Recent Applications of RESOURCESAT-2

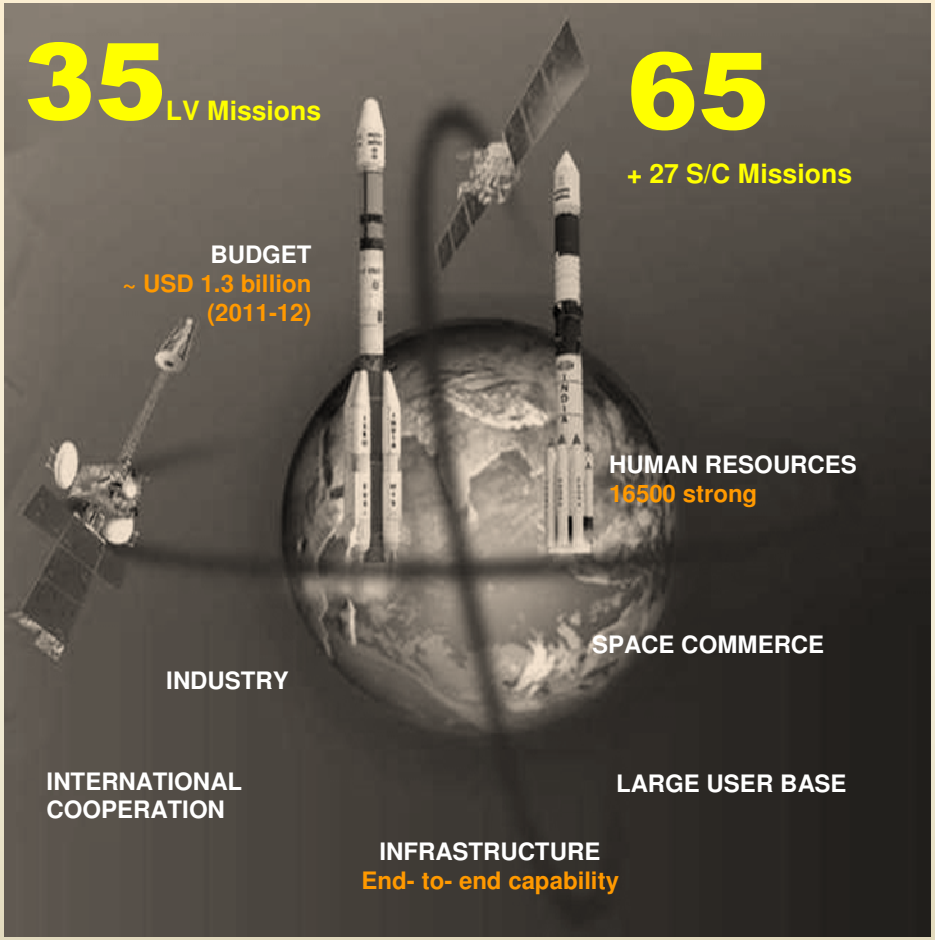
Presentation by Indian Delegation at the
49th Session of STSC-UNCOPUOS
Vienna - February 2012

Outline

- Space Programme in India
- Earth Observation Assets of India
- RESOURCESAT-2: Payloads
- Uniqueness of Indian EO Programme
- Recent Applications
  - Nation-wise periodic Land Use/ Land Cover mapping (using AWiFS data of RESOUCESAT-2)
  - Water Resources Information System (using LISS III data of RESOUCESAT-2)
  - Space-based Informaion Support for Decentralised Planning (using LISS IV data of RESOUCESAT-2)

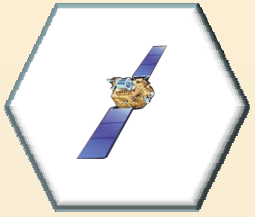
Space Programme in India

- Self reliance in space transportation, spacecraft operations
- Successful demonstration of space technology Applications
- Strong Institutional Mechanism to sustain the activities
- Steadfast International relations

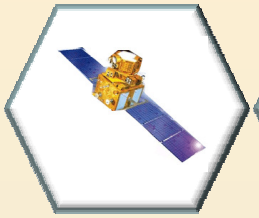


Earth Observation Assets of India

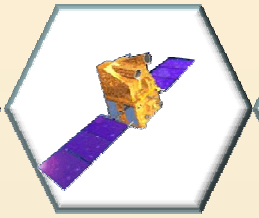
2002
KALPANA-1
VHRR



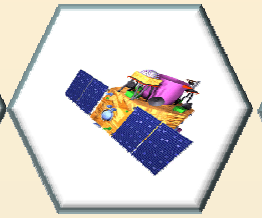
22.10.2001
TES
Step& Stare PAN



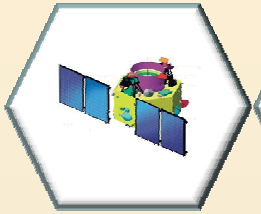
17.10.2003
RESOURCESAT-1
LISS 3 & 4; AWiFS



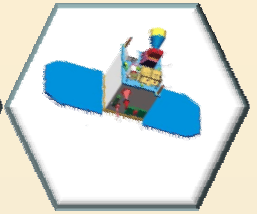
05.05.2005
CARTOSAT-1
PAN, F/A



10.01.2007
CARTOSAT-2
PAN



28.04.2008
CARTOSAT- 2A
PAN

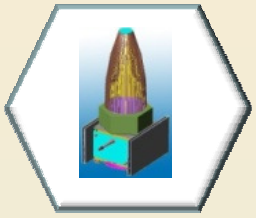


28.04.2008
IMS-1
HySI; Mx

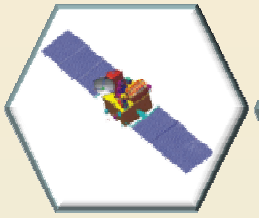
2003 I
NSAT-3A
VHRR,CCD

Aerial

Digital
Camera
Laser
Terrain
Mapper

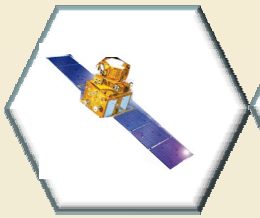


20.04.2009
RISAT-2
X-band SAR

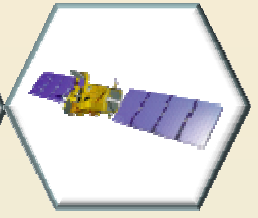


23.09.2009
OCEANSAT-2
OCM, SCAT; ROSA

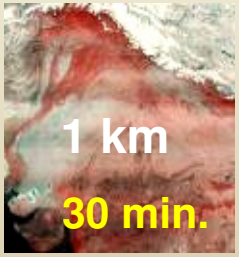
12.07.2010
CARTOSAT- 2B
PAN

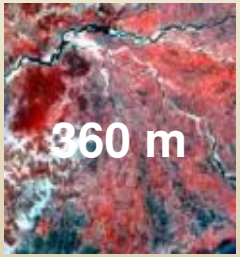


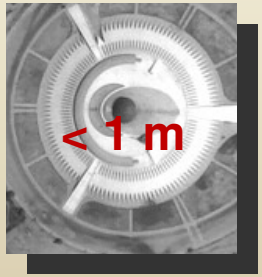
20.04.2011
RESOURCESAT-2
LISS 3 & 4; AWiFS



12.10.2011
MEGHATROPIQUES
MADRAS, SAPHIRE, SCARAB





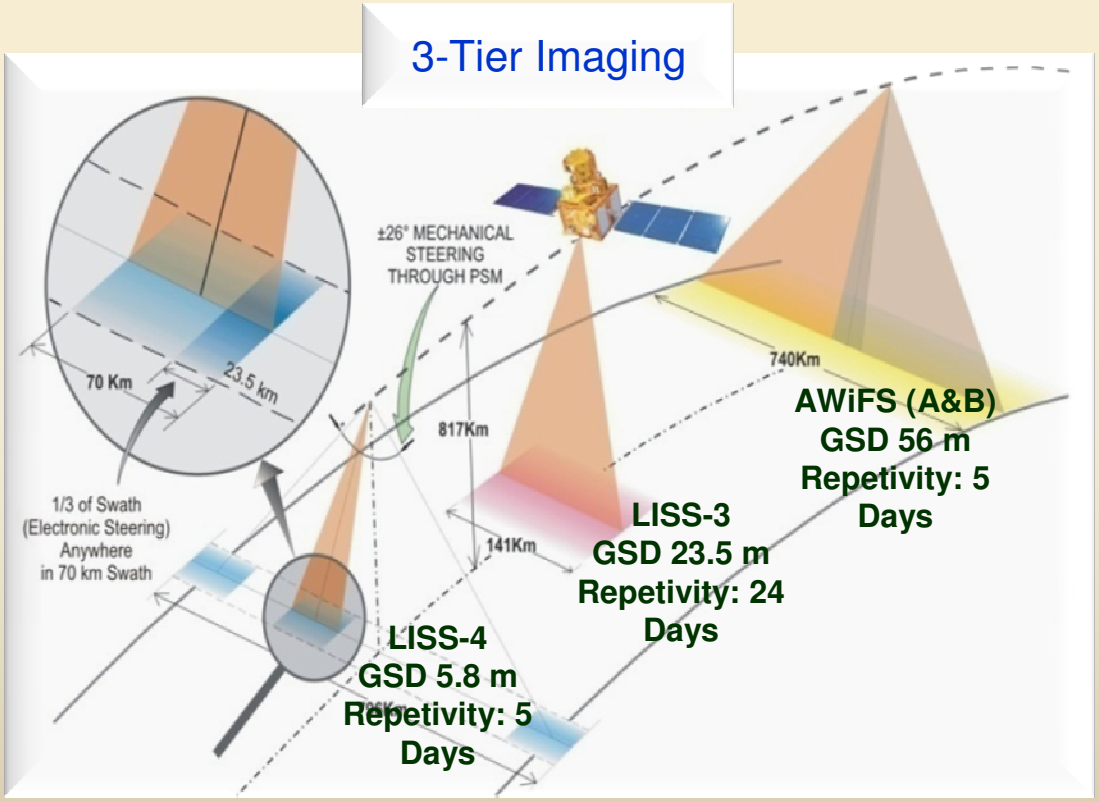


.to be augmented with RISAT-1, SARAL, INSAT 3D & GISAT

RESOURCESAT-2

PSLV-C 16: 3 Satellites in a single mission, with YOUTHSAT & X-SAT

Lift-off: April 20, 2011 [10.12 Hrs IST]



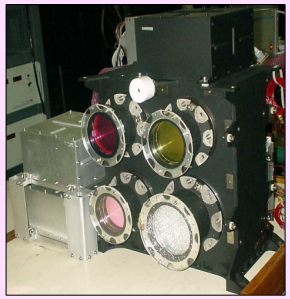
RESOURCESAT-2: Payloads

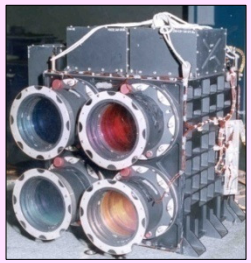
AWiFS

Swath: 740 km

Spectral Bands: 0.52-0.59; 0.62-0.68; 0.77-0.86; 1.55-1.70 um

Quantization: 12 bit (as against 7 in R-1)



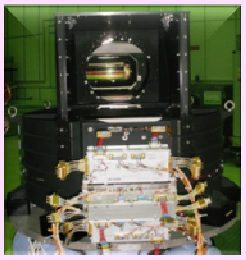


LISS-3

Swath: 140 km

Spectral Bands: 0.52-0.59; 0.62-0.68; 0.77-0.86; 1.55-1.70 um

Quantization: 10 bit (as against 7 in R-1)



LISS-4

Swath: 70 km

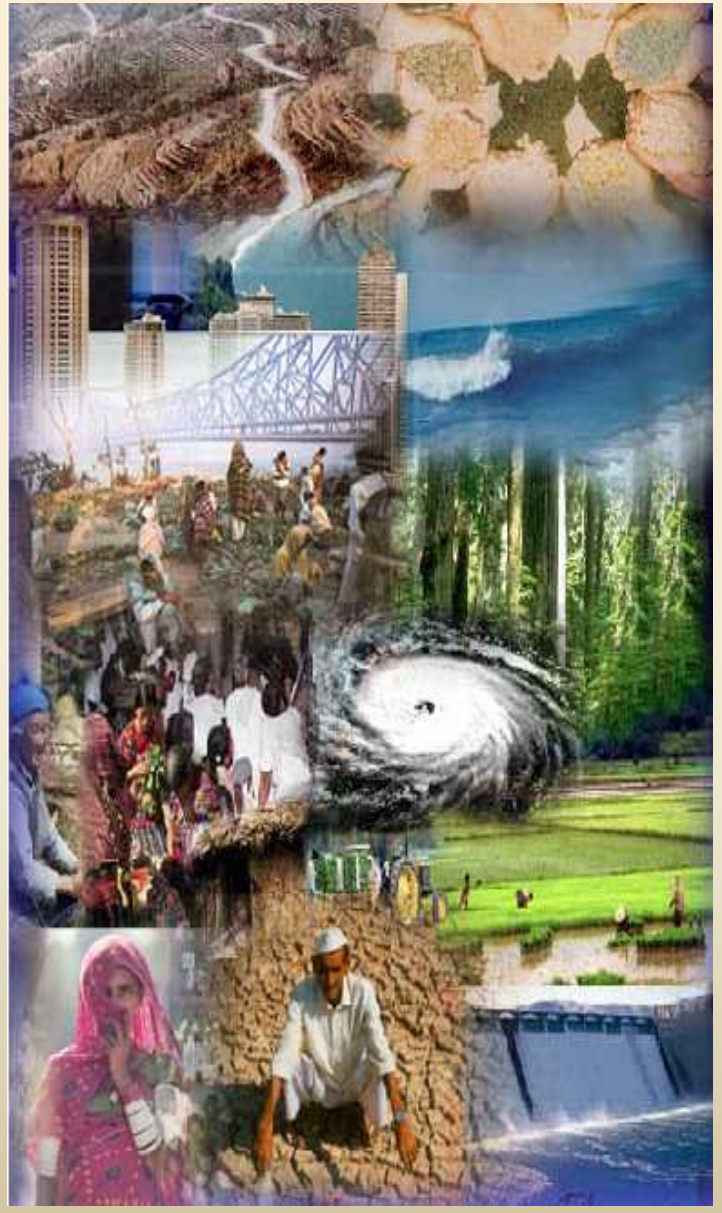
Spectral Bands: 0.52-0.59; 0.62-0.68; 0.77-0.86 um

Quantization: 10 bit (as against 7 in R-1)

AIS: A New Payload from COMDEV, Canada for automatic identification of ships

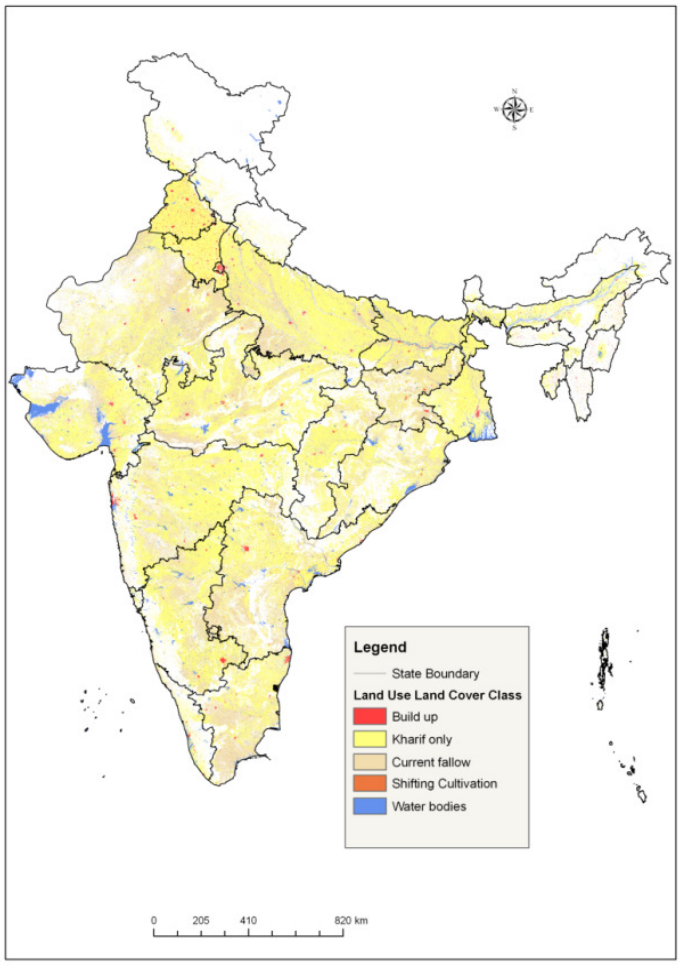
Indian EO Programme: The Uniqueness

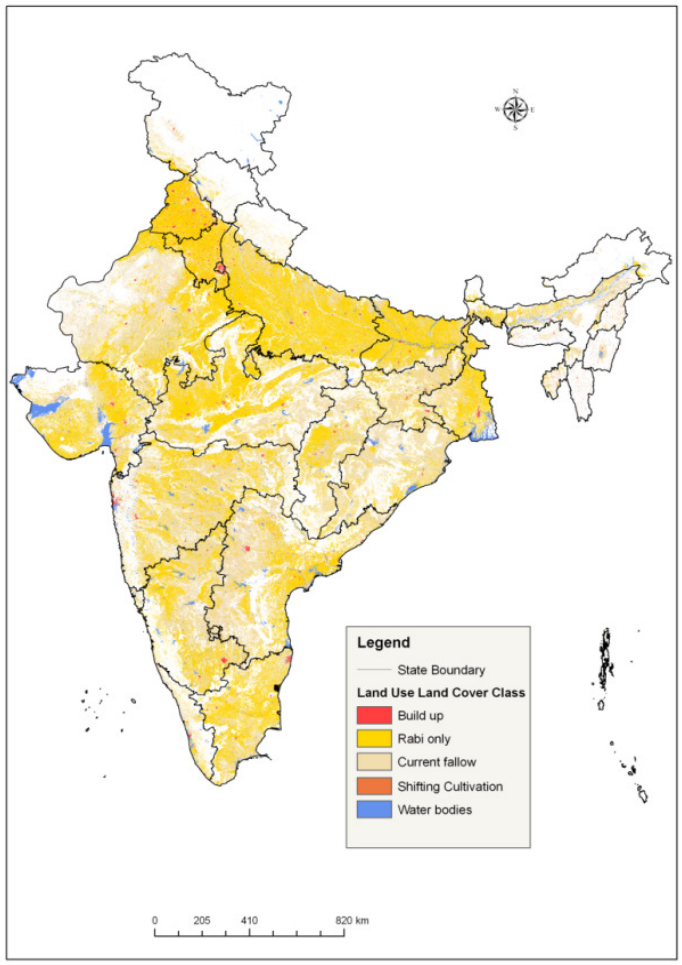
- Vibrant Space Segment: Constellation of Satellites
  - Resourcesat, Cartosat, Oceansat
- Strong Ground Mechanisms
  - Institutional Framework: NNRMS…
  - Ground support: Enabling techniques
- Diversity of Applications
  - Natural Resources: Land & Water
  - Infrastructure building: Physical & Social
  - Livelihood support: PFZ, Bharat Nirman
  - Disaster Management
- Addressing nation's developmental priorities



Land Use and Land Cover Mapping using AWiFS

7th Cycle : 2010-11 Crop Year





S.No	State / UT	Kharif	Rabi
1	ANDAMAN & NICOBAR	0.56	0.00
2	ANDHRA PRADESH	101.28	63.85
3	ARUNACHAL PRADESH	1.93	1.47
4	ASSAM	25.69	7.90
5	BIHAR	53.15	53.46
6	CHATTISGARH	52.20	27.48
7	DELHI	0.53	0.45
8	GOA	0.90	0.42
9	GUJARAT, DNH,DD	74.88	59.56
10	HARYANA	35.41	30.86
11	HIMACHAL PRADESH	3.85	1.72
12	JAMMU & KASHMIR	7.84	2.94
13	JHARKAND	19.47	16.03
14	KARNATAKA	85.29	55.16
15	KERALA	8.09	4.30
16	LAKSHADWEEP	0.00	0.00
17	MADHYA PRADESH	126.65	110.72
18	MAHARASTRA	149.57	77.17
19	MANIPUR	1.98	0.11
20	MEGHALAYA	2.73	0.31
21	MIZORAM	0.87	0.08
22	NAGALAND	1.91	0.62
23	ORISSA	51.22	20.14
24	PANJAB & CHADIGARH	0.23	0.20
25	PONDICHERRY	40.08	37.32
26	RAJASTHAN	100.36	95.90
27	SIKKIM	0.80	0.54
28	TAMIL NADU	41.50	53.11
29	TRIPURA	2.47	0.91
30	UTTAR PRADESH	136.46	147.86
31	UTTARAKHAND	6.26	2.94
32	WEST BENGAL	49.67	35.28
	Total	1183.80	908.82

- Six cycles of annual assessment completed i.e 2004-2010
- in season NSA assessment is completed for Kharif and Rabi 2010-2011

Water Resources Information System (India WRIS)

To address challenges in water sector the ultimate requirement is an information system having four elements: (i) Data Collection; (ii) Data storage, analysis, transformation into user-friendly format; (iii) Geo-visualisation & Decision Making; and (iv) Information Dissemination at Public domain

Source: www.india-wris.nrsc.gov.in

Major Objectives
• India-WRIS S/w, Metadata, Database (30 spatial layers under 5 major groups) • Basin-wise reports • Watershed atlas of the country • Infrastructure development at CWC • Capacity building of CWC manpower

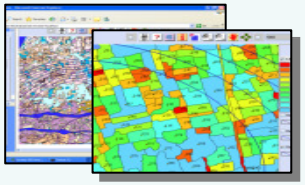
Water Resources Information System (India WRIS)

SL. NO.	Main Information System	Sub Information System, Spatial layers and attributes
I.	BASE DATA INFO SYS	Administrative
❖		Infrastructure
❖		Terrain
II.	SURFACE WATER INFO SYS	
1		Water Resource Region Info Sys
2		Basin Info Sys
3		Watershed Info Sys
4		River Info Sys
5		Surface Water Body
6		Water Resources Projects Info Sys
7		Command Area Info Sys
8		Minor Irrigation Info Sys
9		Canal Info Sys
III.	GROUND WATER INFO SYS	
10		Aquifer / Litholog Info Sys
11		Ground Water Level Info Sys
12		Ground Water Potential Info Sys
IV.	HYDRO – MET INFO SYS	
13		Meteorological Info Sys
14		Climate Info Sys
15		Hydro-Observation Info Sys
V.	WATER QUALITY NFO SYS	
16		Surface Water Quality Info Sys
17		Ground Water Quality Info Sys
VI.	SNOW COVER / GLACIER INFO SYS	
18		Snow Cover/Glacier Info Sys
VII.	INLAND NAVIGATION WATERWAYS INFO SYS	
19		Inland Navigation Waterways Info Sys
VIII.	INTER-BASIN TRANSFER LINKS INFO SYS	
20		Inter-basin Transfer Links Info Sys
IX.	HYDRO - MET EXTREMES INFO SYS	
21		Flood Info Sys
22		Drought Info Sys
23		Extreme Events Info Sys
X.	LAND RESOURCES INFO SYS	
24		Land Use / Land Cover Info Sys
25		Land Degradation Info Sys
26		Wasteland Info Sys
27		Soil Info Sys
XI.	WATER TOURISM INFO SYS	
28		Water Tourism Info Sys
XII.	SOCIO – ECONOMIC INFO SYS	
29		Rural Info Sys
30		Urban Info Sys

Water Resources Information System (India WRIS)

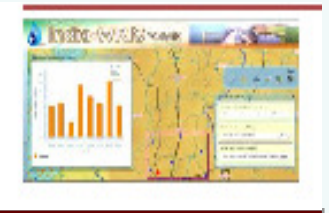
Facilities in India-WRIS

Mapping Tools



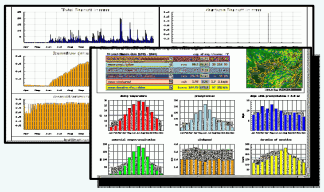
Standard and Customizable Maps

Analysis Tools



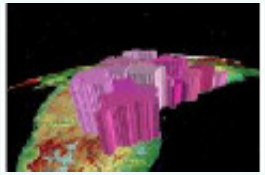
Multi-layer data analysis

Data Visualization Tools



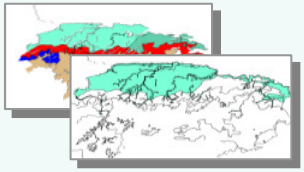
Graphs and figures for visual perception

3D Display



Advanced features like Terrain view, fly through and measurements over terrain

Query and Discovery Tools

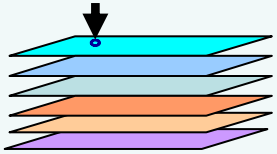


Ability to perform advance searches

Metadata / Info Tools

Directory of projects, their works and outcomes

Contextual Tools



Vertical & horizontal context characteristics

Reporting Tools

Standard and customizable reports for selected areas, time periods and subjects

Space-based Information Support for Decentralized Planning (SIS-DP)

Planning at Grassroots Level
(Geospatial Tech. as enabler)

GeoICT Operational Solutions
(Convergence of RS + GIS + GPS + IT)

Multi Model Dissemination
(Web, Standalone, Atlas)

Single State Level Repository
(Easy Updation, Maintenance)

Local Language Interface

Single Window
(Quick Decision Making)

All information in Consistent Framework

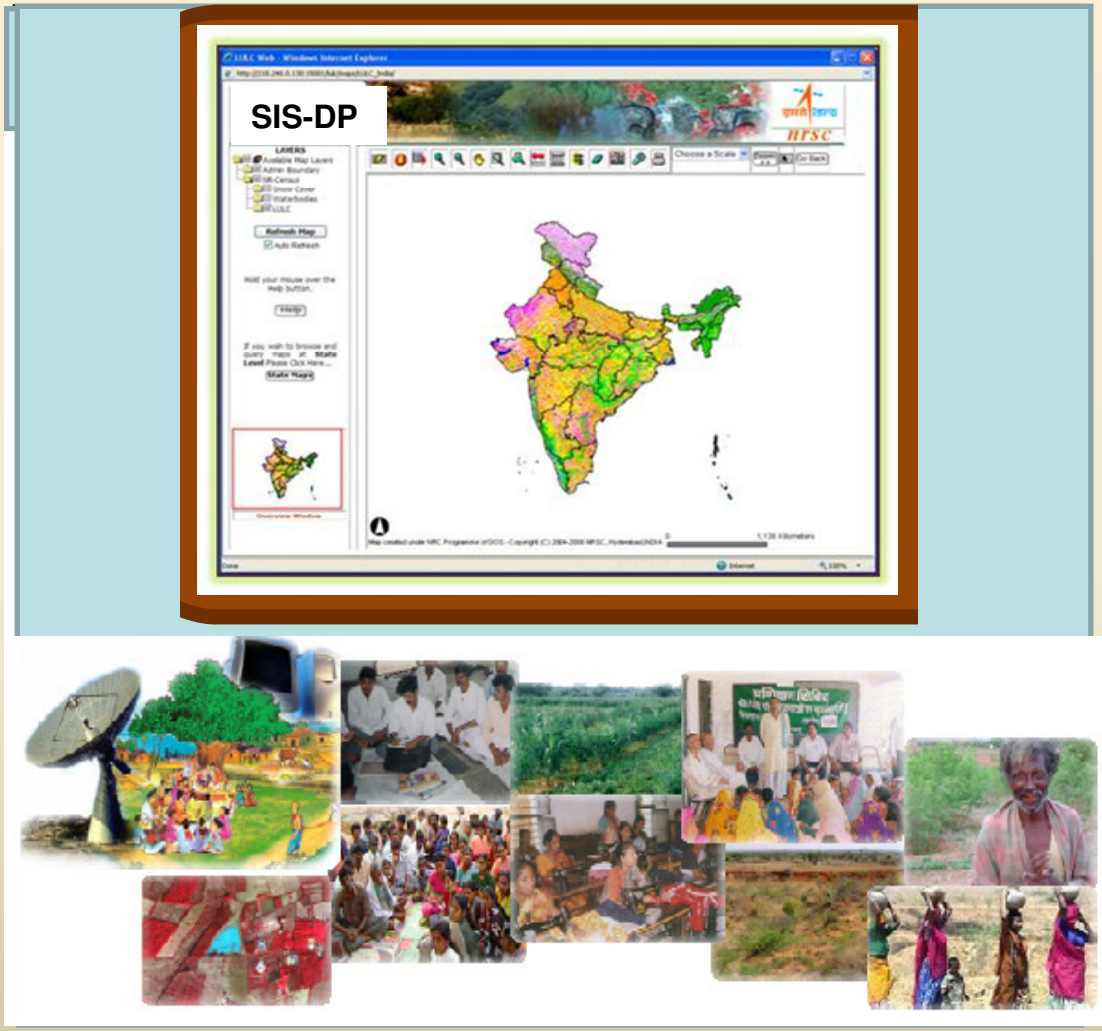
Inclusive Approach
(Lead by State along with Panchayat Raj, SRSAC, Partners, Knowledge Centres)

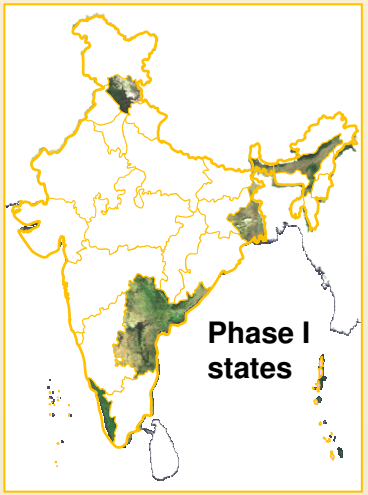
Space-based Information Support for Decentralized Planning (SIS-DP)

ICT enabled geospatial platform using space based data for planning & carrying out developmental activities in a decentralized and speedy manner involving local bodies

Objectives

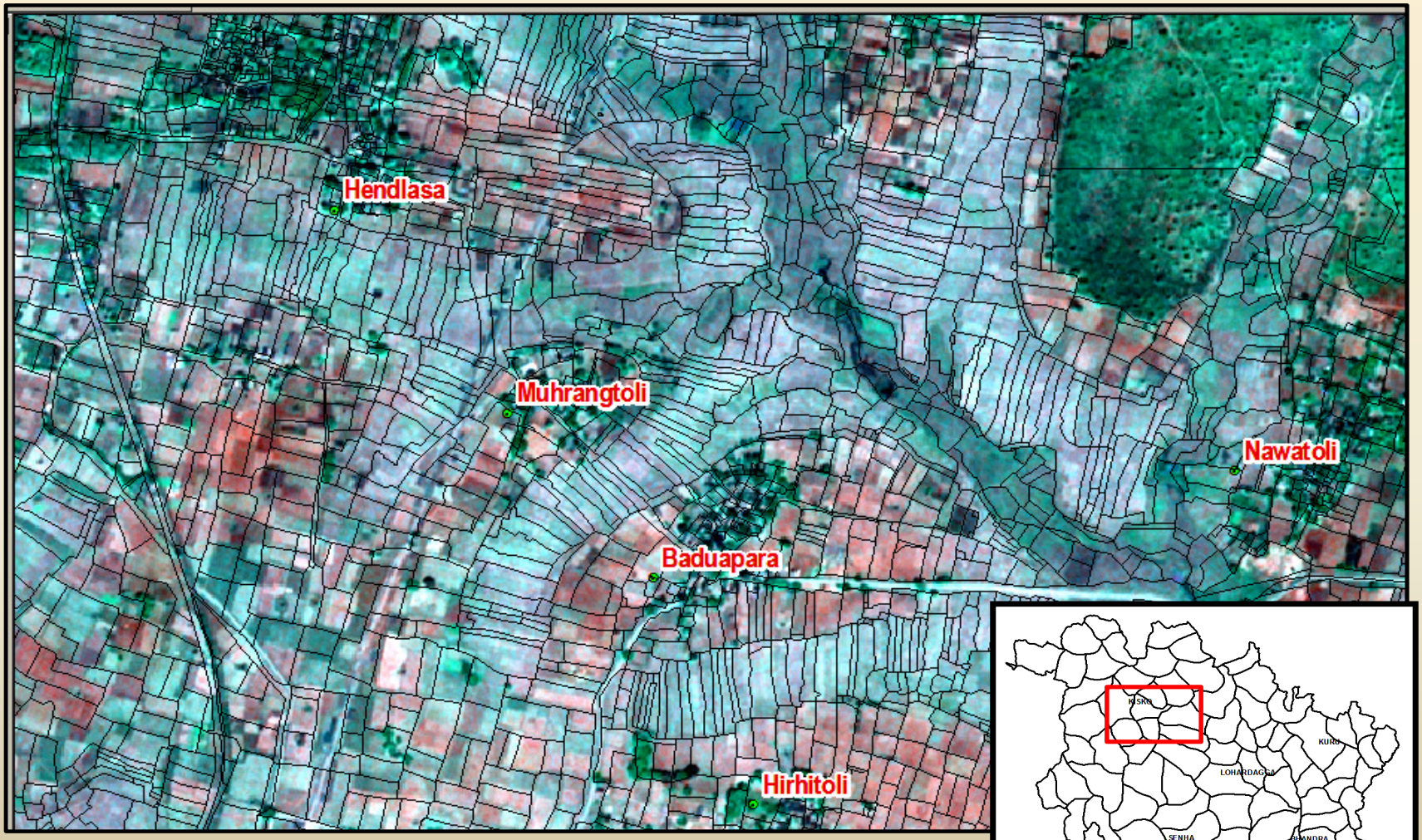
- Mapping at 1:10k scale
- Integrating with existing database
- Linking stake holding departments data,
- Development of information system for the state/ district towards developmental plan preparation
- Capacity building





Space-based Information Support for Decentralized Planning (SIS-DP)

Cadastral overlay on Cartosat – 1 Pan and LISS-IV Mx merged imagery - Natural Colour Compsite

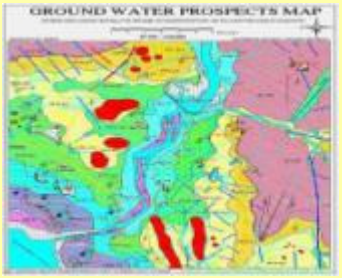


LOHARDAGA DISTRICT, JHARKHAND STATE

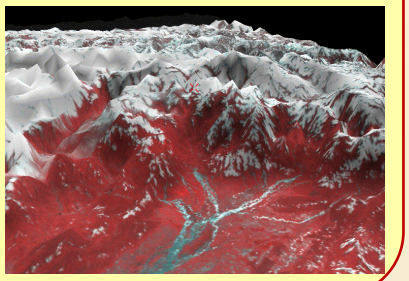
Application Projects in Diversified areas

Agriculture

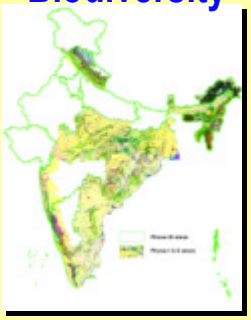
Drinking Water



Snow & Glaciers



Biodiversity



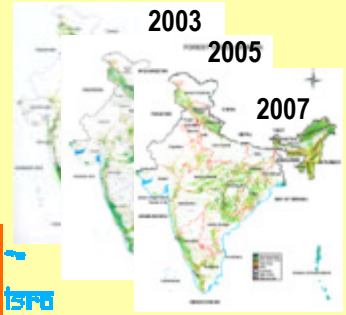
Coastal Studies

Watershed Dev.

Urban Info. System

Wasteland Monitoring

Forestry



Monitoring Irrigation Infrastructure