation of mandates of OSDP. A dedicated Project Management Unit (PMU) is formed to carry out activities relating to data standardization, quality checking, interoperability, sharing and other similar activities as advised by SDEC. The PMU comprise scientists from Odisha Space Applications Centre (ORSAC) and IT specialists from Odisha Computer Application Centre (OCAC), State Data Centre and NIC . All departments of the State Government shall form a Data Dissemination Cell for sharing, publishing and standardization of their data.

As per OSDP-2015, an Odisha State Data Infrastructure (OSDI) is to be created by ORSAC with the financial support from Science & Technology Department of Government of India.The OSDI shall be repository of all non-spatial and spatial database and its metadata. The GIS servers of all departments shall be linked to OSDI through Odisha State Wide Area Network (OSWAN) / National Knowledge Network (NKN). OSDI is to function from the State Data Centre with linkage to all citizen centric and e-Governance applications of the State.

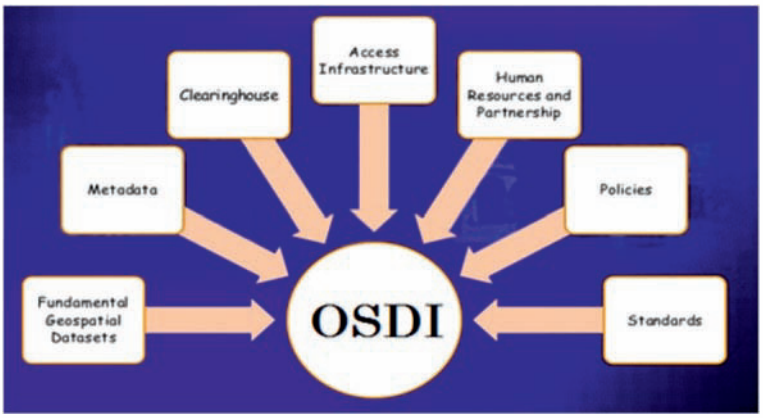
Odisha Spatial Data Infrastructure

Odisha Spatial Data Infrastructure (OSDI) is a state geo-portal and clearing house at organizing, securing, updating and facilitating delivery of geospatial metadata, data, products and application services to end users as per ISO/OGC standards. The geoportal and the clearing house in the long run will ultimately result in the implementation of the state-wide Spatial Data Infrastructure. This project is under development with necessary metadata and data collections from different departments of Govt. of Odisha. The broad objectives of the project are as below.

- To promote use of geographic information for better decision-making.
- To identify and implement protocols for sharing, maintaining and assuring the quality of geographic information for efficient and cost-effective use by Govt. Departments, non-governmental organizations, research institutions and industry·
- To develop and maintain a common geographic database (for all the departments) as a crucial capacity-building effort to enhance normative programme and operational capabilities and efficiencies.
- Development of standards for data collection, documentation and exchange.



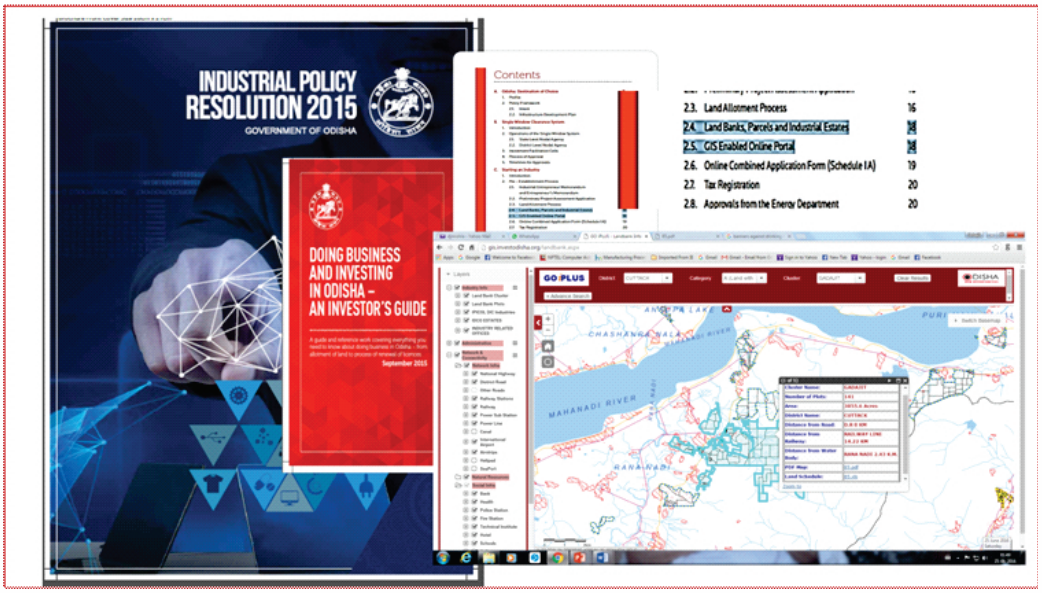
- Formulation of procedures and partnerships to create a national digital geospatial data framework that would include important basic categories of data significant to a broad variety of users.
- Development of new relationships that allow organizations and individuals from all sectors to work together to share geospatial data.
- Create and maintain geospatial data and metadata.
- Deliver this data to their external clients, in real-time and independently from the software they use.
- Share this data with their clients.
- Ensure proper use and security of their data, managing the permissions of the users.
- Provide a discovery facility to their clients, allowing them to identify which data meet their needs.
- Provide an interface offering a dedicated solution to the particular business cases of external or internal clients.



This project is part of the National NSDI (National Spatial Data Infrastructure) programme under Ministry of Science and Technology, Govt. of India.

Web-GIS based Odisha Land Bank for Industrial Development

Industries Department, in its endeavour to provide land, industrial information and hassle-free business environment to investors, prepared Odisha IPR-2015 (Industrial Policy Resolution-Govt. of Odisha Gazette notification/Resolution Dt. 24-08-2015) which emphasised on establishment of GIS based Comprehensive Industrial Data Bank for the use of existing and prospective entrepreneurs, administrators and policy makers. Land is one of the most important factors in economic development today and must be managed well to enhance socioeconomic conditions of communities. Government departments, industrialists and business communities are facing difficulties to implement their development plans because of shortage of appropriate lands. Therefore, technological solutions are searched for creation of land banks. Land Banking is the strategic acquisition of land in advance of expanding urban and industrial development; the practice of buying and holding underdeveloped and pre-developed land for productive and future use. In the present project, geo-informatics, ICT and space technology inputs are used to create the Web-GIS based Odisha Land Bank for industrial development, and compensatory afforestation.



Development of Land Bank maps and Land schedule

High resolution ortho-images, geo-referenced digital cadastral datasets, NIC Bhulekh RoR data, IDCO Land Schedule Data, satellite derived spatial datasets and attribute datasets of industry department are used to create the Web-GIS Odisha Industry information and Land Bank, which is web-hosted in public domain for use by all stakeholders interactively under GOiPLUS (Govt. of Odisha's Industrial Portal for Land use and Services).

Revenue cadastral maps are used as base maps. The shape files of cadastral maps and digitised RoR data are used for identification of plots. Clustering was made considering plot shape, size, landuse, location, physiograpghy, ownership, connectivity and contiguous nature. Ortho-rectified Cartosat 2.5m and World-View 0.5 m data are used to geo-reference the cadastral maps. Land Bank cluster maps are prepared in revenue scale in digital .dwg and .shp format. Multisource data are used to generate data on infrastructure such as landuse, power supply transmission, electric substations,

transportation corridors, rail-road-port-air connectivity; social Infrastructure like schools, colleges, hotels, medical facilities, technical Institutions, police stations, fire stations and bank/ATM etc; physical themes like forests (RF/PF), habitations, surface water along with administrative and investment zones, industrial activities. Land Bank Web-portal developed using the above datasets provides detailed information pertaining to land with regards to availability of industries, plots under land bank cluster and location specific attributes in terms of connectivity, linkages and availability of other utilities, amenities and services.

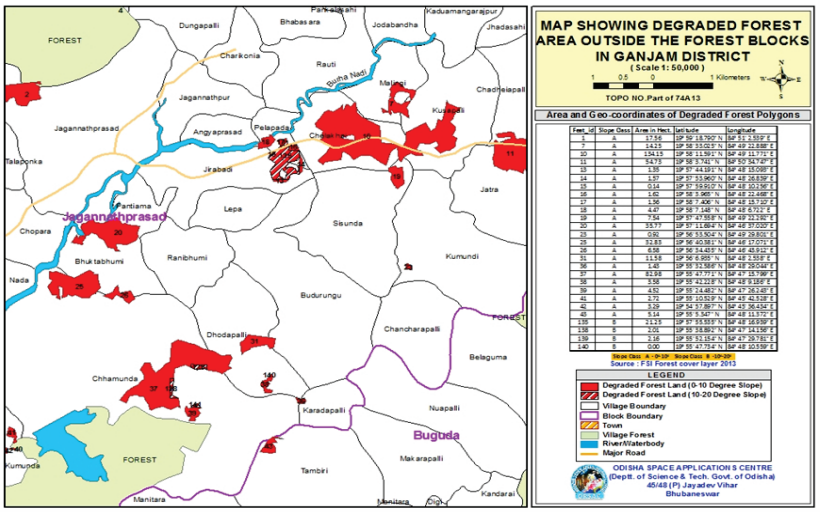
Through the System, a prospective investor can get information not only about land availability but also the key attributes of existing industries operational in that area. It provides a spatial relationship between industrial clusters and infrastructure and other amenities through an overlay of attributes that measures the suitability of industrial development. Web-based development is made to provide information through query mode on appropriate amenities and facilities close to the land bank cluster and proposed business activity which the investors can rely in deciding a particular location. It maps the existing land parcels and its status along with a query analysis that provide a glimpse of developed infrastructure and competitive efficiency in the movement of goods and products. The database provides critical information in the decision making process and planning for future industrial developments in the state.

Data service through Web-Portal

The following data sets and information can be obtained by public from the website www.gis.investodihsa.org.

- Land Bank clusters identified and mapped for 2.4 lakh hectares in 22 districts of the state.
- Land Bank map, data and land schedule for 87,300 Acres are made available in public domain and the hard copies are submitted to IDCO for alienation.
- Availability of vacant plots in existing industrial estates and investment vegions indentified by industries department.

Out of 87,300 Acres, 18,804 Ac land under IDCO (category A) and rest under respective district collectors are mapped on revenue scale. Maps and land schedule are web hosted indicating land category and environment category as per data provided by SPCB/IDCO. Users and prospective investors can locate land clueters in any districts, industrial estates, investment regions, sector specific clusters and around important utilities / mega industries of the state. The centre also prepared maps of land patches for compensatory afforestation in eight districts (Anugul, Jharsuguda, Sambalpur, Dhenkanal, Keonjhar, Cuttack, Khurda and Sundergarh) of the state.



(Degraded forest lands identified under Land Bank for compensatory afforestation.)

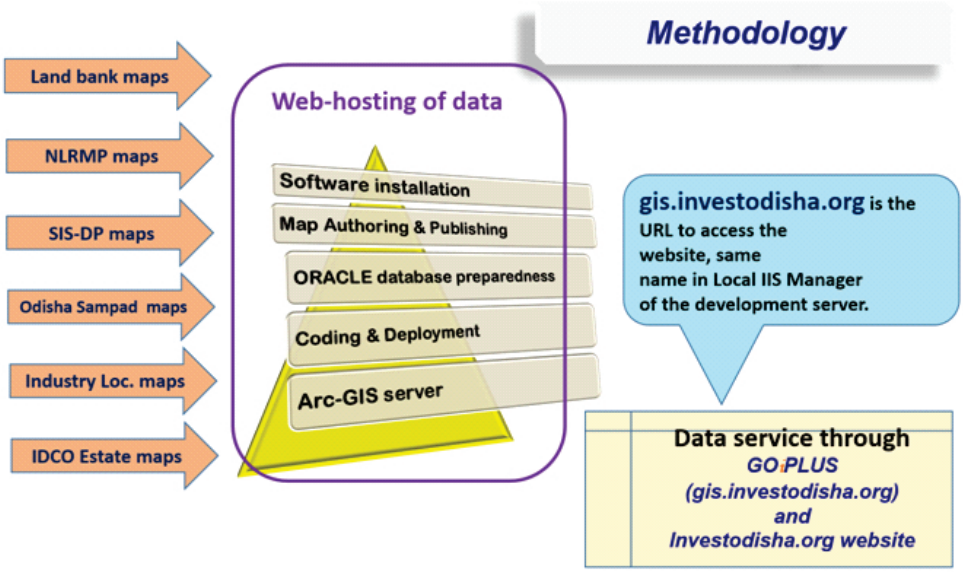
GOiPLUS

Govt. of Odisha's Industrial Portal for Land Use and Services

Industries Department, in its endeavour to provide land, industrial information and hassle-free business environment to investors, entrusted the task of developing a comprehensive RS/GIS based web-portal under GOiPLUS to ORSAC. Industrial Policy Resolution of Govt. of Odisha (General Policy Frame work section) emphasised on Establishment of GIS based Comprehensive Industrial Data Bank for the use of existing and prospective entrepreneurs, administrators and policy makers.

GOiPLUS (Govt. Odisha's Industrial Portal for Land Use and Services) provides industrial activities information of Odisha state with regards to industrial land in the state and associated activities. GOiPLUS is a web enabled platform to provide investor friendly services and is accessible from web, tablets and desktops providing ready-to-use information and maps on a real-time basis to users. Web-based development is made to provide information through query mode on appropriate amenities and facilities close to the land bank cluster and proposed business activity which the investors can rely in deciding a particular location. GOiPLUS is a web enabled platform to provide investor friendly services and to provide ready-to-use information and maps through gis.investodisha.org. GOiPLUS is a :-

- Web-enabled repository of state land bank—for industrial use and compensatory afforestation
- Contains database of industrial land use and infrastructure
  (Transport Corridors-NH/SH/ODR, Rail Networks/ Rly stations, Port connectivity, Power Supply line & Substations and industrial institutions) along with adjacent social infrastructure facilities (Schools, Colleges, Hotels, Health centres, Technical Institutions, Police stations, Fire stations, Bank/ATM etc.)
- Decision support tool for inventory and prioritising industrial land utilization



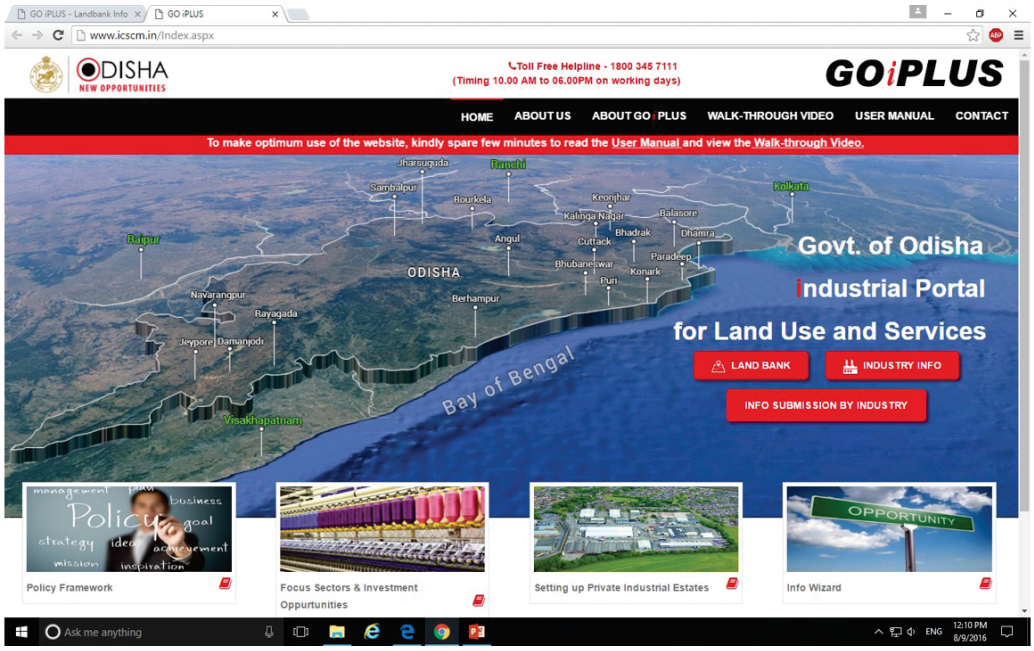
Significant achievement

- To prepare outputs for the project, the cadastral maps of the entire state are digitised, coded, standardise and geo-referenced with ortho-images of entire Odisha.
- Multisource data are used to generate data on landuse, network infrastructure and social infrastructure of the state. Geocoding of all data is undertaken for all above datasets.
- Integrating multi-source and multi-scale data in GIS environment starting from 1:50000, 25000, 12500, 4000 and 2000 scale.
- The system provides detailed information pertaining to land with regards to availability of industries, plots under land bank cluster and location specific attributes in terms of connectivity, linkages and availability of other utilities, amenities and services.
- Significantly under this project, query based spatial and attribute search and information extraction is provided in web-portal in public domain for benefits of all types of stakeholders.
- Development of online portal for industry info submission by industry owners.

User can obtain following information from the portal in public domain

- Land Bank map, data and land schedule for 87,300 Acres available in public domain and revenue scale maps and land schedule.
- Land Banks in 22 districts indicating land category and environment category.
- GIS database of 106 industrial estates of IDCO. The estate maps on image background, pdf maps and excel files. Vacant plots in estates are also linked to the portal.
- Information on Transport Corridors-NH/SH/ODR, Rail Networks/ Rly stations, Port connectivity, Power Supply line & Substations and industrial institutions) along with social infrastructure facilities like Schools, Colleges, Hotels, Health centres, Technical Institutions, Police stations, Fire stations and Bank/ATM etc.
- Information on investment negions and industrial parks identified by the industries department under new IPR (Industrial Policy Resoulution) of Govt. of Odisha.

www/gis.investodisha.org



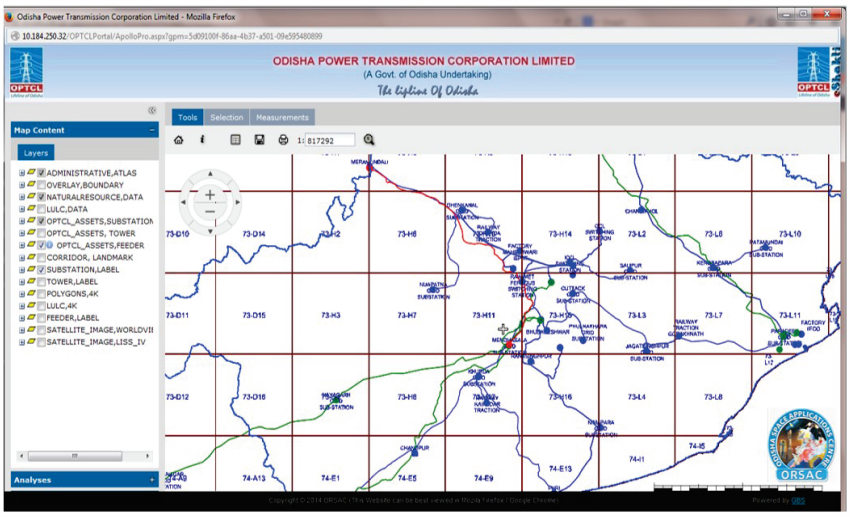
Web Based Power Atlas

The Web based Power Atlas System is developed by ORSAC for Odisha Power Transmission Corporation Limited (OPTCL), Odisha. OPTCL having recognized the importance of GIS along with Remote Sensing and GPS technology, entrusted ORSAC a pilot study for Cuttack circle to test the efficacy for its use in functioning, analyzing and management of Extra High Tension (EHT) towers, Sub-stations and Feeder Lines. The project is now developed as Web based Power Atlas for the Odisha State.

Under the pilot study (Cuttack circle of OPTCL), survey of 5124 EHT towers and 32 numbers of Sub-stations covering 2328.69 Km Circuit using Global Positioning System (GPS) and the geospatial database was generated with Universal Transverse Mercator (UTM) Projection System with WGS 84 spheroid and Datum. Natural Resource layers like Land use / Land cover, River and Water Body, etc. , Infrastructure layers like Road, Railways, Canal Network, Settlement Spreads, etc. were generated in 1:10K scale using high resolution merged image (Cartosat-1+Resourcesat-2). The substations were mapped in 1:4K scale for generation of plot wise land use/cover using World View II Data of 0.5 m spatial resolution and the cadastral digital database. Administrative layers such as Village, Block, District, Assembly, Parliament and Survey of India boundary were used to view the Power Atlas as per the administrative units desired by the user. Linking and integration of spatial layers with respective attributes were carried out using ERDAS APOLLO GEOSPATIAL SERVER and ORACLE RDBMS to facilitate the querying, viewing and managing the electrical assets and other resources. A Graphical User Interface is created using ASP. NET for its customization. The success of Pilot Project for Cuttack Circle gave the way to roll over the Pilot Project to rest of Circles of OPTCL. Survey of 22900 EHT towers, 211 EHT Lines and 80 numbers of substations using Global Positioning System (GPS) for entire Odisha excluding Cuttack Circle of Odisha is completed during 2015-16. The Web Based Power Atlas will be developed for entire Odisha during 2017.

The activities undertaken under this project are:

- Survey of each substation, tower and other assets and collection of GCPs (Ground Control Points) .
- Creation of an uptodate Asset (Substation, Tower and Feeder Line) database with a unique identification number.
- Mapping the electricity network, so that it could be referenced with a geographical location.
- Creation of an asset database and indexing each asset with a unique number.
- Generation of Land Use and Land Cover Map.



Web Based Power Atlas Generation for OPTCL

- Creation of Power Atlas map using Circle/Division/District/Block and SOI grid boundary.
- Integration with other E-Shakti Software using Asset Unique Number.
- Customization using ERDAS Apollo Geospatial Server and hosting the application in Web for the admin user and end users of OPTCL.

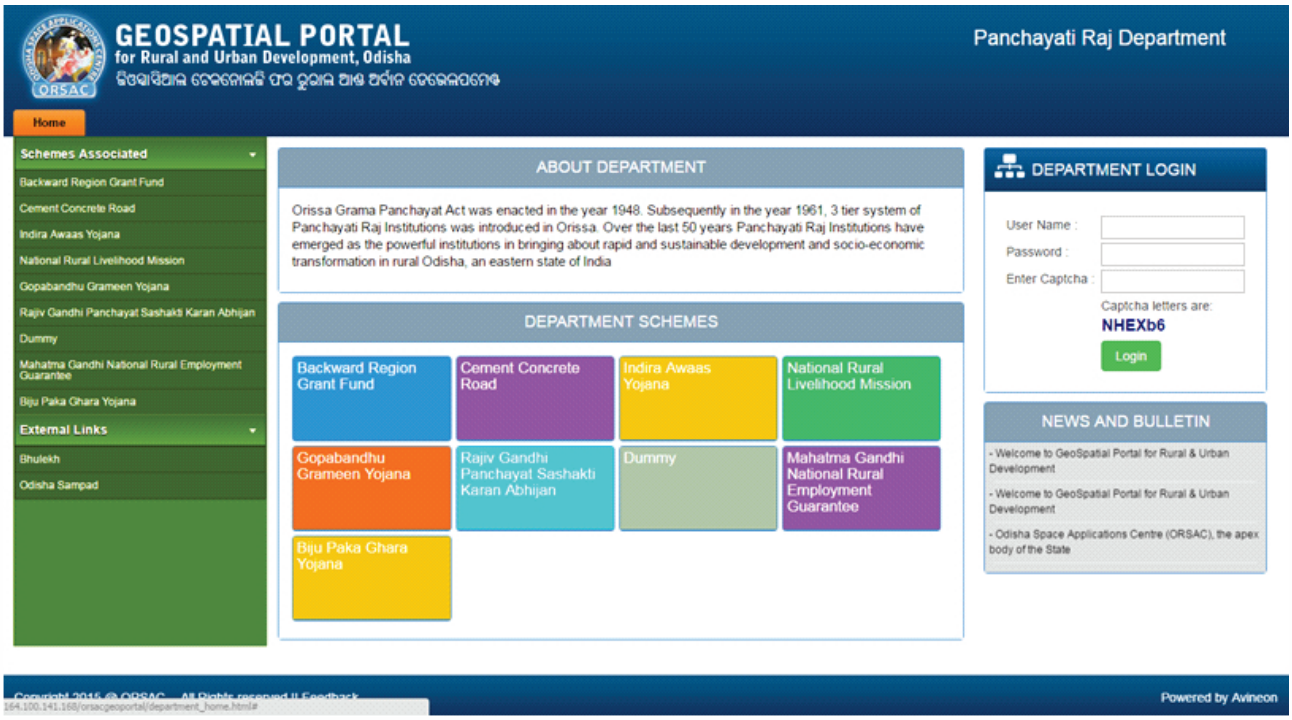
Geospatial Technology for Rural and Urban Development

The project planned to develop web based solution on GIS platform for visualisation, planning & management of rural and urban development programmes/ schemes in Odisha state by integrating space, geo-informatics and ICT technologies. The objective is to develop a dynamic application with MIS support having capabilities for generating queries, both generic and specific, and working as a Decision Support System & Grievance Management System in general and as a Programme Scheme Monitoring System in specific for Odisha state at 1:4000 scale.

Project Features

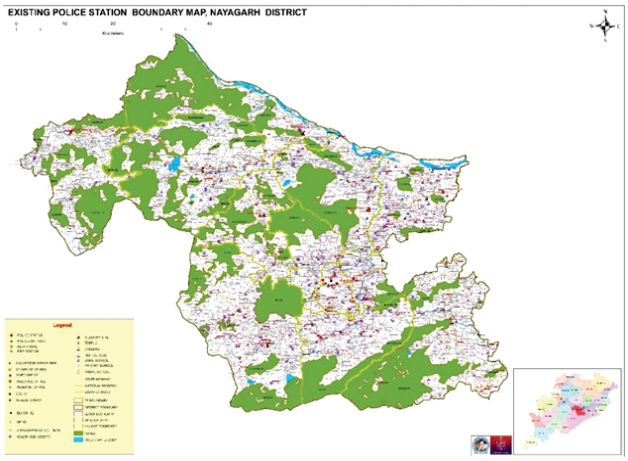
- Creation of plot wise infrastructure and landuse information system generation
- To act as online monitoring of Govt. programmes and schemes at all levels (village GP-Block-District-State)
- To generate queries both generic and specific specially meant for planning and management purposes
- To facilitate linking of e-mail, video, audio, IVRS, GPS/DGPS based observations and Personal Digital Assistant based information with the spatial database of cadastral (plot) level
- To enable the web solution to work as a Citizen Grievance Management System

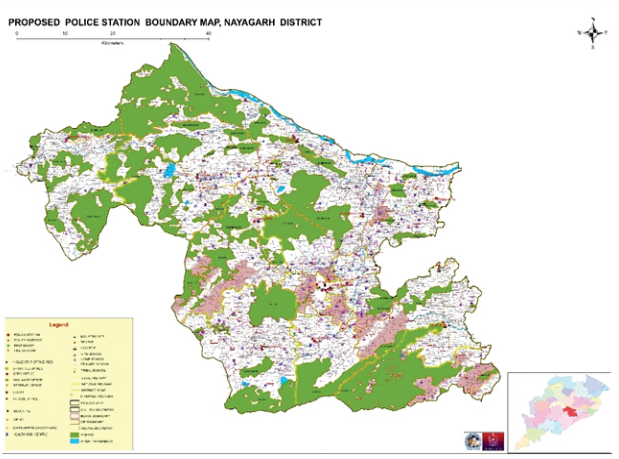
In pilot phase, the project has been implemented in three blocks of Cuttack and field survey and spatial information generation has been completed for seven blocks namely: Tangi-Chowdwar, Salipur, Cuttack Sadar, Nischintkoili,Mahanga, Baranga, Banki, Kantapada, Niali, Narsinghpur, Athagarh and Tigiria.



Police Information System

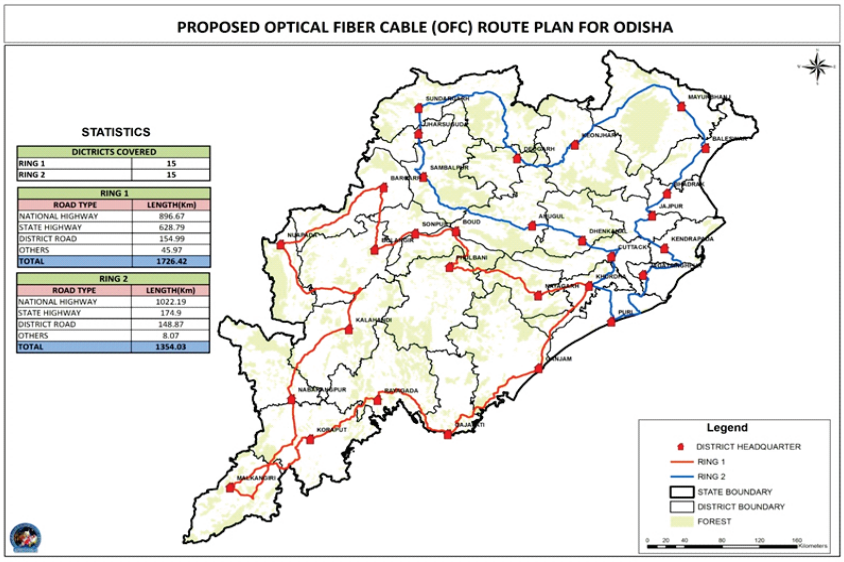
The objective of this project is to create the GIS database of existing police boundary and generation of proposed police boundary for the 36 Police districts using multilayer spatial datasets in GIS environment. This also includes Govt. Railway Police (GRP) boundaries. Below images show the existing and proposed police station boundary of Nayagarh district.





Bharat Net-Optical Fibre Network

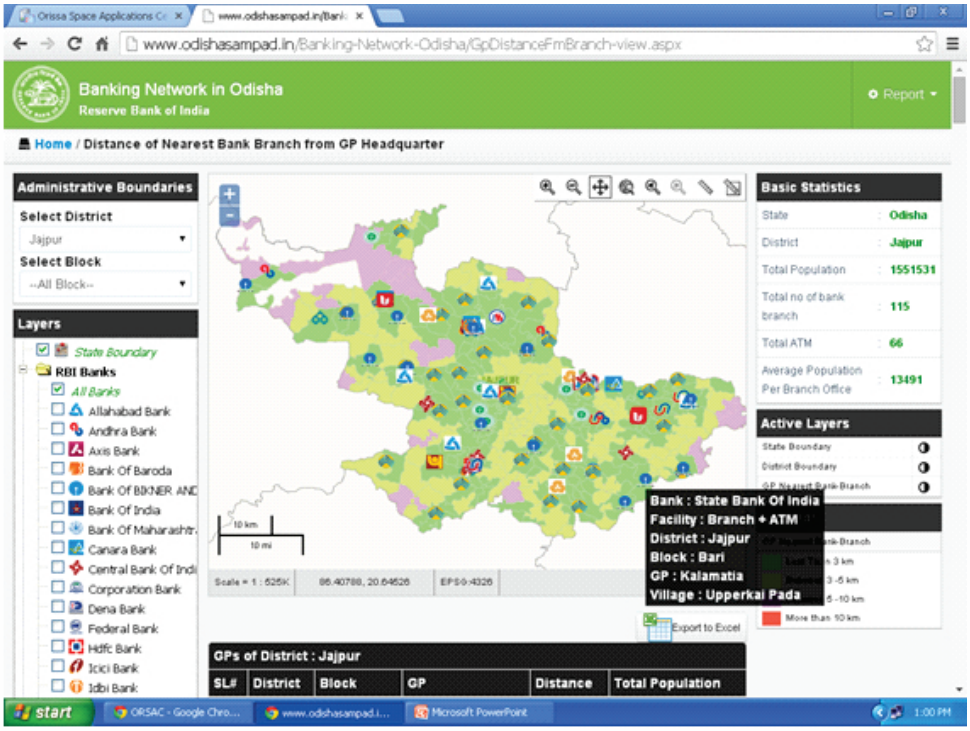
The Government of India has set up Bharat Broadband Network Limited (BBNL), a Special Purpose Vehicle (SPV), for the Establishment, Management and Operation of National Optical Fiber Network(NOFN) to provide 100 mbps connectivity to all the 250000 Gram Panchayats (GPs) spread over 6590 Blocks and 637 Districts in the country. This project has been initiated in order to bridge the connectivity gap between Block and GP through an Optical Fiber Network. In order to build broadband network connectivity, ORSAC identified the optimized Optical Fiber Cable (OFC) route using the geospatial application. The OFC network ring is generated at three different phases. They are Phase-1: District Ring, Phase-2: Block Ring and Phase-3: Gram Panchayat Ring. Once the OFC ring plans are generated, it is being verified by the Department of Electronics & Information Technology.



Banking Information System For Odisha

"Banking Network-Odisha" is a web based GIS hosted in public domain for use of Reserve Bank of India all bank administration and common citizens. Developed using open source softwares, it is a low cost utility software. The Banking Network is web application of GIS for all RBI approved 3999 scheduled Banks and 4000 nos. of ATMs present in Odisha which has the potential to organize complex spatial environment of all 34 types of banks with tabular and statistical form. The home screen consists of five major reports like Branch Details, Gram Panchayat having no bank, Distance of Nearest Bank from GP and Distance of Bank from village. Easy toolbar has also been provided for users. In the Branch Detail Report, the user can find the detailed availability of Bank and ATMs in a particular district/block/GP along with the attribute data and map. User can also get spatial information about administrative boundaries, natural barriers (forest, river etc.), road connectivity, market sites, and industries around the bank. In the no bank GP Report, the list of Gram Panchayats either for a district or a block is displayed. In the "Distance of Nearest Bank from village", the user can find the details of distance from the village to its nearest bank branch/ATM along with the facility of "scale to map" allow the user for distance calculation. Facility has been provided to users to download any desired data in MS Excel format.

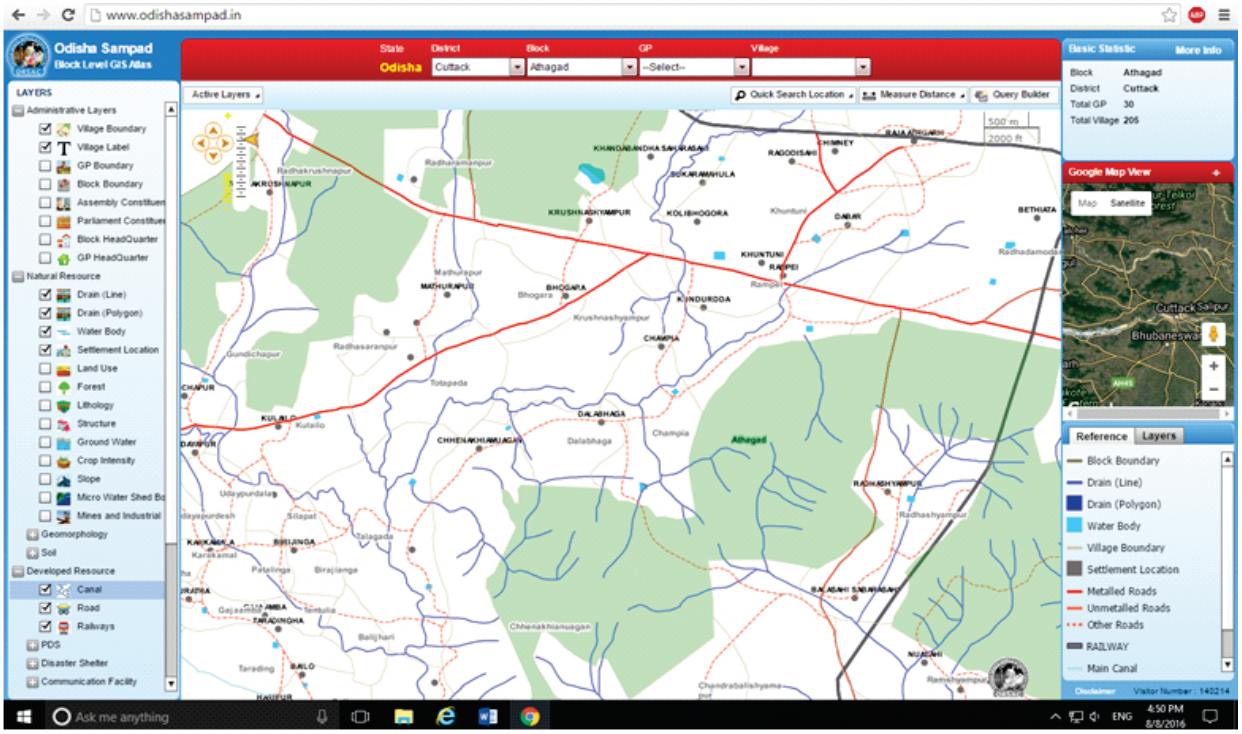
The hosting of this application software "Banking Network-Odisha" is helping the Reserve Bank of India and all banks to identify the No Bank Gram Panchayats/villages in the state to set up new banks especially in rural Odisha. Since the application software is hosted in public domain, it is becoming helpful to the citizen to identify and know banking infrastructures in their localities.



Banking Network in Odisha

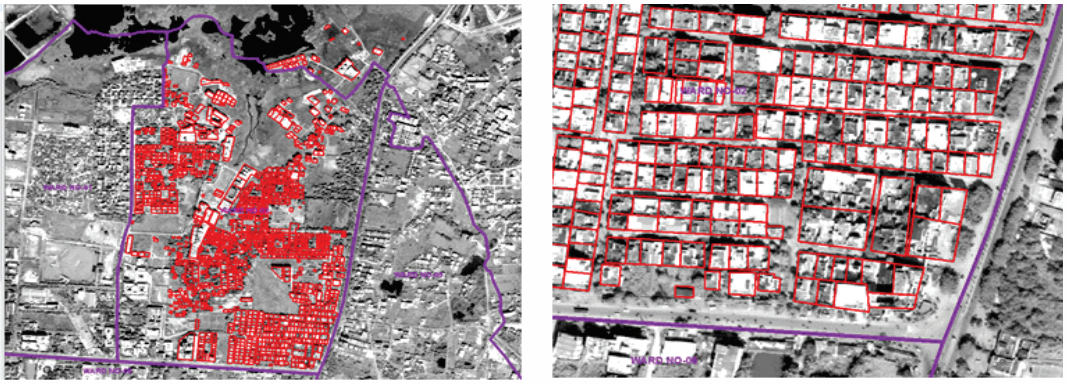
Odisha Sampad

Odisha Sampad contains 106 layers of information on natural resources, demography and infrastructures of the state. ORSAC is presently updating the contents of Odisha Sampad and converting the same to a dynamic vector based software with Crowd Sourcing facility to make it more useful in quick decision making process.



Remote Sensing based Property Tax Assessment of Bhubaneswar and Puri Municipal Areas

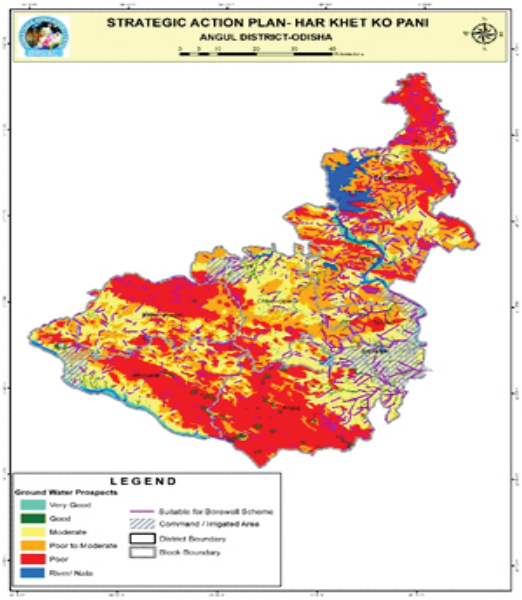
Assessment of property Tax of Bhubaneswar and Puri Municipal Areas using latest high resolution World View 2 satellite images, field based observations and GIS are being undertaken with the financial assistance of Housing and Urban Development Department of State Government during the year 2015-16 & 2016-17.



Footprints captured from high resolution image.

Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) – District Irrigation Plan

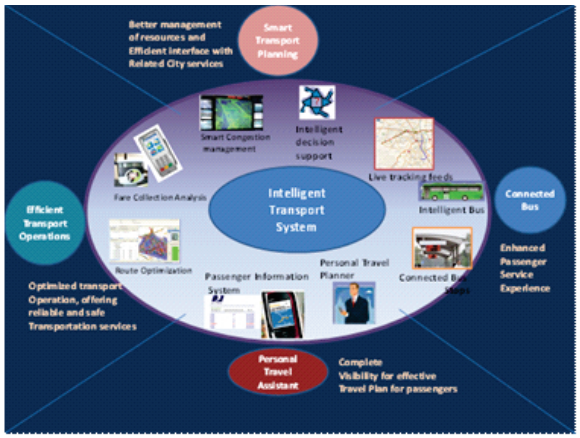
Odisha Space Applications Centre (ORSAC) has helped and guided the District Level Irrigation Committee (DLIC) in preparing the District Irrigation Plans (DIP) for 6 district i.e. Angul, Dhenkanal, Kandhamal, Keonjhar, Khordha and Mayurbhanj. In the DIP detail analysis is done and explained with the support of different thematic maps and statistical analysis which will be useful in proper irrigation planning and management.



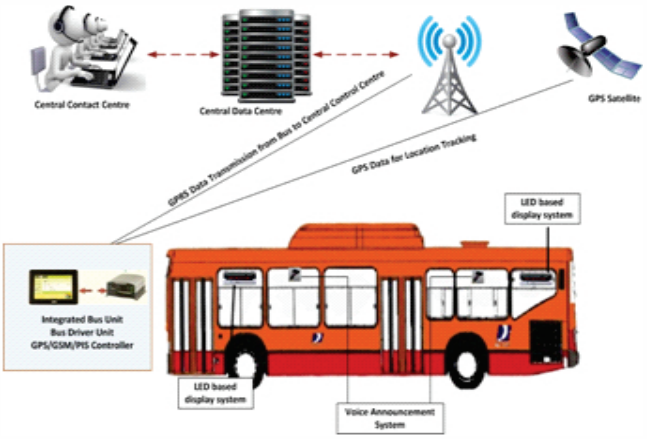
GIS Based Stage Carriage Permit Management System

Draft district transport plans based on existing permit status and incorporating diversion/ extension/ new route proposals for optimal coverage of public transport have been submitted for 18 districts and for rest 12 districts are under progress. These plans have been discussed with the RTA officials in 7 districts. WebGIS based Permit Management System (PMS) for the state has been planned.

ORSAC is also planning to implement Intelligent Transport System (ITS) in buses in Odisha. ITS provides integration of a broad range of technologies. ITS applications bring system users, vehicles and infrastructure together into one integrated system that enables the exchange of information for better management and use of available resources.



Intelligent Transport System



Vehicle Tracking System

National Land Records Modernization Programme (NLRMP)

Government of India is implementing the Centrally-Sponsored National Land Records Modernization Programme (NLRMP) for modernizing management of land records. The major components of the programme are computerization of all land records including mutations, digitization of maps and integration of textual and spatial data, survey/re-survey and updation of all survey and settlement records including creation of original cadastral records. In Odisha state, Revenue and Disaster Management Dept. is implementing the program. ORSAC is associated in two major project components of NLRMP project.

A Quality Checking of digitized cadastral maps

B Cadastral Resurvey

- Cadastral resurvey of 4 districts (Cuttack, Khurda, Ganjam and Keonjhar) by HRSI (High Resolution Satellite Image) method.
- Cadastral resurvey of 5 districts (Sundergarh, Deogarh, Samabalpur, Bolangir, and Sonepur) by Aerial survey/photography method.

A. Quality Checking of digitized cadastral maps

Cadastral maps of the state comprising 51,666 number of villages are digitised by Revenue Dept. and quality checked at Survey and Map Publication Office, Cuttack and also at ORSAC. The centre is preparing GIS ready CAD files of digitised maps after quality check by automated software developed for the purpose. Datasets are also prepared for linking of Bhulekh RoR data with cadastral map plots.

B. Cadastral Resurvey by High Resolution Satellite Image (HRSI) method

High Resolution Satellite Images depict field bunds distinctly. The plot parcels are delineated from cloud free ortho-images and obscured/difficult areas are surveyed using DGPS and ETS. The vector datasets derived through RS/DGPS/ETS survey are integrated in GIS environment to generate the base cadastral vector datasets for further settlement/title confirmation activities by Revenue Department. The project is implemented in Khurda, Keonjhar, Cuttack and Ganjam Districts by Revenue & DM Dept. in technical consultation with ORSAC.

C. Cadastral Resurvey by Aerial survey/photography method

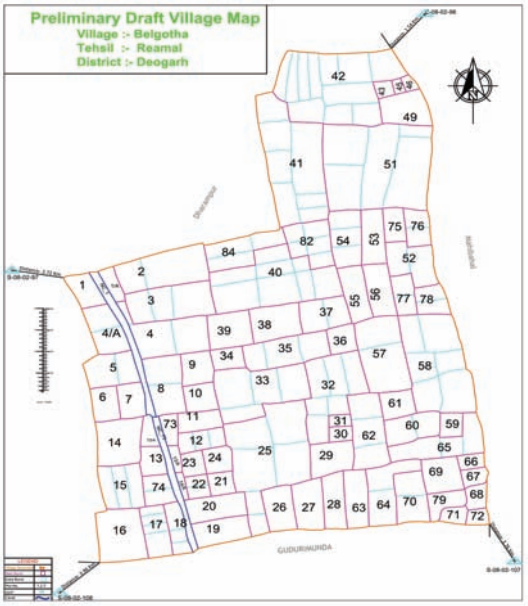
The centre is also assisting the Revenue Dept. engaged vendor for preparing cadastral maps of 5 districts (Sundergarh, Deogarh, Samabalpur, Bolangir and Sonepur) using Aerial Photography method.

Methodology

The broad methodology adopted under this project is as follows:-

- Acquisition of digital stereo satellite data of World View-II.
- Establishment of GCP control network by DGPS.
- Generation of photogrammetric block.
- Ortho image generation
- Collection of existing cadastral maps & Coding/Scanning/Digitization of maps
- Delineation & confirmation of village boundary

- Plot level vectorisation & map generation from ortho image
- Integration of image derived vectors and cadastral vectors (DoLR map) / ROR linking
- Survey and mapping of difficult areas/ ground truth collection
- Integration of vectors and preparation of base maps
- Map/RoR printing (output generation)
- GIS Database Creation



Establishment of GCP control network by DGPS Survey

Ground Control Points established by the vendor in 5 districts of Sundargarh, Deogarh, Sambalpur, Bolangir and Sonepur in each 4 km have been verified by ORSAC. The DGPS observation of GCPs for 4 districts of Sundargarh, Deogarh, Sambalpur and Sonepur has been verified by ORSAC under the quality checking programme.

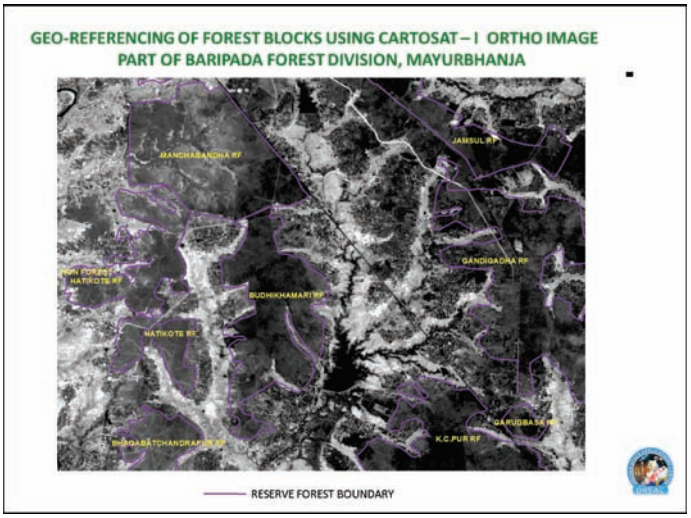
Aerial photo acquisition

Aerial photographs acquisitions is undertaken by DLR S&C, Cuttack and stored at ORSAC. The photogrammetric block is being prepared by the vendor under direct supervision of ORSAC scientists. Meanwhile, orthoimages are being prepared and quality checked by ORSAC. The aerial orthoimages are prepared for Sundargarh and Deogarh districts and parts of Sonepur district. The security zones are identified and marked as per the direction of Survey of India. The aerial ortho-photos are being used by the DLRS&O vendor for preparation of cadastral resurvey maps.

Cadastral Resurvey:

- 334 maps have been quality checked, maps authenticated by ORSAC were submitted for resurvey work for Khurda and Cuttack districts.
- 130 maps prepared by the vendor have been quality checked at ORSAC and verification completed. The maps were submitted by the vendor for resurvey work for Sundargarh district.

Geo-referencing of forest boundary of Odisha



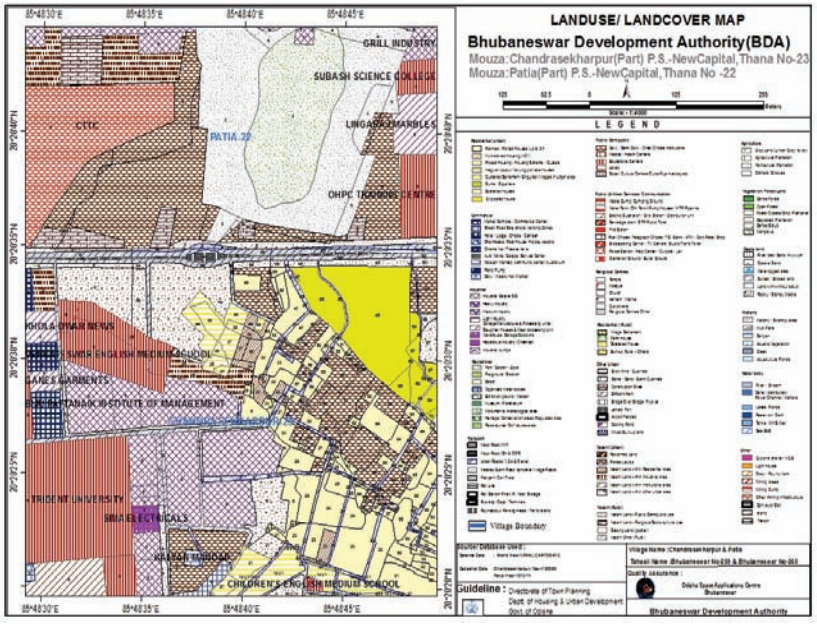
Digitisation of forest block boundaries comprising of Reserve Forest, Protected Reserve Forests, Protected Forests, Demarcated Protected Forests and Un-demarcated Protected Forests of all 50 Forest Divisions of Odisha have been completed on scale 1:50,000 as per the maps supplied by the Forest Department. The forest boundaries are geo-referenced with the Ortho-image of Cartosat-1 data. The centre is developing a seamless geo-referenced digital forest block boundary database for the state where the user can able to get information about the forest blocks and its area and geo-coordinates easily.

Remote Sensing and GIS Inputs Generation for CDP Preparation of Towns of Odisha

Housing and Urban Development Department Govt. of Odisha has assigned the task to ORSAC to prepare Remote Sensing and GIS database for CDP preparation of 44 Towns of Odisha State in a phased manner. The maps have been prepared on 1:2000/4000 scale. The main objectives for preparation of GIS database of towns are:-

- To capture cadastral maps in digital format and to use this as base for all types of development planning.
- Generation of RS & GIS inputs for Comprehensive Development Plan (CDP) on cadastral base of Town Planning area/ Development Authority Area, Special Planning Authority Area / Regional Improvement Trust Area.
- Plot level Digital Urban Land use Database Generation on cadastral base.

During 2013-15, inputs of 20 towns namely. Koraput, Malkangiri, Nabarangapur, Phulbani, Boudh, Sonepur, Deogarh, Paralakhemundi, Kendrapara, Jagatsinghpur, Pattamundai, Jajpur, Dhamara, Basudevpur, Nayagarh, Anandpur, Joda, Rajgangpur, Biramitrapur and Sundergarh on 1:2000/4000 scale are prepared. The final data base of Fifteen (15) towns (Dhamara, Sonepur, Malkangiri, Koraput, Nabrangapur, Deogarh, Basudevpur, Sundergarh, Pattamundai, Boudh, Paralakhemundi, Joda, Phulbani, Kendrapada and Nayagarh) have been completed by using Cartosat-2 data and rest Five towns (Anandapur, Biramitrapur, Jagatsinghpur, Jajpur and Rajgangpur) have been completed using World View-2 satellite image during 2015-16 . GIS Database generation on cadastral base for existing 205 villages and additional 363 villages of Bhubaneswar Development Authority (BDA) has also been completed using World View 2 satellite image of the year 2014-15. Besides this, the centre is undertaking RS &GIS database of 59 towns of Odisha state for the year 2016-17.



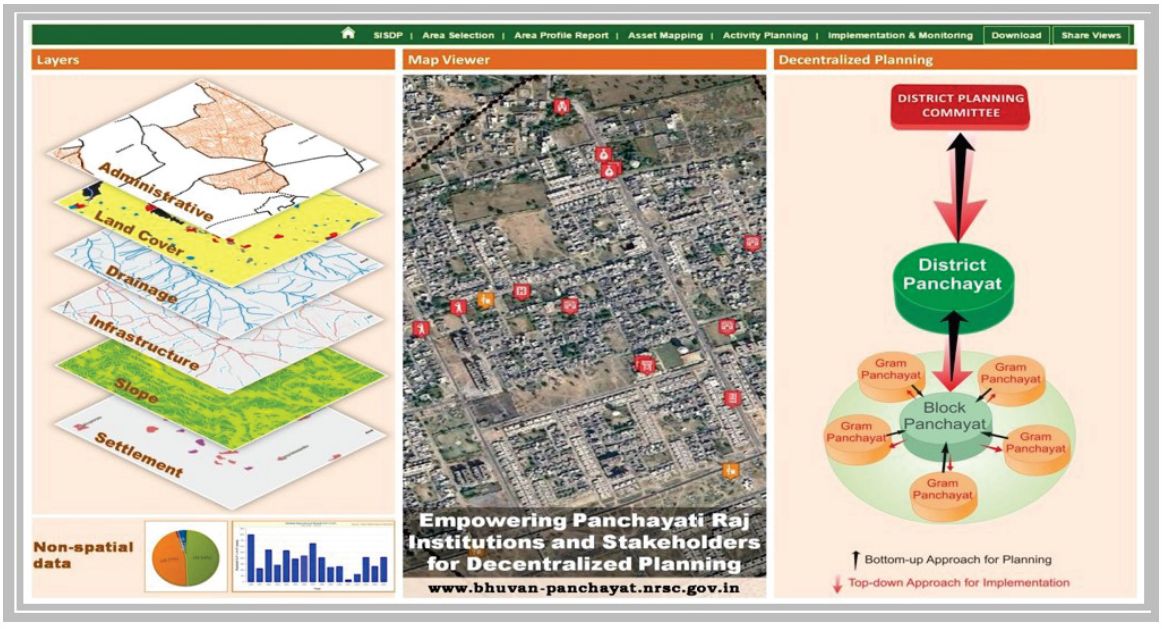
The GIS database in complete format are supplied to planning section of respective Town Planning Units for Comprehensive Development Plan (CDP) preparation. The database has been generated to establish an Urban Database Information System in the urban local bodies for planning, monitoring and management purposes.

Space Based Information Support for Decentralized Planning (SIS-DP) Project

At the behest of Planning Commission, Govt. of India and Planning Committee of National Natural Resources Management System (PC-NNRMS) initiative, ISRO has taken up a programme called "Space Based Information Support for Decentralized Planning" (SIS-DP). The programme aims at generating geo-spatial layers on 1:10K scale on natural resources/ infrastructure (land cover, settlements, infrastructure etc.), creating inventory of resources (water sources, road network and communication network etc.) and disseminating them by using platforms like Web enabled information system, digital CD/DVD ROMs etc. for use in planning at grassroot level. Under SIS-DP project implementation in Odisha. 1:10K scale thematic mapping activity for entire Odisha state is completed by the centre and the thematic layers are submitted to NRSC for uploading in a web based portal (www.bhuvan_panchayat.nrsc.gov.in)

Empowering Panchayati Raj Institutions Spatially (EPRIS)

It is a collaborative Project between Odisha Space Applications Centre (ORSAC) and National Remote Sensing Centre,ISRO, DOS, Govt. of India. The project goal is to empower Panchayati Raj Institutions for resource-based and integrated spatial developmental planning inputs in a user-friendly enabling environment.The scope of the work includes—(i) Capacity building of EPRs, support functionaries and facilitators, (ii) Asset mapping and (iii) Activity planning— A team of two trainers will be trained by NRSC at national/regional level. After the training of trainers, a cascading series of trainings are to be organized by ORSAC in the selected districts. There will be training workshops organized by ORSAC in State, district and block headquarters. All community assets lying in the Panchayat area are to be mapped by the facilitators chosen by the Panchayats. The latest version of Bhuvan Panchayat Asset Mapping Mobile App, freely downloadable from the Bhuvan Panchayat Portal is to be used for the purpose of mapping assets.



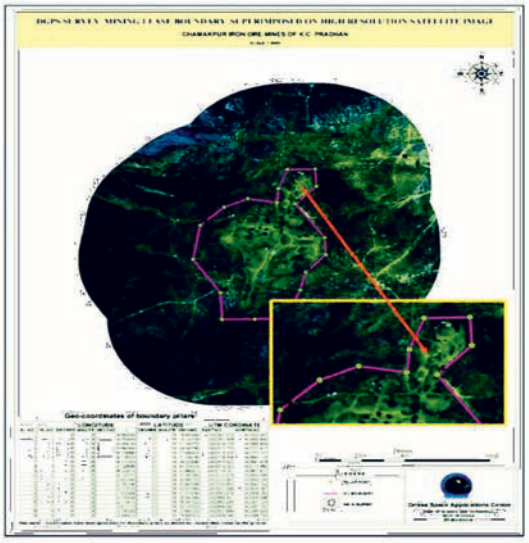
Mining Lease Area Survey

Govt. of Odisha has recognized ORSAC as the Nodal agency for the purpose of DGPS survey to facilitate digitization and geo-referencing of mining lease map(Letter No: 4276/IV(A)SM-92/09 dt-17.7.2010) to comply with the IBM (Ministry of Mines, Govt. of India) circular on geo-referencing and DGPS survey of Mining lease boundary. Accordingly, each Lessee of the individual mining lease has to apply to ORSAC for DGPS survey of their lease. Further, Steel & Mines Department issued an order vide letter No: IV (B) SM-39/2014/ 0058, dt: 18.12.2014 for joint survey of all Iron & Manganese mines of the state. The Joint survey is under progress by 5 nos. of Joint Survey team constituted by Steel & Mines Department comprising of representatives from ORSAC, Revenue, Forest and Mining Department.

METHODOLOGY : The steps involved in this process are DGPS and ETS survey, Ortho-image preparation from high resolution stereo pair image using network adjusted DGPS control points, digitization and geo-processing of cadastral revenue map/ original mining lease map and their integration in a GIS environment to prepare a final geo-referenced map of the mining lease.

Programme 2015-16: DGPS survey for lease boundary of 236 mining leases of the state has been completed as per the request of concerned Lessees. The Joint survey exercise for 51 Iron & Manganese leases has been completed so far including 12 leases in the year 2015-16. The joint survey for remaining 135 mines is under progress and will be completed by 2016-17. Further, the exercise for temporal monitoring of the mining area for detection of illegal mining outside the lease hold is undertaken by the Centre. A proposal for formation of a cell at ORSAC for the monitoring exercise has already been submitted to Steel & Mines Department for approval.

Year	DGPS Survey of M.L.Boundary	DGPS Survey for Geo-Referencing of Coal Block	Joint Survey of Mining Leases
2010-11	29		
2011-12	139		
2012-13	24		
2013-14	25	11	39
2014-15	11	03	
2015-16	04	02	12
Total	236	16	51



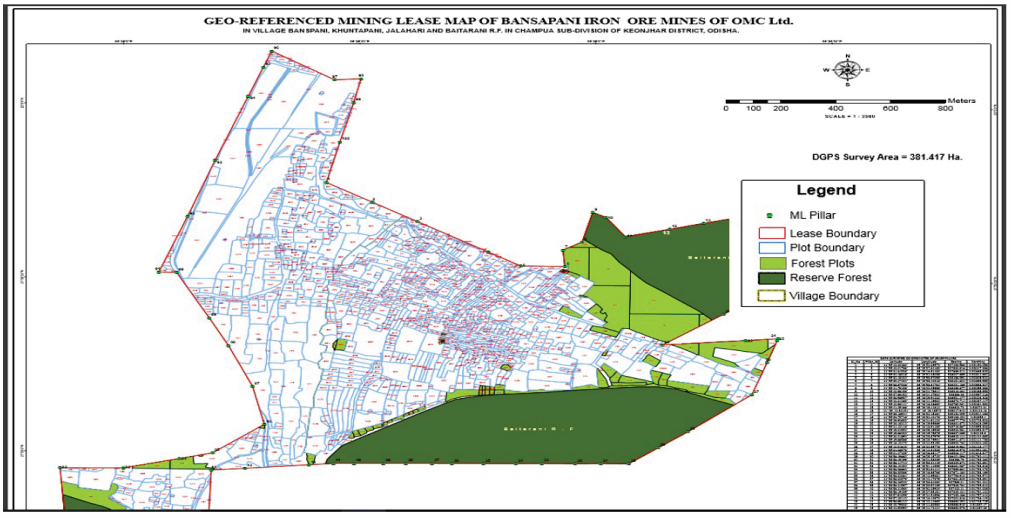
RS-GIS-GPS based Mapping & Survey of Forest Area proposed to be diverted for Development Planning Activities

Ministry of Environment and Forests, Govt. of India vide their circular No.F.No.-11-9/98-FC, dated 08-07-2011 have stipulated that to ensure accurate delineation of forest area proposed to be diverted for non-forestry purposes under Section-2 of Forest Conservation Act, 1980, the diversion proposal under Forest Conservation Act shall be accompanied by DGPS / ETS surveyed maps of the forest land proposed for diversion. The State Govt. in Forest & Environment Department has recognized (vide letter no.18393/F&E, dt.13-1 0-2011) ORSAC as the nodal agency to undertake DGPS/ETS survey and technically authenticate the DGPS/ETS surveyed maps undertaken by ORSAC user agencies, through ORSAC empanelled DGPS/ETS survey agencies. Accordingly, ORSAC has prepared technical guidelines for the user agencies while undertaking DGPS survey. The activities include establishment of Primary Control Points and determination of Geo-coordinates of Base Station/ Geo-coordinates of boundry demarcation points (Secondary Control Points). The centre has also prepared a detailed guideline with specific instructions for maintaining high accuracy of point observations for all agencies desirous of forest diversification and venders engaged in the survey, emphasizing the mode of survey and data submission for validation.

Survey completed in 2015-16 for Forest Diversion / Compensatory Afforestation

Sl. No.	Name of The Category	A. No. of Projects	B. No. of Projects
1	Irrigation	02	12
2	Power Plant & Transmission Line	06	9
3	Railways		2
4	Roads / Infrastructure	05	13
5	Water Supply Pipe Line		2
6	Industry & Allied Services		13
7	Mines / Canal	02	21
8	Compensatory Aforestation	05	13
Total number of projects		**20**	**85**

A- Work done by ORSAC
B- Vetting of survey undertaken by empanelled vendors.
* Diversion – 15 and compensatory afforestation – 5, Total = 20



Survey and GIS Referencing of Other District Roads (ODR)

Survey and GIS referencing of the newly declared Other District Roads (ODRs) since 2011 is assigned to ORSAC by Works Department, Government of Odisha. ORSAC is assisting Works Department, Govt. of Odisha, for their GIS network referencing of newly declared ODRs for updating the road network under their the Odisha Road Asset Management System (O-RAMS).

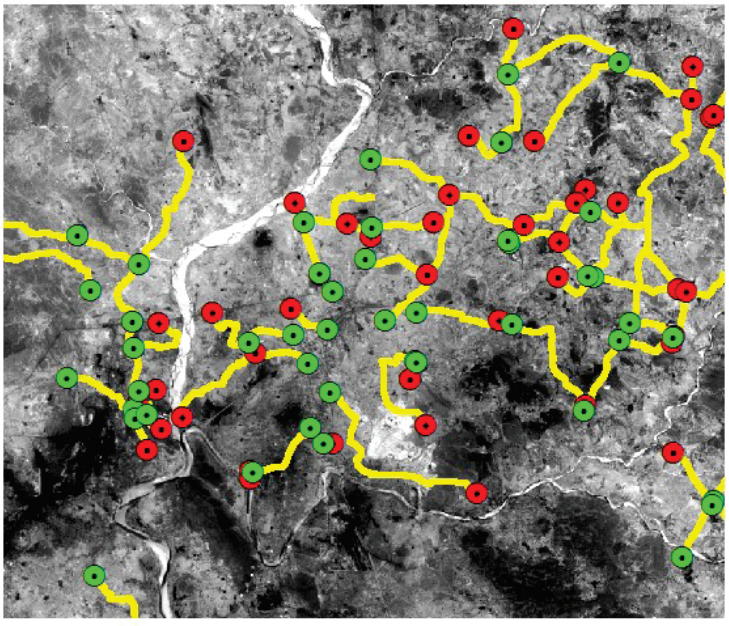
The objective is to carry out GPS observation of newly declared Other District Roads and their cross-checking from High Resolution satellite data. World-View Satellite data of the period 2012-15 and Ortho-rectified Cartosat Satellite data of the period 2008-12 is used for the study.

GPS survey was undertaken for location referencing of selected ODR network of various (R&B) Divisions of Odisha. The GPS device used had a positional accuracy of 2-5 metres. The device records start point, end point, significant intersections, village/towns etc. of each road at the central line. The recording was automatic and the recording interval was less than 1 metre in order to get closely placed points to gain accuracy. The collected GPS data was imported to Arc-GIS environment and cleaned up for snapping and smoothening of lines. Then the vector data was overlaid on Geo-rectified World View satellite data of the period 2012-14 having a resolution of 50 centimetres and cross-checked for accurate road alignments. Finally the shape files in UTM Projection, WGS-84 Datum and zone 44/45 were submitted to the Works Department.

The work was undertaken in three phases and the no. of kilometres surveyed are given below-

Phase	No. of kms surveyed
1st phase	2987
2nd phase	557
3rd phase	806
Total	4350

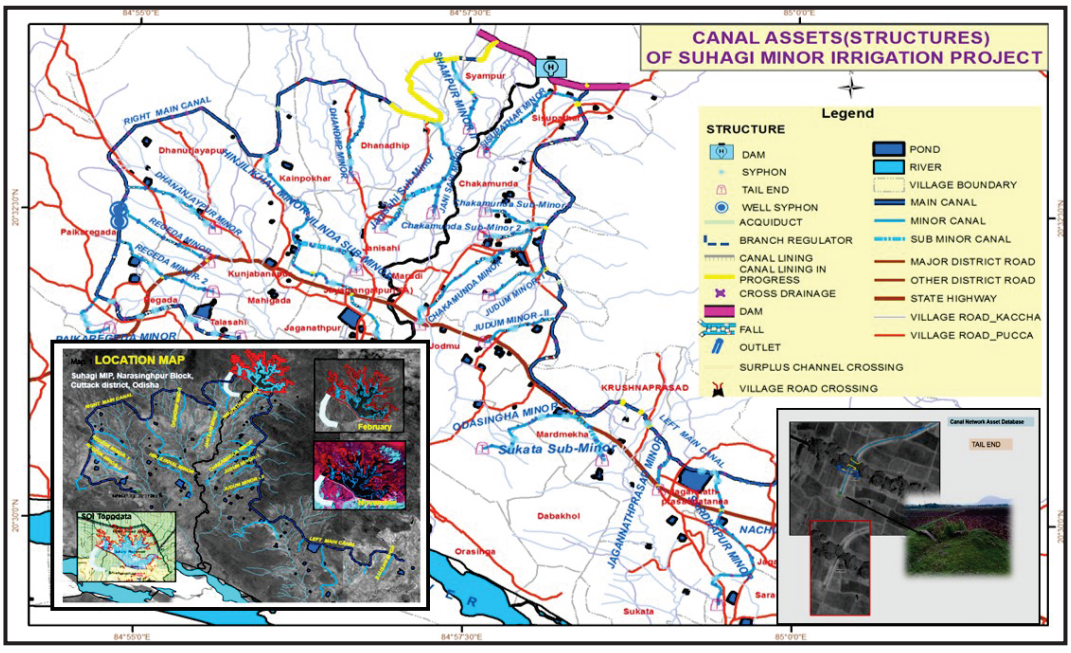
GPS SURVEY OF NEWLY DECLARED OTHER DISTRICT ROADS OF JHARSUGUDA R&B DIVISION OF WORKS DEPT.



Canal Network Asset Database Development

As per records, Odisha state is having 61.65 lakh hectare of cultivable land. Out of this only 33.12 lakh hectare has been facilitated with irrigation, including both Rabi & Kharif seasons. In Odisha, maximum irrigated area is covered under canal irrigation. But water supply at tail end and also on regular basis during cropping season and crop growth period is not achieved regularly. The designed canal system passes through variety of land form covered by varied land cover patterns with or without road connectivity. Further, canal system undergoes a lot of changes in the canal alignment during execution in the ground. Minor Irrigation Department of Govt. of Odisha has assigned a pilot study to be undertaken for Suhagi MIP of Narasinghpur Block of Cuttack district. In this study an attempt has been made to provide a scientific database approach in canal network mapping, database development, solutions for asset management and study of efficiency and usability.

High resolution satellite data of Worldview II with a spatial resolution of 0.5 m is used to delineate the canal system up to the tail end of the sub-minor canals along with the structures like outlets, cross drainage, village road crossing, siphons and tail ends etc. The village wise ayacut area is also delineated along with database of beneficiaries. The asset data provided by the irrigation department is linked with this database to generate the canal network asset and distribution database.



The centre is now planning to generate irrigation infrastructure Web-GIS database for Odisha State. Further the centre has taken up the priority task of sanitizing the data on cultivated area as well as irrigated area of the State. The ayacut boundary and Land utilisation database inside the ayacut is under preporation and will be completed in 2016-17.

Monitoring of Status of Afforestation / Plantations in Odisha

Forest Department is undertaking afforestation / plantations activities inside the forest areas since 2008 in the State. Different plantation programmes namely block plantations, gap plantations and avenue plantations are taken up under different schemes like CAMPA / OFSDP in Odisha. However, due to non-availability of any consolidated maps showing the status of afforestation/ plantations undertaken by Forest Department, monitoring and future planning of afforestation / plantations becomes very difficult. Satellite remote sensing technique has been used to monitor the status of afforestation / plantations activities in all 50 Forest Divisions of Odisha. Two dates satellite data e.g Resourcesat 2 LISS IV 2012 and Resourcesat 2 LISS IV 2014 have been used in the study. On screen interpretation of plantation density classes of all the plantation patches undertaken during 2008 to 2014 has been carried out based on crown cover e.g 1. Dense plantation (> 70% crown cover), 2. Moderately Dense Plantation (40-70% crown cover) 3. Open plantation (10-40% crown cover) and 4. Degraded plantation (< 10% crown cover). The mapping is carried out on scale 1:10,000. The change detection study is carried out to monitor the status of all the plantation patches covering 50 Forest Divisions in Odisha.

MONITORING OF PLANTATION IN ANUGUL FOREST DIVISION

RESOURCESAT 2 LISS IV,2012

RESOURCESAT 2 LISS IV,2014

Code	CLASS	2012 (AREA HA)	2014 (AREA HA)
1	Very Dense Plantation (>70% crown cover)	-	0.333435
2	Moderately Dense Plantation (40-70% crown cover)	0.768719	5.260397
3	Open Plantation (10-40% crown cover)	5.097012	3.110372
4	Degraded Plantation (<10% crown cover)	4.130803	1.292329
	TOTAL	9.996534	9.996534

LOCATION	CHHENDIPADA
RANGE	CHHENDIPADA
SCHEME	NBM
YEAR OF PLANTATION	2010-11
RECORDED_AREA (Ha.)	10

ODISHA SPACE APPLICATIONS CENTRE
(Deptt. of Science & Tech. Govt. of Odisha)
4S/4B (P) Jayadev Vihar
Bhubaneswar

Groundwater Prospects Mapping For Anugul Block

Groundwater prospects maps were prepared earlier for the entire state of Odisha in 1:50,000 scale and provided to user agencies like RWSS, Govt. of Odisha. These maps depict groundwater prospects zones and the indicative groundwater water yield. Lineaments were also shown on the maps which indicate narrow linear zones where groundwater prospects are better than its surroundings. These maps are now used to select suitable sites for borewells, dugwells etc. for drinking water supply to the villages with high rate of success. Though these maps provide indicative information about groundwater occurrence, plot level information cannot be obtained from these maps because of the scale limitation. Therefore, Anugul block was taken up on a pilot basis for groundwater prospects map preparation at 1:10,000 scale. This project is sponsored by the Directorate of Rural Water Supply and Sanitation of Govt. of Odisha.

The objective of the project is to prepare maps at a larger scale (1:10,000) with the use of higher Resolution satellite data which can give plot level information on groundwater. Ortho photographs of High Resolution Cartosat/ World View data along with LISS IV data are used for mapping purpose. In addition to this, other ancillary groundwater data such as depth of the wells, depth to water table, and yield of the existing wells are also used to authenticate the maps.

Base maps are prepared from ortho-photographs of Cartosat data depicting road, river, stream, rail and major waterbodies. This image is used for thematic interpretation on lithology, geomorphology, lineaments and other features. Finally, all the information will be integrated to prepare groundwater prospects maps. The database will be available in digital mode. It will comprise information in digital layers as mentioned below.

Base Layer: This layer will depict administrative units (district block and village boundaries), settlements, road network, railway lines etc.

Lithology Layer: Different types of rock formations of the concerned area.

Geomorphology Layer: All the land forms/ geomorphic units occurring in the area.

Structural Layer: The structural layer consists of faults, shear zones, thrusts, fractures, dykes, veins which are responsible for groundwater occurrence and movement and other structural layers such as bedding, schistocities/ foliation, folds etc .

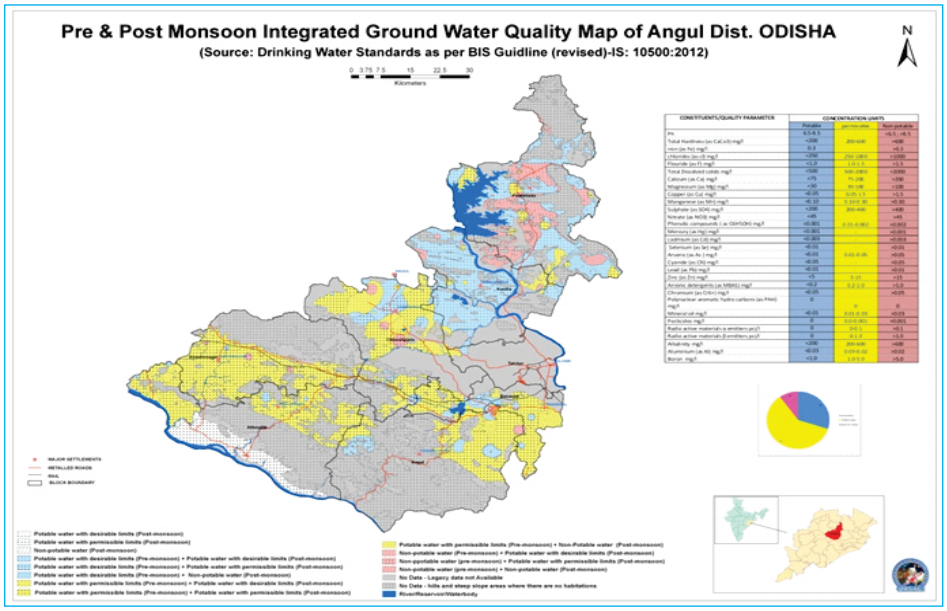
Hydrology Layer: Features like drainage, waterbodies, canals, rainfall data, irrigated area, springs and wells are depicted in this layer. These information are collected from satellite image, SOI toposheets and other secondary sources.

Groundwater Prospects Map: Information available in lithology, geomorphology, structural and hydrology layers are integrated to prepare groundwater prospects map. The hydrogeomorphic units in this map are coloured with different hatching patterns based on their yield and depth ranges.

The main user agency of the groundwater prospects maps is the Directorate of Rural Water Supply and Sanitation (RWSS) of the state. The map will also be useful for different departments such as Directorate of Groundwater Development, Agriculture and Water Resources Departments of Govt. of Odisha.

Groundwater Quality Re-mapping

Ground water quality (GWQ) mapping was done earlier under Rajiv Gandhi National Drinking Water Mission, Govt.of India for Odisha state in 1:50,000 scale. The objective of the project was to assess potability of drinking water (Groundwater) as per BIS standards. Legacy data on GWQ was procured from RWSS for pre- and post- monsoon periods. Out of the 15 districts completed, it was observed that ground water in most of the area in seven districts namely Anugul, Baragarh, Jagatsinghpur, Malkangiri, Kendrapara, Khordha and Rayagada was non-potable. Expecting that the reason for non- potability was due to data gaps, re-mapping was proposed to RWSS. The mapping exercise in these districts were undertaken by ORSAC with funds made available by RWSS. Ground water quality samples were collected afresh for points selected by ORSAC in consultation with RWSS which are well distributed in a spatial domain. Ground water sample collection and analysis was done by RWSS. The GWQ data for pre- and post- monsoon periods was provided by RWSS afresh. Finally the mapping was done by ORSAC in a GIS environment using Spatial Analysis module on eight common parameters such as pH,Alkalinity, Hardness, Chlorides, Fluoride, Iron, Nitrate and Phosphate for mapping of ground water quality in terms of suitability for human consumption i.e. potable, permissible and non-potable as per Bureau of India Standards (BIS). Mapping has been completed for all the seven districts.



Map Data Dissemination Section (MDDS)

Map Data Dissemination Section (MDDS) deals with the sale of maps of different thematic layers available with ORSAC both in hard copy as well as soft copy format to the users as per their need. The price of the maps for different sizes / scale are as per approved rates. In addition to this, the projects on user's demand are also undertaken and maps are delivered to the user agencies. During 2015-2016, MDDS has received Rs. 32,26,123.00 from map sales and user service.

Coordinated Programme on Horticulture Assessment and Management Using Geoinformatics (CHAMAN)

This project with objective of horticulture crop inventory and management using Remote Sensing, GIS and collateral data has been approved by Ministry of Agriculture and Farmers Welfare, Govt. of India, under the Mission for Integrated Development of Horticulture (MIDH). This project is being coordinated by Mahanalobis National Crop Forecast Centre (MNCFC), Ministry of Agriculture and Farmers Welfare, Govt. of India, New Delhi. The technique development for horticulture crop inventory for tomato and chilli crop is attempted with the technical collaboration of Space Applications Centre (SAC), ISRO, Ahmedabad. Inventory for tomato crop for five selected districts namely, Keonjhar, Khurda, Kalahandi, Mayurbhanj and Ganjam and chilli crop for six districts namely, Ganjam, Sambalpur, Balasore, Cuttack, Koraput and Kalahandi will be undertaken using RS data, GIS and multiple ground truth.

Two days training programme on CHAMAN was organized by Mahanalobis National Crop Forecast Centre (MNCFC), Ministry of Agriculture and Farmers Welfare, Govt. of India, New Delhi at ORSAC on 16th & 17th July,2015 where twelve Horticulture officials of the State participated.

Forecasting Agricultural output using Space, Agro-meteorology and Land based observations (FASAL)

District wise Kharif and Rabi rice acreage estimation and production forecast in Odisha has been made in collaboration with Mahanalobis National Crop Forecast Centre (MNCFC), Ministry of Agriculture & Farmers Welfare, Govt. of India, New Delhi. Three dates of RISAT-I SAR (Synthetic Aperture Radar) Medium Resolution Scan SAR mode data were used for acreage estimation. Rice yield has been estimated by using correlation weighted Agro-metmodel (IMD model) at district level using weather data upto 23rd September, 2015. The Kharif rice acreage and production has been estimated at 3.81 million ha. and 7.51 million tonnes respectively for the year 2015-16. Wall to Wall groundtruth has been collected from selected sample segments of Kalahandi and Mayurbhanj districts for post classification accuracy assessment.

Rabi rice acreage estimation for Odisha state has been undertaken using three dates RISAT-1 SAR data. Last date of data used for the state is 18th March, 2016. District level yield forecast has been made by IMD developing correlation weighted Agromet model using weather data upto March first fortnight, 2016. The Rabi rice acreage and production at the state level has been estimated at 2.93 lakh ha. and 9.85 lakh tonnes, respectively. Village list has been supplied to Directorate of Agriculture and Food Production, Govt. of Odisha, Bhubaneswar for crop cutting experiment from selected eight districts of the state namely, Balasore, Bhadrakh, Bargarh, Cuttack, Kalahandi, Puri, Sambalpur and Subarnapur.

DISTRICTWISE ACREAGE & PRODUCTION ESTIMATE OF KHARIF RICE IN ODISHA, 2015-16

(Area in ' 000 ha., Yield in q/ha. & Production in '000 t.)

SL.NO.	DISTRICT	AREA	RICE YIELD	RICE PRODUCTION
1	ANGUL	86.00	NA	NA
2	BOLANGIR	126.40	NA	NA
3	BALASORE	197.80	NA	NA
4	BARAGARH	192.70	23.74	457.40
5	BHADRAK	135.20	21.03	284.30
6	BOUDH	64.60	NA	NA
7	CUTTACK	125.40	19.95	250.20
8	DEOGARH	34.90	11.82	41.20
9	DHENKANAL	73.90	NA	NA
10	GAJAPATI	36.40	NA	NA
11	GANJAM	239.50	NA	NA
12	JAGATSINGHPUR	68.30	20.94	143.00
13	JAJPUR	109.40	NA	NA
14	JHARSUGUDA	30.90	16.87	52.10
15	KALAHANDI	157.50	22.79	358.90
16	KENDRAPADA	101.30	11.95	121.00
17	KEONJHAR	152.30	17.41	265.20
18	KHURDA	97.20	20.31	197.40
19	KORAPUT	96.20	18.60	178.90
20	MALKANGIRI	87.20	19.83	172.90
21	MAYURBHANJ	240.20	19.93	478.70
22	NABARANGPUR	119.40	18.04	215.50
23	NAYAGARH	78.20	17.65	138.10
24	NUAPADA	58.50	NA	NA
25	PHULBANI	42.80	15.95	68.20
26	PURI	117.80	17.20	202.60
27	RAYAGADA	59.90	NA	NA
28	SAMBALPUR	73.70	17.58	129.60
29	SONEPUR	81.60	29.74	242.70
30	SUNDARGARH	131.70	20.07	264.30
	TOTAL	3216.80		4262.00
	ODISHA	**3811.9**	**19.69**	**7506.5**

Interoperability Study of GIS and DIP SW

The "Study on interoperability of different GIS softwares and its interface with Digital Image processing (DIP) software as well as web applications of both the softwares" is carried out under Research & Development scheme, which has been approved by Department of Science & Technology, Govt. of Odisha under 12th Financial Commission Grant. The Objectives of the project were as follows.

- To study the interoperability among various GIS softwares (Desktop, Enterprise and Open Source)
- To study the interface between GIS and DIP
- To study the feasibility of viewing the geospatial data (Satellite images and Vector layers) by various Govt. Departments over internet or intranet
- To study the proper/efficient use of different softwares for execution of different GIS and Web GIS Projects.

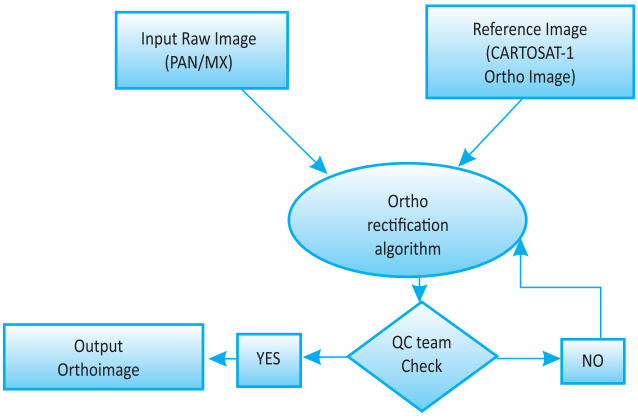
To achieve the above objectives the following softwares are procured by ORSAC.

- ORACLE 11g R2/12©, ESRI (Arc GIS Desktop and Arc GIS Server), Intergraph / ERDAS (Intergraph Geospatial Server, ERDAS Imagine and Geomedia Desktop), Terra Go (GEO), TNT Mips (Digital Image Processing and Web GIS Software). The interoperability among the above software are being studied.

Ortho Rectification of World View-II PAN and Mx Data of Odisha State

This project is to generate scenewise ortho-image from the raw World View–II PAN and MX images (scenes) using the standard ortho rectification algorithm available with any Industry Standard Digital Image Processing Software and make an seamless individual PAN & MX state mosaic as well as to make resolution merge of both PAN and MX to generate one seamless state mosaic of standard False Colour Composite (FCC) and Natural Colour Composite (NCC). The schematic diagram below explains the process of orthographic projection in a simplified manner.

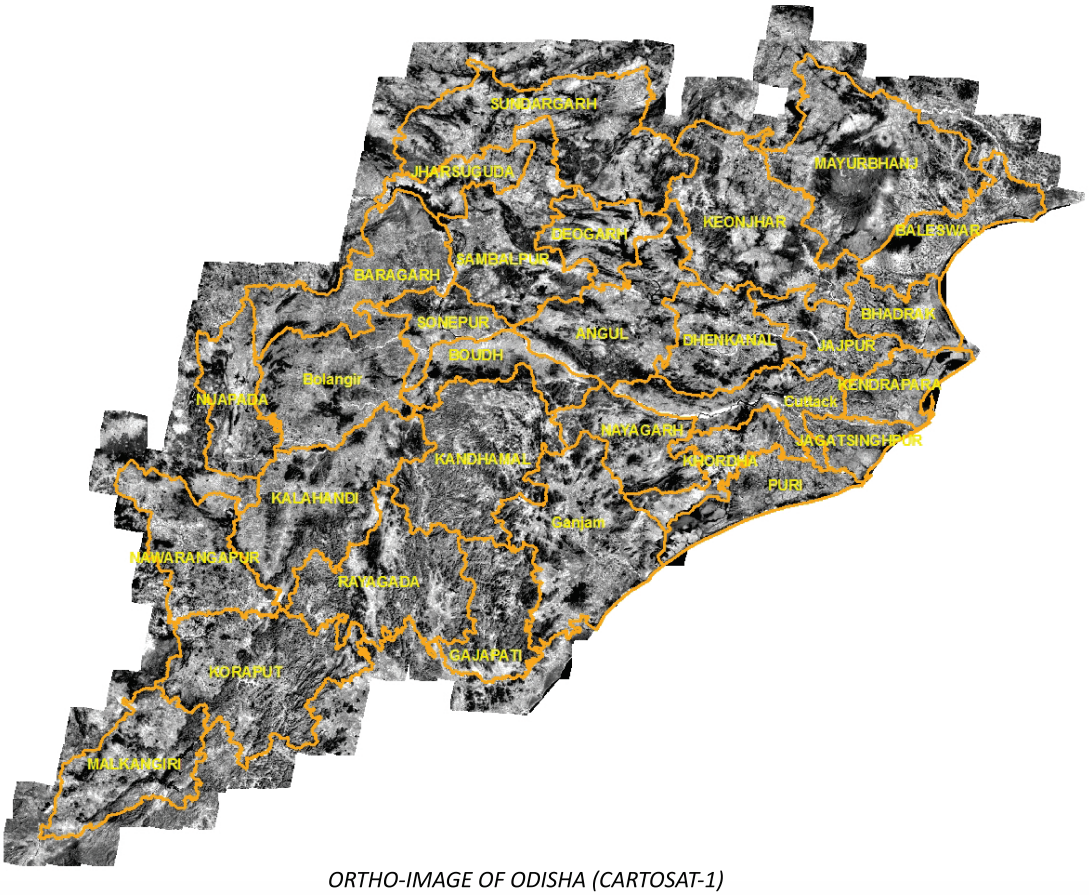
The flow diagram given below explains the methodology for generation of orthoimage using ortho rectification algorithm



For all type of resource mapping, the ortho image derived data is used as base map. Seamless Cartosat-I ortho image of Odisha is used now for Resource Mapping for all State Departments. By the end of 2016, the seamless World View ortho image will be under operational use.

Photogrammetric Block using Cartosat-1 stereo pairs and Generation of products

The Photogrammetric Block generation for the entire State requires stereo pair images where the image have minimum 40% side over lap and 20% lateral overlap. Cartosat-1 providing stereo pair images having spatial resolution 2.5 meter has been used by ISRO to generate seamless ortho image, Digital Elevation Model (DEM) and Slope under Space based Information Support for Decentralized Planning (***SISDP***) project. The photogrammetric Block of Odisha State was generated using Leica Photogrammetric Suite. The Centre is generating the products for Forest Department, Govt. of Odisha like seamless ortho image of Cartosat-1, DEM having spatial resolution of 5m and slope for the entire State following Photogrammetric Bundle Adjustment Technique. This project is unique in nature as DEM of 5m spatial resolution is being planned to be generated under this project by incorporating Ground Control Points (GCP) measured through Differential Global Positioning System (DGPS) in the Photogrammetric Block. These products would be used as the base image for the office of PCCF for further use in their Geospatial initiatives.



ORTHO-IMAGE OF ODISHA (CARTOSAT-1)

Satellite Communication Project

GRAMSAT NETWORK IN ODISHA :

During the year 2015-16, GRAMSAT has produced 03 public awareness video spots for Health & Family Welfare Dept. on mother & child care, immunity and 03 spots for Energy Dept. on energy conservation and one documentary on solar water pump for OREDA (Science & Technology Dept.)

EDUSAT NETWORK IN ODISHA :

Indian Space Research Organization (ISRO), Govt. of India has pursued the utilization of the space technology for the education and development and has come up with a dedicated satellite named as EDUSAT. This satellite enables a platform for two-way video and two-way audio communications between a central control center and series of remote terminals. Under this programme, ISRO has supported installation of control center and a few remote terminals in the State of Odisha following the decision to utilize the channel for benefit of the High School students. At present, 216 Satellite Interactive Terminals (SIT) are installed in 127 High Schools of S&ME Dept. and 89 Residential Schools of ST &SC Dev. Dept.

During 2015-16, EDUSAT has transmitted 475 educational programmes utilizing 175 transmission days. The transmission has covered hardcore topics from IX & X syllabus on the subjects like English, Mathematics, Life Science, Physical Science and Geography. Through an audition test 25 new tele-teachers were empanelled for tele-teaching .

Production of Edusat programmes

a) Target audience of Edusat transmission:

The programmes are designed to cater to the requirement of secondary school students (Class-IX & X).

b) Subjects covered – Mathematics, English, Physical Science, Life Science & Physical Geography.

c) Live classroom programmes:

The trained Resource teachers identified by School & Mass Education Dept. are now operating from ORSAC studio as Resource Persons. The hard spots on Mathematics, English, Science and Geography are being taught to the students with required visual support.

d) Transmission timing –

Monday to Friday : 12.30 PM to 01.30 PM, 03.00 PM to 04.00 PM, 07.00 PM to 08.00 PM
Saturday & Sunday : 11.00 AM to 01.00 PM

Evening transmission and transmission on Saturdays & Sundays are meant for ST&SC Dev.Dept.'s Residential Schools. The transmission schedule in form of wall calendar is provided to all Edusat schools for information of students and teachers about the specific subject to be covered in each transmission slots.

Edusat programmes transmitted			
Year	Class-IX	Class-X	Total
2015-16	242	233	475

Celebration of Independance Day and Republic Day at the centre

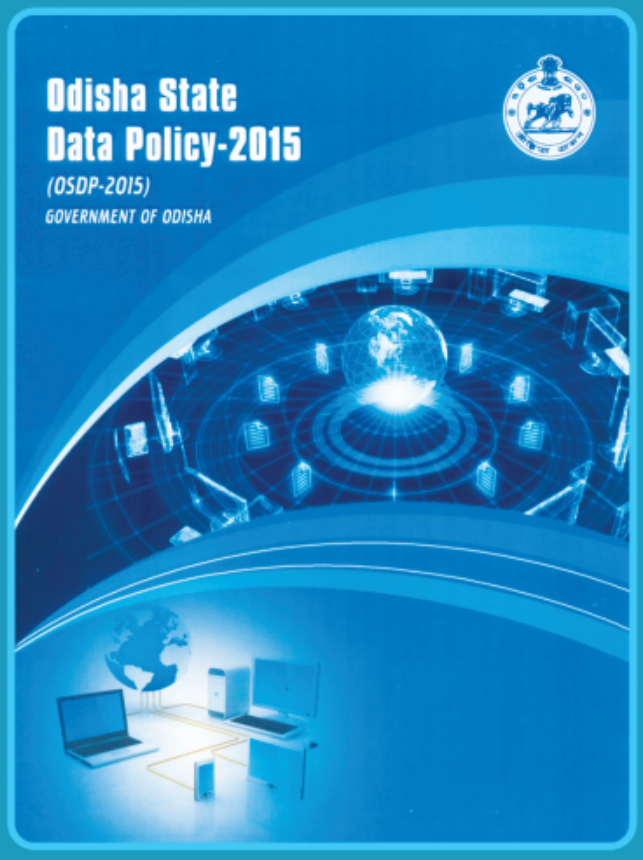
Visit of students to "Space Information Centre" created by ISRO at ORSAC

View of Edusat Studio

Onsite training program by ORSAC scientists / Engineers

Celebration of Annual Day of Sc. & Tech. Dept., Govt. of Odisha

ORSAC participation in GEOSMART INDIA 2016 and GEO-intelligence Asia 2016



Odisha State Data Policy-2015, approved by Odisha State Cabinet on 13th August, 2015 and published in Odisha Gazette No.3446-ST-III-ORSAC-5/2015/ST dated 22nd August, 2015.

For implementation of OSDP-2015 in the state, the Science & Technology Department is declared as the nodal department and Odisha Space Applications Centre (ORSAC) shall act as the nodal agency. ORSAC will establish "Odisha Spatial Data Infrastructure-OSDI".

ODISHA STATE DATA POLICY (OSDP)-2015

The Odisha Gazette

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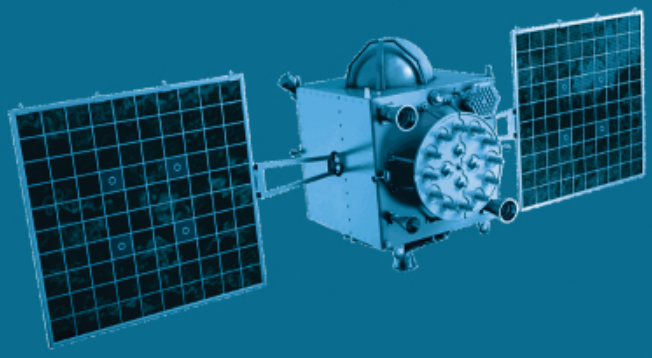
SCIENCE & TECHNOLOGY DEPARTMENT

RESOLUTION

The 22nd August, 2015

ODISHA STATE DATA POLICY-2015



For futher information contact :

Chief Executive

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