

High Resolution Imaging Applications in India



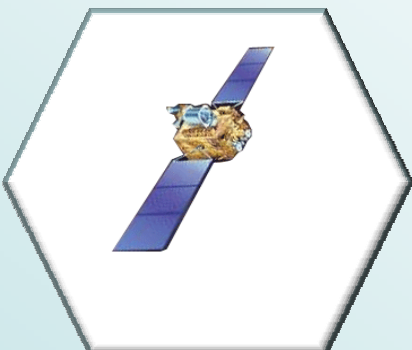
Presentation by Indian Delegation to 48th STSC-UNCOPUOS

February 17, 2011 - Vienna

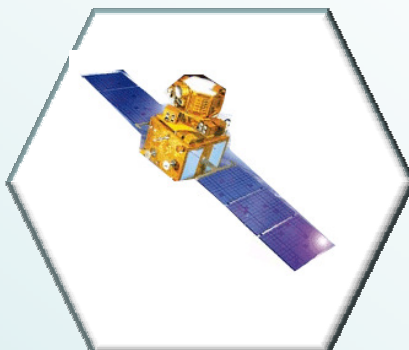
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 - **Archaeology**

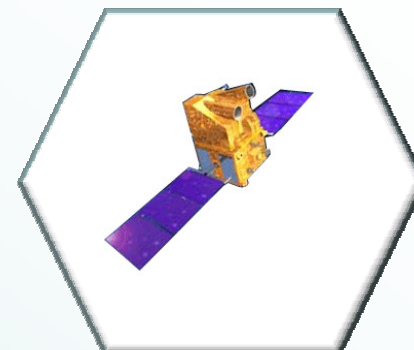
Indian High Resolution Imaging Capability



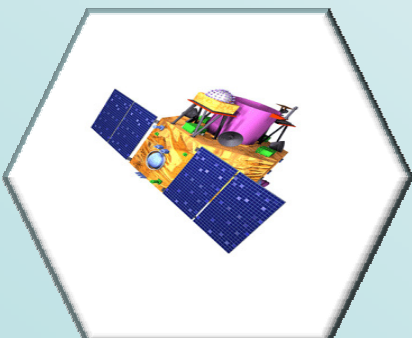
22.10.2001
TES
Step& Stare PAN



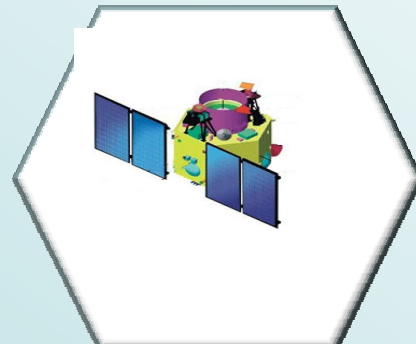
17.10.2003
RESOURCESAT-1
LISS 3; LISS 4; AWiFS



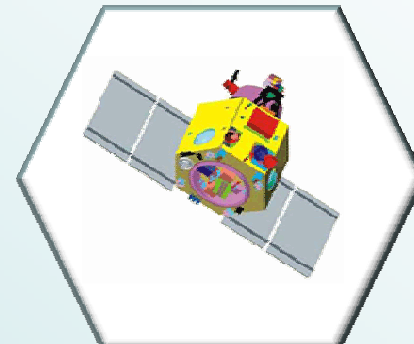
05.05.2005
CARTOSAT-1
PAN, F/A



10.01.2007
CARTOSAT-2
PAN



28.04.2008
CARTOSAT- 2A
PAN



12.07.2010
CARTOSAT- 2B
PAN

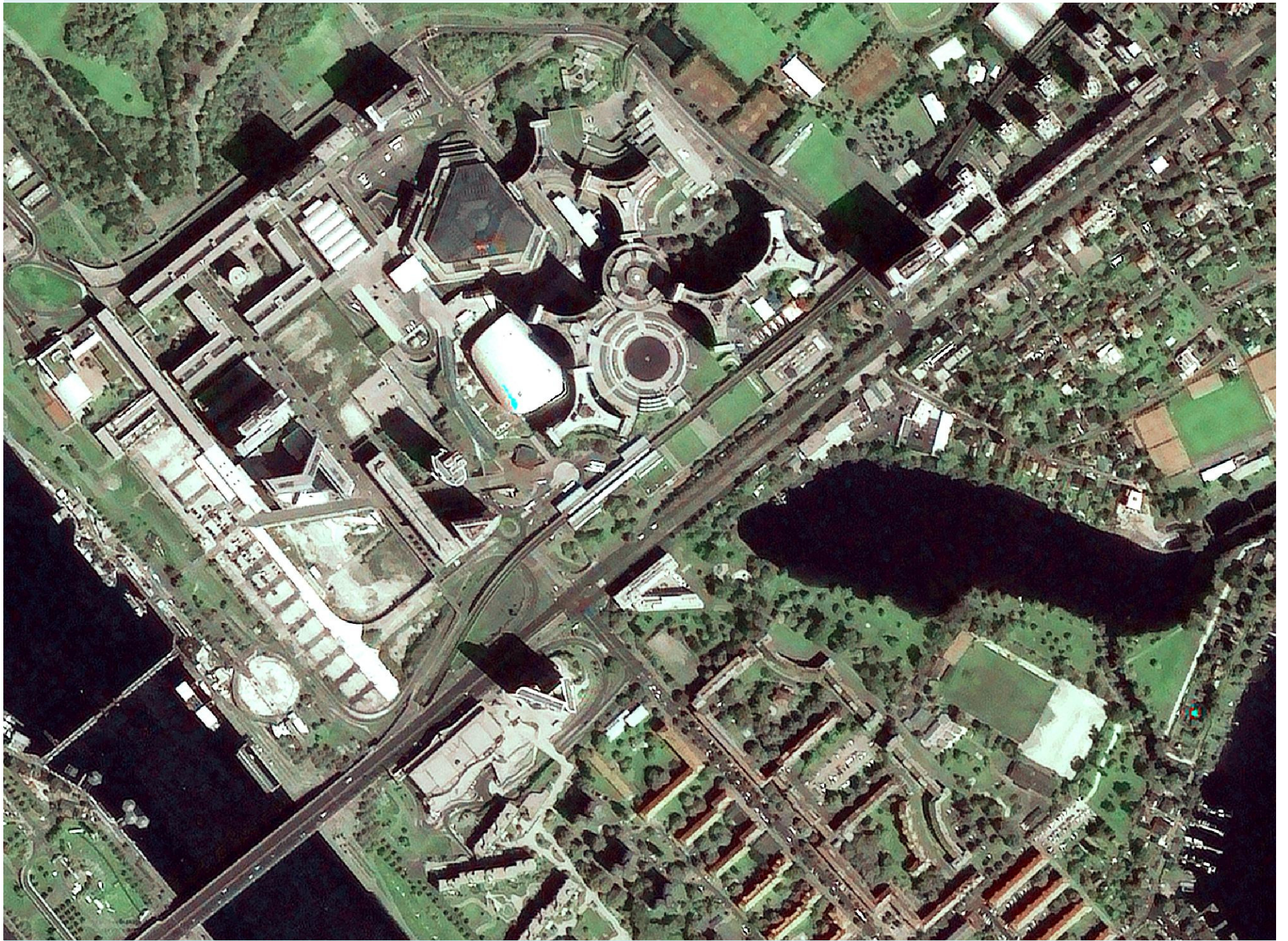
Aerial



**Digital Camera
Laser Terrain Mapper**

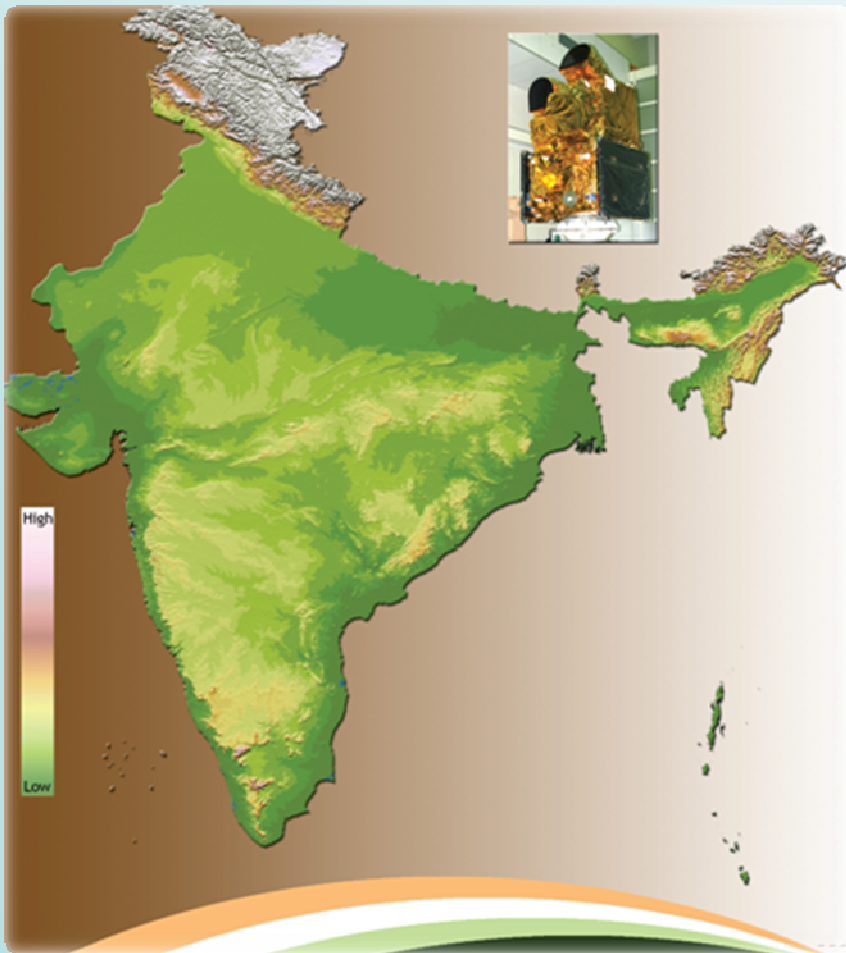
A few High Resolution Images





CartoDEM: National DEM from Cartosat -1 Stereo data

- ❑ Surface model of elevation covering Indian mainland; referenced to the WGS84 ellipsoid datum
- ❑ Accuracies: 8 m Vertical & 15 m Horizontal at 90 – 95 % C.I.
- ❑ > 80% of area covered



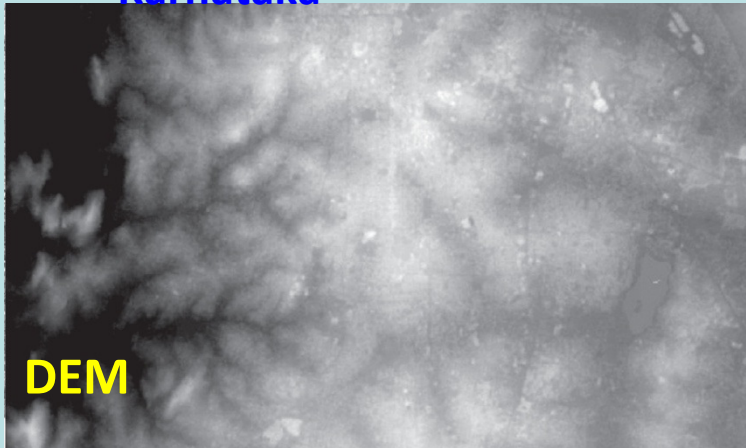
CartoDEM applications:

- Contour generation
- Drainage network analysis
- Quantitative analysis of run-off & soil erosion
- Volume-area calculations
- Design of hydraulic structures
- Design of new road, rail & pipeline alignments
- Watershed planning
- Urban utility planning
- Landslide zonation
- River configuration studies & flood proofing
- Fly through visualization

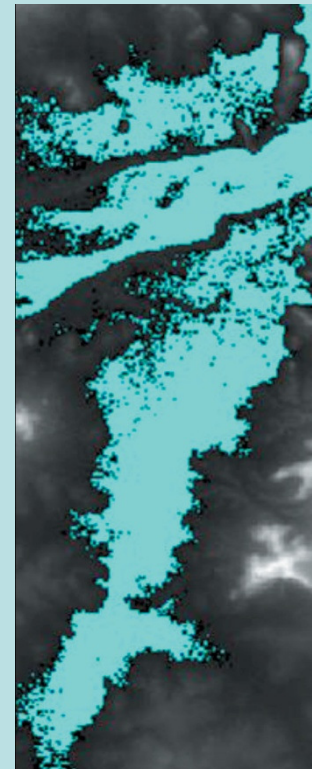
CartoDEM : Applications

Bangalore
Karnataka

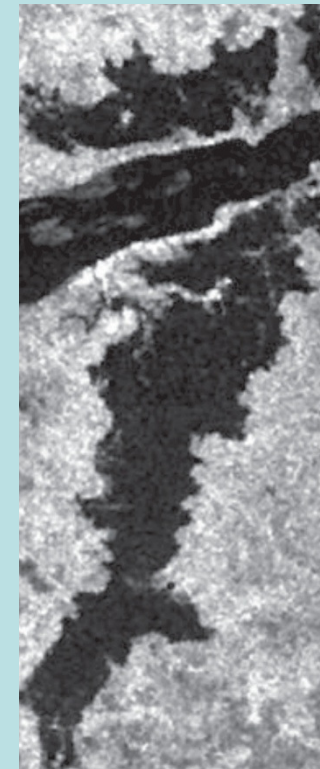
city,



Mahanadi river basin



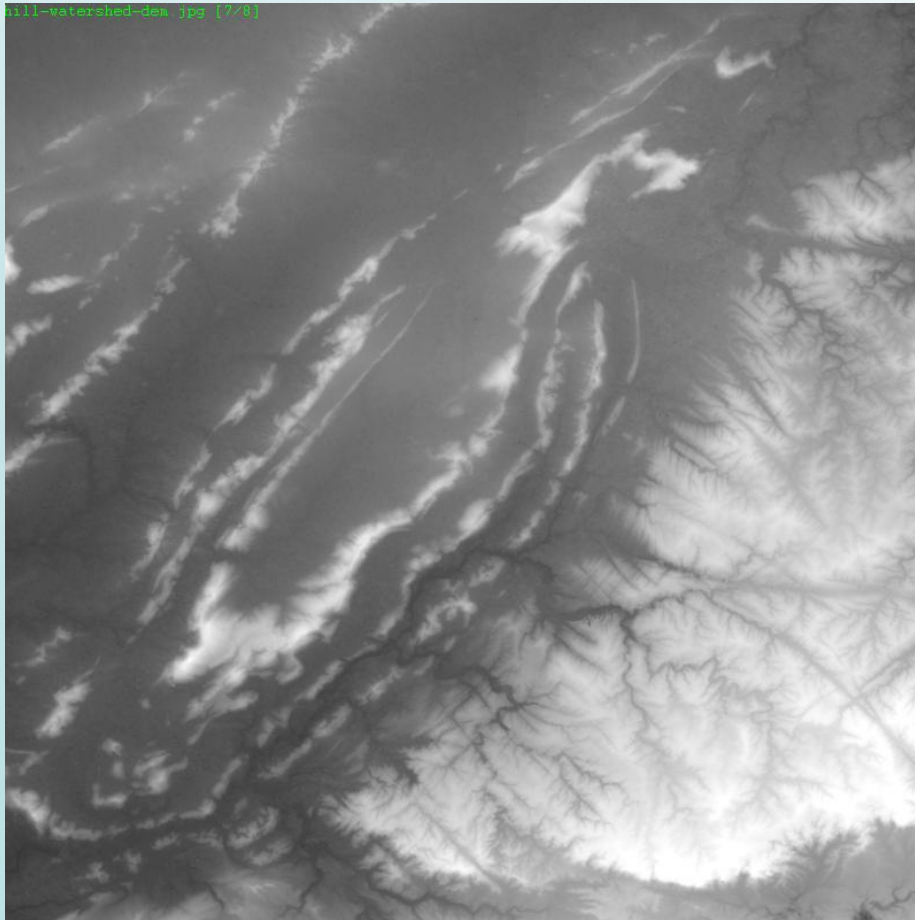
Simulated
flooded
area using
CartoDEM



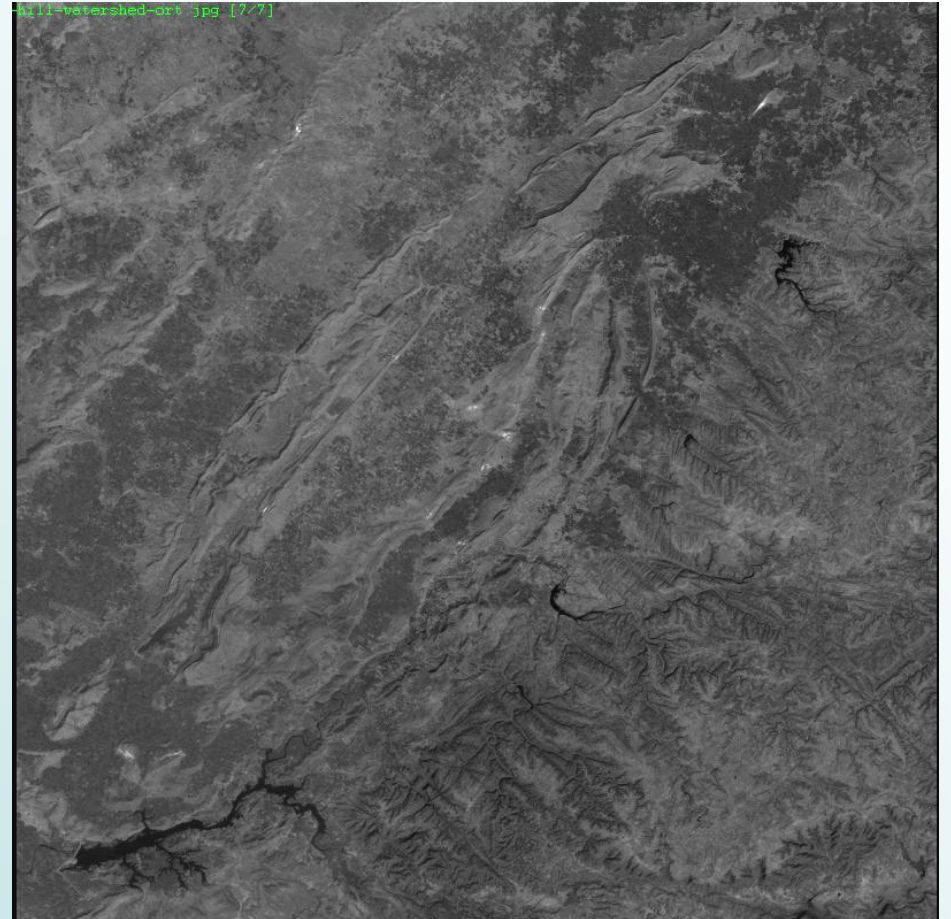
actual flood
inundated
area in SAR
data

CartoDEM and Orthoimage of a hilly terrain Rajasthan

hill-watershed-dem.jpg [7/8]

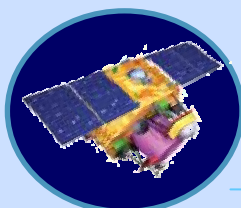


hill-watershed-ortho.jpg [7/7]

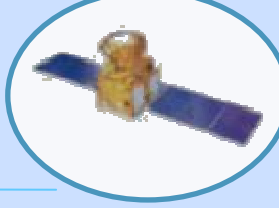


Space based Information Support for Decentralized Planning

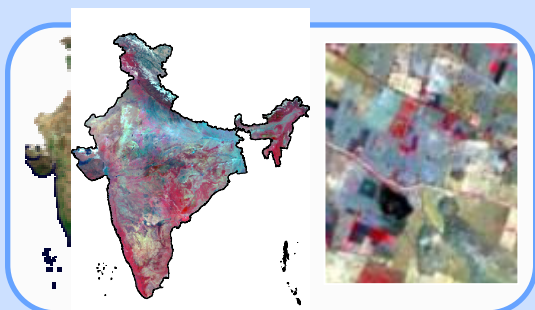
Use of High Resolution satellite data & ICT to support speedy and accurate planning at Panchayat level



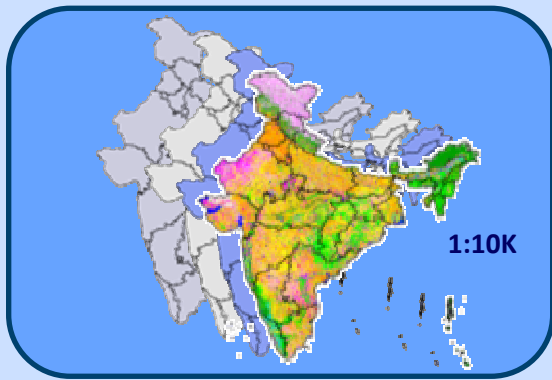
Cartosat 1/2
Stereo Data



Resourcesat 1
L4 MX



Orthorectified
1:10K co-registered image



Land cover / Roads / Settlement/ Slope

Space Based
Information Support
for Decentralized
Planning

SIS-DP Objectives

- Land & water resources information at Cadastral level
- Tools for user driven applications for speedy, accurate decision making;
- Dissemination & Capacity building

Geo-rectified
composite map with cadastral
boundaries



Input spatial / attribute data from user department

Ponds, Wells, Water harvesting
Structure Health Centres, Educational
Institutes,, Watershed development
Marketing yards, Power Grid , REC,
Forest , Animal Husbandry, Cottage
industries, Disaster Management, etc.

Link

Scale
Based
Rendering

Overlay



Cadastral Data

- Land use/Land cover Mapping – Level III
- Soil Mapping
- Land Degradation Mapping
- Groundwater Prospect Mapping
- Vegetation Cover Mapping
- Wetland Mapping
- Snow and Glaciers Mapping
- Watershed boundaries

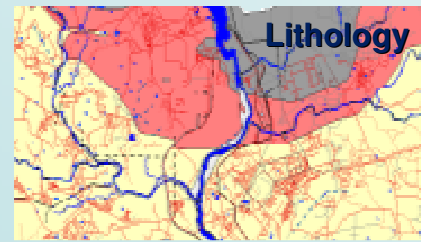
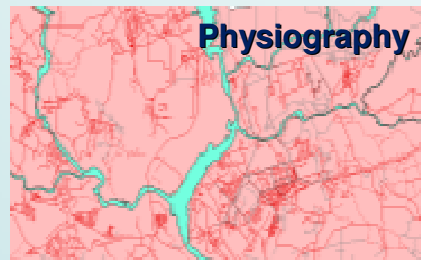
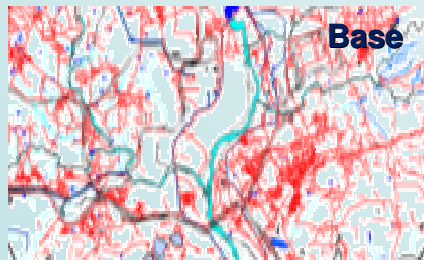


1: 50K
2005-06

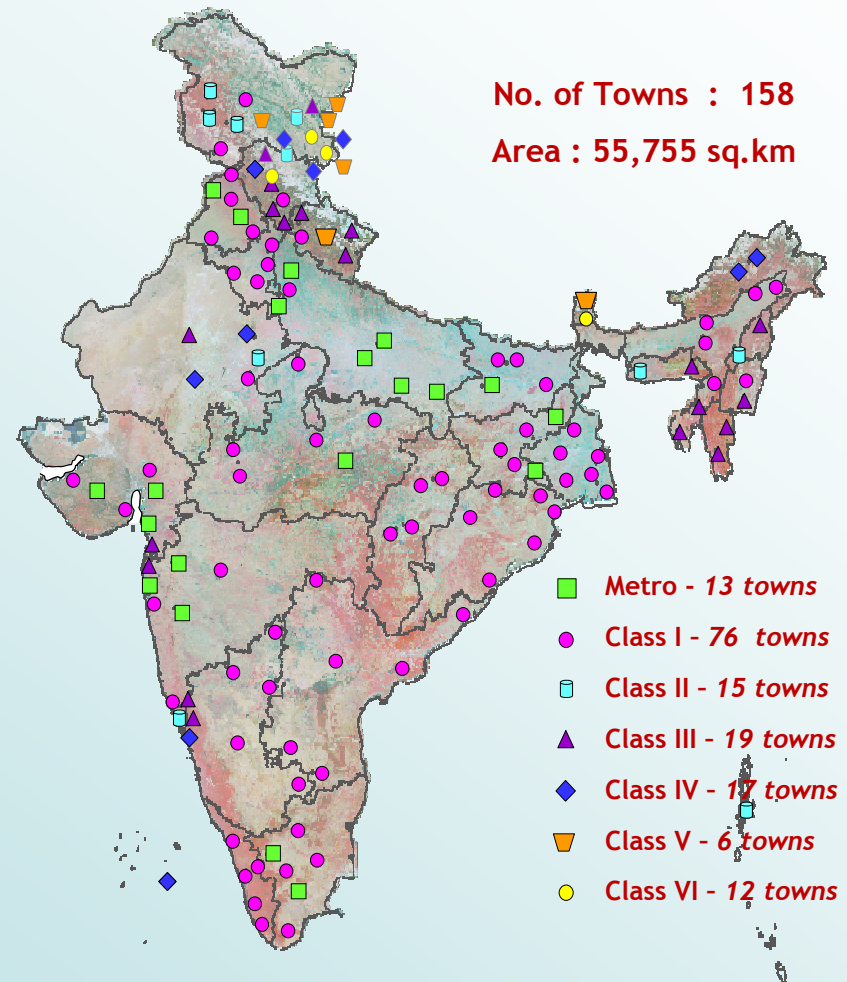
NR Census (available)

NUIS: National Urban Information System

- Multi scale (10K, 2K,1K) hierarchical Urban Geospatial database
- For supporting Urban Planning, Infrastructure development, e-governance.



Towards administering Towns/ Cities in a Scientific Manner



NUIS Applications

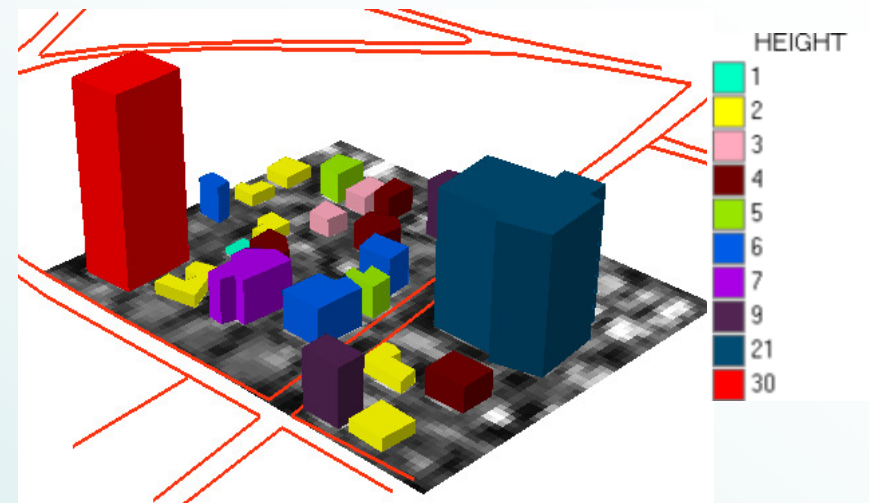


**CARTOSAT-2 PAN + LISS-IV MX
HYDERABAD**

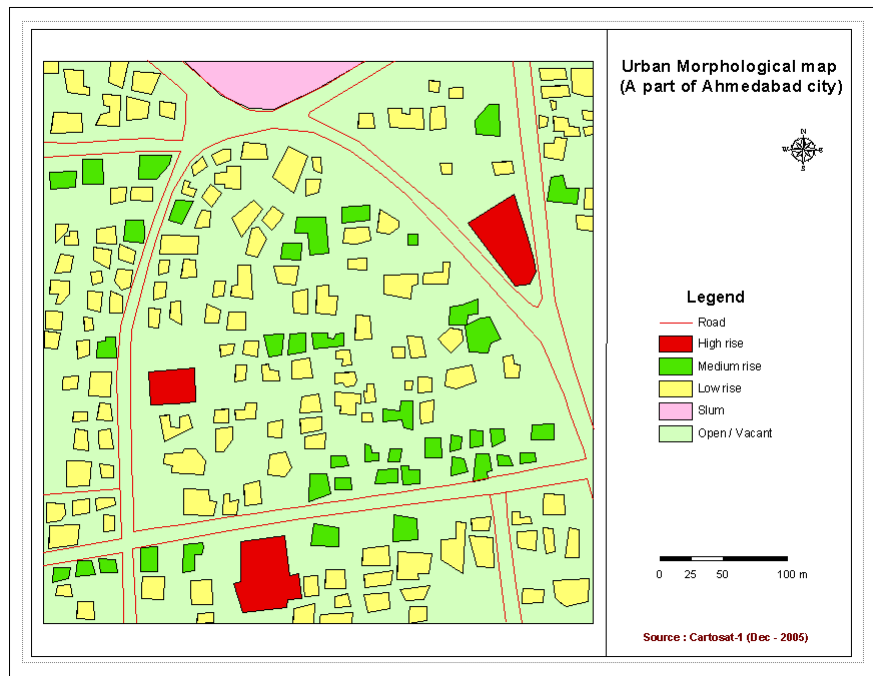
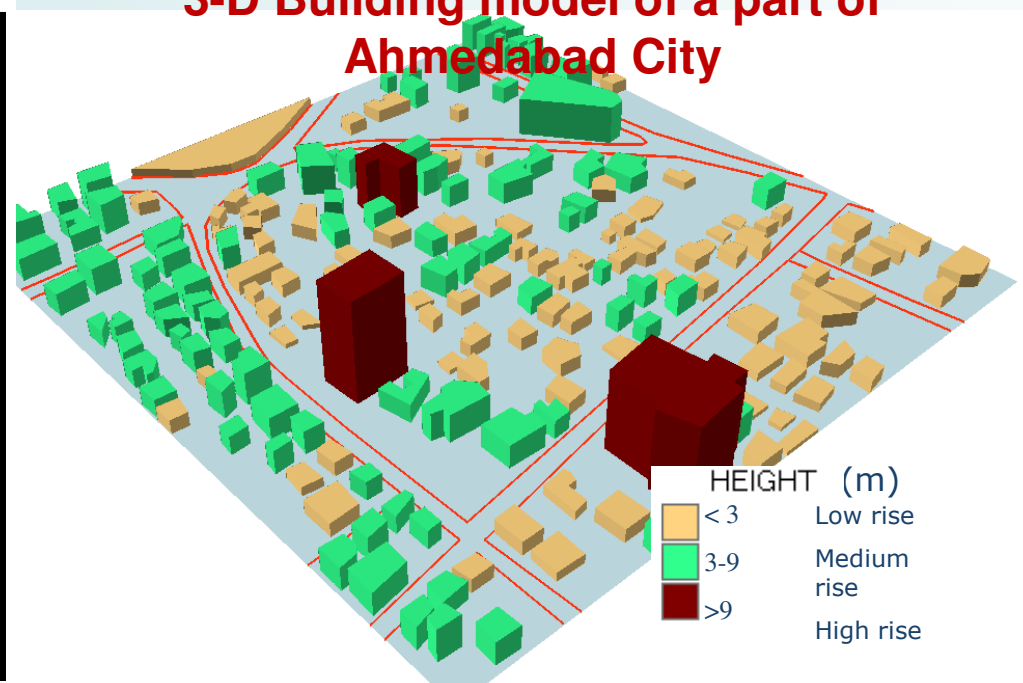
Urban Morphological Mapping

1. To detect and delineate various typologies of urban structures using both normal and stereo data employing visual and digital analysis.
2. To prepare a detailed urban morphological map at large scale using orthoimage.

Building Height derived using Stereo

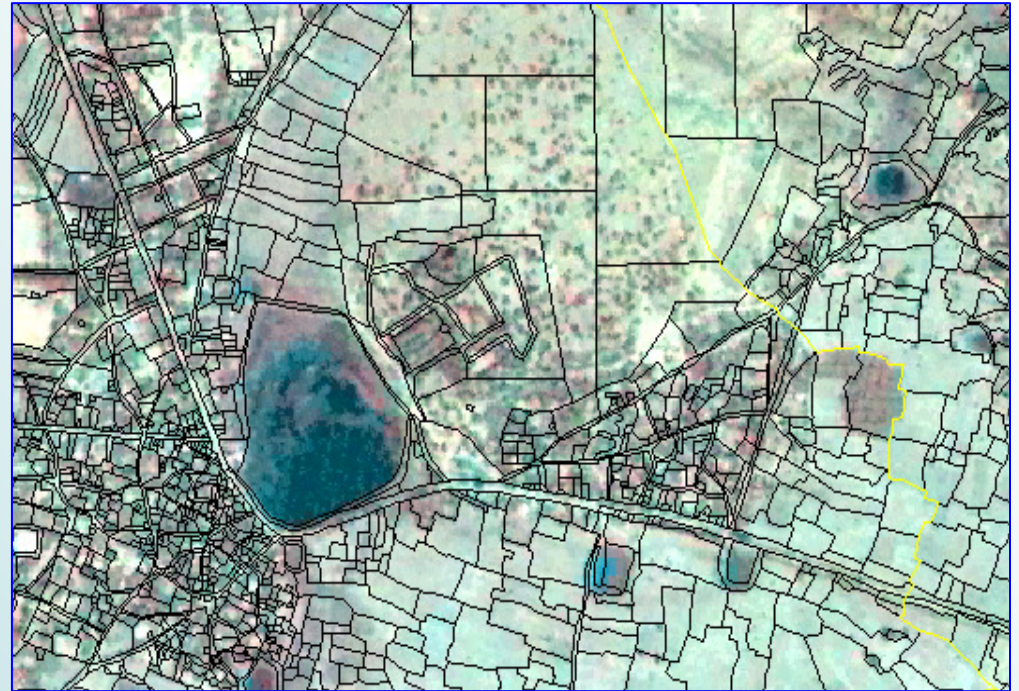
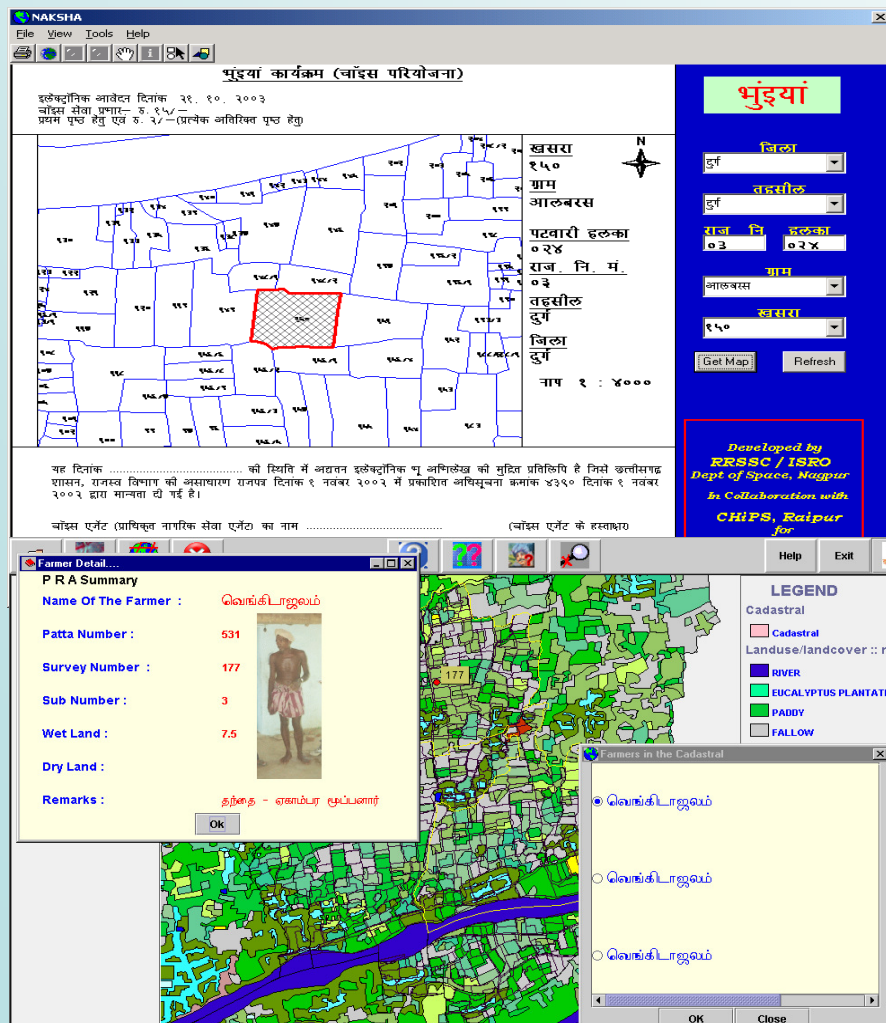


3-D Building model of a part of Ahmedabad City



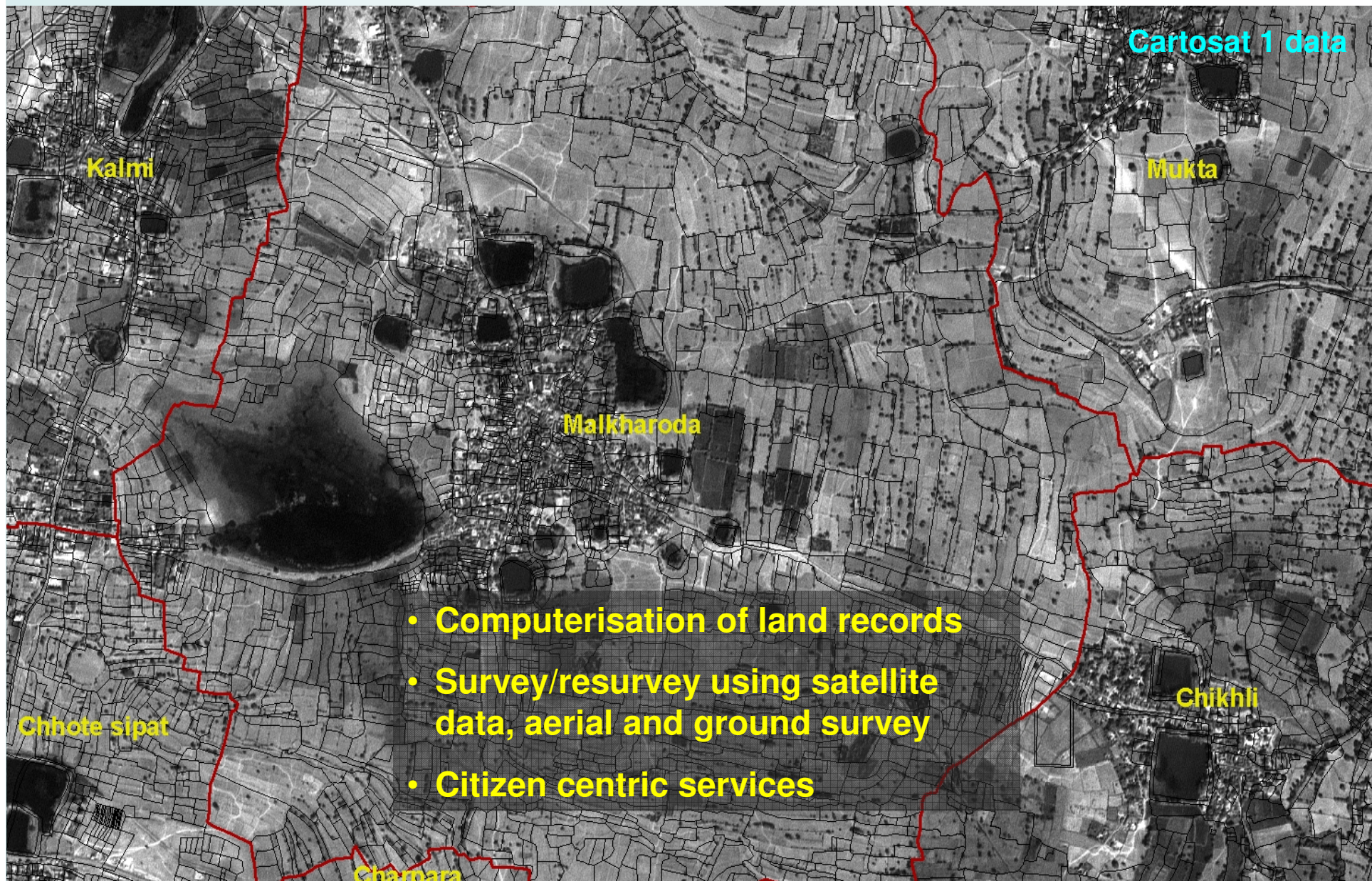
Geo-Referencing of Land Records

For 'Citizen-centric' delivery of information & services; Information empowerment; e-governance, implementation & monitoring of developmental plans - at farm levels



- Cadastral level advisories
- Alternate Land use
- Crop insurance
- Modernization of Land Revenue Administration

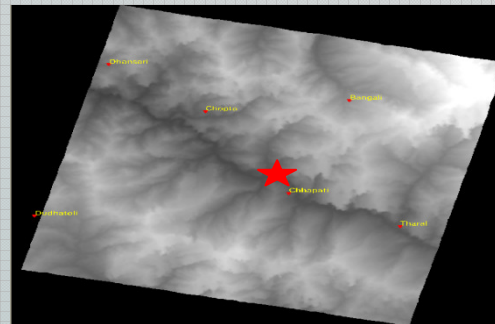
Supporting NLRMP for Land Record Modernization



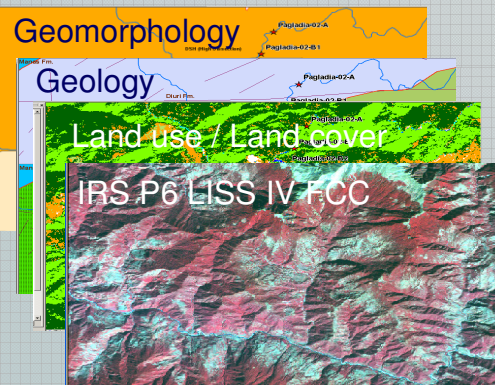
Energy: Hydropower Site Selection

- Estimation of power potential
- Pilot study completed for Pinder Valley, Chamoli dist

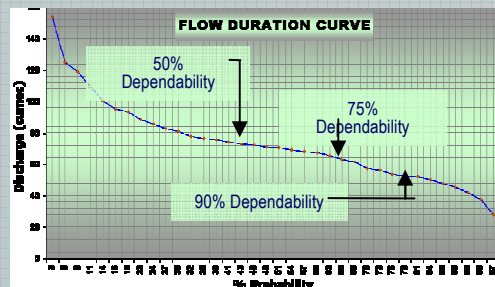
- Resourcesat data for thematic mapping
- Catosat-1 stereo data for terrain analysis



DEM & Terrain Analysis

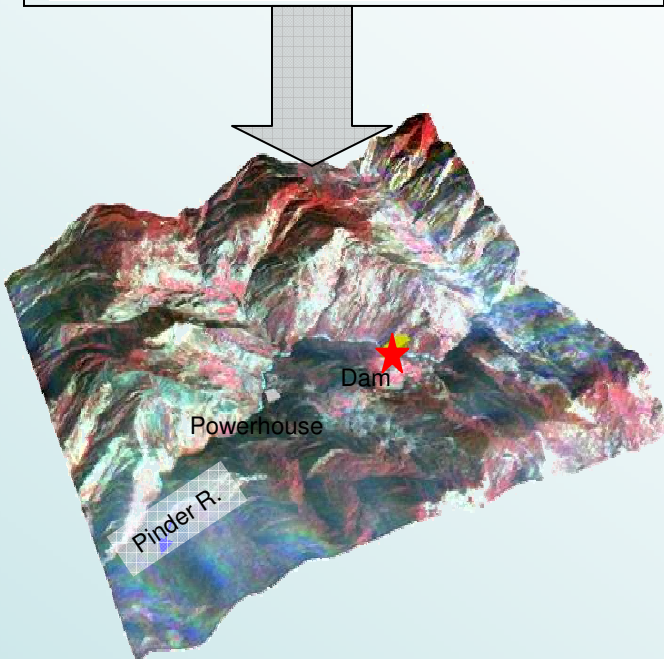
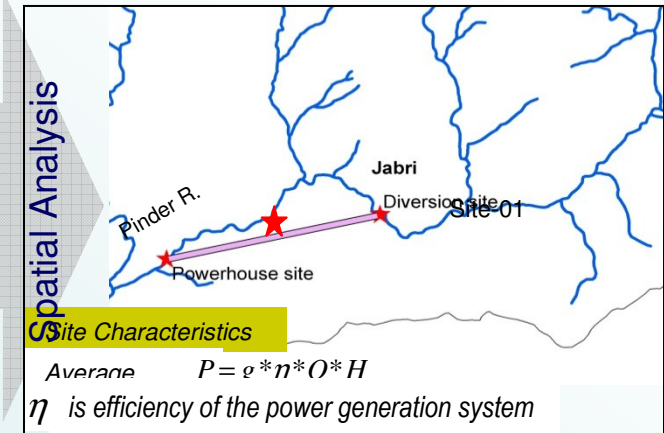


Thematic Evaluation



Dependable Discharge (Q)

Discharge Modeling



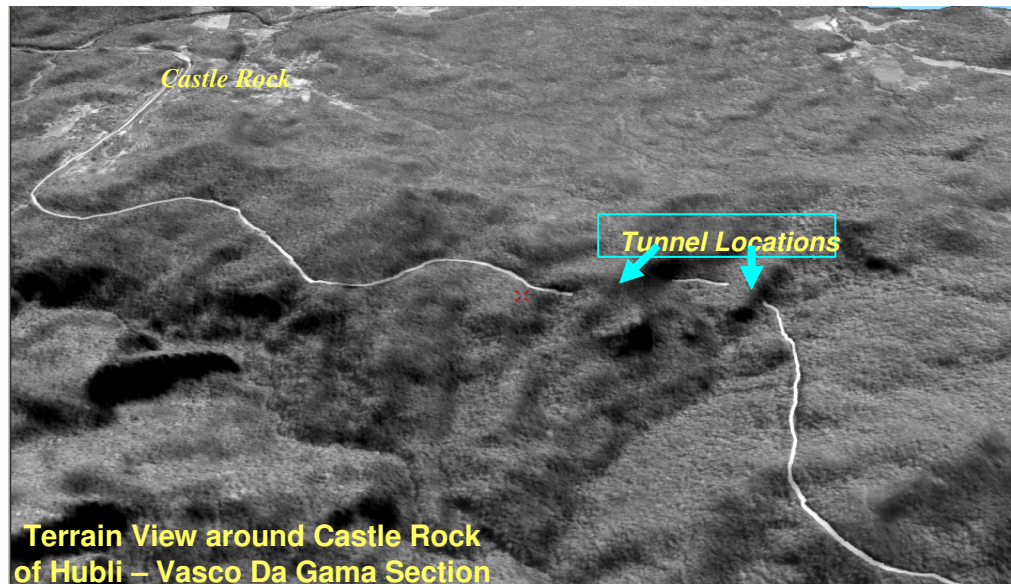
Site Characteristics

$$P = \rho * \eta * Q * H$$

η is efficiency of the power generation system

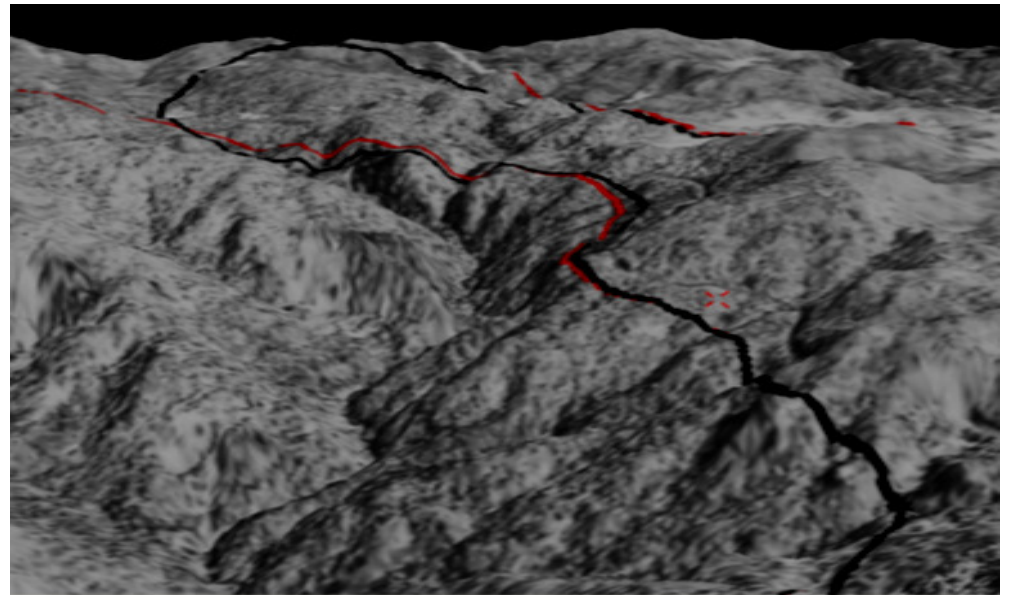
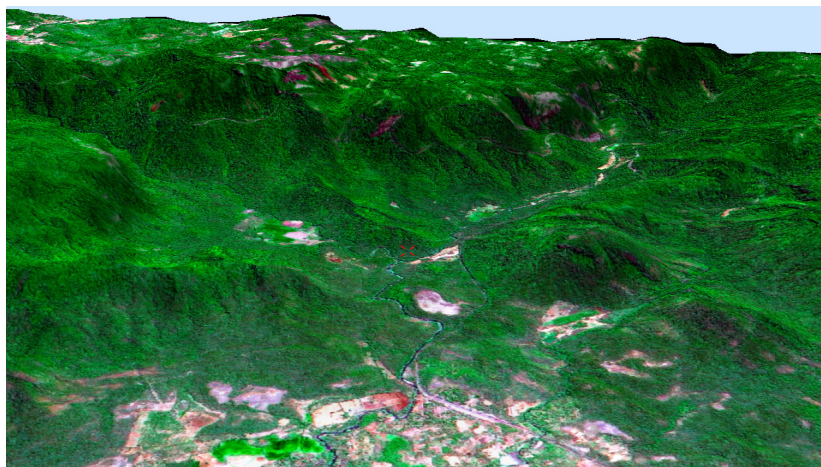
Infrastructure: Rail network realignment

For improved gradient for traversing across the terrain



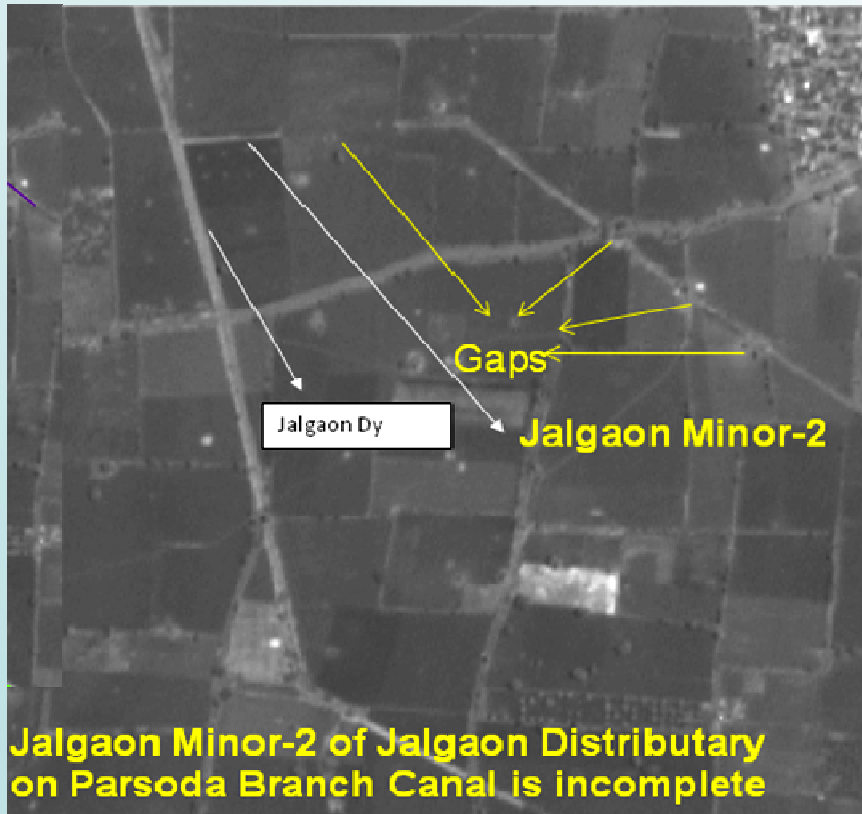
- *Cartosat Stereo imaging with DGPS survey could provide required solution in a cost effective and timely manner*
- *3D perspectives as a tool for detailed analysis of terrain complexity*

Contour from Stereo



Agriculture: Assessment of Irrigation Potential

Upper Wardha Project, Maharashtra State

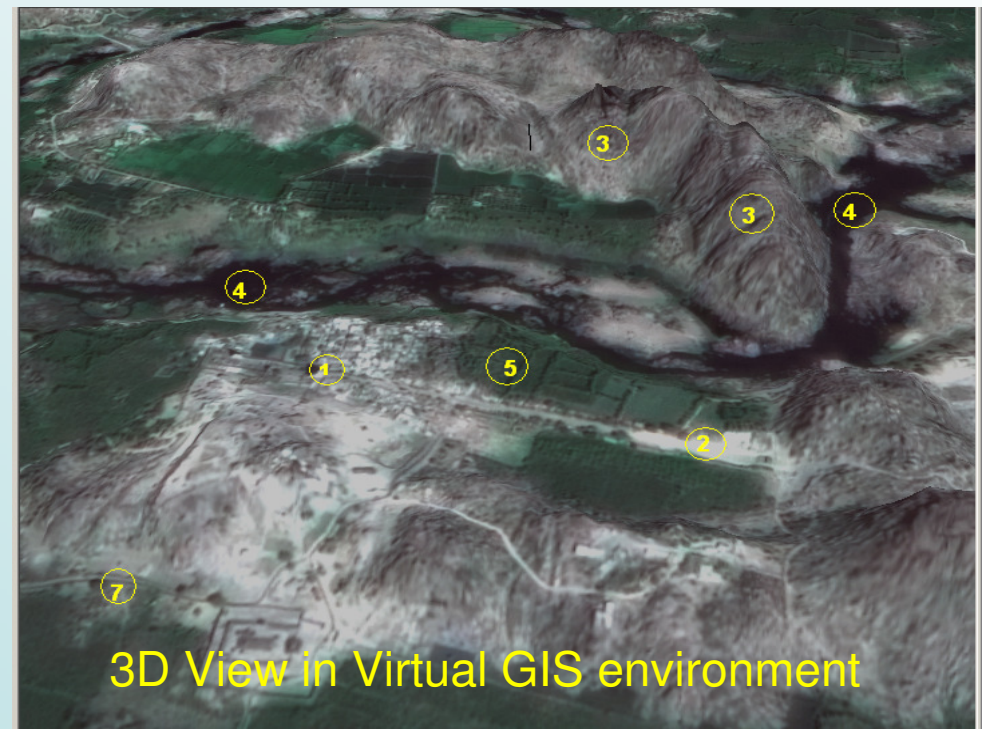
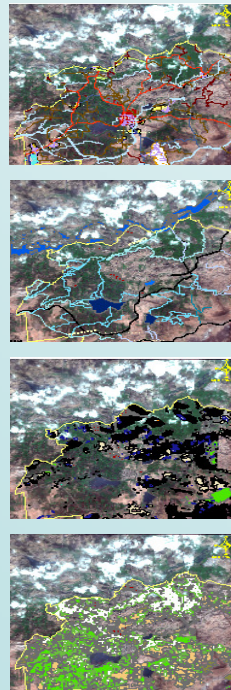


Cartosat-1 images showing the Incomplete canal and Pending canals with balance irrigation potential yet to be created

Archaeology: Management of Hampi World Heritage Site

**synoptic view and stereo capability
helps in generating multi-tier database
on resource inventory for condition
assessment; conservation
management planning and
monitoring**

**Transport Network; Surface water bodies &
canals; Hills & Rocky outcrops; and
Agriculture**





Thank you for kind attention...