

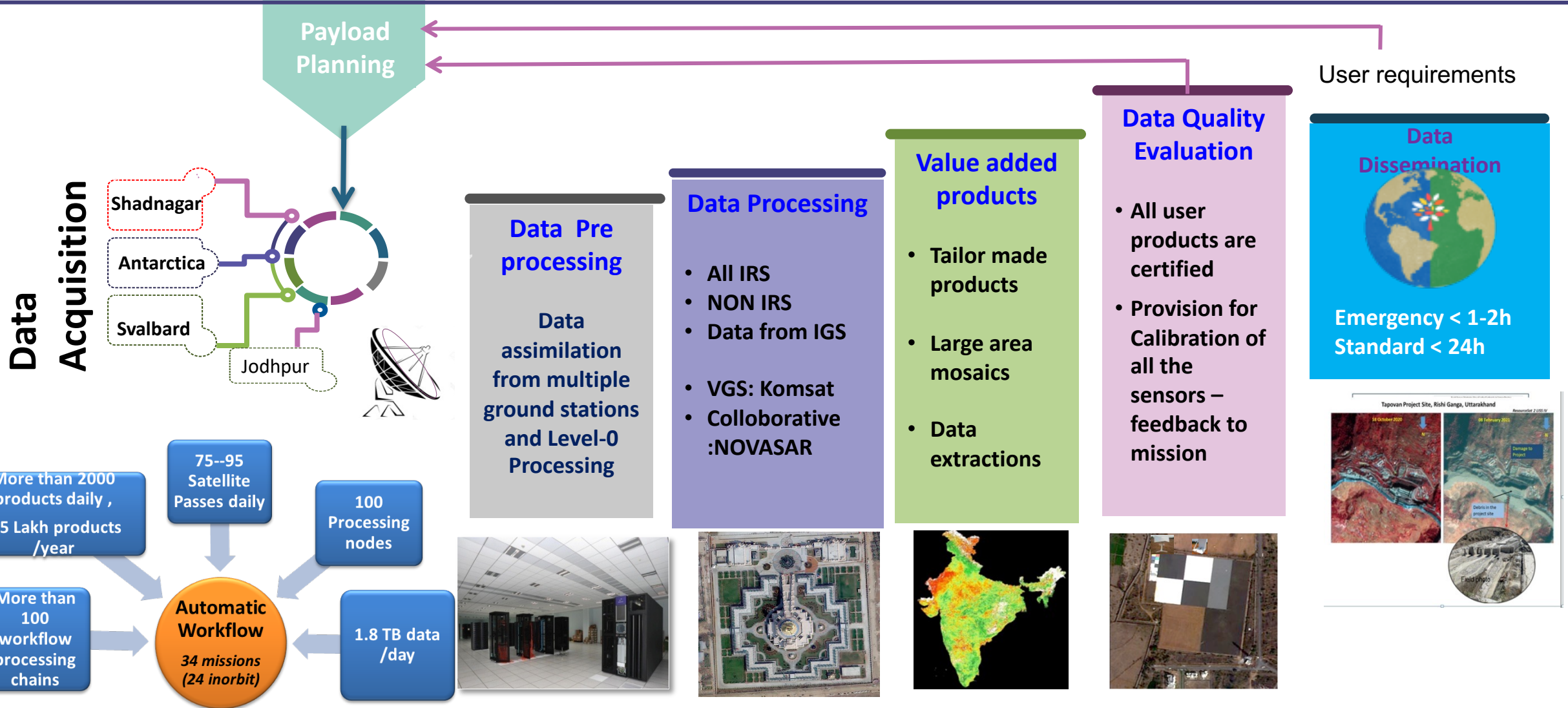


# **Geospatial Applications *for* Sustainable Development Goals**

**National Remote Sensing Centre is a segment of ISRO with the mandate of:**

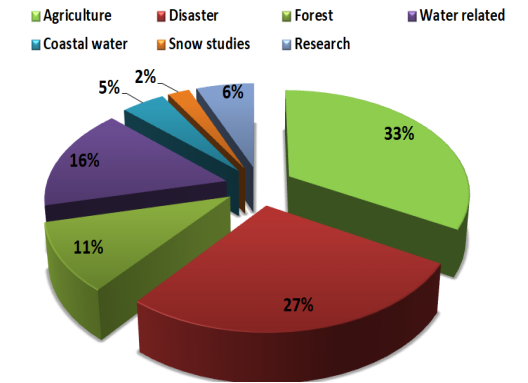
- Providing Earth observation (EO) Data from space and aerial platforms
- Data acquisition , Processing & Archival
- Developing technologies & applications for Natural Resources Management, Climate & Environment Monitoring, Infrastructure Development & Regional and Local planning
- Providing EO Services for Management of Disaster
- Providing Geospatial, web services to governance, academia, citizens and other stakeholders
- Capacity building for utilization of EO data

# Data Processing for EO Satellites



# Data products & Services

Thematic Applications based utilisation

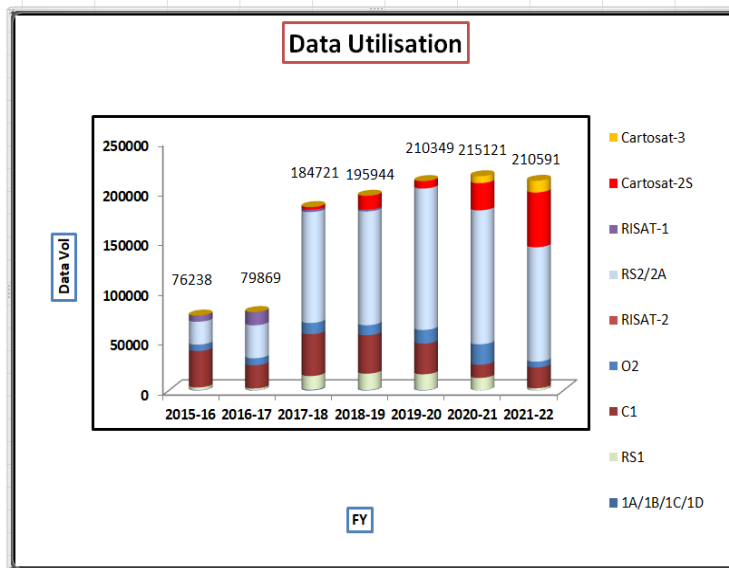


Users

Continuous support to all user needs

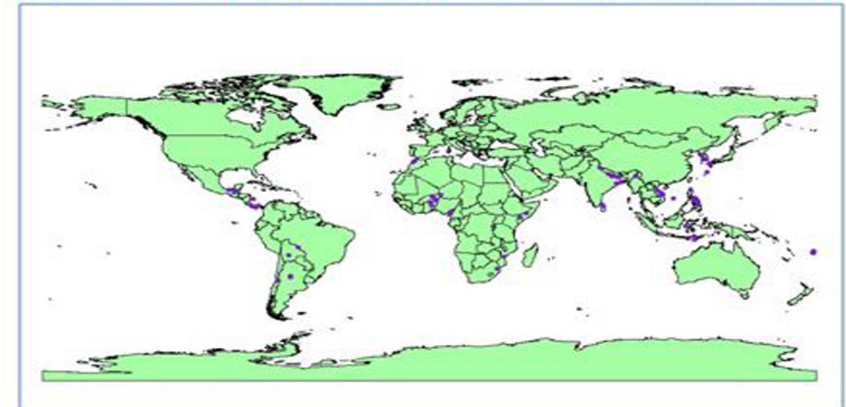
1. Indian Users
2. International users
3. International Ground stations

More than 3000 active users.



~ 2 lakh products per year

ISRO SUPPORT FOR INTERNATIONAL DISASTER ACTIVITIES DURING THE FY 2020-21



Disaster Events Serviced during the FY Apr.20 - Mar.21

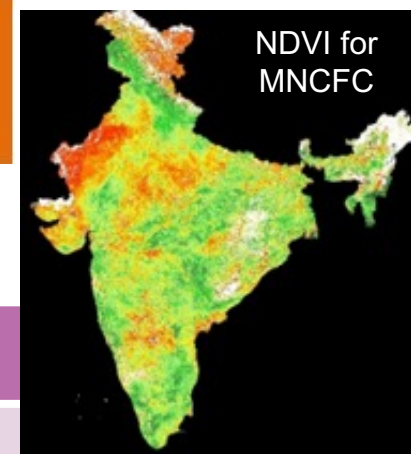
International Charter	No. of events
International Charter	35
<b>Type of Disaster</b>	<b>No. of events</b>
Floods, Storm, Cyclone, Hurricane	19
Landslide	11
Earthquake	2
Wildfire	3

Satellite data provided to International Charter during the FY Apr.20 - Mar.21

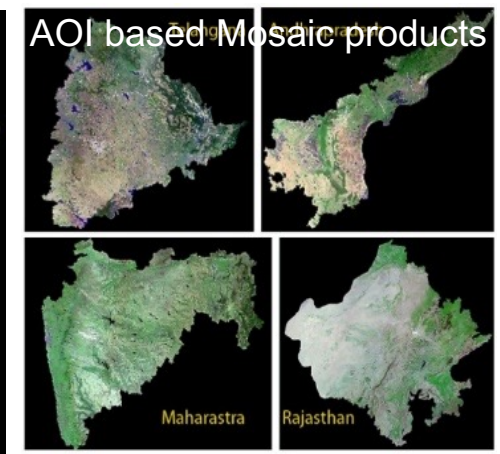
Satellite	No. of Scenes
Resourcesat-2/2A	107
Cartosat-2E	25
Total No. of products disseminated	132

~ 30 Disasters support every year

# Different kinds of data products

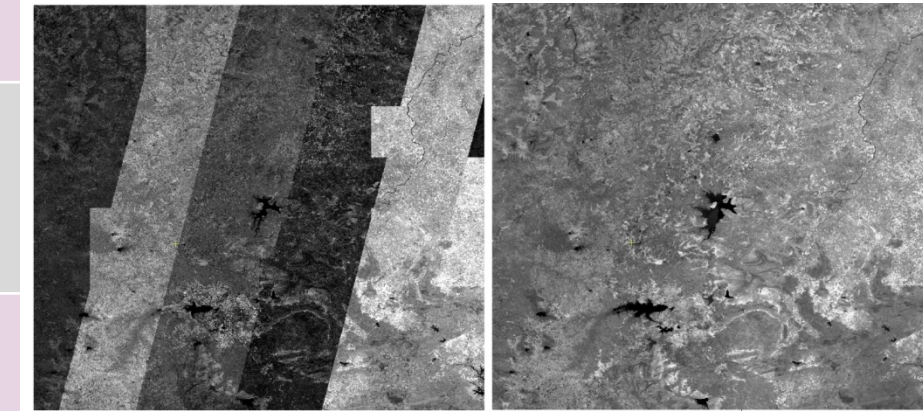


NDVI for MNCFC



AOI based Mosaic products

Maharashtra Rajasthan



*Standard path row/scene based products*

*Generating AOI based-ortho mosaic & merged product for C2S, C3 & other missions using*

*Generating - temporal consistent products*

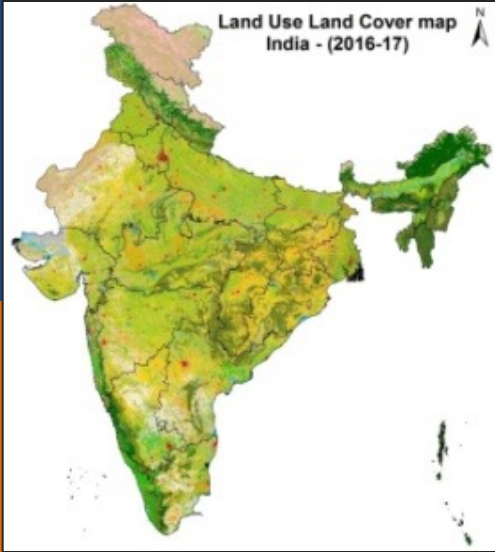
*Generation of NDVI full India products at monthly basis*



Before Radiometry Adjustment

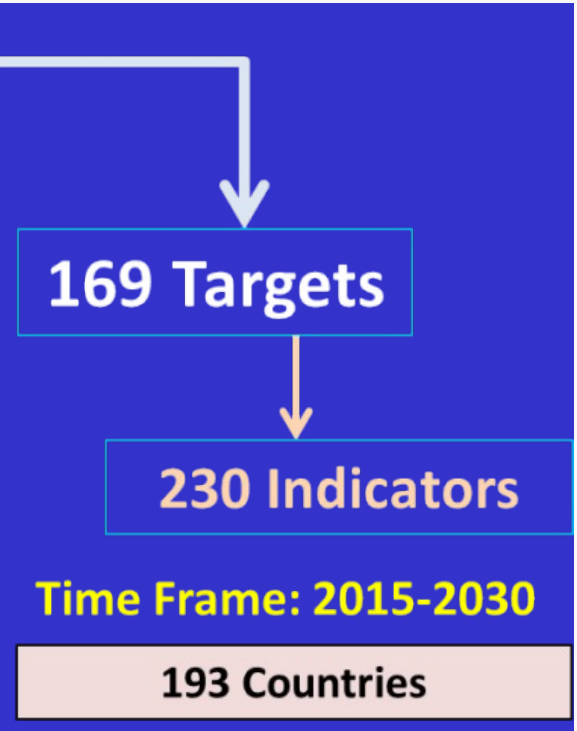
After Radiometry Adjustment

# Geospatial Applications for Sustainable Development Goals



Multi Disciplinary Approach for Integration of Information & Dev. Of Decision Support Approaches / Tools / Methodologies

**“Sustainable Development Goals(SDG) are the blueprint to achieve a better and more sustainable future for all”– United Nation**



**Sustainable Development:** “Development that meet their needs of present without compromising the ability of future generation to meet their own needs”– World Commission on Environment & Development.

Earth Observation

Information & Knowledge

Utilisation for Governance

# Geospatial Applications



“

- Agriculture
- Water Resources
- Rural Development
- Natural Resources
- Disaster Management Support
- Forestry & Ecology
- Geosciences
- Urban & Infrastructure .
- Information Services

”



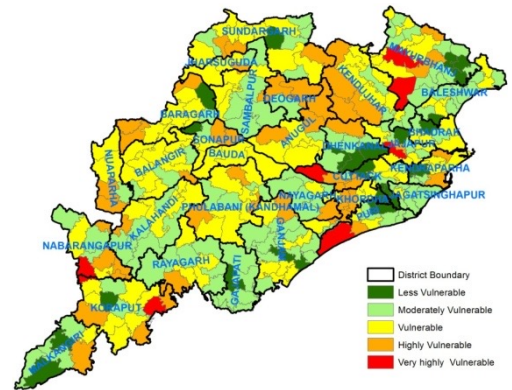
# Agriculture

- Agricultural Drought
- Site suitability for various cropping cultures
- High value, Fiber Crops
- Crop Intensification
- Crop Insurance Value
- Bioenergy -Agricultural Crop residue
- Carbon, Moisture Fluxes

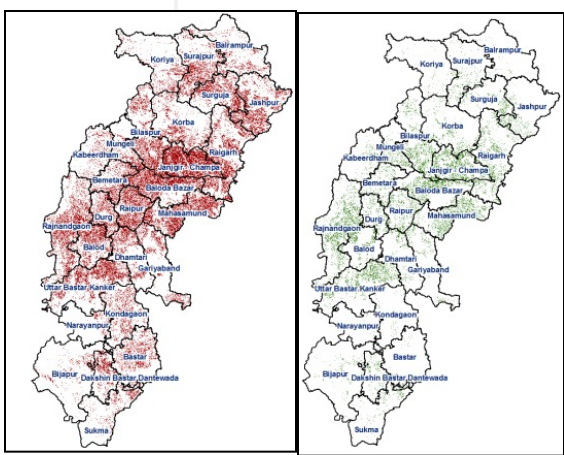
Supporting PMKSY,NFSM,PMFBY, RKVY,MNRE, etc.

## Using the Resourcesat series of satellites

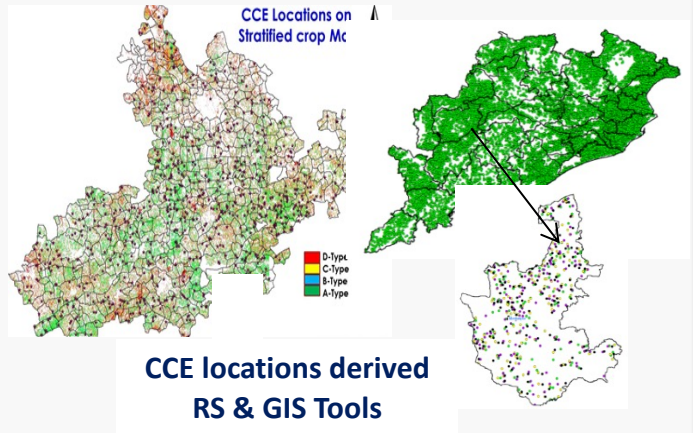
### Agricultural Drought Vulnerability



### Identifying Scope for Crop Intensification

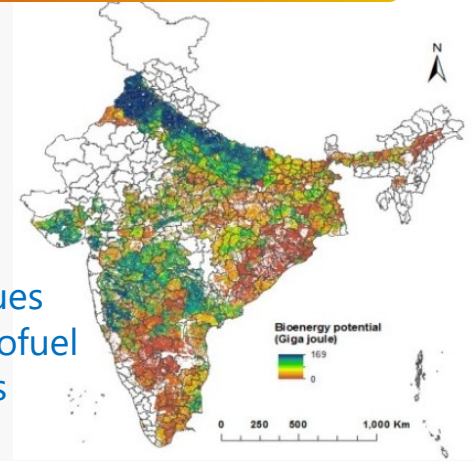


### Crop Insurance - Value Chain – Inputs



### Bio-Energy

- Crop residues for biofuel plants



### Mobile Based Suvelliance



### Improved Field Instrumentation





# Water Resources

- Irrigation Potential, Expansion, Inter-Basin Water Transport, Water Use Efficiency
- Surface Water -Storage, Dynamics, Quality
- Snow cover , Snowmelt, Reservoir inflows
- Water availability & Demand, Reservoir inflow, Stream flow (Long-term, Future)
- Urban Lakes, Pollution, Water Sources, Spatial Demand

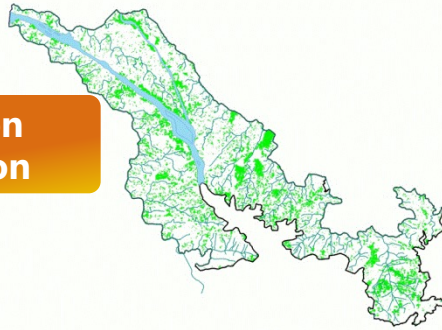
Supporting CWC, MoJS, Programmes – NHP,AIBP,ILR, etc.



Irrigation Expansion



Irrigation Utilisation



Flood Early Warning



Evapotranspiration



Glacial Lakes



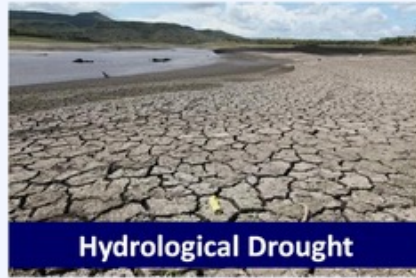
Snowmelt Runoff



Hydrological Modelling



Irrigation Management



Hydrological Drought



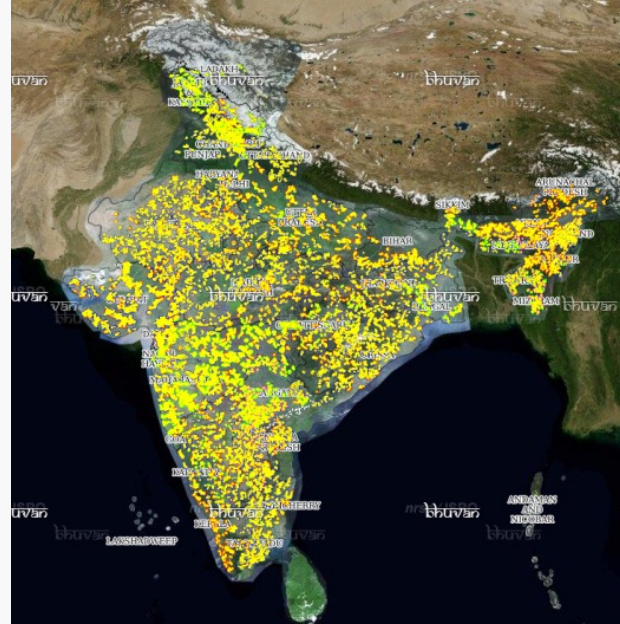
Capacity Building

# Rural Development

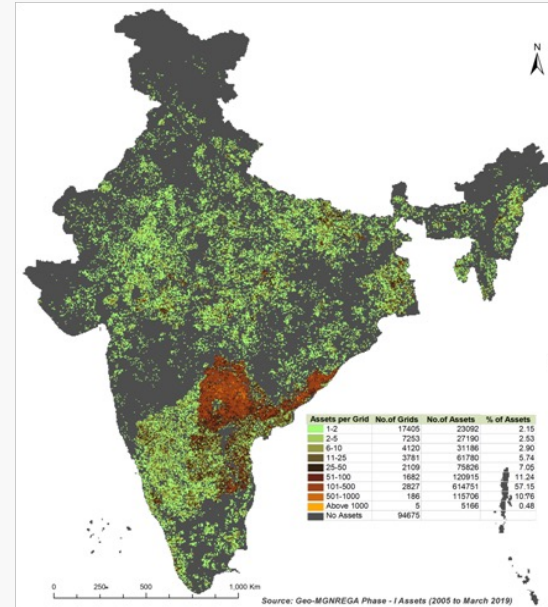
- GIS implementation of Mahatma Gandhi Rural Employment Guarantee Act (MGNREGA)
- Online GIS repository for watershed development assets
- Impact Monitoring of Watersheds
- Decentralized Planning at Panchayat Level
- Rural Road Connectivity

Supporting MoRD, NABARD Programmes – MGNREGA, IWMP, NABARD, etc.

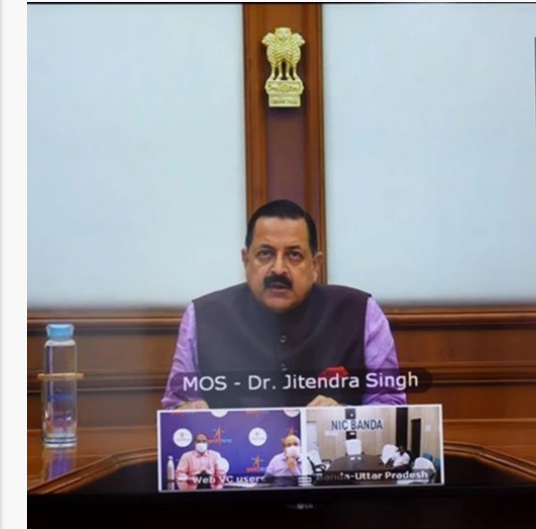
## Watershed Monitoring



## Afforestation Assets



## Geospatial Tools for Online Geospatial Tools



- Paradigm shift in MGNREGA implementation
- Management Planning using Yuktdhara
- Geotag linked budget release system ( Before / during / after assessment)
- Total Assets geotagged : 4.85 Crore

# Natural Resources Monitoring

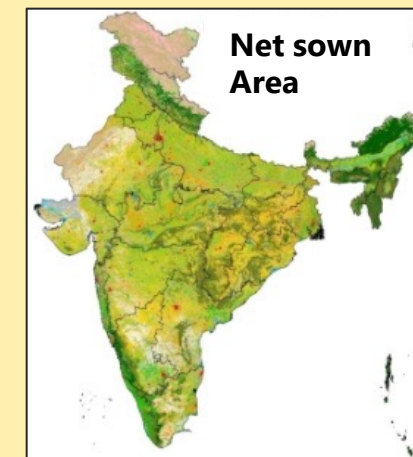
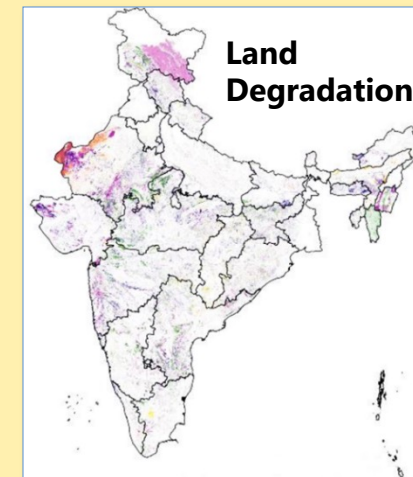
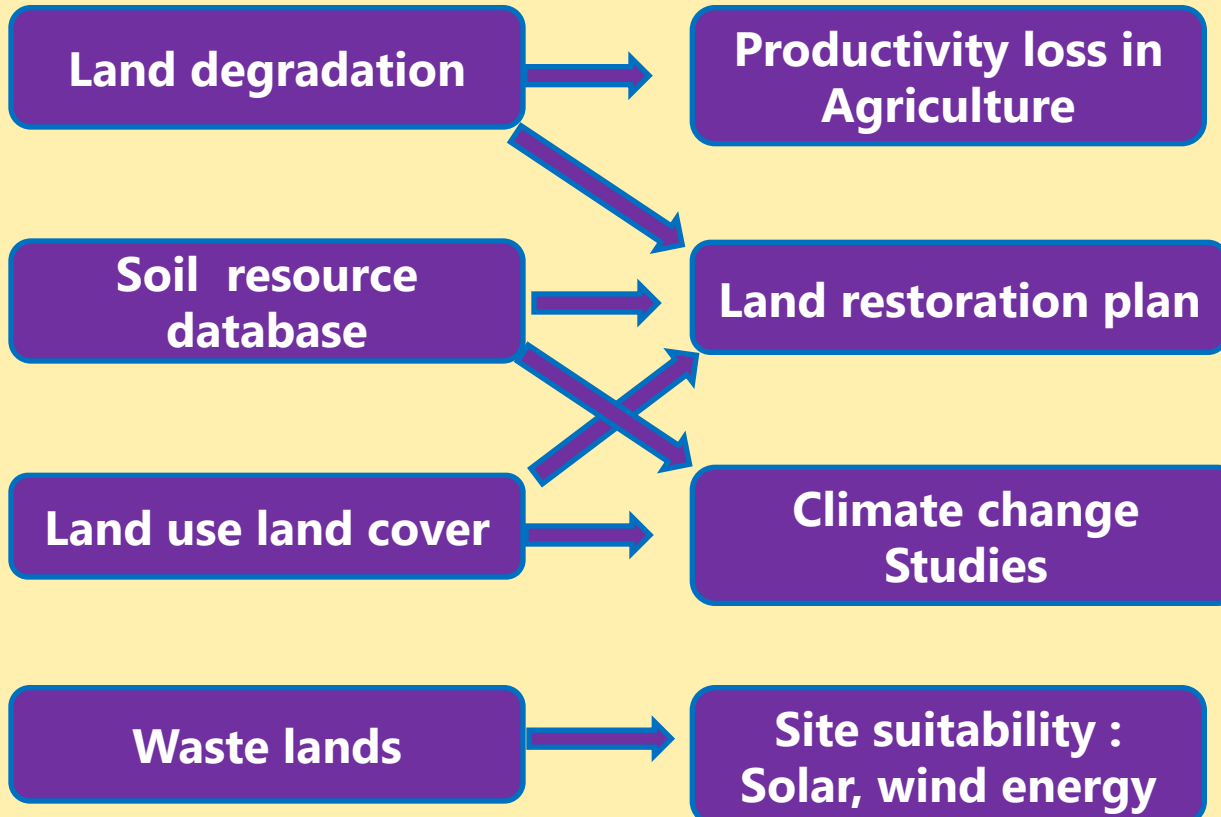
- Land use/ Land cover at 1:250,000 & 1:50,000
- Land Degradation (1:50,000)
- Waste Land Mapping and Monitoring (1:50,000)
- Soil Resource Mapping

Supporting MoA, Programmes – Supporting PMKSY, NAPCC, NSM, NRCP, etc.

Geospatial Information

Utility of Assessment

Contribution to SDGs



# Disaster Management Support

Near real time monitoring and mapping (Flood, Cyclone, Earth Quake, Forest Fire)

Early Warning Systems

Disaster Mitigation Planning Inputs

National Database for Emergency Management

Intl. Cooperation

Supporting MHA, Disaster Management Authorities (State/Central)

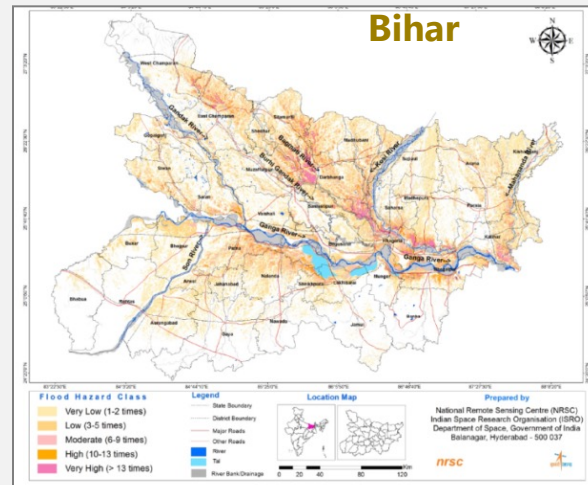
## Near Real Time Flood Mapping



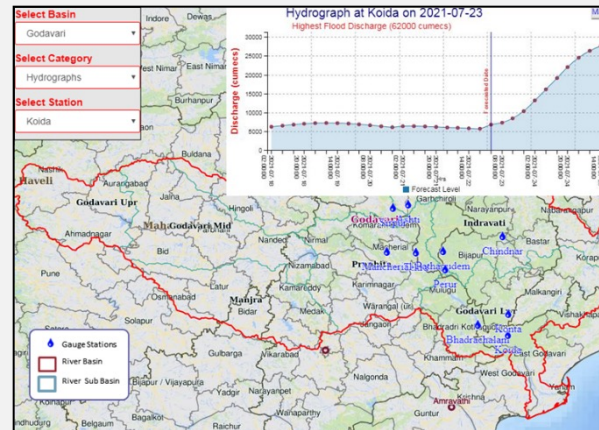
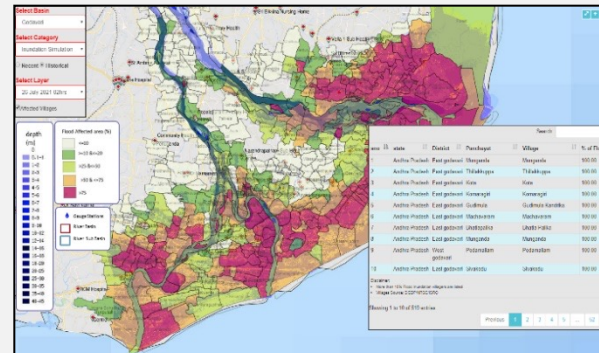
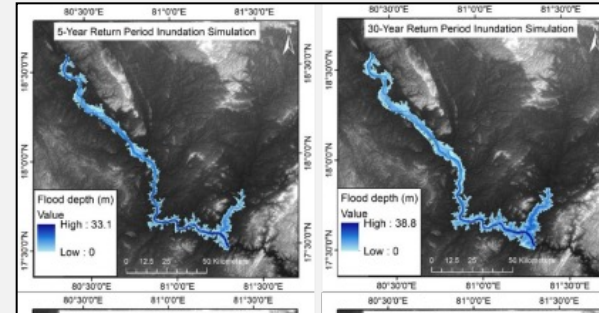
Flood Affected States

Year	2017	2018	2019
No. of States Flooded	8	10	14
Districts affected	108	112	186
Total flooded area (sq.km)	25,536	15,340	40,233
No. of flood products	101	92	256

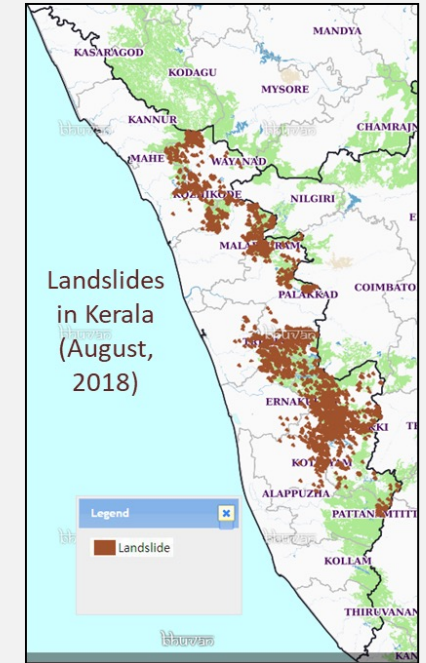
## Flood Hazard Atlases- 5 States



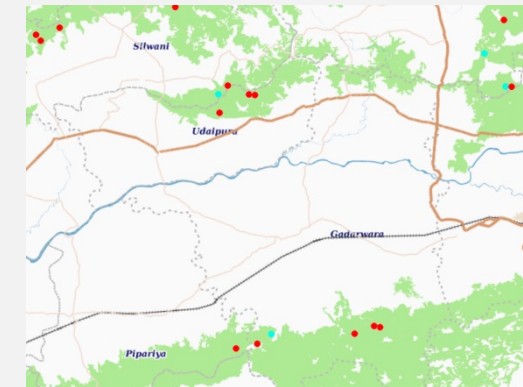
## Flood Prone Area – Risk Assessment



## Landslides



## Forest Fire Alerts



# Forestry & Ecology

Forest Mapping and Monitoring

Forest Fire

Forest Loss alerts

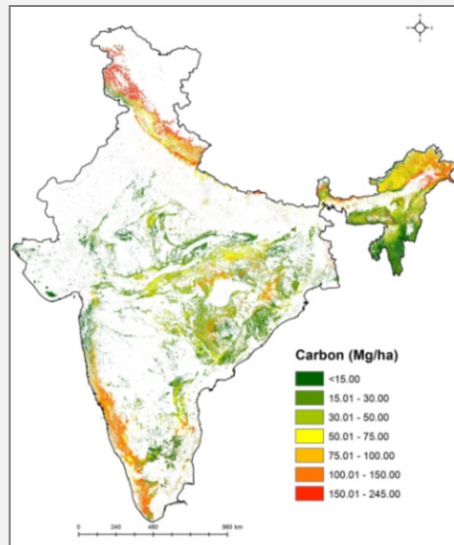
Forest biomass

Biodiversity

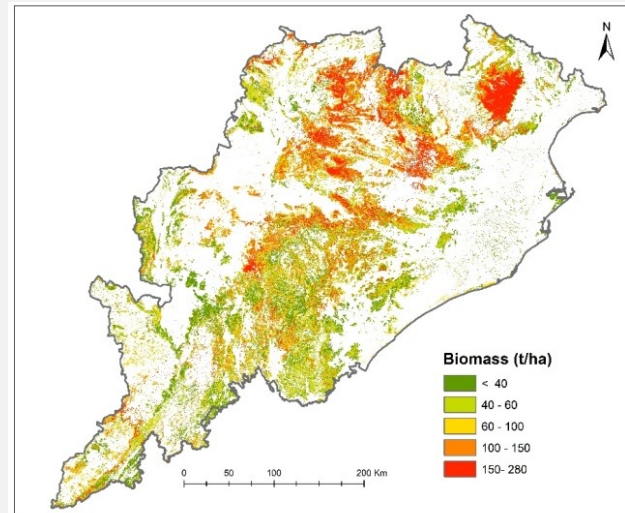
Spatial Carbon Assessment

Supporting MoEnF, FSI, DST, DBT, ICFRE, State Forest Departments

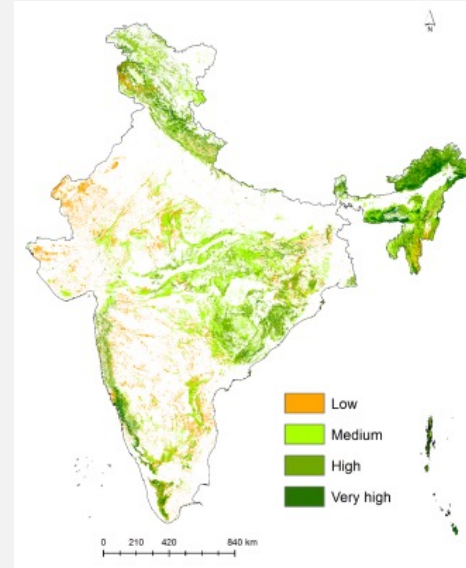
## National Forest Biomass



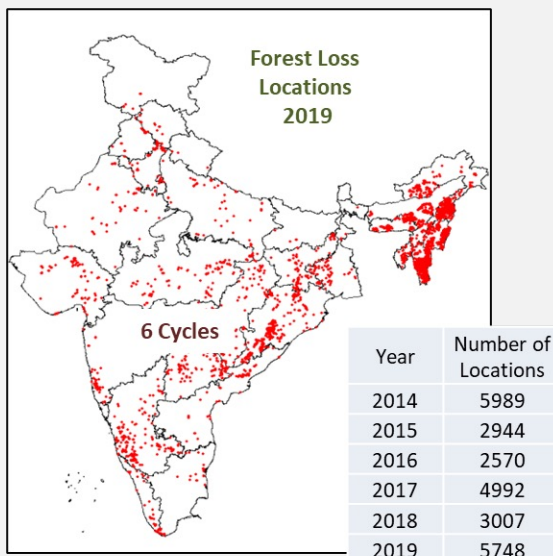
## Above Ground Forest Biomass



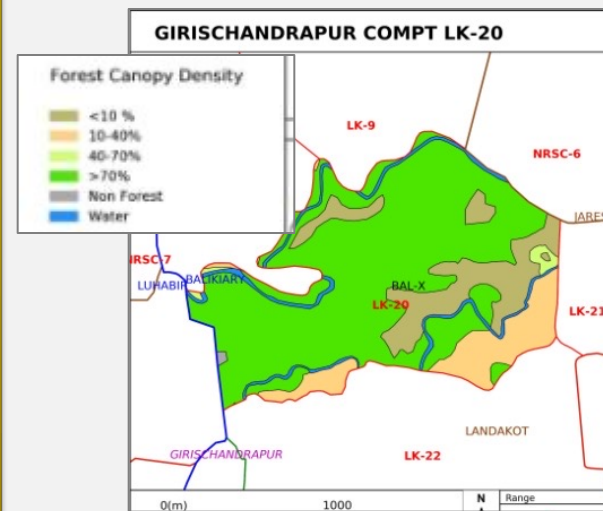
## Biological Richness



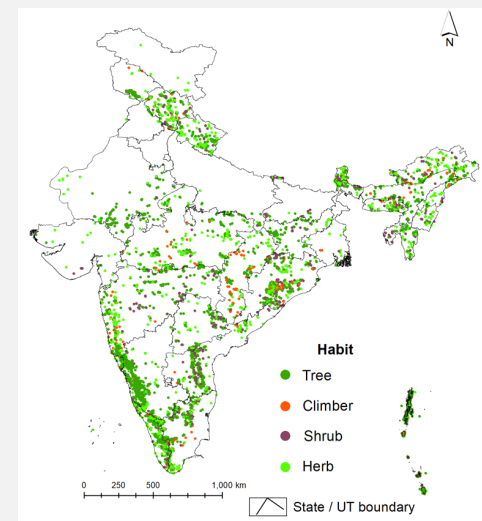
## Forest Loss Locations



## Forest Working Plans



## Endemic Plant Species



# Geosciences

Ground Water Prospects & Quality

Geomorphology

Mineral Prospects

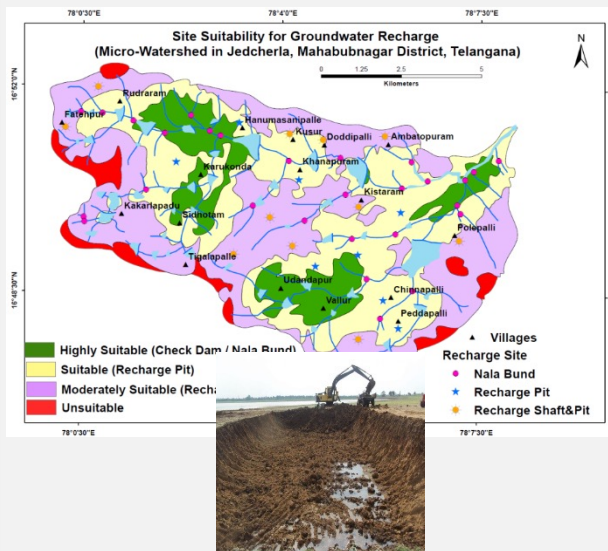
Landslide & Earthquake

Coal Fire

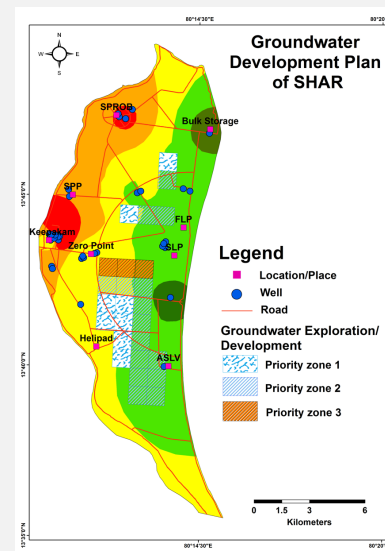
Land Subsidence

Supporting RGNDWM, NRDWP.

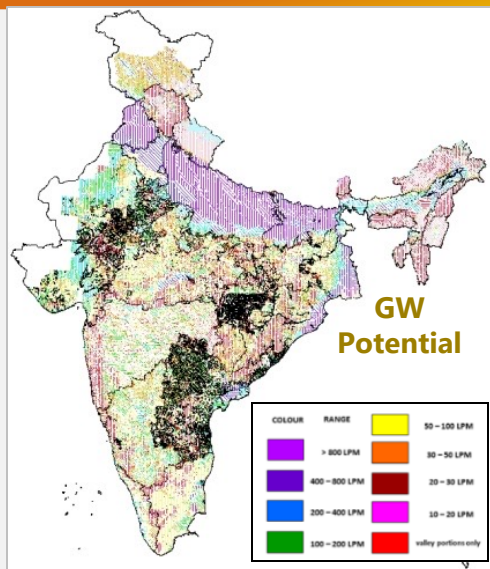
## Sites- Groundwater Recharge



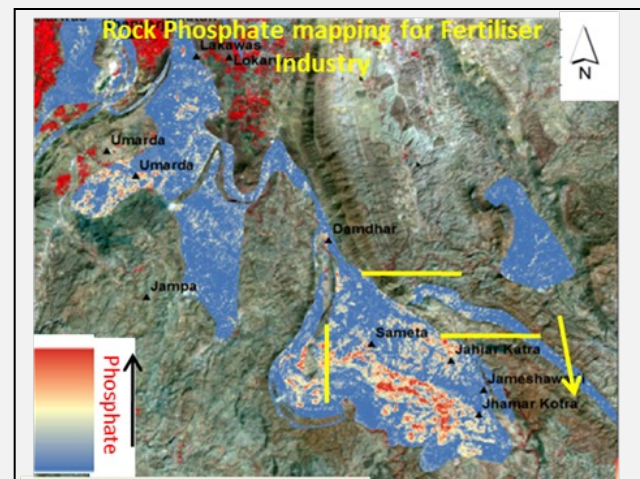
## Groundwater Dev. Plan



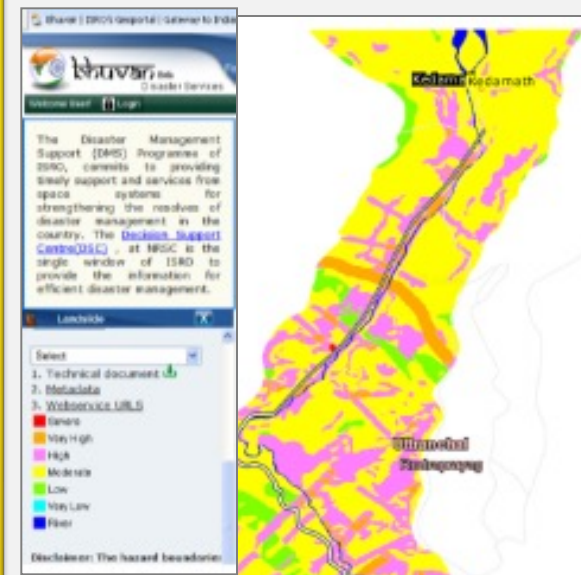
## Ground water Potential



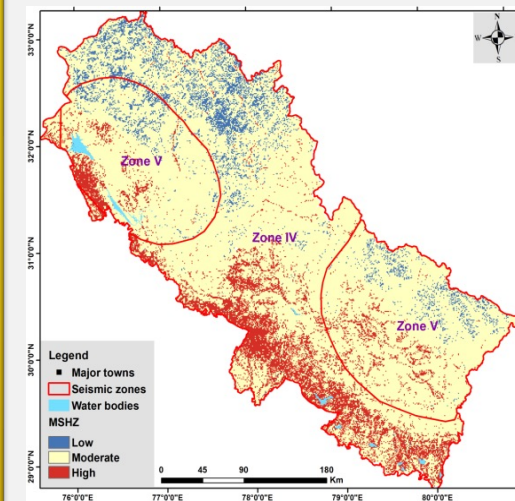
## Mineral Prospect Mapping



## Landslides –Inventory, Hazard zonation



## Seismic Hazard Zonation

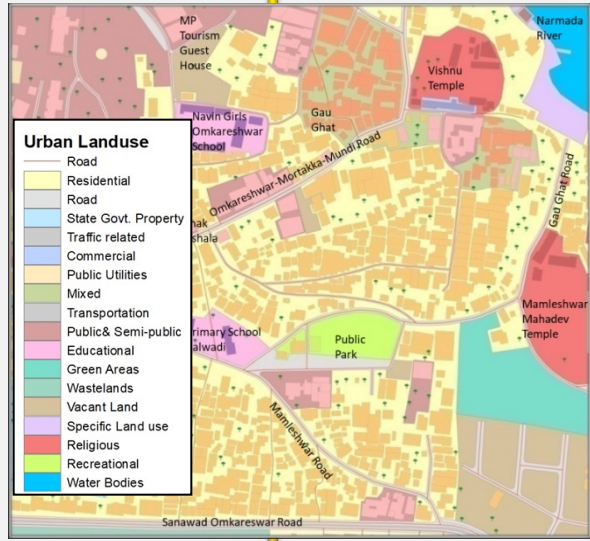


# Urban & Infrastructure

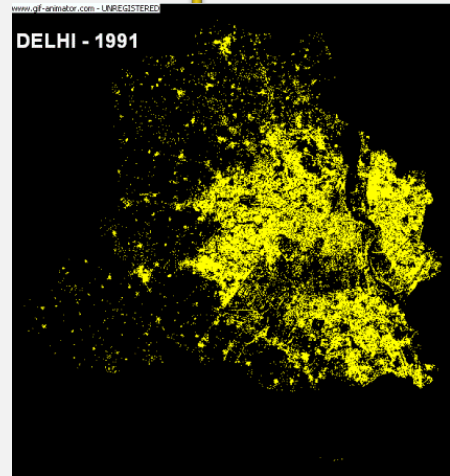
City Master Plans
Regional Plans
Infrastructure Monitoring
Urban Information System
Site Management and Inventory of Heritage Centres
Urban Growth Dynamics

Supporting AMRUT, Smart Cities, NUIS, NRCPB

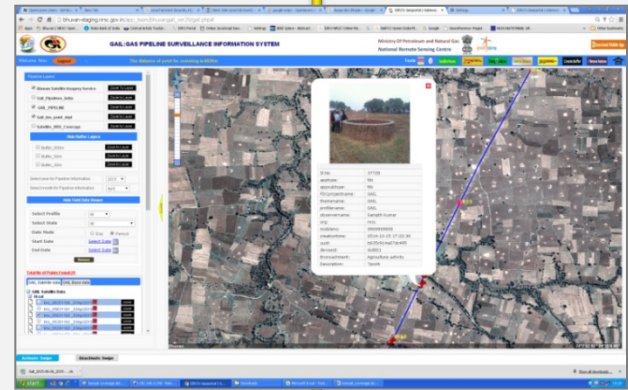
## 1: 4000 Database



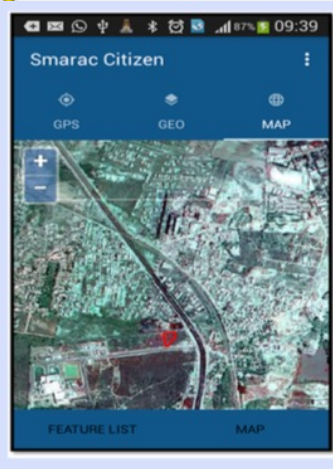
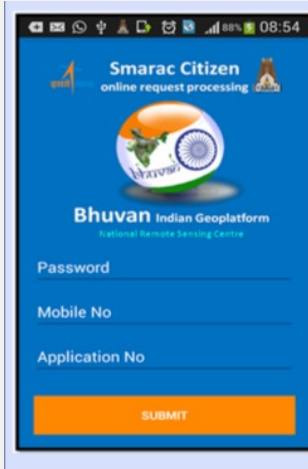
## Urban Growth Monitoring



## Pipe Line - Right of Use Monitoring



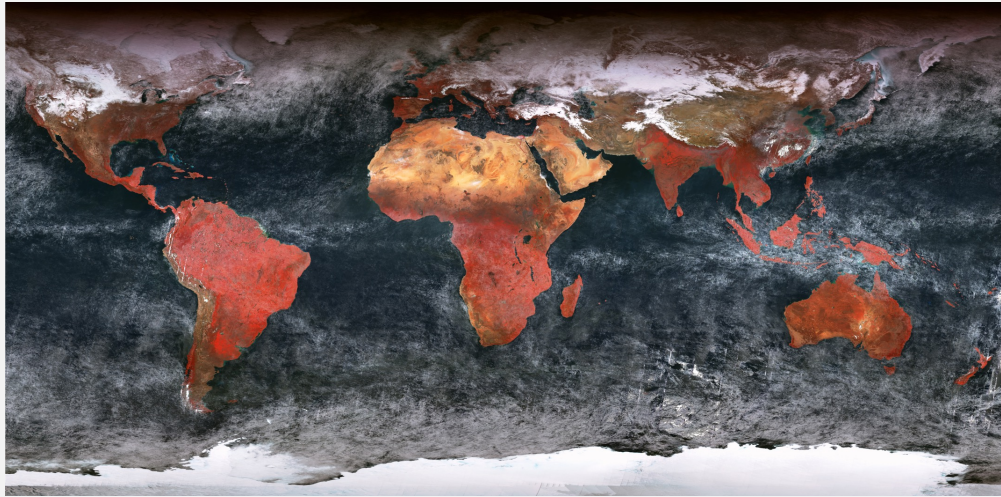
## Infrastructure Monitoring



SDG-1: End poverty, 3: healthy lives , 6: Access to water & sanitation, 8: Economic growth and employment, SDG-11: Make cities safe & sustainable, SDG-12: Sustainable production and consumption patterns,

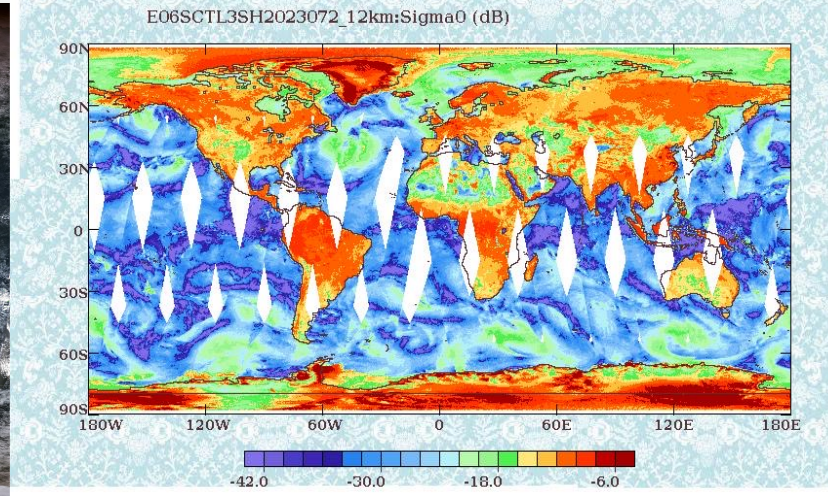
# EOS-06 (Oceansat -3)

- 2 days full Global data at 1km resolution ( systematic coverage)
- 2 days Local area coverage at 360m resolution
- Marching orbit : Glint free global coverage in 13 days



OCM – GAC

- ❖ Scatterometer-3 nominal mode provides 12.5 X 12.5 km grid for wind vector and high resolution mode provides 5 X 5 km grid size (experimental)



SCAT

- Data is made available through Bhoonidhi
- Free and open data to all
- Data within 180 min for SCATSAT & OCM < 1h
- Emergency planning within 8-10h and products within 1h

**The data is available through Bhoonidhi**

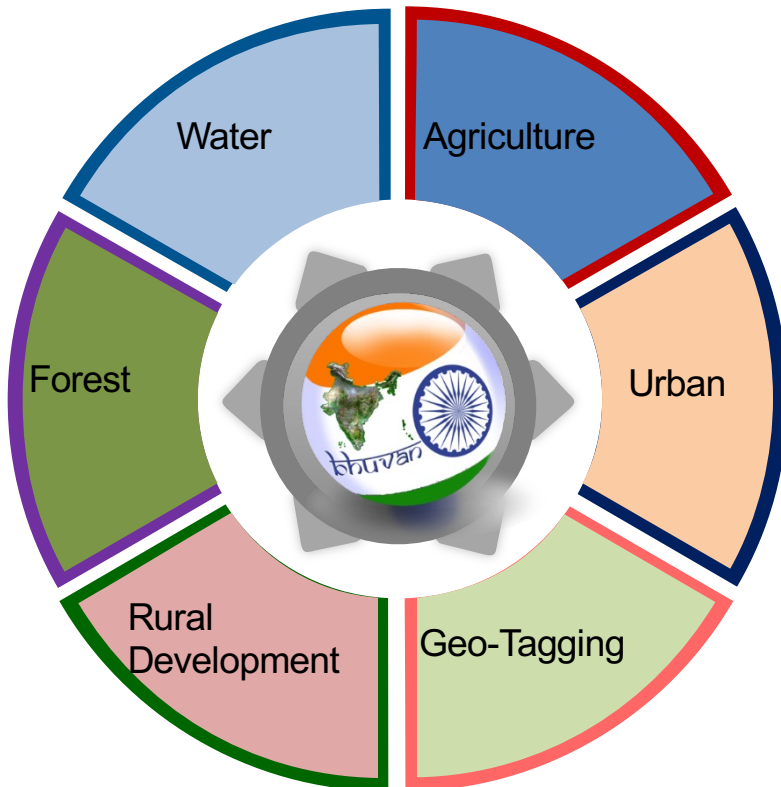
- Level-1 (Basic Data Products)
  - L1B : Radiance Product
  - L1C : Geo-referenced Product
- Level-2 Geophysical Parameters
  - ( Chlorophyll , Suspended sediments, Yellow-substance, AOD)



Bhuvan APPLICATIONS

- 100+ Apps
- 75+ Mobile Apps
- 1 m high resolution satellite data for entire India

### Major Bhuvan Application Sectors



Asset Mapping and Inventory Creation

Planning & Development

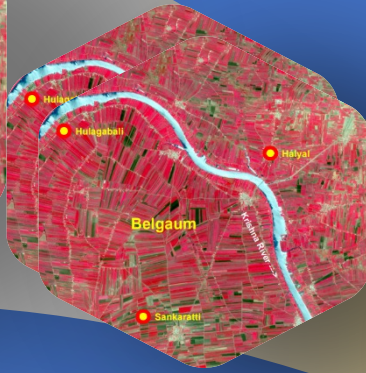
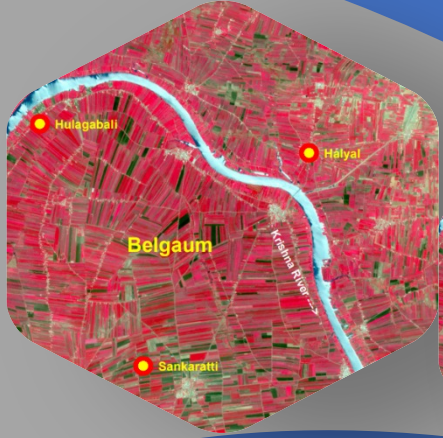
Evaluation of Program Activities

Sustainable Development of Land and Water Resources

Flagship Programs : Multi-Activity Support

Governance Functions

SI	NO	INDICATORS	SOURCE
1	2.4.1	Proportion of agricultural area under productive and sustainable agriculture	LULC
2	3.8.2	Number of people covered by health insurance or a public health system per 1,000 population	AB/NHRR
3	3.C.1	Health worker density and distribution	NHRR
4	6.3.2	Proportion of bodies of water with good ambient water quality	WBIS
5	6.5.2	Proportion of transboundary basin area with an operational arrangement for water cooperation	NHP
6	6.6.1	Change in the extent of water-related ecosystems over time	WBIS
7	7.1.1	Proportion of population with access to electricity	Suomi NPP
8	7.2.1	Renewable energy share in the total final energy consumption	AIML/S/W
9	9.1.1	Proportion of the rural population who live within 2 km of an all-season road	PMGSY
10	11.1.1	Proportion of urban population living in slums, informal settlements or inadequate housing	Mapping/AIML
11	11.3.1	Ratio of land consumption rate to population growth rate	Mapping/AIML
12	11.6.2	Annual mean levels of fine particulate matter (e.g. PM2.5 and PM10) in cities (population weighted)	NICES
13	11.7.1	Average share of the built-up area of cities that is open space for public use for all, by sex, age and persons with disabilities	Mapping/AIML
14	11.a.1	Proportion of population living in cities that implement urban and regional development plans integrating population projections and resource needs, by size of city	NUIS
15	15.1.1	Forest area as a proportion of total land area	LULC
16	15.3.1	Proportion of land that is degraded over total land area	LDM



# Thank You

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*nrsc*