Annual Report
2018-19

ODISHA SPACE APPLICATIONS CENTRE (ORSAC)

Department of Science & Technology
Government of Odisha

AWARDS RECEIVED BY THE CENTRE

Hon'ble Minister
Science & Technology, Public Enterprises,
Social Security & Empowerment of Persons with Disability
Government of Odisha

MESSAGE

I am happy to present the Annual Report 2018-19 of ORSAC which reflects significant achievements and contribution of the Centre in assisting the State Administration in its mandated objective of providing Geospatial Decision Support Systems (DSS) based solutions for Resource Management, Infrastructure Development, Environmental Monitoring and Sustainable Development.

During 2018-19, the Centre provided Geospatial Datasets as inputs for State's development planning process. Various types of Decision Support Solutions are also provided to State Government for effective governance using Remote Sensing, Satellite Communication, Geo-informatics, Geo-ICT, Satellite Navigation and Computer Technologies.

Significant contribution of the Centre 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 Centre plays an important role in providing Database solution to State departments for Land Bank development, establishing Vehicle Tracking System for Mineral Carrying Vehicles, Sanitization of Cultivable and Irrigated Area data of the state, Forest Working Plan preparation, Urban area Database development for CDP preparations of Towns of the State, wasteland mapping of the State and DGPS based survey of Mining areas, Minor minerals and for the purpose of Forest Diversion. Further, under the Hon'ble Chief Minister's 5T programme, the Centre is developing web-based portals for providing accurate, timely and scientific inputs for Decision making.

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 Organisation.

(Ashok Chandra Panda)

MESSAGE

I am glad to present the Annual Report of Odisha Space Applications Centre (ORSAC) for the year 2018-19 documenting its multipronged activities.

In the present age of 'knowledge society', Credible Data is a 'Precious Capital'. ORSAC is mandated for creation of such a Data Repository in Odisha through application of new Space Technology. Since its inception in 1984, ORSAC has been contributing immensely to the Geospatial Database for Planning, Implementation, Management and Evaluation of the Developmental interventions in various sectors ranging from Farming to Forestry, from Village Road to Railway Track/ Airfield, from Industrial Park to Environmental Upgradation.

ORSAC with its sophisticated laboratories, softwares and a team of well-experienced Application Scientists has created multi layered Database such as *Odisha Sampad, Odisha 4K Geo and Odisha Spatial Data Infrastructure.* Presently, it has extended its frontiers of action to mapping of Urban Land Utilization, Identification of Land for industrial Land Bank, Development of Irrigation Database, Data Analysis and UAV applications, Assessment of crop condition, Mapping of wet and moisture level of soil etc. ORSAC is also all set to develop a *'single window platform'* for Geospatial Data services for all Departments through web-based portals and Mobile Apps.

Because of its qualitative excellence, ORSAC has bagged prestigious International Awards like *Geospatial World Excellence Award* from the *World Geospatial Forum and Special Achievement in GIS (SAG)* from Environmental System Research Institute (ESRI), USA. I hope the entire ORSAC team will keep up its hard work and innovations to achieve newer heights in coming years.

I record my appreciation for the services rendered by ORSAC Team and wish the publication of the Annual Report all success.
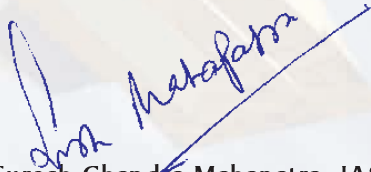
(Asit Tripathy, IAS)

MESSAGE

I am glad to know that the Annual Report of Odisha Space Applications Centre (ORSAC) for the year 2018-19 has been documented for dissemination of information about its activities.

ORSAC is the Nodal Agency of the State for Application of Remote Sensing, GIS, GPS, Geo-ICT and SATCOM Technologies for Development purposes. As a multidisciplinary organisation and in line with its mandate, the Centre is continuously engaged in providing support services and solutions for effective Governance using Scientific Methods and Advanced Technologies. The centre has created Repository of GIS Database of all major Natural Resources, Infrastructures and Environmental parameters of the entire State. Geospatial Datasets for the State is created from District to Village level having Plot Level Datasets for local, GP, Block and District Level Planning. The Centre is providing Geospatial Datasets as planning inputs to all departments of the State for Development Planning, Scheme Formulation, Enforcement and System plan preparation. The Centre has also collaborated with ISRO, SAC, NRSC of Dept. of Space and NSDI of Dept. of Science & Technology, Govt. of India for carrying forward Research & Development projects in the areas of innovative application of Geo-ICT and SATCOM Technologies. Some of the significant achievements of the Centre during 2018-19 are Land Bank development for industrial development, Digital Data layer creation for CDP preparation of Towns, Sanitisation of irrigated and Cultivated area data of the State, Forest Working Plan preparation, Vehicle Tracking System for Mineral Carrying Vehicles, Coastal Zone Management Plan preparation and Cadastral Resurvey map preparation.

I record my appreciation for the services rendered by ORSAC team for the significant achievements during the year 2018-19.

(Suresh Chandra Mahapatra, IAS)

Principal Secretary to Govt. of Odisha
Pancjayati Raj & Drinking Water Dept.
and
Science & Technology Dept.

MESSAGE

ORSAC as State Nodal Agency generates high volume Geospatial Datasets to cater to the needs of State Departments. During 2018-19, the Centre undertook several important State assignments like Land Bank development for Industrial Activities, Sanitisation of Irrigated and Cultivated areas data of the State; completion of DGPS survey of projects under Forest Diversion proposal approval and Mining lease areas, Road expansion, Canal network extension and provision of Power networks; Digital map creation for Comprehensive Development Plan (CDP) preparation of Towns; Survey of Minor Minerals of the State; Forest Working Plan preparation; PMGSY Road Network planning; Irrigation Ayacut / Command Survey; Watershed monitoring; Forest Working plan preparation, Wetland Database creation, Digital Revenue Cadastral Database creation; Plantation Monitoring, Vehicle Tracking System for Mineral Carriage Vehicles and Crop Acreage & Yield estimation for Kharif and Rabi seasons etc.

The continuing activities of the Centre is aimed towards developing State Spatial Data Infrastructure through OSDI and Odisha 4k Geo which will enable a framework to support department authorised users to use and share cross platform support and to obtain web-responsive maps and Apps for geospatial DSS services.

I wish my best wishes for the endeavour of ORSAC.
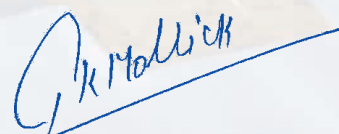
17/10/2019

(Deoranjan Kumar Singh, IAS)

From the desk of Chief Executive

It is my privilege to present the Annual Report 2018-19 which summarises the important initiatives of the centre in achieving the aim of State's Nodal Centre for providing Geospatial services to State Administration. During 2018-19, the Centre provided Geospatial Datasets and web-based DSS to State Departments like Industries, Steel & Mines, Water Resources, Revenue & Disaster Management, Home, General Administration, Housing & Urban Development, Agriculture and Farmers Empowerment, Commerce & Transport, Forest & Environment, Energy, Panchayati Raj, Handloom, Textile & Handicraft, Planning & Convergence, Fisheries & Animal Resources Development, School & Mass Education, Health & Family Welfare, Rural Development, ST & SC Development, Women & Child Development and Works etc.

The centre also extended its services to Central & State agencies like, OMC, OPTCL, OHPC, NALCO, NTPC, MCL, GAIL, SAIL, WAPCOS, OIL, EIL, RITES, OCC, Election Commission, Watershed Mission, IPICOL, IDCO and other major business establishments.

One of the major achievements of the Centre in the current year is generating Geospatial Datasets in Revenue Cadastral scale i.e 1:4,000 and creation of Web-services under "Odisha 4k Geo", which is the first such attempt by any organisation in the country. Besides "Odisha 4k Geo", the Centre is augmenting High-Tech IT innovations in OSDI (Odisha Spatial Data Infrastructure) portal for extending WMS & WFS services to Central & State Departments. Besides the above, the Centre is assisting other departments in continuing projects under the 5T program. The Centre initiated three important Web-portals i.e. Odisha Sampad ver 3.0, Odisha Asset Geo-Portal and KYL (Know Your Location) for the State administration during 2018-19.

I take this opportunity to record my thanks to the staff of the Centre for their immense contribution to the success of the organisation in 2018-19.

(Prafulla Kumar Mallick, IFS)

Important Application Projects, 2018-19

National Level Projects

- FASAL (Forecasting Agricultural output using Space, Agro-meteorology and Land based observations)
- Coordinated Horticulture Assessment and Management using Geoinformatics (CHAMAN)
- SIS-DP (Space based Information Support for Decentralised Planning)
- National Wetland Inventory and Assesment

Central & State Joint Programmes

- DILRMP- (Digital India Land Records Modernisation Programme) - Cadastral Resurvey
- Dissemination of Educational Services through EDUSAT
- OSDI – Odisha Spatial Data Infrastructure
- Monitoring of Integrated Watershed Management Programme (IWMP) Watersheds

State Sponsored Programmes

- ODIIS – Odisha Irrigation Information System under Sanitisation of Cultivated and Irrigated area data of Odisha
- Geo-spatial Technology for Rural & Urban development programme on Web-GIS platform (Odisha 4K Geo)
- Digital Database creation of Irrigation ayacuts/ schemes of Odisha
- Monitoring of OIIPCRA (Odisha Integrated Irrigation Project for Climate Resilient Agriculture) project.
- Odisha Road Geospatial DSS
- Odisha Land Bank Development for Industrial and Tourism purposes
- Coast Zone Management Plan Preparation
- Odisha Aquaculture Information System Development
- Odisha Police Station Geodatabase creation
- Know Your Location (KYL) portal & Mobile App development
- Odisha Asset Data portal
- Monitoring of Nuapada NAFCC (National Adoptive Fund for Climate Change) project
- DGPS survey for Forest Diversion proposals
- RS & GIS inputs for Comprehensive Development Plan (CDP) preparation of towns.
- GOPLUS – Govt. of Odisha's Portal for Land Use Services
- DST Climate Change project – DEM creation and Assessment of erosion prone areas of Odisha State
- Mining Lease Boundary survey through High-Tech method
- TS/DGPS survey of Miner Minerals of the State
- Survey and Mapping using Unmanned Aerial System
- Database for implementing Crop Technology Mission
- Utilization of 'RISAT' all weather Data & ISRO 'GAGAN' Network
- OPMS - Odisha Permit Management System

Odisha Space Applications Centre (ORSAC)

ODISHA SPACE APPLICATIONS CENTRE (ORSAC) is the apex body of the State for Space Technology Applications and comprises of a pool of multidisciplinary Application Scientists and Engineers to undertake Remote Sensing, GIS, GPS, Geospatial Data management, Geo-ICT and Satellite Communication Technology Applications. State Government vide resolution No.3765/ST dated 30th July, 2009 of the Science & Technology Department declared the centre as the sole Nodal Agency for providing Remote Sensing, GIS, GPS and SATCOM application solution to all Govt. departments, Public Sector undertakings and other Research Organisations as per their requirements.

Mandate / Objectives

- Establishment of up-to-date library of satellite data, topo-maps, cadastral and Geo-coordinates for the State.

- 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), Department of Space, Govt. of India.

- 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.

RESOURCES & INFRASTRUCTURE

Human Resources

24 Scientists and 46 Engineering/ Technical staff having specialization in Optical and Microwave Remote Sensing, Image Processing, GIS, ICT, Digital Photogrammetry, GPS & Computer Applications etc. having subject background of Applied Geography, Geology, Physics, Botany, Oceanography, Marine Science, Mathematics and Civil/Mining/Electrical Engineering etc. are working now at the Centre.

For completion of multiple sponsored projects, the centre has engaged 62 contractual staff (project scientists, project assistants, engineering assistants, MIS/CAD and GIS operators) during, 2018-19.
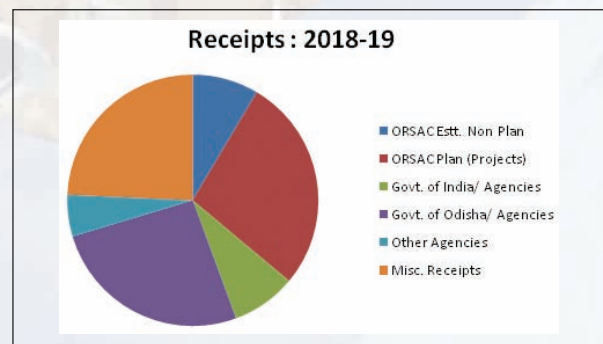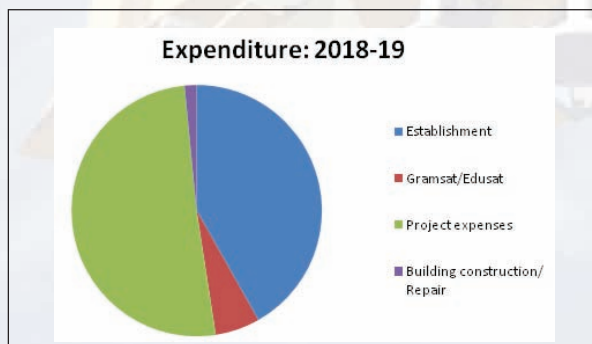
ACCOUNTS

Receipts

(Rupees in lakhs)

Schemes	Nature of funding	2014-15	2015-16	2016-17	2017-18	2018-19
ORSAC Estt. Non Plan	Grant-in-aid	309.00	309.00	309.00	355.35	355.35
ORSAC Plan (Projects)	Projects	1146.12	1063.53	1100.00	867.25	1145.32
Govt. of India/ Agencies	Projects	318.86	595.70	131.33	72.39	346.86
Govt. of Odisha/ Agencies	Projects	679.95	1839.71	1572.91	1524.95	1078.87
Other Agencies	Projects	120.09	786.66	845.61	305.12	224.02
Misc. Receipts		671.98	746.33	729.70	891.82	1009.78
Total		3246.00	5340.93	4688.55	4016.88	4160.20

Expenditure

(Rupees in lakhs)

Head of expenditure	2014-15	2015-16	2016-17	2017-18	2018-19
Establishment	658.33	831.64	937.71	816.81	1362.72
Gramsat/Edusat	835.30	205.61	151.75	315.87	186.90
Project expenses	1092.00	503.59	819.19	1478.64	1659.15
Building construction/ Repair	59.66	47.83	121.77	153.64	50.00
Total	2645.29	1588.67	2030.42	2764.96	3258.77

Year	2014-15	2015-16	2016-17	2017-18	2018-19
RECEIPTS	3246.00	5340.93	4688.55	4016.88	4160.20
EXPENDITURE	2645.29	1588.67	2030.42	2764.96	3258.77

Expenditure: 2018-19
- Establishment
- Gramsat/Edusat
- Project expenses
- Building construction/ Repair

Receipts : 2018-19
- ORSAC Estt. Non Plan
- ORSAC Plan (Projects)
- Govt. of India/ Agencies
- Govt. of Odisha/ Agencies
- Other Agencies
- Misc. Receipts

HARDWARE

System

	Nos
Blade servers	27
Rack Servers	13
High-end Workstation for Digital Photogrammetry	8
High-end Desktop (Intel core-i5)	50
High-end Desktop (Intel core-i7)	69
Desktop - Intel core-i5	35
Desktop - Intel core-i3	2
Workstation - Intel core-i7	18
Desktop - Pentium Quad core	10

Storage

On -Line Storage (36 TB) with Tape Backup System	1
Mini - Storage attached with Blade servers (14TB)	1
SAN Storage attached with Blade servers (16TB)	1

Scanner

(VIDAR) A0 Size (Titan H36)	1
HP - A4 size	3

Printer/MFP

Inkjet / Deskjet / Laserjet - A4 / Multi Function Printer	21
A3 Laser color Printer	1

Plotter

HP Design Jet 4000 —A0 (36 inch)	1
HP Pagewide XL5000	1

GPS/DGPS

Hand GPS (Garmin — 12)	21
Palm Top GPS /GIS	1
DGPS (Base) + ROVER (Trimble/Leica)	14
ETS (Total Station)	4
GPS Based Hand Held Device	3

SOFTWARE

GIS

	Nos
Arc GIS Desktop Version 10.6/Arc GIS Pro	24
Auto CAD + Auto CAD Map	2
Geomedia Webmap/Desktop	3
Terrago Geo PDF (2D & 3D)	1

Image Processing

ERDAS WITH LPS (Leica Photogrammetry Suite)	6
ENVI / TNT MIPS / ERDAS APOLLO (Enterprise GIS)	4
Intergraph Geospatial Server 2016	3
Arc GIS Server	2

Others

ORACLE 11g R2/12c	1
Postgress EDB (Enterprise + Developer)	2
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/7/8/10, Windows Server 2000/2003/2008/2012/2012 R2/2016/2019)	
Office Std 2013/2016/2019	

Odisha Sampad ver 3.0

ODISHA SAMPAD

State and District Level Geospatial Web Portal For Planning and Development

"Odisha Sampad" portal is the repository of State's Geospatial Datasets consisting of administrative information, natural resources data layers, geocoordinate / georeferenced infrastructure details and other socio-economic parameters. The portal aims to cater to the need of geo-spatial data need of State Administrators, Decision Makers, Resource Managers and Planners.

The portal can be used for planning, especially for community development at block level by using scientific database containing geo-spatial natural resources & infrastructure profile of the Block and spatial representation of demographic, socio-economic, agro-economic and utilities/ amenities/ infrastructure data (generated by GIS based analysis and visualization).

During 2007-08, the Centre undertook 'Block Level Resource Atlas & GIS Database Generation' project using satellite remote sensing data for all the Blocks of the State. The Center has aptly demonstrated the application of Space and IT technology for generating inputs for development planning through preparation of this Digital Web-Atlas as **ODISHA SAMPAD (Ver 1.0)**. The portal was updated again in 2012 as **Ver 2.0** by updating the information in various layers.

Growth of IT technology particularly web-based services in e-governance, adoption of advanced Geo-ICT technology at ORSAC and approval of Odisha State Data Policy (OSDP) led the foundation for creation of **ODISHA SAMPAD (Ver 3.0)** in 2018.

ODISHA SAMPAD (Ver 3.0) facilitates easy access and sharing of Government owned Geospatial data in open format for supporting sustainable and inclusive governance, and effective planning. Odisha Sampad Web-portal is supported by an online platform that provides authoritative spatial data at Block and District scales having an authentication data integrity framework and a set of on-line tools to visualize, analyse and access Geospatial Data. Odisha Sampad Ver 3.0 is expanded to provide spatial data through an administrative search query mode.

Odisha Spatial Data Infrastructure (OSDI)

Odisha Spatial Data Infrastructure (OSDI), a single window based Geospatial Clearing house, was established in the line of National Spatial Data Infrastructure (NSDI) of Govt. of India to access, share and disseminate GIS Datasets available with various Government agencies in Odisha through OGC compatible web-services. It is one of the nodes of the National Spatial Data Infrastructure (NSDI) like other State data Infrastructures of the Country. Odisha Space Applications Centre (ORSAC) is identified by the Govt. of Odisha as the nodal agency to design, develop and update the OSDI and it is hosted at State Data Centre. Odisha Spatial Data Infrastructure (OSDI) aims to position itself as an essential instrument to support decision-making through the use of Geographic Information.

The OSDI Geoportal provides easy and convenient ways to search, discover and use Geospatial Data Resources. The primary goal of the OSDI Geoportal is to improve access to Odisha State Geographic Data Portfolio and expand the creative use of those Data Resources. The OSDI Geoportal strives to increase information transparency and is committed to create an open environment for accessing important Government derived Geographic Data.

OSDI aims towards facilitating and co-coordinating the exchange and sharing of spatial data among the stakeholders in Odisha, thus creating an information highway and facilitating smooth transaction and integration of sophisticated Geospatial Datasets. OSDI operates on a GIS Database of data layers containing important information such as Administrative Boundaries, Roads, Railway Lines, Land Use / Land Cover, Hydrology, Soil, Geomorphology, Geology, Structures, Ground Water Potential, Forestry, Cadastral and others.

Odisha 4k GEO Web-portal

Under Geospatial Technology for Rural and Urban Development project, the Centre created the Land Use Database of entire state at 1:4000 scale after georeferencing all the Revenue Cadastral maps of the State using SIS-DP/ISRO Orthoimages under Dept. of Science and Technology assistance from 2015-2017. During 2018-19, the centre decided to put all these Datasets under a Web-GIS based Web-Portal for visualization, Data dissemination, Data access and for providing inputs for development planning activities by State Departments. 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. This can be used as a Asset Data Portal & for Programme Scheme Monitoring System for Odisha State at 1:4000 scale. All the infrastructures / utilities / amenities created under Government schemes are to be incorporated to the portal via dedicated server and Mobile-App based architecture.
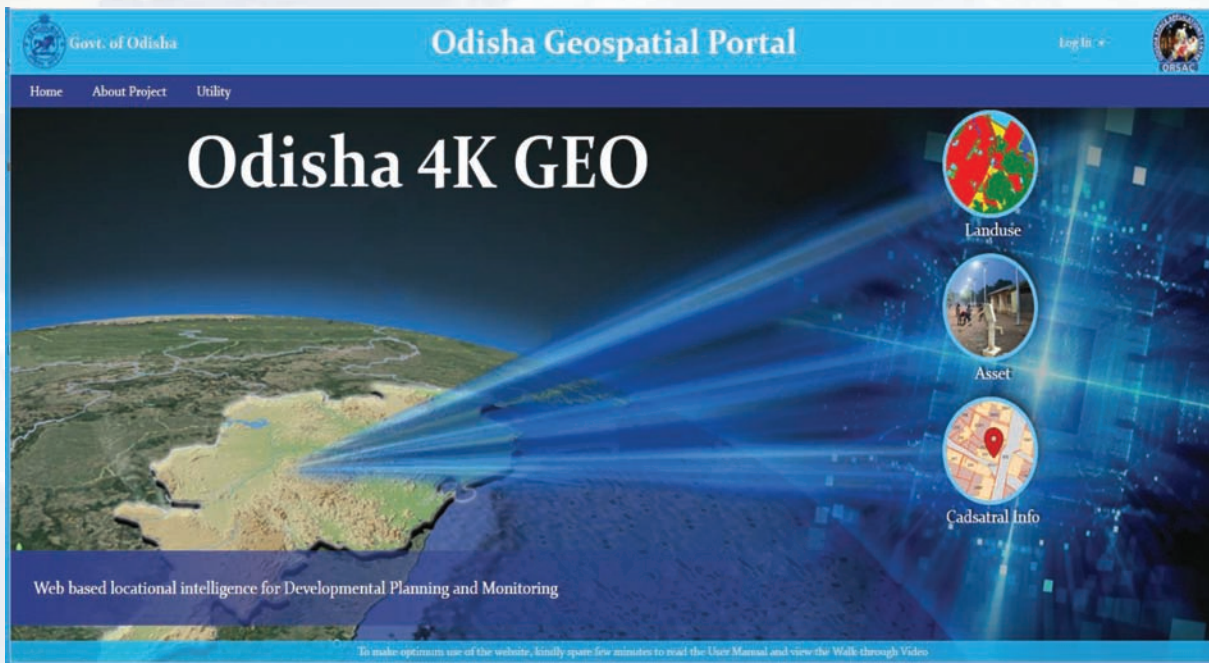
Odisha 4k Geo portal will provide availability of data sharing framework; Standardized, Structured & Updated Geo-spatial Data. Infrastructure for seamless integration of data of multiple-sources; Standard mechanism for ensuring Data integrity. Technology for dynamically updating of real-time data and live feeds and finally Geo-coordinated location-based data and GIS-based Maps for effective Decision Support.
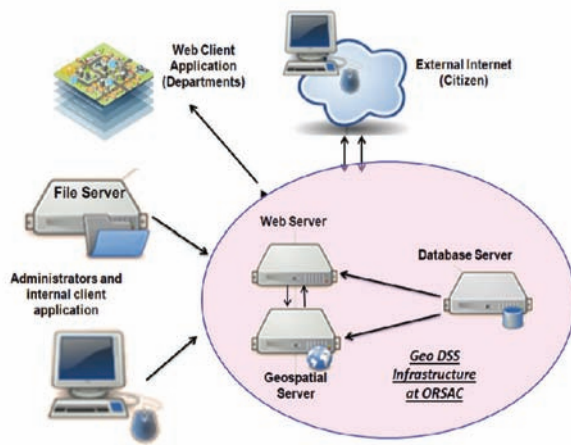
Schematic Diagram of Odisha 4k GEO Server Infrastructure
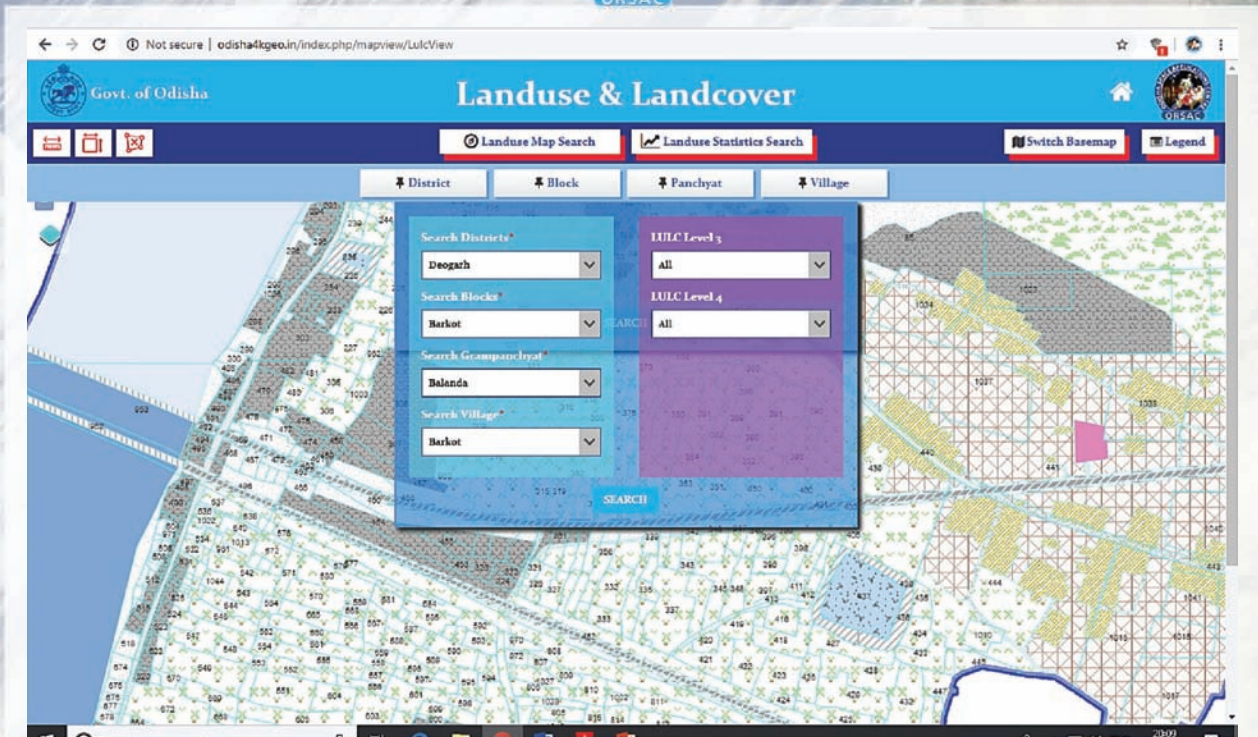
The portal module "Landuse & Landcover" provides opportunity to users to access map and data as per Administrative hierarchy i.e., District, Block, GP and Village. The maps can also be viewed with satellite data and cadastral (Revenue) maps in the background.
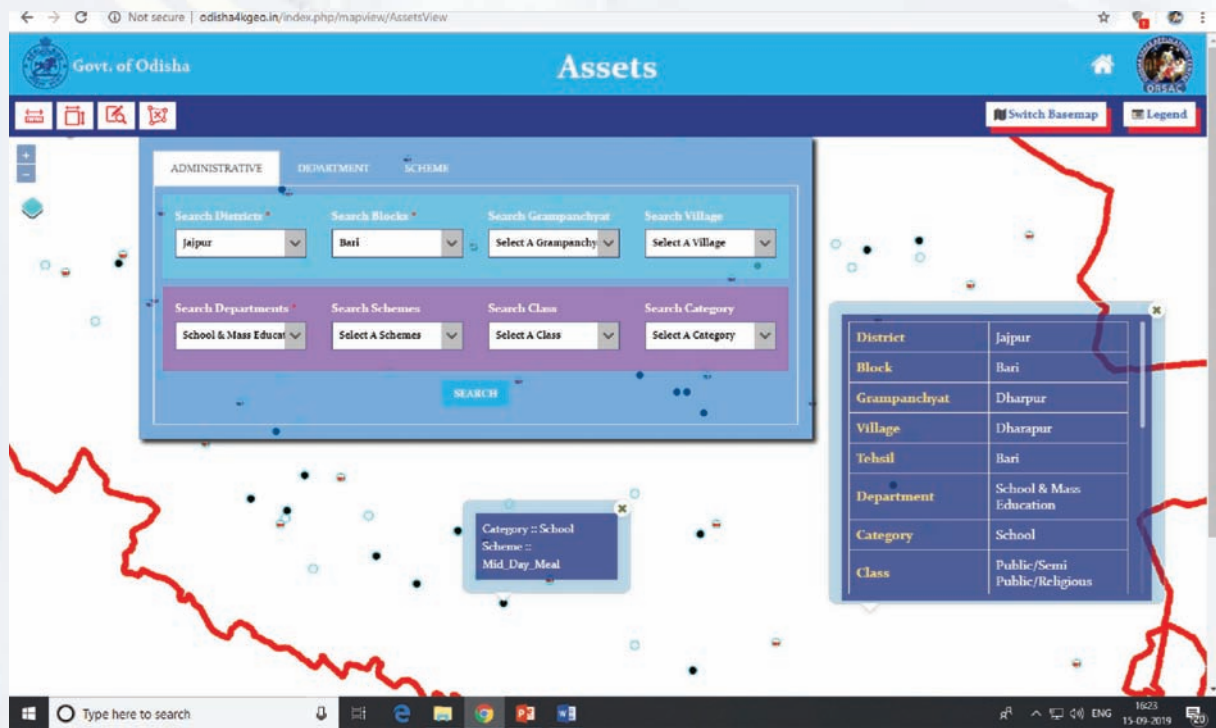

The portal module "Asset" provides facilities to view the departmental assets (to be collected through the Mobile App – Mobile Asset Mapper) as per Administrative hierarchy basis and department wise Data viewing.

Odisha 4k GEO provides

- Structured storage,

- Multi-source Data Integration,

- Web-enabling of Data,

- Mobile App for Data capturing

- Data analytics,

- Query module creation,

- Dashboard based information visualization,

- Net based dissemination and

- On-demand Decision Support provisions

Mobile Apps using Odisha 4k GEO infrastructure

Under Odisha 4k GEO, it is decided now to generate a module ASSET to capture Departmental Asset Data as per the requirement of State Finance Dept. Asset module will be a Data analytics based web-based services through integration of ORSAC's OSDI and Odisha 4k GEO Validated GIS Data layers with Departmental Asset data.
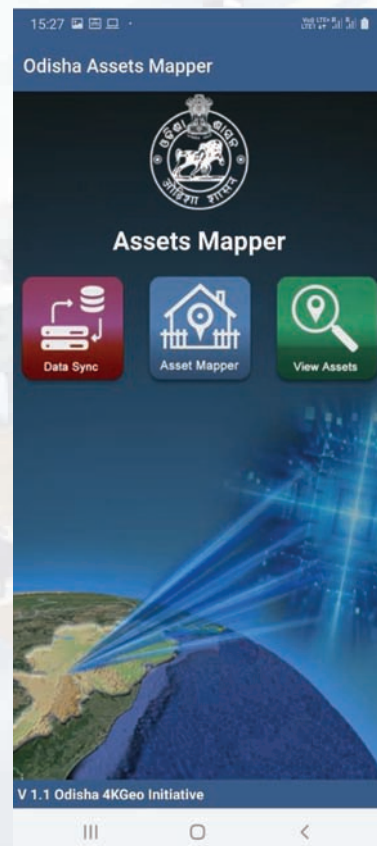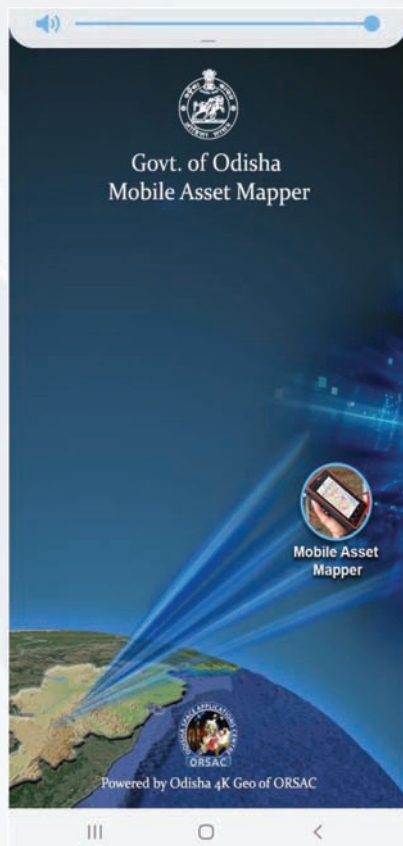
Odisha Irrigation Information System
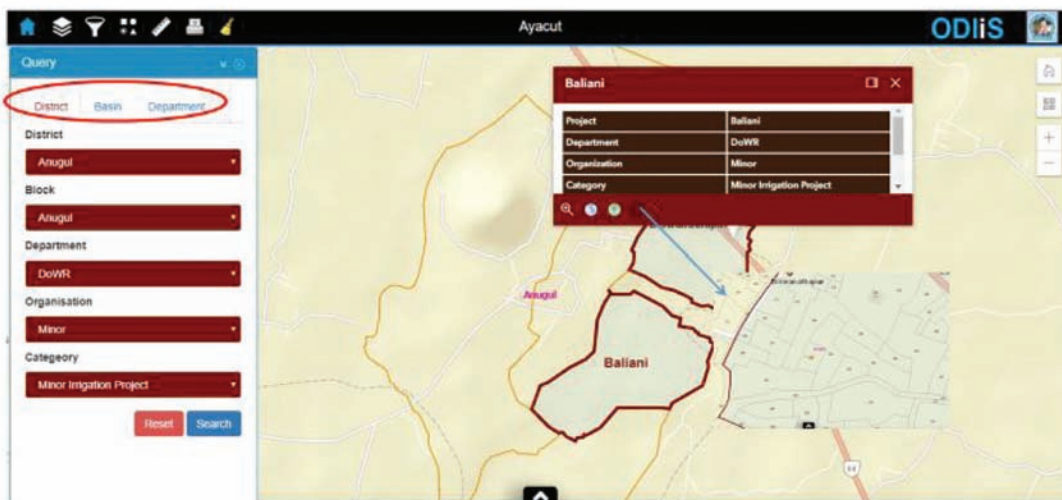
ODIIS Web-GIS Portal development under "Strategy for Sanitizing the Data on Cultivated area and Irrigated area of the State" Programme

Geographical Database of the irrigation network, its asset and functioning status in digital format are not available for the State in standardised and structured manner. In addition to this, accurate data relating to cultivated area and irrigated area are also not available in standardized manner. Interdepartmental co-ordination issues and absence of proper system for data collection, collation, storage and dissemination are major factors for varying statistics by various departments. In view of the above, Dept. of Water Resources, Govt. of Odisha as per the High-Level meeting on "Strategy for sanitizing the data on cultivated area and irrigated area of the State" on 17.05.2016 assigned the work to this Centre to undertake the work for generating data on cultivated and irrigated area of the state in the first phase and Asset Database generation in second phase.

Data from Dept. of Water Resources, (Irrigation Dept.-Major, Medium, Minor, Creek; Watershed Mission, OLIC and Mega Lift); Dept. of Agriculture (Jalanidhi - I, OAIC- Jalanidhi-II, Horticulture); Dept. of SC/ST (ITDA) and Dept. of Panchayatiraj (DRDA /Block) are collected and GIS database generation is completed. Sanitization of the data is completed and submitted to DoWR for vetting. Initiatives are also taken for development of Geo-ICT based Apps for regular, automated and authentic data collection of further irrigation related activities / new project execution of the state. The web-portal developed as ODIIS is under validation by DoWR Dept.

ODIIS AYACUT INFO SERVICE

Ayacut Info Service provides user to query information about ayacuts of any Department or Organisation by District / Blockwise, River basin wise and as per Department ownership basis. All ayacut and scheme implemented info of 11 agencies of 4 departments are web hosted in the portal in query based modules.


ODIIS LANDUSE INFO SERVICE

Landuse Info Service provides land utilisation in Ayacut and extension of cultivable lands. The portal also provides information on extent of cultivable land for all 314 blocks as interpreted from high resolution satellite data.

NAFCC Nuapda Project

The project envisages development of a Web Based dashboard for depicting the land based & socio-economic interventions made under NAFCC Nuapda Project. The Nuapada Adoption Project is a Programme under National Adaptation Fund for Climate Change (NAFCC) and the objective is to construct water harvesting structures i.e., check-dams to conserve water through the management of run-off in the river basin to reduce vulnerability and enhance resilience for traditional livelihood. Under NAFCC Nuapada Project, three Check Dams are constructed at Budhipali, Parsabhadar and Parkod. The project area is covering six villages along Kharkhara nala (Amlidadar, Baloda, Burhipali, Parkor, Prasabhadar, Bhainsatal, Jangula) nala in Nuapada district.

The goal of the project is to develop a GIS-based system for visualisation and analysis of Geotagged activities of NAFCC Nuapada. Under the project, the DEM/DSM of the area is generated using HR images. Key Expectations of NAFCC is to provide a Common Operational Platform for:

- Geotagging of all plot level interventions
- Integrating Data & Information from all sources seamlessly
- Supporting, simplifying and connecting all stakeholders
- Improving delivery of temporal changes
- Making integrated information and change statistics available to policy makers
- Preparation of Dashboard based into services
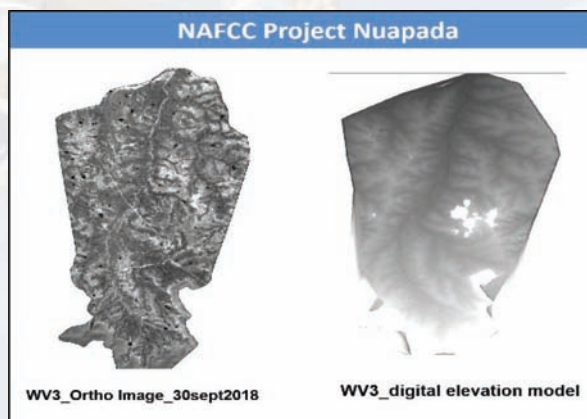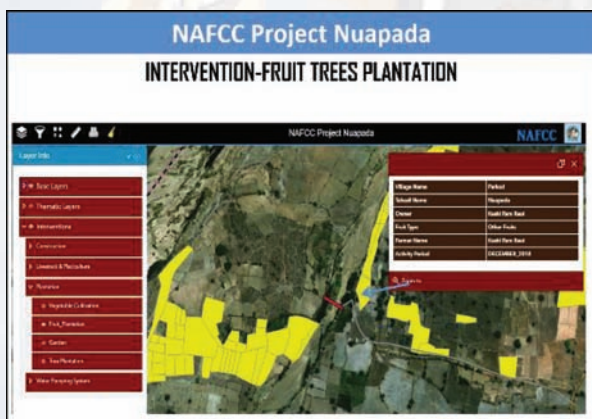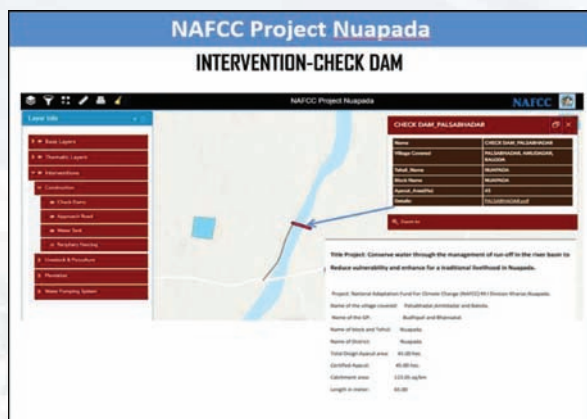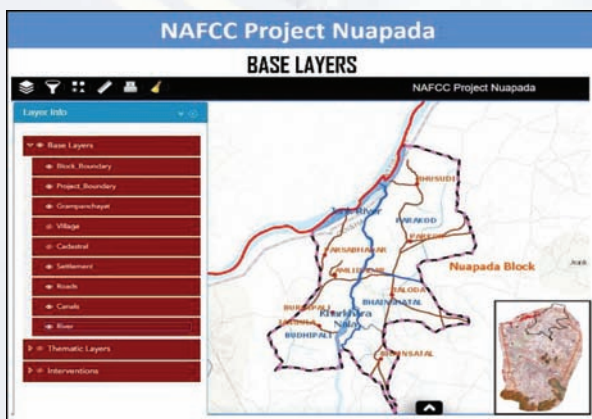
Odisha Land Bank Web services through GOPLUS

Availability of land and its associated attributes is one of the most important factors for policy makers to devise smart growth strategies and development framework. Odisha Industrial Policy Resolution 2015 focusses on providing quality industrial infrastructure and creation of a large Land Bank. In this resolution, it was decided to develop a GIS based web-services for use by Decision Makers, Planners and Investors. Considering the requirement of the Government, a GIS based web-portal was developed by the centre for providing Land Bank and associated utility and developed infrastructure information to potential investors and entrepreneurs. Geo-ICT, Space Technology inputs and Geospatial Data modelling was used to create the Web-GIS based Land Bank portal.

GOPLUS- Government of Odisha's industrial Portal for Land Use and Services http://gis.investodisha.gov.in
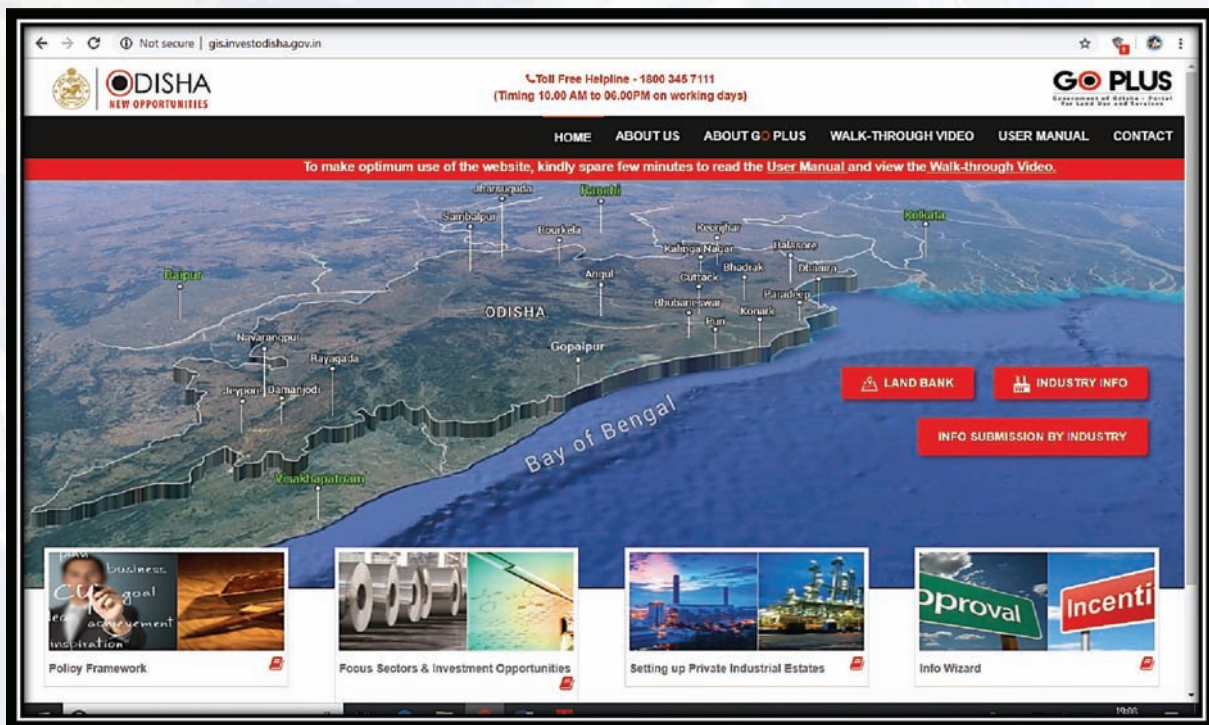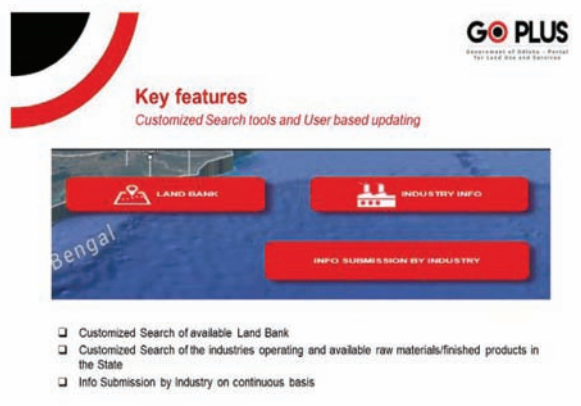

GOPLUS (Ver 3.0) portal contains:

- Land Bank map, data and Land schedule for 1.24 Lakh Acres are made available in public domain. GIS database of 113 Industrial Estates, industry location maps and database of sector specific cluster development are generated.

- Digital Database of 715 Industries outside IDCO Estates and 15 Industrial Parks / Investment Region are also generated and web-hosted.

- 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.

- Industrial plots available at KNIMZ, Kalinga Nagar; PCPIR, Paradip; SEZ, Gopalpur and plots available at focus sectors zone like metal, chemicals, Plastic & Petro-chemicals, Electronics Manufacturing, Food Processing, Tourism, Textile and Apparels

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.

The system provides detailed information with regards to availability of Land and utility / services around it. A prospective investor can define preferred parameters such as the District, size of land required, facilities available in the vicinity and environmental categorisation etc. based on which the portal identifies and returns information regarding the suitable and available Land parcels in the State. Through the System, a prospective investor can get information not only on Land availability but also key attributes of existing developed and operational infrastructure required for industrial activities. It also provides information on zoning of the Industrial Land in terms of environmental categories i.e. Green, Orange and Red to enable an investor decide on suitable location for investment based on the proposed business activities. The unit cost of the Land as per IPR 2015 has also been provided for easy assessment by the user.
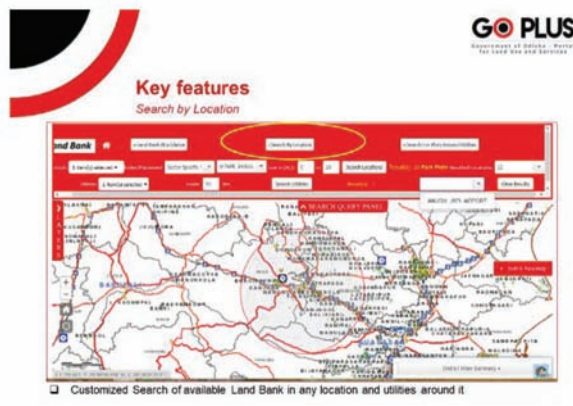
Odisha Mineral Vehicle Tracking System (OMVTS)

Odisha is endowed with about one third of the estimated national mineral resources. International and domestic demand for minerals has grown steeply in the past decade. This was preceded by a slump in the global mineral industry lasting well over a decade. Streamlining the mining operations including tracking of end to end mineral transaction has been an issue of deep concern for the Government since long.

On the above backdrop, implementation of a comprehensive Information Technology based e-Governance initiative by the Department of Steel & Mines has been underway in multiple stages and phases since early 2010. Government of Odisha has implemented the IT Based mineral administration through a software application named Integrated Mines and Mineral Management System or "i3MS". It was also decided by Govt. of Odisha to monitor and manage the mineral carrying Trucks through a Global Position System (GPS) based IoT device installed in the Trucks from source to destination to bring transparency in the mineral delivery process. ORSAC is assigned to design, operate and manage the Vehicle Tracking System to facilitate Steel & Mines Department, Government of Odisha in monitoring the mineral transport. The Project is launched in 2016 with the name "Odisha Mineral Vehicle Tracking System (OMVTS)" and it has completed successfully 3 years fulfilling its objectives.
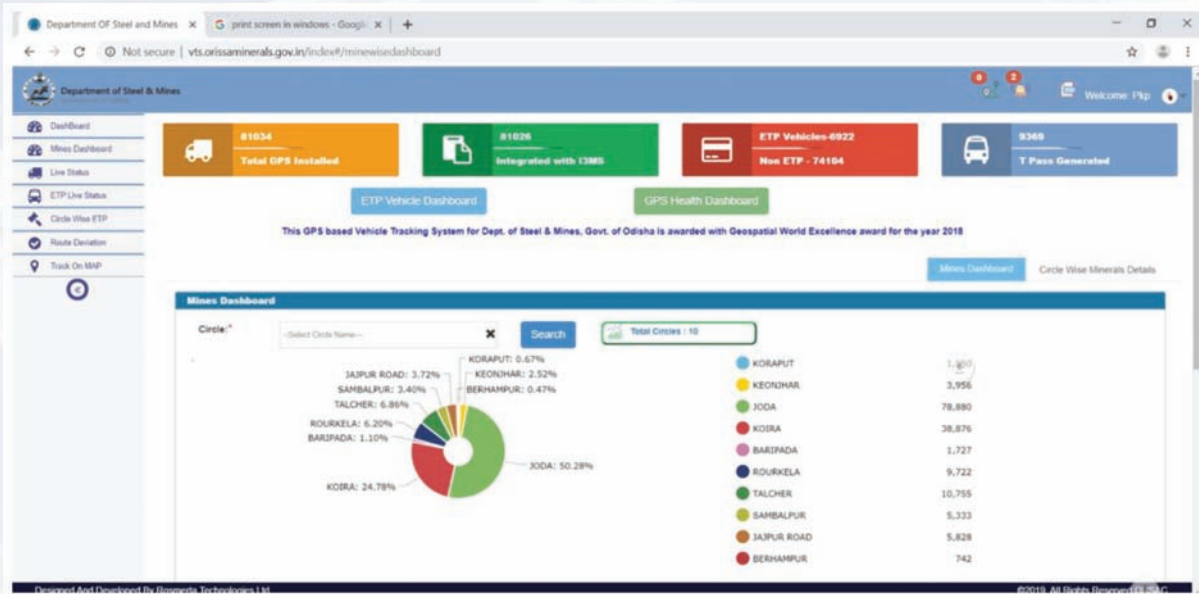
The OMVTS has a web portal with an URL www.vts.orissaminerals.gov.in and an android based Mobile App, available in Google Play store as **OMVTS_ORSAC**. The Mobile App is freely accessed by all the stake holders to know about the current location of the vehicles, working conditions of Vehicle Tracking Units (VTUs), SIM validity and Electronic Transit Pass issued against the vehicle. The web-portal is also accessed by the stake holders with proper login authentications. Some of the use aspects of the OMVTS Project are depicted through the screen shots of the OMVTS Web-Portal and OMVTS_ORSAC Mobile App below.

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 in 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 ORSAC for DGPS survey for their lease. Further, Steel & Mines Department, Govt of Odisha issued an order in 2014 for joint survey of all Iron & Manganese mines of the state by constituting representatives from ORSAC, Revenue, Forest and Mining Department.

For Mining Lease survey & mapping, the steps involved in this process are field DGPS and ETS survey by the joint survey team, Ortho-image preparation from High Resolution stereo pair satellite image using network adjusted DGPS control points, digitization and geo-processing of cadastral Revenue map/ original Mining Lease map/Plan map and their integration in a GIS environment to prepare a final geo-referenced map of the Mining Lease superimposed on High Resolution satellite image.

JOINT SURVEYED MINING LEASE BONDARY SUPERIMPOSED ON HIGH RESOLUTION SATELLITE IMAGE
MAHAGIRI CHROMITE MINES OF INDIAN CHARGE CHROME LTD, JAJPUR DISTRICT.
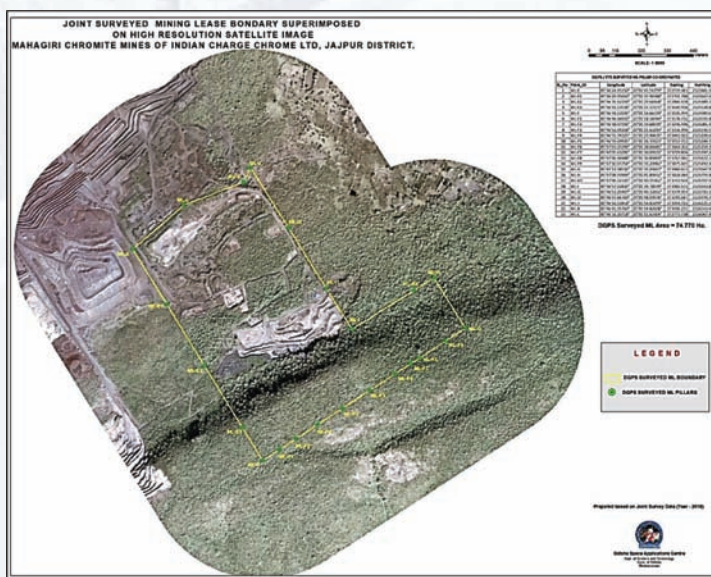
During 2018-19, out of the 152 Mining Leases, the joint survey exercise for 145 leases has been completed. The joint survey for remaining mines is under progress and will be completed by 2019-20. The DGPS survey map for 18 Mineral Blocks to be put up for auction are also completed as per the requirement of Steel & Mines Department. The DGPS survey exercise for 29 Granite Leases and 202 Mining Lease areas of which possession have been taken over by the concerned Mining Circles is initiated and the field survey will be undertaken in the year 2019-20.

The DGPS survey exercise for all the Minor Minerals and Sairat sources (sand, stone, morrum quarry etc.) of the State is initiated. The survey of 240 Sairat Leases have been completed so far in the field. The field demarcation of remaining Sairats are under progress by the Field Officers of Revenue Department and will be undertaken in the year 2019-20. The list of completed areas so far under the Mining area survey exercise and program for 2019-20 is summarized in table.

FEE GRADE NADIKASIRA & RUNGTA B I Co. LTD., SUNDERGARH DISTRICT. SUPERIMPOSED ON CARTOSAT-2 SATELLITE IMAGE

Progress Program	Joint Survey of Mining Leases using DGPS/ETS	Joint Survey of Mineral Blocks for Auction Purpose using DGPS/ETS	DGPS/ETS Survey for Geo-referencing of Coal Block	DGPS/ETS Survey of Possession Leases	DGPS/ETS Survey of Granite Leases
Completed up to the year 2018-19	145	18	21		
Works allotted & Target in 2019-20	8		3	202	29

JOINT SURVEYED LAND USE MAP OF TANTRA, RAIKELA, BANDHAL (TRB) IRON MINES IN SUNDERGARH DISTRICT. (M/s. JINDAL STEEL & POWER LTD.)

JOINT SURVEYED LEASE BOUNDARY MAP OF TANTRA, RAIKELA, BANDHAL (TRB) IRON MINES IN SUNDERGARH DISTRICT (M/s. JINDAL STEEL & POWER LTD.), SUPERIMPOSED ON RAPIDEYE SATELLITE IMAGE

RS-GIS-GPS based Mapping & Survey of Forest Diversion Proposals

As per the circular of MoEF Govt. of India & State Govt.in F & E Department notification on Forest areas proposed to be diverted for Non-forest use (vide letter no.18393/F&E, dt.13-10-2011); ORSAC (as the nodal agency) is undertaking DGPS/ETS survey and technically authenticate survey undertaken by empanelled DGPS/ETS survey agencies.

Status Report on Forest Diversion Proposal Authenticated by ORSAC (April 2018 to March 2019)

Category	Completed
Road	45
Railway	07
Irrigation	45
Power	11
Industry	09
Mines	07
Misc. (Coal Block-2, Oil Pipeline-1, Others-6)	09
Compensatory Afforestation	12
Total	105

Status Report on ORSAC Survey For Forest Diversion Proposal (April 2018 to March 2019)

Project type	Forest Diversion
Irrigation	02
Coal (MCL)	03
Energy	03
Road	01
Other Development Project	02
Compensatory Afforestation	01
Total	12
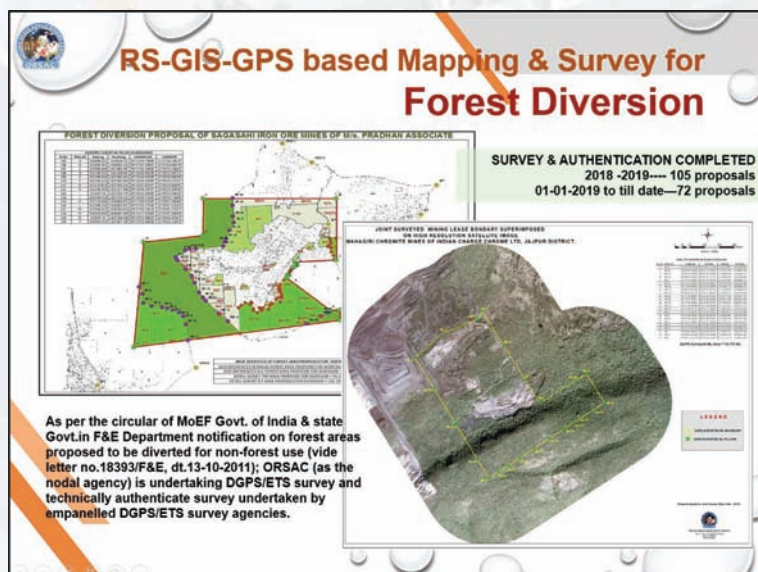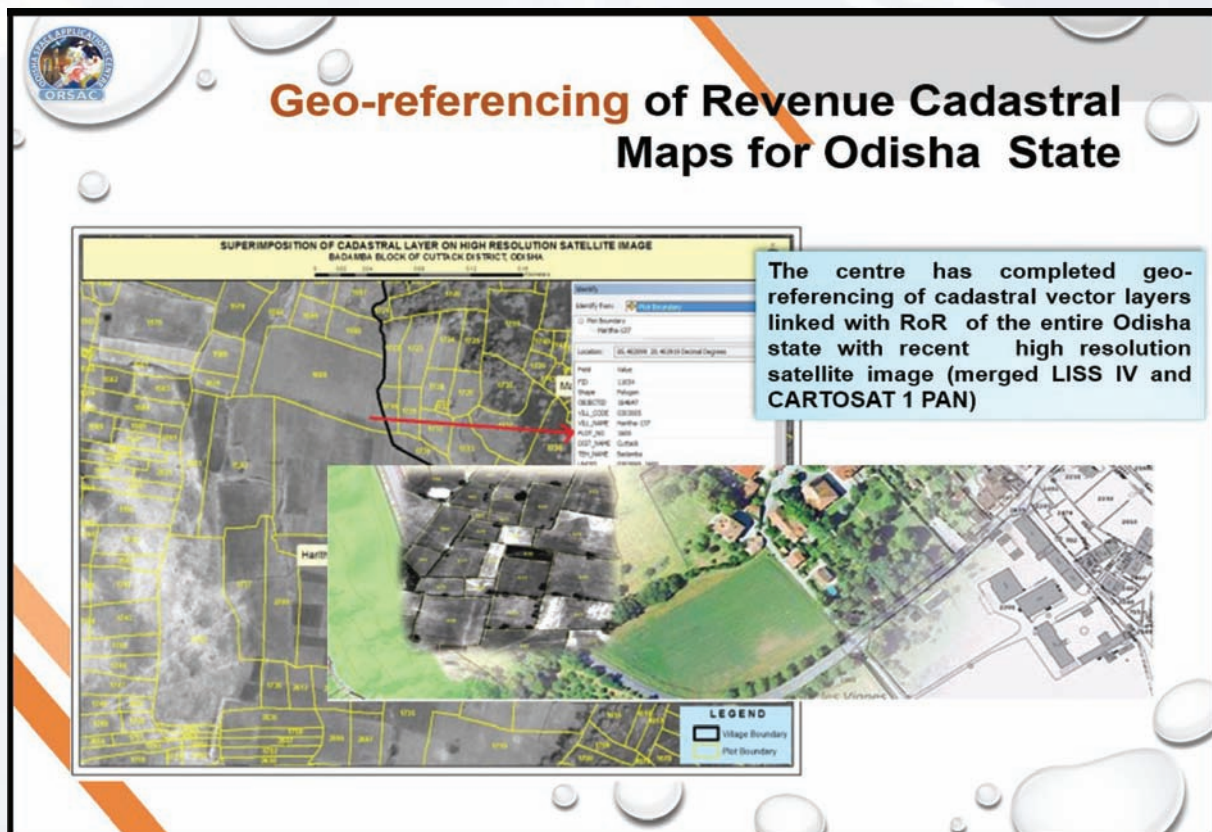
Digital India Land Records Modernization Programme (DILRMP)

Major components of DILRMP program are computerization of all Land Records, survey/re-survey of lands 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, i.e. Quality Checking of Digitized Cadastral maps and Cadastral Resurvey.

A. Quality Checking of Digitized Cadastral maps

Cadastral maps of 51,637 number of villages, out of 51681 villages are quality checked by Revenue Dept. and Quality Checked (QC) at Survey and Map Publication Office (S&MP), Cuttack on glass table for one to one check and also at ORSAC (QC of digitization). The newly published digitized cadastral maps of 2035 villages generated by Revenue Dept. are also quality checked. The Centre is preparing GIS ready CAD files of digitized maps after quality check for linking of Bhulekh RoR data with cadastral map plots by NIC in form of shape files.

Geo-referencing of Revenue Cadastral Maps for Odisha State

The centre has completed geo-referencing of cadastral vector layers linked with RoR of the entire Odisha state with recent high resolution satellite image (merged LISS IV and CARTOSAT 1 PAN)

B. 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. 4000 draft village maps of parts of Sundargarh, Deogarh, Samabalpur, Bolangir and Sonepur districts prepared by the vendor have been quality checked at ORSAC and verification completed. Technical support is being provided for preparation of maps along with quality checking of maps. Draft village map preparation work in 250 villages has been completed till date and ready for publication. Resurvey work in Deogarh and Sonepur is continuing during 2018-19, for which draft maps of Deogarh district has been completed by the vendor and quality checking work has been completed at ORSAC.

Village Bahali, Tahasil – Deogan, **BOLANGIR DIST**

PITAMBARPURSASAN, DIGAPAHANDI BLOCK, GANJAM DISTRICT

CADASTRAL MAP OF BIJAYPADMANAVPUR VILLAGE
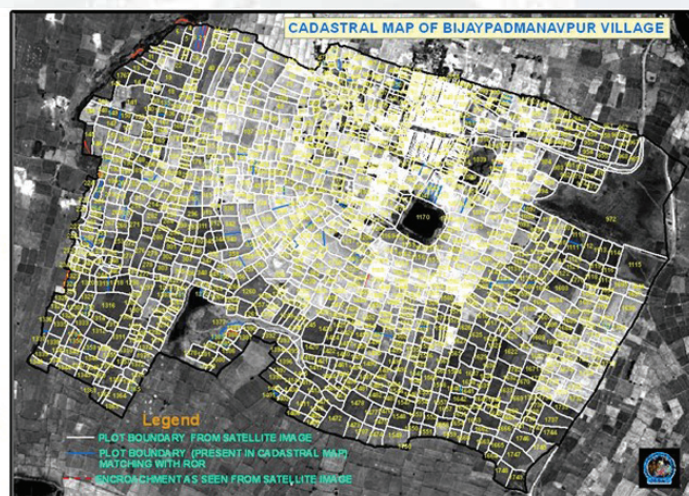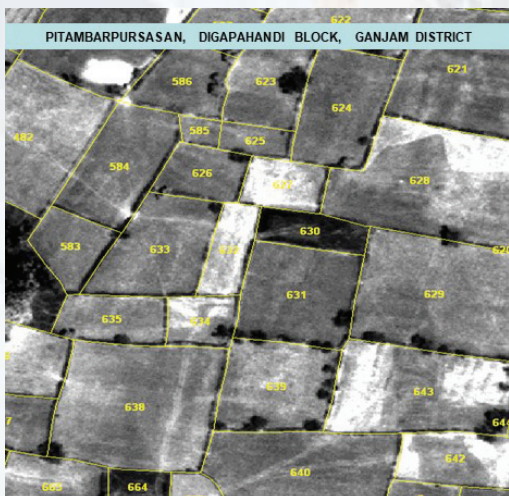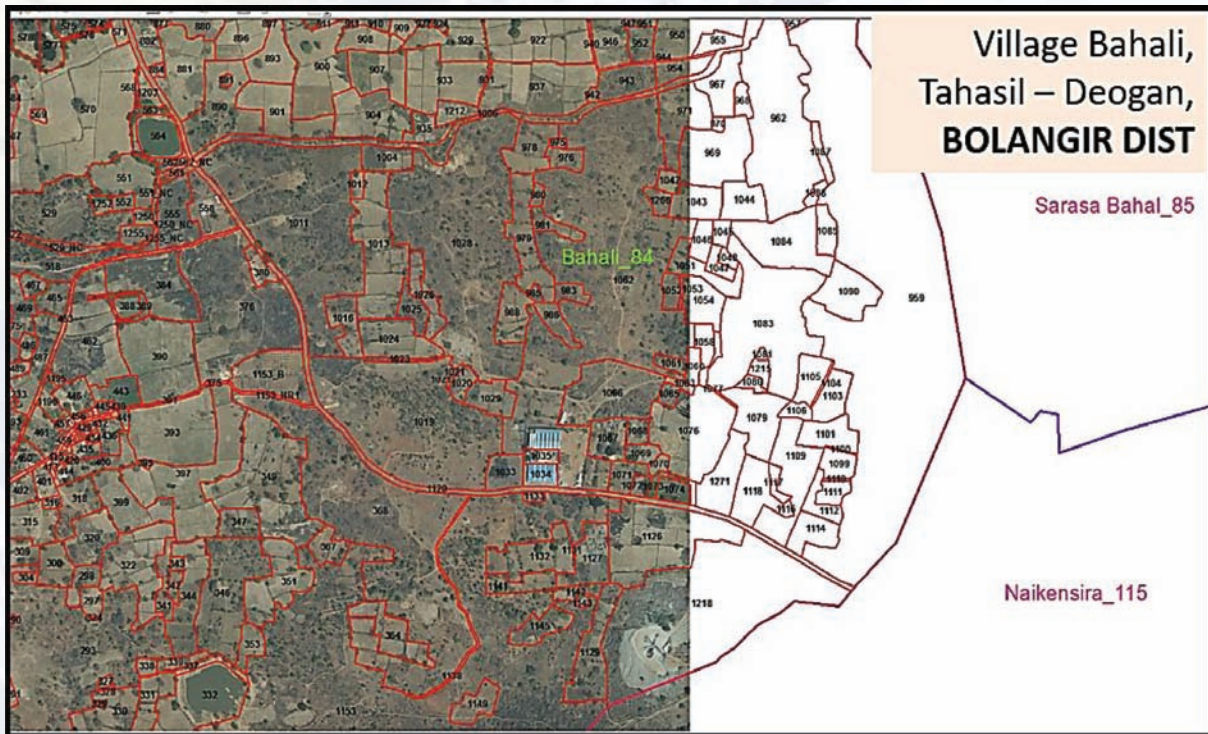
Monitoring of IWMP Watersheds

Integrated Watershed Management Programme (IWMP) deals with the integrated use of land, vegetation and water in geographically discrete drainage area for the benefit of the people and addresses key issues related to land and water resources by incorporation of environmentally benign or clean technologies. Space technology currently with the High spatial and temporal Resolution satellite data are envisaged for effective planning, monitoring and evaluation of IWMP activities.

Odisha Space Applications Centre (ORSAC) has been assigned 310 number of projects through National Remote Sensing Centre (NRSC), ISRO for monitoring and evaluation of IWMP watersheds using the Bhuvan Geo-ICT Web portal tools namely- *Srishti and Drishti*.

NCC IMAGE OVERLAID WITH DRISHTI POINTS

LANDUSE / LANDCOVER

NDVI
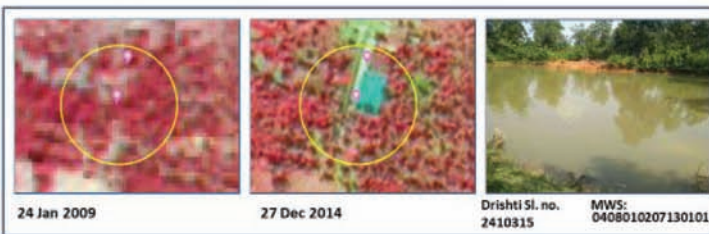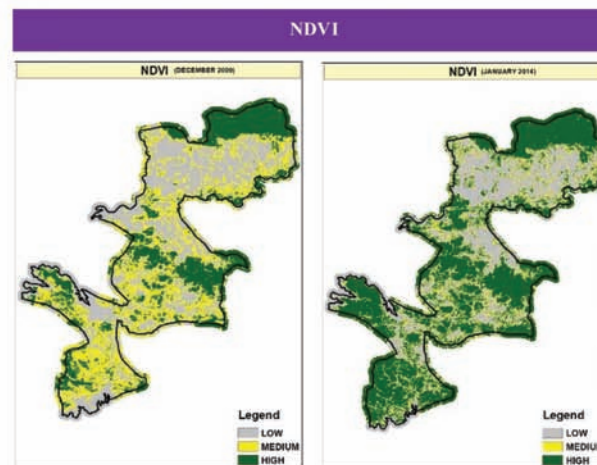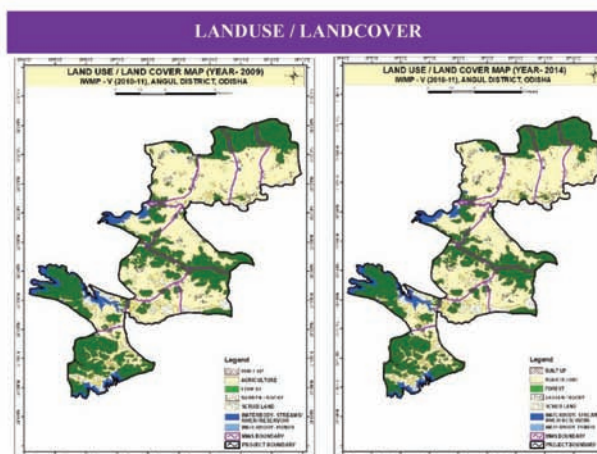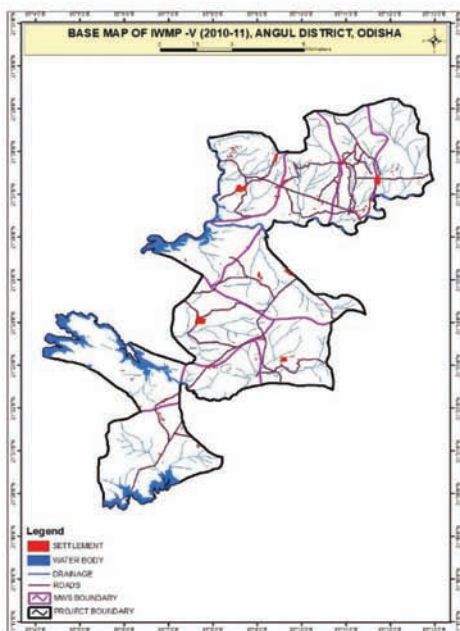
RS & GIS Applications – Agriculture

Forecasting Agricultural Output Using Space, Agro-Meteorology and Land Based Observations (FASAL)

District wise Kharif Rice Acreage estimation and production forecast has been undertaken in collaboration with Mahanalobis National Crop Forecast Centre (MNCFC), Govt. of India, New Delhi. Three dates of Sentinel-I SAR data have been used for district wise acreage estimation for Kharif Rice in Odisha. Rice yield has been estimated by using meteorological subdivision level yield models. Remote Sensing based yield models and selected Crop Cutting Experiment(CCE) carried out using Remote Sensing based CCE plans. The Kharif Rice area of the state is estimated at 37.49 lakh ha. with rice production of 72.39 lakh tonnes. Rabi rice acreage estimation for selected districts of Odisha has also been undertaken using Sentinel-II optical data.
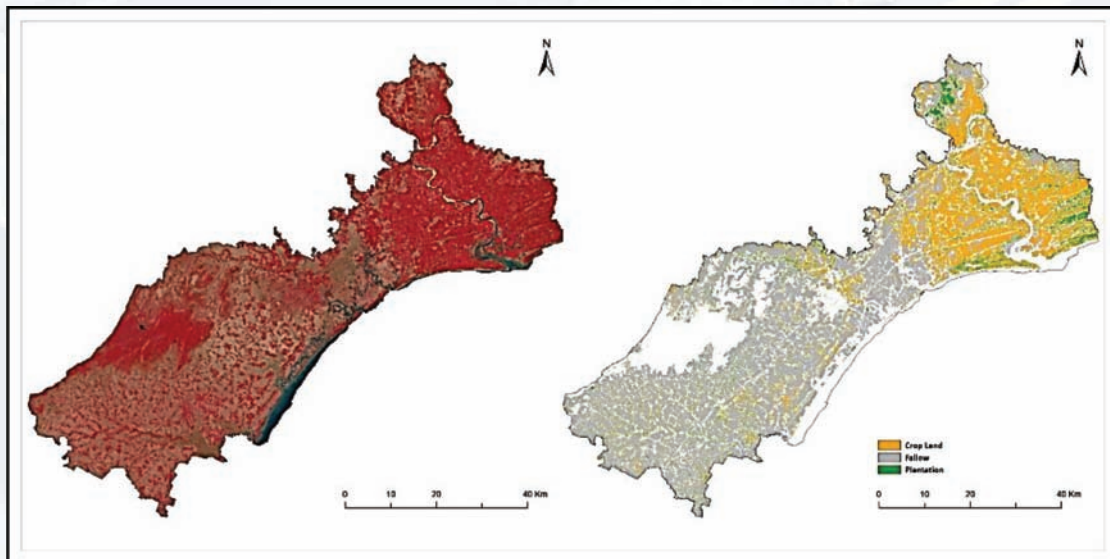
Co-ordinated Horticulture Assessment and Management using Geoinformatics (CHAMAN)

After successful implementation of CHAMAN Phase-I, Ministry of Agriculture and Farmers' Welfare, Govt. of India, New Delhi has approved Phase-II Programme for the period 2018-19 & 2019-20. This project is being coordinated by Mahanalobis National Crop Forecast Centre (MNCFC), Govt. of India, New Delhi. The major objective of the programme is operationalisation of the technologies developed during the Phase-I, inclusion of new crops and research & development studies, especially the crop yield modelling.

Under this Programme, acreage estimation for Tomato and Chilli crops for selected districts of Odisha have been undertaken in association with MNCFC, New Delhi. Ground Truth has been collected for complete horticulture crop mapping for Dhenkanal & Ganjam districts. Geospatial studies for Khurda and Angul districts are in progress in collaboration with State Horticulture Department with special reference to MIDH schemes of the State.

Technology Mission for Geospatial Aided Agricultural Information System for Odisha State

This program has been sponsored under Rastriya Krushi Vikash Yojana (RKVY), Department of Agriculture and Farmers' Empowerment, Govt. of Odisha, Bhubaneswar. This program aims at village/GP level crop monitoring, fertiliser distribution advisory, land suitability study for various crops and irrigation infrastructure mapping for the entire State.
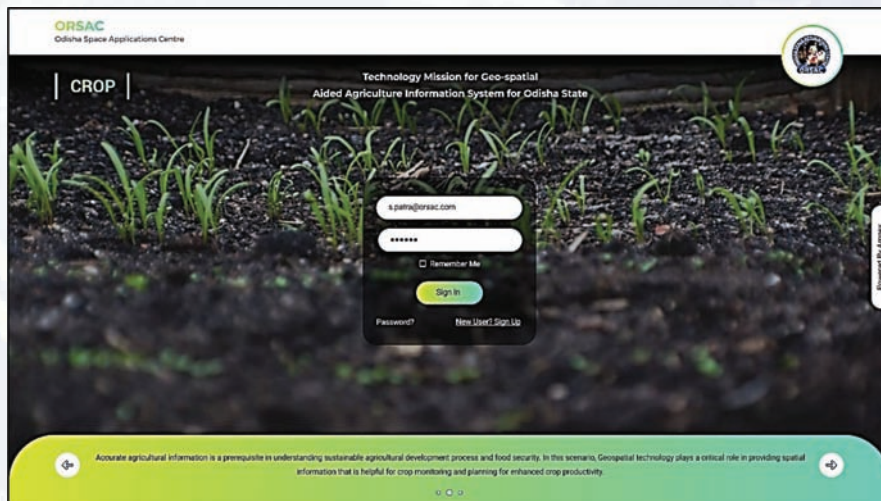
Two sets of Sentinel-II optical data have been downloaded for the State. Digital image processing of the data has been completed. Masking for agricultural layers and Mobile Application development for ground data collection is in progress. Web-GIS portal is also under development.

Geo-Spatial Inputs for CDP Preparation of Towns

Housing and Urban Development Department of Govt. of Odisha has assigned the task to ORSAC to prepare RS and GIS based Database for CDP preparation of 59 Towns of Odisha State in the year 2016-17. 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 CDP map preparation.

- Generation of RS & GIS inputs for 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 2018-19, Remote Sensing & GIS data inputs of 15 towns namely Chilika-Balugaon, Banapur, Rairangpur, Athagarh, Banki, Buguda, Purusottampur, Kodala, Chikiti, Digapahandi, Aska, Bhanjanagar, Belguntha, Khalikote and Ganjam on 1:2000/4000 scale have been completed using Worldview -2 satellite image.

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.

Satellite Image Of Gunupur
Mouza:Kapilapur,P.S.-Gunupur

Land use Mapping for Rurban Clusters

Panchayati Raj and Drinking Water Department, Govt. of Odisha has assigned the task to ORSAC in consultation with Housing and Urban Development Department, Govt. of Odisha to prepare Land use/ Land cover maps using Worldview satellite image data on 1:1000/2000/4000 scale of 14 Rurban Clusters of Odisha State in the year 2019-20.
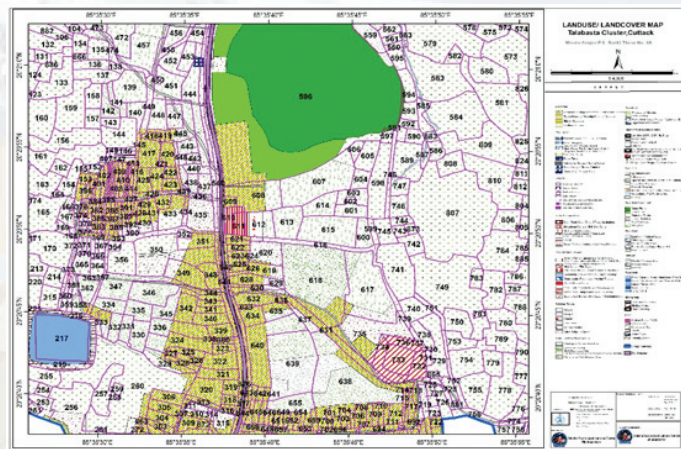
During this year, Land use / Land cover maps of 05 Clusters (Talabasta, Ranipada, Samsingha, Thakurmunda and Utkela) have been assigned, out of which Talabasta Cluster of Cuttack District has been completed. The georeferenced digital cadastral datasets have been used as base for generating other datasets required for Master plan preparation of Rurban Cluster. Other datasets are like existing land use, ownership, Network connectivity etc. along with information on Natural Resources like Vegetation cover, Drainage and Surface Waterbodies are linked to the plot level cadastral datasets.

Assessment of Erosion Prone Areas of Odisha State

(A R&D Project under the Climate Change Action Plan of Government of Odisha)

Odisha, which has a coastline of 480 Km and an abundance of rivers that flow into the sea, could be subject to the merciless onslaught by the monstrous seas. A modest sea-level rise will not only create havoc on the coastal ecosystem but also disrupt the very socio-economic foundation of the thickly populated coastal areas. The coastal tract of Odisha has an average height of 4-5 m above mean sea level with some areas as low as I-2 m above mean sea level. The coastal tract is also subject to all kinds of fluvial, aeolian, tidal and other marine activities and supports a variety of landforms. In global warming scenario, the impact on these coastal features is expected to be traumatic. Therefore, a detailed scientific study is being undertaken using Geospatial Technologies. The progress in the project to generate the base level data are listed below.

a)   DEM/DSM and Orthophoto generation of entire Odisha using Carto Sat Stereo data (5m contour interval). DEM data along-with slope, Land use / Land cover, Geomorphology, Soil and Drainage data; Spatial & Temporal data on precipitation, Wind speed, Temperature; and other terrain data are being integrated into a GIS based model. Detailed GIS based simulations, analysis and modelling will be undertaken for vulnerability studies and delineation of erosion prone area map of entire Odisha at 1:10k.

b)   DEM/DSM and Orthophoto of coastal Odisha are being prepared from High Resolution (30cm resolution) World View Stereo data. Integration of DEM data with slope, LU/LC, Geomorphology, Soil, Drainage maps of coastal Odisha at cadastral scale (1:4k) are being undertaken to develop a GIS based 3D model of coastal Odisha

For DEM/DSM creation, DGPS observation on Secondary control points has been completed at 4km x 4km grid points covering the study area of about 7555 Sq. Km in the coastal part of Odisha.
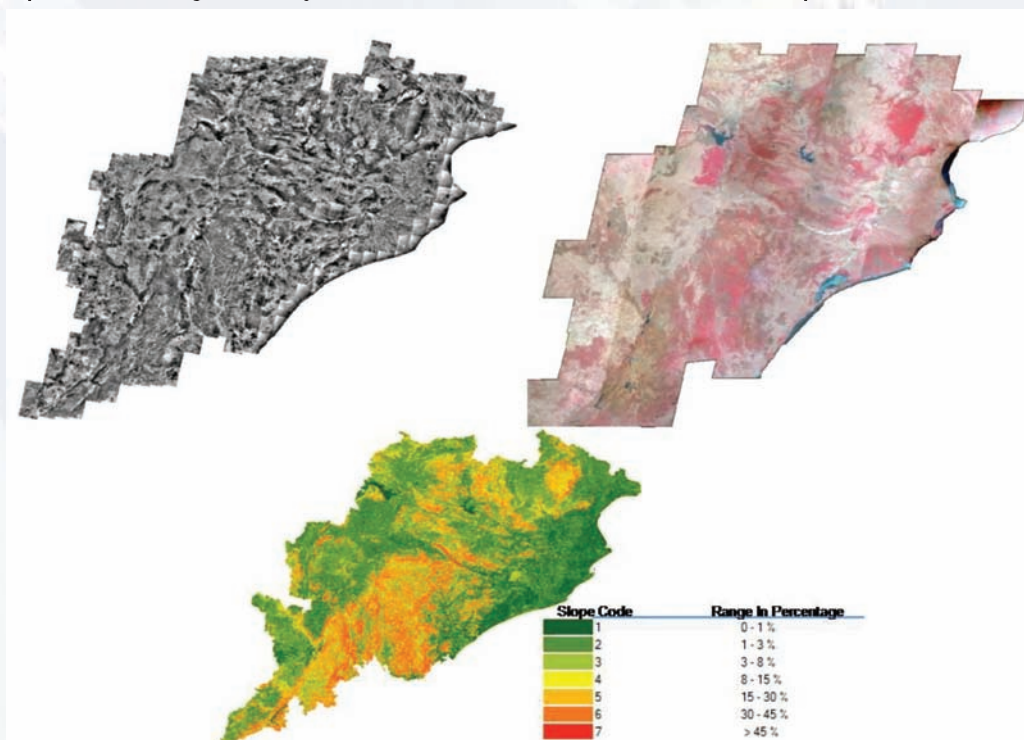
Web-GIS Coastal Aquaculture Portal

Odisha occupies fourth place in brackish water shrimp farming (area wise) and third place (production wise) amongst the coastal states of the country. Out of the thirty districts of the state, nine districts namely Ganjam, Khurda, Puri, Jagatsinghpur, Kendarapada, Bhadrak, Baleswar, Jajpur and Cuttack are considered as coastal districts. The coastal area is defined as per the Notification of the Coastal Aquaculture Authority, Govt. of India. The boundary is drawn by taking a buffer of 2 Km from the High Tide Line. The study area is undertaken as per Coastal Aquaculture Authority Act, 2005 (24 of 2005) Gazette Notification as '**Area of land within a distance of two kilometres from the High Tide Line (HTL) of seas, rivers, creeks and backwaters'.**The area is selected as per the HTL Line delineated by NCSCM, Ministry of Environment and Forests & CC and spreading across 3189 villages covering 583972 ha.

Spatial Database on Aquaculture, allied network infrastructure, water bodies and leasable and non-leasable lands available in the coastal area are prepared by RS & GIS method. Leasable Lands will be made available to the entrepreneurs for development of aquaculture in the State. The Web-Portal is under development.

EXTRACTION OF PONDS LAYER FROM IRS-PS-LISS-IV SATELLITE IMAGE
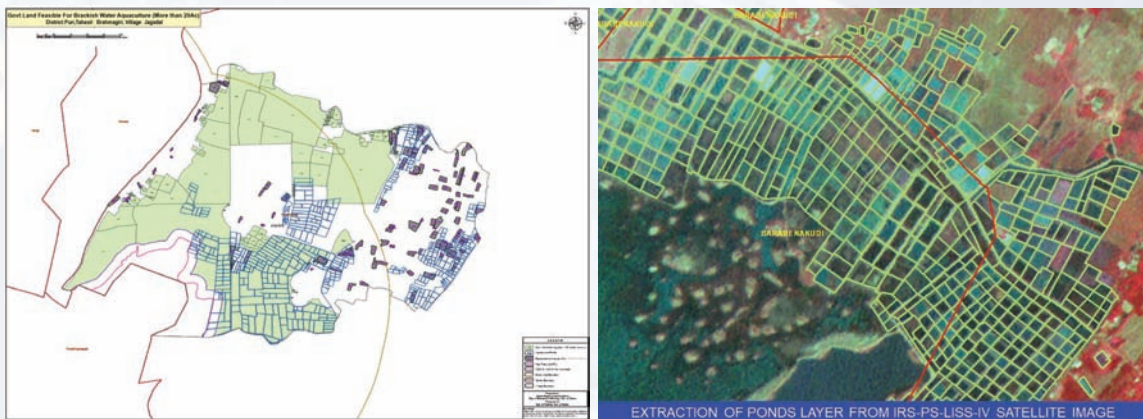
CRZ Management Plan Preparation

The objective of Environment (Protection) Act, 1986 and the CRZ Notification, 2011,Govt. of India is to ensure livelihood security to the fishing and other local communities living in the coastal areas; to conserve and protect coastal stretches, its unique environment and its marine area; and to promote development in a sustainable manner based on scientific principles taking into account the dangers of natural hazards in the coastal areas and sea level rise due to global warming.

**CZMP Planning Process:** As per para 5 (ii) of the CRZ notification 2011, Coastal Zone Management Plan maps (CZMP) are prepared by the Centre using 1:25,000 scale HTL and LTL (provided by NCSCM with the approval of the MoEF & CC) as base data. CZMP Map preparation, Ground Truth collection, Stake holders consultations, incorporation of recommendations of the Scrutiny committee comments etc. were jointly undertaken with the Forest and Environment Department.
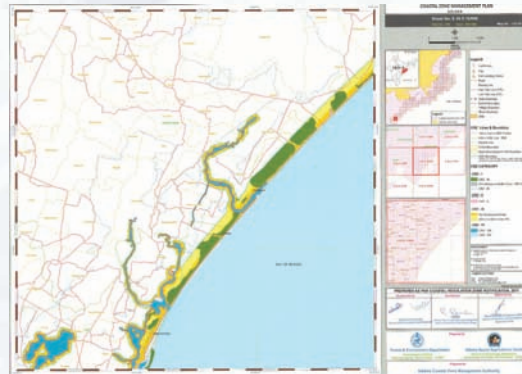
Generation of CZMP maps: The LTL, HTL, 200 m CRZ line, 500 m CRZ line on the sea coast and the 100 m or width of the water body line for the tidal influenced water bodies, 100 m for Bay and 100 m for fisheries villages were prepared. The boundary lines of CRZ I (ESAs, geo-morphologically important zones, archaeological and heritage sites), CRZ II (Developed area/municipal areas), CRZ III (undeveloped /rural areas) and CRZ-IV (water area of the tidally influenced water bodies from the mouth of the waterbody at sea up to influence of tide) have been incorporated.

In case of CRZ III, a 200 m line (No Development Zone) was drawn on the CZMP maps. In case of mangrove areas of greater than 1000 sq.m, a buffer line of 50m has been provided. Other buffer lines were drawn wherever necessary, as specified in the CRZ Notification 2011. With this information, the final maps in 1:25,000 scales were generated as per CRZ Notification, 2011.

Preparation of Critically Vulnerable Coastal Areas (CVCA) Boundary: -Framework for demarcation of CVCAs includes a) Development of criteria; b) Assessment of Community Based Resource Management (CBRM) Index and c) Demarcation and Governance of CVCA. In Odisha Bhitarakanika area has been identified as CVCA in CRZ, 2011 notification.

Demarcation of Hazard Line: The word 'hazard line' denotes the line demarcated by MoEF&CC through the Survey of India(SoI) taking into account of tides, waves, sea level rise and shoreline changes. Based on the Technical Scrutiny Committee of NCZMA recommendations, two sets of maps have been provided: (i) CZMP map depicting different CRZ categories and (ii) Coastal land use maps (authenticated by Space Applications Centre, ISRO, Ahmedabad). Odisha is the first state in India in submitting CZMP to MoEF & CC, Govt. of India.
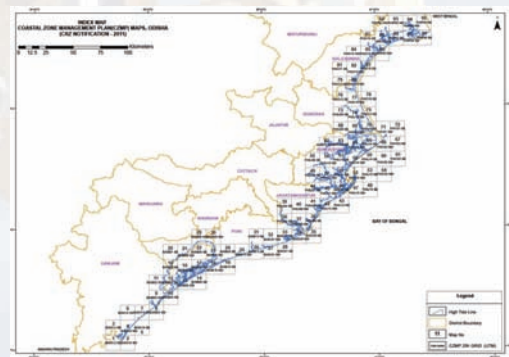
CZMP-2019: CZMP as per CRZ-notification 2019 is under preparation.

Working Plan Inputs for Forest Divisions

ORSAC in collaboration with NRSC, Hyderabad & Odisha Forest Dept., Govt. of Odisha completed preparation of working plan inputs using Remote Sensing & GIS for 34 Territorial and Wildlife Divisions completing the Working Plan for the year 2016-17 & 2017-19.

As per National Working Plan Code 2014, ORSAC prepared different thematic maps namely Forest Density maps on scale 1:25,000 using Wold view II colour satellite data, Forest Administrative & Forest Management maps on scale 1:50,000. NRSC, Hyderabad prepared Forest Type map on scale 1:50,000 and generated 17,443 sample points for Forest Inventory work. OFD is engaged on the field for forest inventory data collection using GPS-PDA device and the sample point data is being uploaded in OFD webserver. Compartment wise stock and yield calculation is done at NRSC using the software developed for the purpose.
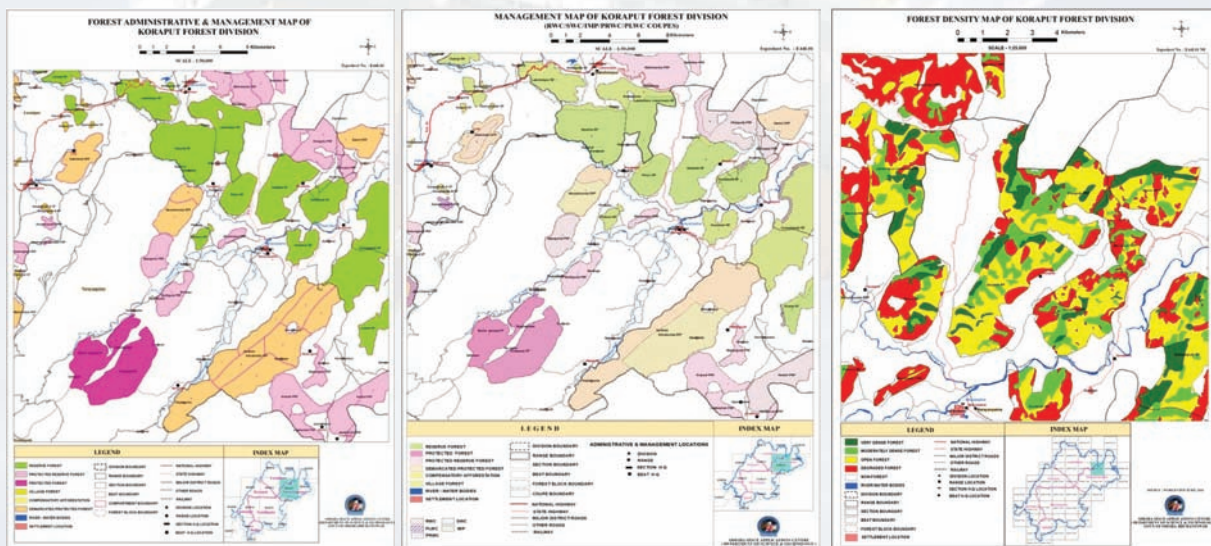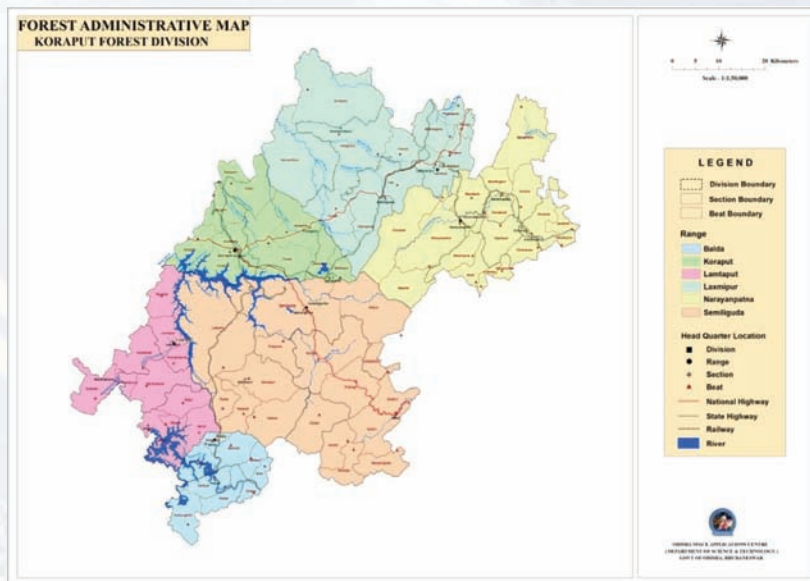
Implementation of GIS under World Bank assisted Rural Roads Project ll, PMGSY

Rural Development Department, Government of Odisha entrusted the National Rural Roads Development Agency, Ministry of Rural Development, Government of India project to ORSAC to develop comprehensive Road GIS database of Odisha State. Accordingly, ORSAC developed the PMGSY road database with the following layers.

GIS Data Layers in the database:

- Habitation
- District, Block, MP, MLA Constituency Boundary
- PWD Division & Circle Boundary
- Forest Boundary
- DRRP Road and CN Road
- Bridges and Level Crossing (Manned/ Unmanned)
- Construction Material Sites
- Market Centre
- Administrative HQ (Revenue, Block, District, Panchayat)
- Water Body
- Tourist Place
- Drainage
- Railway
- Other Road Attribute Data

All the GIS Layers are generated with WGS84 datum and lat-long coordinates. The database layers were updated from latest High-Resolution World-View II satellite data. This database has been uploaded by C-DAC at the website www.pmgsy-grris.nic.in. The Geospatial Rural Road Information System (GRRIS) is a geospatial presentation of PMGSY. GRRIS seeks to provide every citizen, even in the remotest corner of this country, to visually see in a map the details of rural roads and roads improved/covered under the PMGSY scheme in any Block, District or State. It also provides locational information of habitations, markets, Administrative Headquarters etc. which will help in better decision making of the resident communities of rural area and development of rural markets and enterprises. ORSAC on behalf of RD Dept. uploads the geo-sptial data layers to GRRIS at regular interval.

VIEW OF NH NEAR KHURDA ON SATELLITE IMAGE (LEFT) & FIELDPHOTO (RIGHT)

VIEW OF RURAL EARTHEN ROAD IN KHURDA DISTRICT ON SATELLITE IMAGE (LEFT) & FIELDPHOTO (RIGHT)

Ground Water Quality Mapping in Odisha under Rajiv Gandhi National Drinking Water Mission Ph-IV

Increasing threat to groundwater quality due to extensive anthropogenic activities in recent years has led Ministry of Drinking Water &Sanitation, Govt. of India to include the Ground Water Quality Mapping in its Phase –IV mission of Nation-wide Rajiv Gandhi National Drinking Water Mission for source targeting of ground water. The Ground Water Quality Mapping was carried out by using the legacy data of the Ministry of Drinking Water & Sanitation, Govt. of India from the year 2009 to 2017. Since groundwater is occurring in different landforms and also controlled by monsoon, the methodology adopted for mapping comprises the segregation of the legacy data for two seasons i.e. pre-monsoon and post-monsoon with respect to different geomorphic units. The mapping was done using Inverse Distance Weighted (IDW) method for reclassification of Ground Water Quality parameters to assess the potability such as Desirable, Permissible and Non-potable of the ground water based on the BIS standards (June 2015) of the Ground Water Quality parameters approved by Ministry of Drinking Water & Sanitation, Govt. of India.

Ground Water Quality Status in Odisha State

Very Good (Desirable in both the seasons)	35.98%
Good (Desirable in one season and Permissible in other season)	13.18%
Seasonal Good (Desirable /Permissible in one season and Non-potable in other season)	6.18%
Non-Potable (Non-potable in both the seasons)	2.57%
No Data, Hills, Forests and Major Water Bodies	42.09%

N.B.: *The above percentage is w.r.t. the Geographical area of the State.*
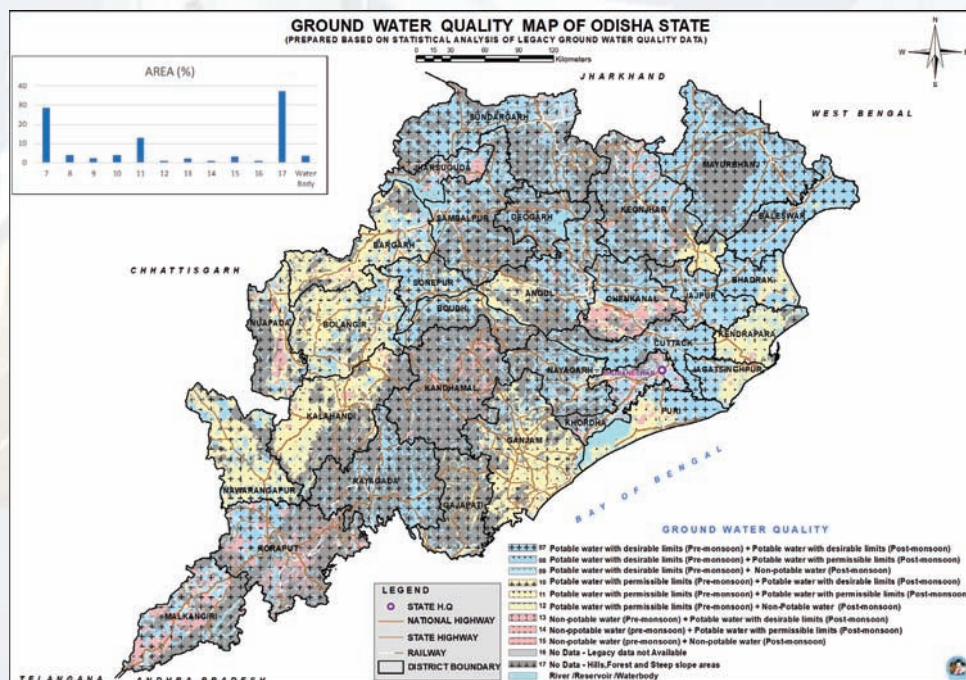
Satellite Communication Project

Gramsat Network in Odisha:

During the year 2018-19, GRAMSAT has produced public awareness spots for various departments of Government of Odisha. Two spots for Health & Family Welfare Dept., seven video spots for ORERA, four video spots for Energy Dept., two video documentaries for Food Supply & Consumer Welfare Dept. and one video documentary on ORSAC & its commitment are prepared. There are several video spots of Health & Family Welfare Dept. and Revenue & Disaster Management Dept. at different stages of production. One video programme for ODIIS project is also prepared.

EDUSAT NETWORK IN ODISHA:
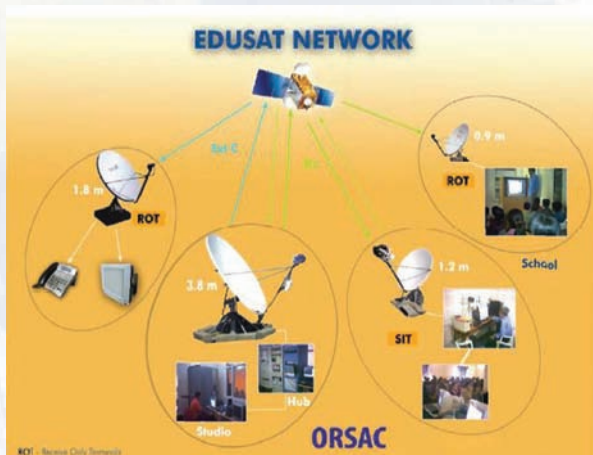
Renovation of Edusat studio set is completed and now ready for Edusat transmission. That apart for Edusat transmission, through an Academic Workshop programme briefs on the subjects Math, English, Physical Science, Life Science and Physical Geography for class IX and X were prepared. Details of supporting visuals of each topic are also prepared and the regular Edusat transmission through Doordarshan is planned for 2019-20.

(New ORSAC Edusat Studio)

Utilization of L & S Band SAR Data for Surface Soil Wetness Mapping

Soil moisture varies according to the texture, porosity, permeability, rainfall and irrigation etc. along with evapotranspiration, precipitation, seepage etc. Near-surface soil moisture (i.e. in the top 50 mm of the soil profile) is particularly complex and highly variable. Many authors have investigated the main factors controlling the spatial and temporal dynamics of soil moisture, including topography (slope gradient, curvature, relative elevation), soil properties (clay content, albedo, organic matter), aspect, land use, vegetation, solar radiation, upslope or specific contributing area, and mean soil moisture. These above factors have somehow balanced in an irrigation command area. Odisha is dependent mainly on monsoon for cropping. In a state like Odisha, a number of irrigation projects have been created to provide water for crop both in Ravi and Kharif seasons. Though the irrigat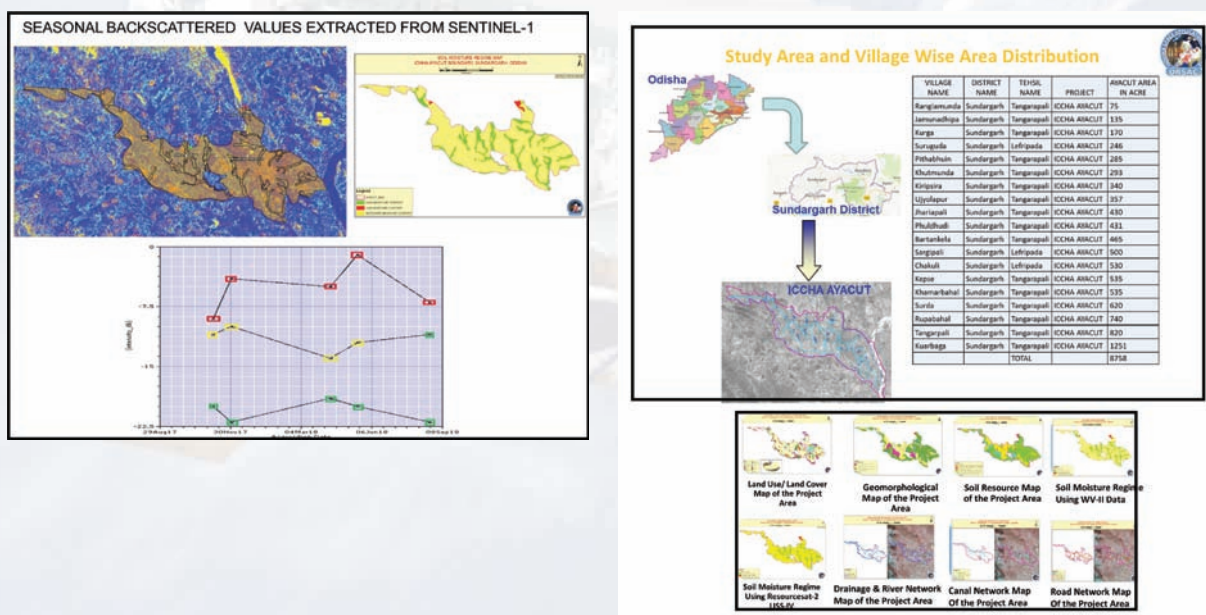ion potential has been generated, a quantitative assessment of projects according to productivity has not been taken up. Remote sensing and GIS play an important role for assessment of crop production. Due to cloud cover sometimes, it is very difficult to acquire data during monsoon period. In this context availability of SAR data along with other microwave data plays an important role in assessing and monitoring the crop growth. Temporal availability of microwave data during a cropping season can be leveraged to study the soil moisture and crop growth. An assessment also can be made for the availability of water and its use for crop in an irrigation command (ayacut) area.

Main objectives of this R & D Project is to study the surface soil wetness condition, mapping and development of calibration site for soil moisture. These objectives would be met based on the work carried out under the following sub-objectives:

- Soil wetness data assimilation and modelling of root zone conditions
- Spatio-temporal soil wetness distribution pattern and its agricultural applications.
- Development of calibration site for soil moisture
- Measuring the efficiency of irrigation water supply.

As part of the ongoing studies, an experimental Minor Irrigation Project (1835 Ha) – Ichha Minor Irrigation Project in Lephripada and Tangarpali Block of Sundergarh District in the northwest of Odisha is selected.

Generation of GIS enabled Web Based Power Atlas for Odisha State

Under the OPTCL sponsored project survey of EHT Towers; mapping of Land Use and Land Cover of the portion of the land under the power corridor and area covering the Grids and Substations; integration of existing MIS/ERP data with the spatial data; updating of the infrastructures through Crowd Sourcing; integration of cadastral parcel level information and other infrastructures crossing through the Power Corridor and Live Crossings of other Power lines under the Transmission Network etc. are undertaken. The main components of the projects are the following

- Survey covering 95 EHT (400kV, 220kV & 132kV) Sub Stations, EHT Lines having 24,289 Towers covering 6952.975 route km having 3-5-meter accuracy.

- Generation of GIS Data base and integration of Survey data.

- MIS Data integration.

- World View High Resolution satellite image based Landuse mapping.

- Power Atlas composition by Integration of all survey and Land Use/ Land Cover data of the patch of the land under the EHT line along with all physical connectivity of the lines etc. to depict in the GIS User Views.

- Web Based customization was done using Geospatial Server. Oracle 11g R2 and ASP.NET Technology. A user friendly GUI was developed for easy access of Web Based Power Atlas and for Crowd Sourcing facility.

The Web Based GIS System is able to respond to user based queries. These queries are based on spatial and non-spatial data. The queries are generated on any of layers of the system. Standard Spatial queries cover all spatial operators, including Proximity / Neighborhood analysis, Thematic Analysis, shortest and Optimal Routing, Multi-criteria and Multi-Objective Analysis etc.

Map Sales by Map Data Dissemination Section (MDDS)

The map sale to the users through MDDS section during 2018-2019 has earned **Rs. 83,72,695.00**. The users comprise Government Departments / PSUs of both Govt. and private entrepreneurs, researchers, NGOs and individuals. The details of this as follows:

ORSAC Map prices (Hard Copy)

Sl.	Map Specification	Rate
1	Hard copy (Map of standard size A2 and above both Colour & B/W	Rs.1250/-
2	Hard copy (Map of standard size A3 and above both Colour & B/W	Rs.550/-
3	Hard copy (Map of standard size A4 and above both Colour & B/W	Rs.300/-

Cost of digital vector data per 1:50,000 toposheet

Sl.	Theme(s)	Rate
1	Land Use/land cover	Rs.1430/-
2	Hydrogeomorphology	Rs.1210/-
3	Soil	Rs.1100/-
4	Drainage/River/Canal	Rs.1430/-
5	Drainage/Watershed/Watershed Priority	Rs.1100/-
6	District/Block/Village	Rs.1100/-
7	RF/PF/Forest Management boundary	Rs.1100/-
8	Settlement (point)/Major road & River/Rail	Rs.990/-

Soft copy and GIS ready datasets are provided to Government departments and agencies as per Map and Date Policy of Govt. of India and ORSAC Governing Body approved the norms/rates.

ISRO Space Information Centre at ORSAC

Celebration of Republic Day 2019 at ORSAC

Visit of Hon'ble Minister, Science & Technology to ORSAC and review of activities

ORSAC presentation at GEOVISION at Bhubaneswar

Scientists receiving Best Technical Paper presentation award at ESRI, INDIA UC 2018 at Hyat Regency, Kolkata

Chief Executive, ORSAC addressing the audience on the eve of visit of Asst. Secretary General, UN, UNEP, New York

Chief Executive, ORSAC addressing on National Seminar on NFSD organized by NSDI and ORSAC at Bhubaneswar

Joining of new Chief Executive, ORSAC in December 2018

ORSAC participation at Geo Smart Water, India 2019 at New Delhi

Visit of Engineering student to Space Information Centre, ORSAC

Interaction of Asst. Secretary General, United Nations with ORSAC scientists and ISRS, Bhubaneswar members.

Celebration of Independence Day 2018 at ORSAC

Scientists receiving the Award for best RS&GIS Centre Award for 2018

Celebration of GIS Day 2018 at ORSAC

ORSAC presentation at NESAC, ISRO on advances in RS&GIS at NEHU, Shilong

ORSAC presentation at ISPRS TCV at IIRS, Dehradun

Illumination of ORSAC building on Utkal Divas

Hon'ble Minister S&T visit to ORSAC Lab

Hon'ble Minister S&T visit to ORSAC Studio

Hon'ble Minister S&T discussing with ORSAC Scientists