

Capacity Building: An ISRO Initiatives

By

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Indian Institute of Remote Sensing

Indian Space Research Organisation

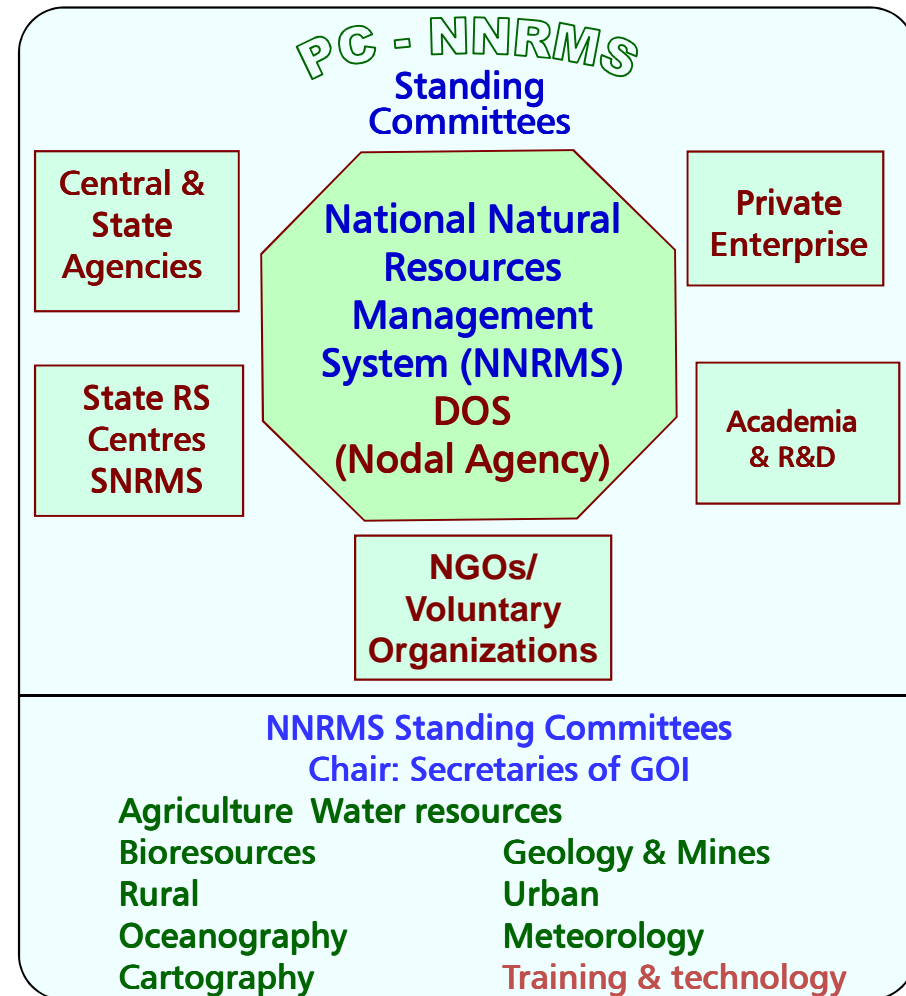
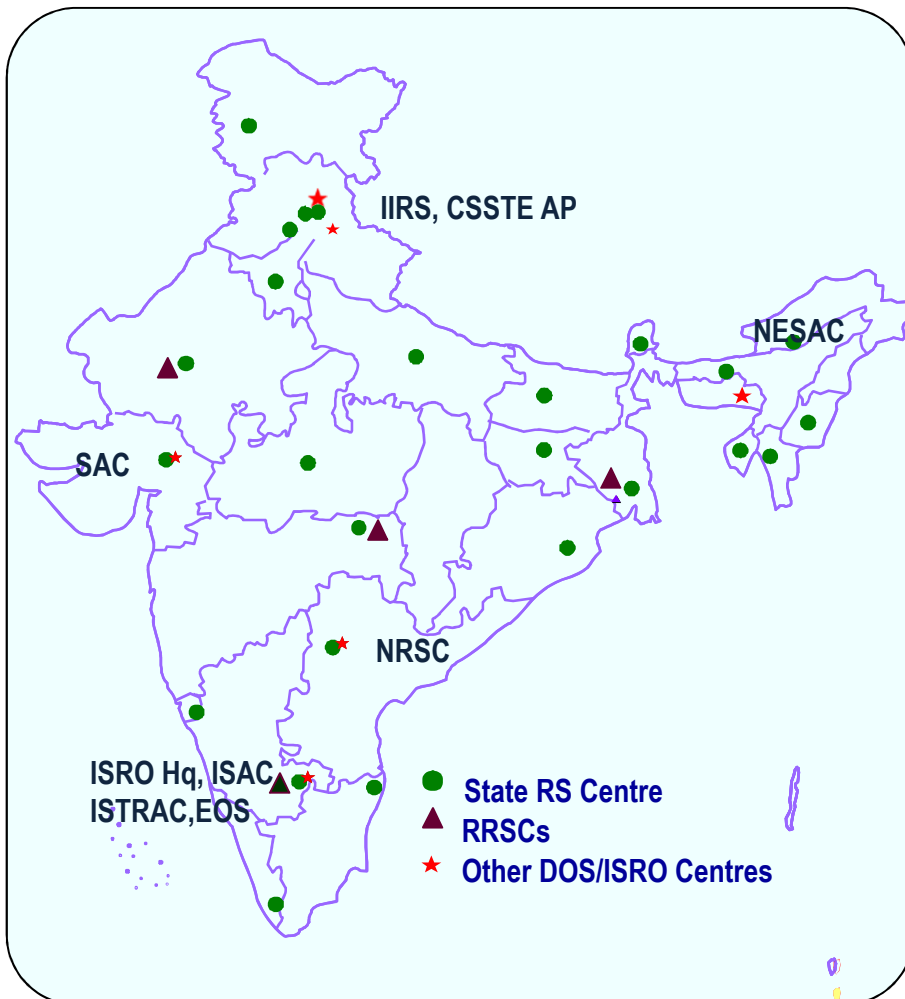
Department of Space, Government of India.



सत्यमेव जयते

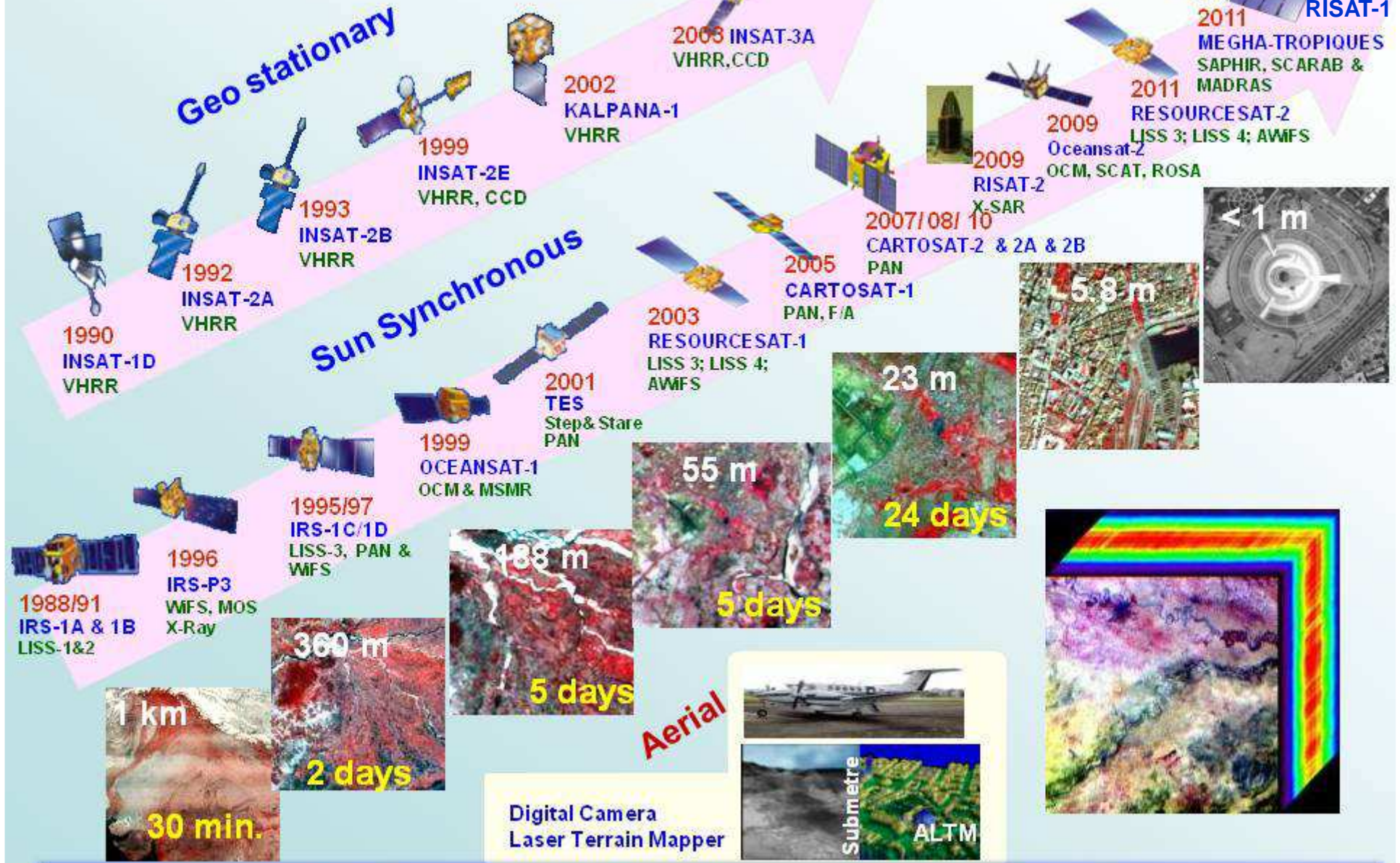
India's EO : Institutional Framework

..... NNRMS will Integrate the Data obtained through Remote Sensing into the Existing System with Appropriate Technical, Managerial and Organisational Linkages
 – NNRMS Mandate (1985)





Indian EO Imaging Capability



A valuable infrastructure in Space for monitoring NR & Environment

ISRO Institutions for Capacity Building

- Indian Institute of Remote Sensing (IIRS)
- National Remote Sensing Centre(NRSC)
- Space Application Centre(SAC)
- Indian Institute of Space Science and Technology(IIST)

Other Govt. and Academic Institutions

Indian Institute of Remote Sensing

Institute's approach for Capacity Building

Training & Education

Mission

Transfer technology through capacity building & research in the field of Remote Sensing & Geoinformatics for sustainable development.

Masters,
PG Diploma,
Certificate &
Tailor-made
Courses

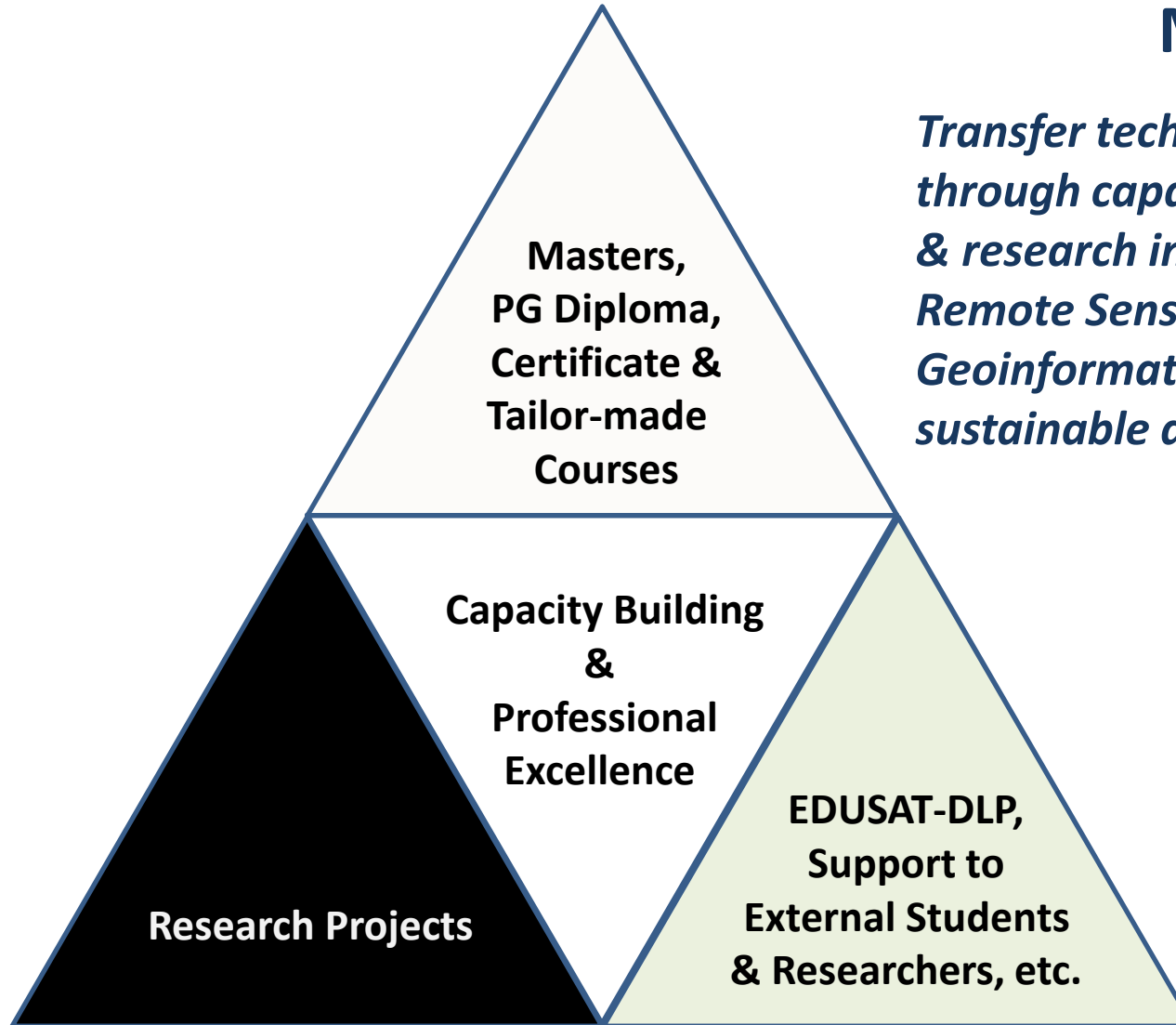
Capacity Building
&
Professional
Excellence

EDUSAT-DLP,
Support to
External Students
& Researchers, etc.

Research Projects

Research

Outreach



Courses: *Training Programmes*

❖ Postgraduate Diploma (10 months)

- **Remote Sensing & GIS in NRM (7 specializations:** Sustainable Agriculture, Forest Resources & Ecosystem Analysis, Geosciences, Marine and Atmospheric Sciences, Human Settlement Analysis , Water Resources, Photogrammetry and Remote Sensing)
- **Geo-information Science & Earth Observation (2 specialisations:** Geoinformatics, NHDRM)
(with ITC, The Netherlands)

❖ Certificate Courses (8 weeks)

- **Remote Sensing & Image Analysis (for Indian User Participants)**
- **Remote Sensing – with emphasis on DIP (ITEC Programme)**
- **Geoinformatics (ITEC Programme)**

❖ NNRMS-ISRO sponsored Certificate Courses (8 weeks) (for University faculty)

- **Remote Sensing & GIS (8 disciplines:** Water Resources, Forestry&Ecology , Urban & Regional Planning, Geosciences, Agriculture and Soils, Meteorology & Atmospheric Sciences, Cartography and Mapping and GIS Technology and Advances)

❖ Awareness Programme for Decision Makers (1 weeks)

❖ Special On-Demand / Tailor-made Courses (1-8 weeks)

Courses: *M.Tech. & M.Sc.*

❖ Master of Technology (M.Tech.) in RS & GIS

- 24 Months, since 2002
- Affiliated to Andhra University, Visakhapatnam
- Specializations in 8 thematic disciplines (Sustainable Agriculture, Forest Resources & Ecosystem Analysis, Geosciences, Marine and Atmospheric Sciences, Human Settlement Analysis , Water Resources, Photogrammetry and Remote Sensing and Geoinformatics)
- Includes 12 months research

❖ Master of Science (M.Sc.) in Geo-information Science & Earth Observation (*Specialisation – Geoinformatics, NHDRM*)

- 18 Months, since 2002
- Offered as Joint Educational Programme with ITC (Twente University), The Netherlands (*till 2013*)
- Includes 3 months course work at ITC and 6 months research

Special Courses on User Request

List of Select Users (April 2007 onwards)

Total No. of Courses: 75+ Total Participants: 1200+

National: For Central/State government departments

User Areas	Professionals Trained
Ground Water prospect mapping	72
Rural Development	53
Groundwater Surveys and Development	58
Survey and mapping	117
Forest mapping and biomass estimation	72
Forest resources	78
Mines	16
Geological Survey	20
Urban planning	22
EIA of Hydel power projects	10
Irrigation water Management	19

Special Courses contd.. (April 2007 onwards)

User Areas	Professionals Trained
Irrigation water management	31
Land Records	30
Urban Development	34
Public Works: water resources	40

International

Organization/country	Professionals Trained
SAARC Disaster Management Centre, Delhi	62
BIMSTEC countries	12
UN Office on Drugs and crime, Afghanistan	8
PA Managers from Forest Department of Bangladesh	5
Geo-Informatics and Space Technology Development Agency (GISTDA), Thailand	12
International Organization of Migration, Sudan	5

Major Projects/Research Programmes at IIRS

❖ National Mission Projects

BIS (*Biodiversity IS*) & IBIN (*Indian Bio-Resource Information Network*)

- NRC Projects (*LULC, Land Degradation & Geomorphology*)
- SIS – DP (*Capacity Building, & coordination HP, UK, J&K*)
- Village Resource Centres (*HP, UK, UP*)
- Accelerated Irrigation Benefit Program (*AIBP*), Phase –I&II
- Contributions in development of *ISRO Geo-portal & Bhuvan*

❖ ISRO – GBP Project

National Carbon Project (NCP) [*Soil Carbon Pool (SCP);
Vegetation C Pool(VCP) & Soil & Vegetation – Atmosphere Fluxes (SVF)*]

- LULC dynamics and impact of human dimensions in Indian river basins

❖ EOAM Projects

RS based Hydro-Met. Data Assimilation in the Hydrological and WRF Models

- Mapping, Modeling and Impact Assessment of Land Subsidence in North India
- Use of spaceborne LiDAR & optical RS datasets for terrain feature extraction

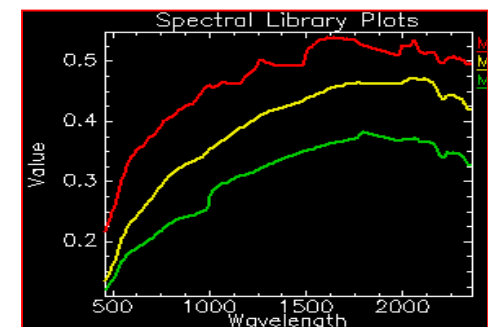
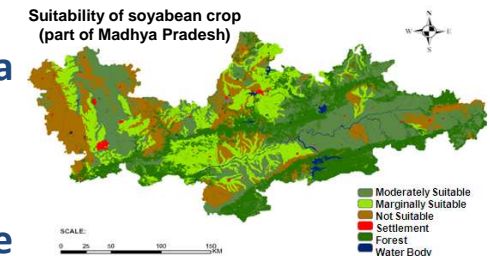
❖ RISAT – UP Projects

Modelling of Land Subsidence phenomena in Jharia Coalfield, by Space-borne D-InSAR Technique aided by Ground-based GPS, and Leveling

- Estimation of snow cover area, snow physical parameters and glacier related studies in parts of Western Himalayas using microwave and optical RS
- Characterization of Forest Plantations using SAR in Tarai CFD, Haldwani

❖ DMS Project: Rainfall Thresholds for Initiation of Landslides and Decoupling of Spatial Variations in Precipitation, Erosion, Tectonics in Garhwal Himalaya

❖ In-house TDPs: Hyperspectral , Polarimetric SAR & High resolution RS data processing & applications



Student's Research -2012 ,at IIRS

- **Modeling**
 - Future Climate Scenario and Hydrological simulation using WRF and VIC model
 - Simulating impact of Climate Change on Productivity, Carbon Sequestration and Erosion Process in Agricultural Landscape
 - Regional Crop Yield Forecast by Integrated Use of Climate and Crop Models
 - Impact of Aerosol Loading on Indian summer Monsoon Rainfall variability over Arabian Sea, Bay of Bengal and Central India
 - Measurement of Carbon dioxide fluxes in the Arabian Sea
 - Glacier Dynamics Studies using Geospatial Techniques
- **Microwave Remote Sensing application**
 - LAI estimation of Rice Using Semi-Empirical Canopy Backscatter Model with temporal Polarimetric SAR Data
 - Study of Slow moving Landslides using SAR Interferometry Techniques
 - Land Subsidence Modeling by Advanced DInSAR Techniques
 - Soil Moisture Dynamics using active and passive MW
- **Lidar application**
 - Exploring the relationship between forest structure metrics derived from large footprint spaceborne LiDAR
- **Hyperspectral Remote Sensing**
 - Mineral mapping
 - Forest biomass estimation
- **GNSS**
 - GNSS Availability and Multipath Prediction in Urban Environment
- **Instrumentations**
 - Eco-sounder for Glacial lakes studies with DGPS, Terrestrial Photogrammetry and 3D GIS

IIRS Outreach Distance Education Programme

(Satellite based interactive & internet based e_learning Initiatives)

- Initiated in 2007 to complement educational programs of Indian universities
- About 8249 students from 83 Indian Universities (1 Foreign Univ.) benefited so far

Who Can Participate?

- UG & PG students/ Researchers/ Faculty
- Individuals having good internet facility
- Users under CEC-UGC / CIET networks
- Institutions on high-speed National Knowledge Network (NKN)

Courses Offered

- Basic Course on RS, GIS & GPS (12 Weeks)
- Advanced Courses (4 Weeks)

IIRS e_learning Initiative

- Planned to launch certificate course of 3-4m
- Rich e-learning content is being developed with high quality animations / flash interactions and easy understanding modules
- Focus on e-learning theme is Principles of Remote Sensing, GIS and GPS
- Launch of 1st programme in 2013-14

University Network with IIRS/ISRO



Training of International Participants

- **CSSTE-AP**
 - Host HQ of CSSTE-AP & Support to Director, CSSTE-AP
 - PG-Diploma in RS/GIS (9 months) – 16 courses since 1996
 - Short Course RS GIS in a thematic area
- **ITEC – Ministry of External Affairs**
 - Short Course in RS & Digital Image Processing (8 week)
 - Short Course in Geoinformatics
- **Foreign Students In Regular Trainings**
 - Variable
 - 35 Venezuela students in PG-Diploma (10 month, 24 completed)
 - 11 Algerian students in PG-Diploma (ITEC sponsored, 10 months)

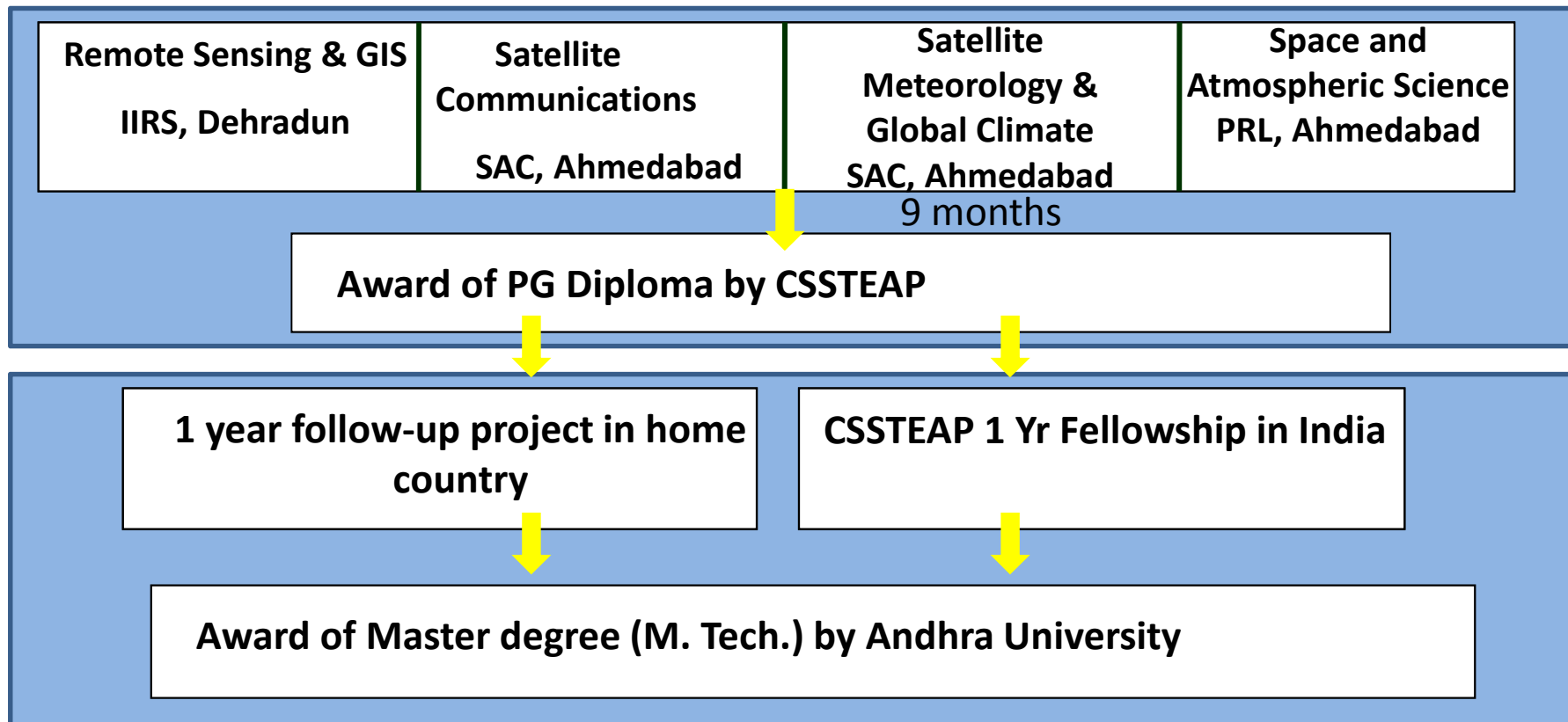
Centre for Space Science and Technology Education in Asia and the Pacific (CSSTEAP)

(Affiliated to the United Nations)



- Established at the behest of UN General Assembly in 1995 by UN-OOSA
- First Regional Centres for Space Science and Technology Education in the World
- With an objective to strengthen the existing national/regional educational institutions in the developing countries in the field of space science and technology to enhance the societal benefits.
- Government of India through Department of Space has provided the access to infrastructure necessary to organize and conduct the various academic activities.
- Policies are guided by 16 Governing Board members from Asia Pacific
- Academic activities are guided by Advisory Committee of international subject experts

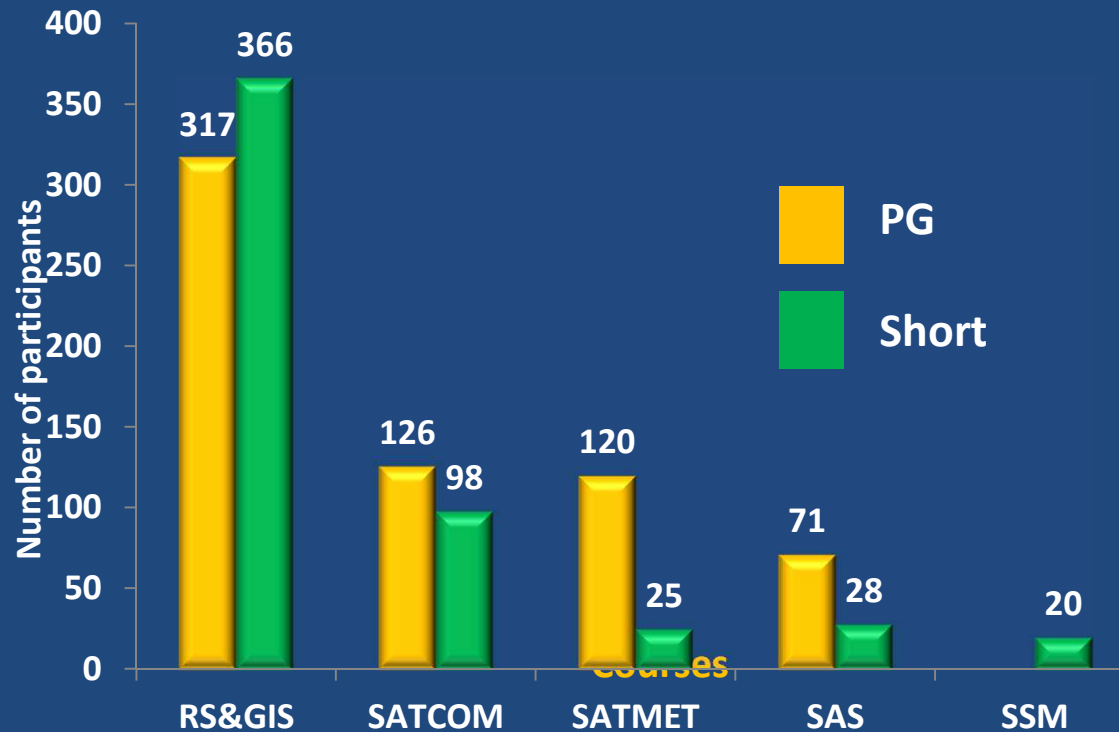
Training & Educational Programmes – Post Graduate



Short Courses – Theme-based

Disaster Risk Reduction 4 weeks (IIRS, Dehradun) UNSPIDER & UNESCAP	Satellite Navigation & Positioning 4 weeks (SAC, Ahmedabad)	Small Satellite Missions 15 days (IIRS, Dehradun/ ISAC, Bengaluru)	Open Source Geospatial Tools 4 days (IIRS, Dehradun)
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Courses conducted and Beneficiaries (1996-2012)



No. of PG Courses conducted:

RS & GIS – 16

SATCOM- 08 * (Odd year)

SATMET – 07 * (Even year)

Space Science- 07 * (Even year)

* Alternate Years

No. of Short Courses conducted:

RS & GIS – 19

SATCOM- 06

SATMET – 02

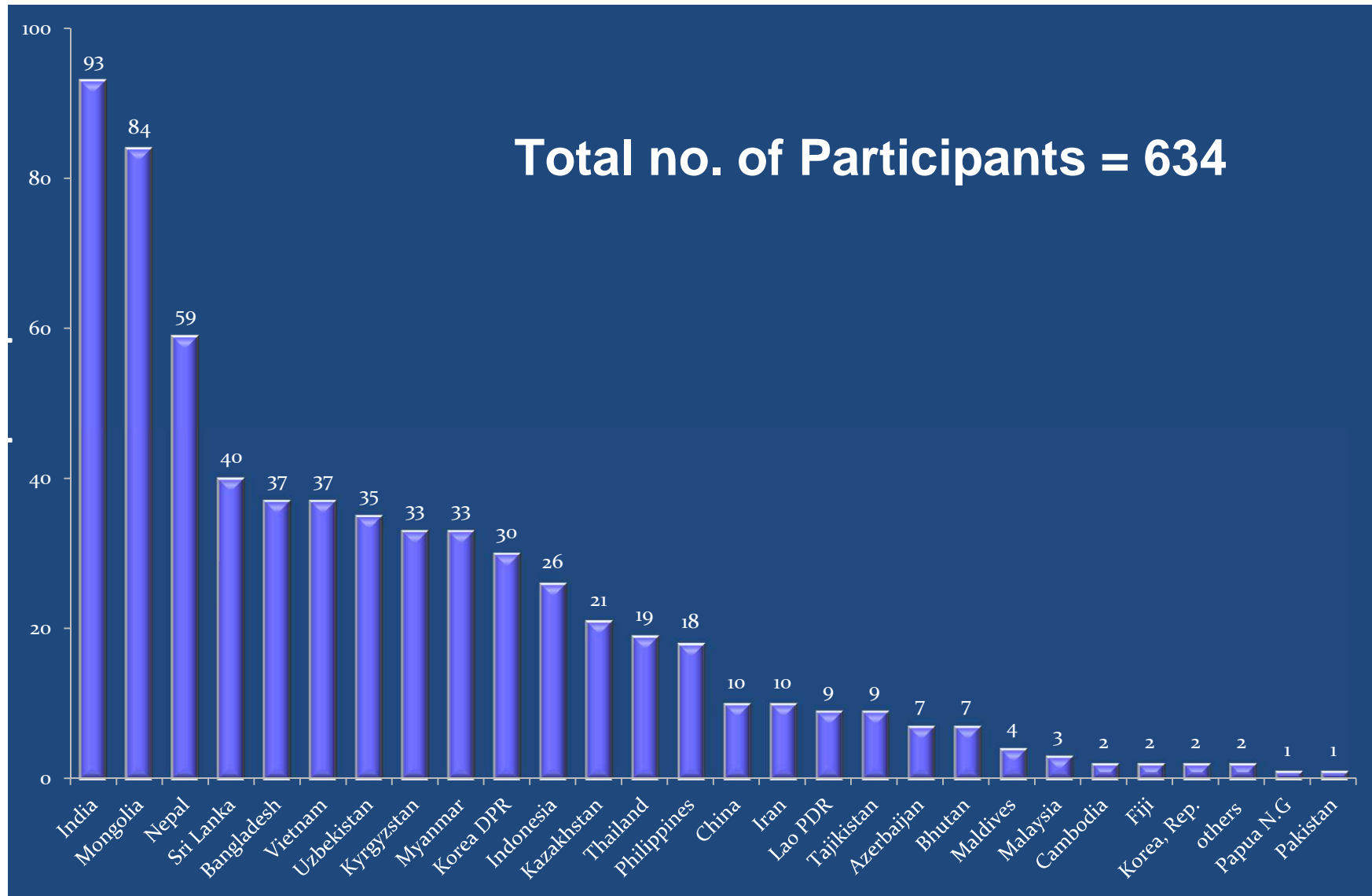
Space Science – 01

Small Satellite Mission - 01

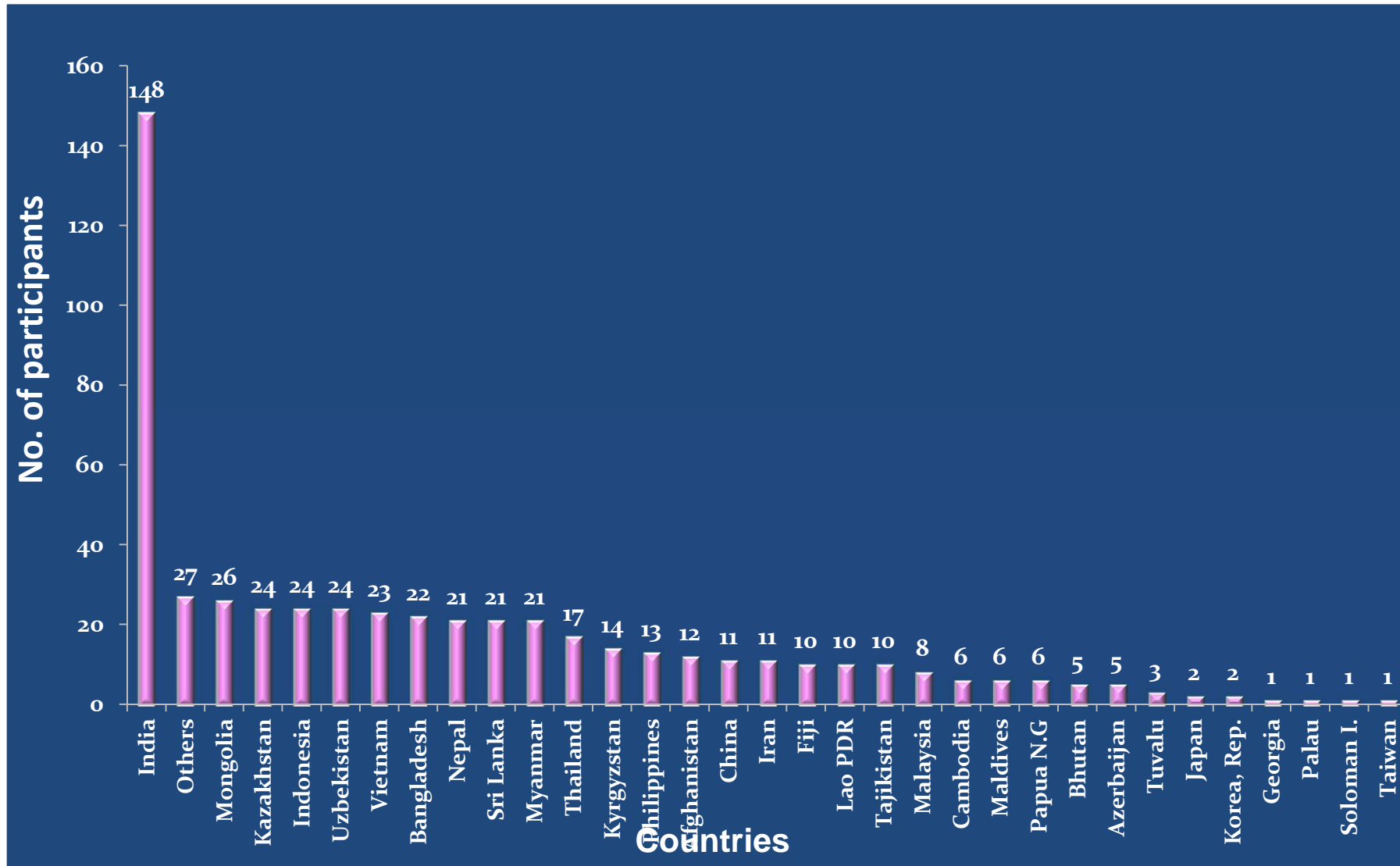
Highlights:

- 1141 from 35 countries of Asia-Pacific region and 29 participants from 18 countries outside Asia-Pacific region.
- M. Tech. degree awarded 113.

Country-wise Beneficiaries (PG Courses)



Country wise Beneficiaries (Short Courses)

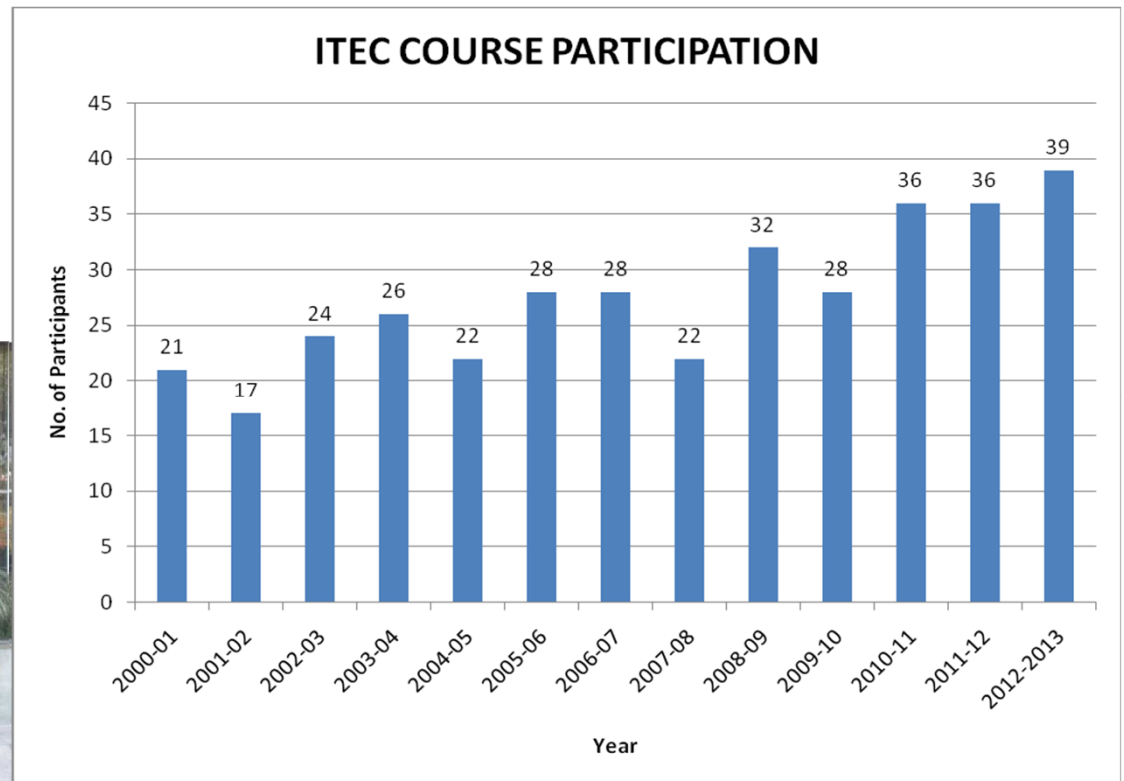


ITEC/SCAAP Sponsored Course

- Indian Technical & Economic Cooperation (ITEC) and Special Commonwealth Africa Assistance Plan (SCAAP) of Ministry of External Affairs, Government of India has recognized two short courses of 8 weeks at IIRS, namely,
 1. Short course in RS with special emphasis on Digital Image Processing (since 2001).
 2. Short course in Geoinformatics (since 2004).
- Additionally ITEC has sponsored 11 Algerian course participants for a P.G. Diploma course in the year 2009.

Total pass outs : 370 from 65 Countries

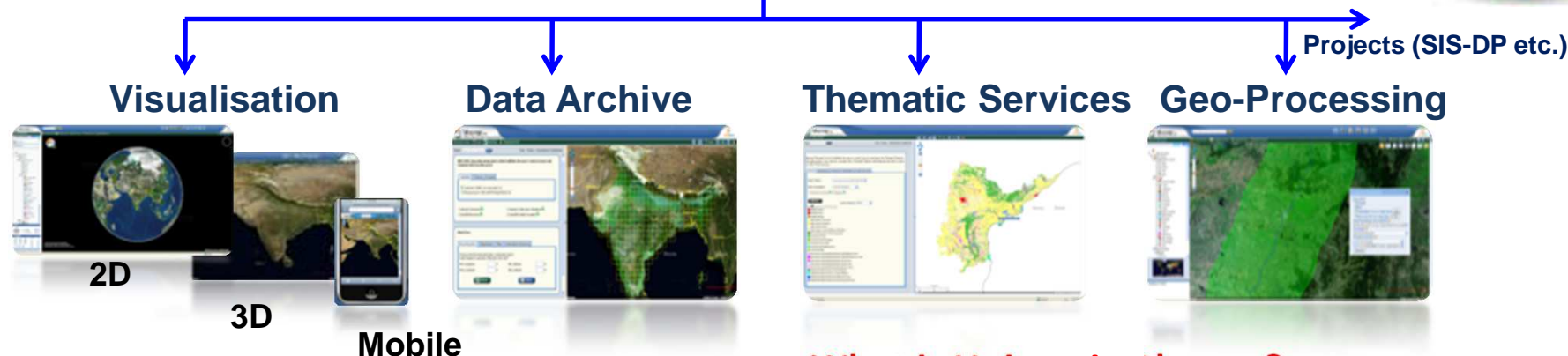
- 250 (DIP)
- 109 (Geoinformatics)
- 11(PGD)



Bhuvan - Gateway to Indian EO Data Products & Services



<http://bhuvan.nrsc.gov.in>



- ✓ Seamless High Resolution Data
- ✓ Multi-Sensor, Temporal Resolution Data
- ✓ Rich Thematic Information
- ✓ Weather Data from ISRO AWS
- ✓ Ocean Services
- ✓ Collaboration/Community Participation
- ✓ OGC Web Services
- ✓ OS TOOLS
- ✓ Distributed Server Architecture

Avr 14000 unique users / month + > 48000
down loads , 14 TB data served

What is Unique in Bhuvan?

- ✓ Online Shape file Creation
- ✓ Terrain Profile
- ✓ Urban Design Tools
- ✓ 3D Fly Through
- ✓ Multi-Lingual (English | Hindi | Tamil | Telugu | Gujarati | Marati | Kannada)
- ✓ Data Download (CartoDEM, AWiFS, LISSIII)

CAPABILITY FOR

- ✓ Citizen-centric Data Updation
- ✓ Change Analysis using temporal images
- ✓ MIS Tools
- ✓ Capacity Building

Website of the Month – Dec' 2010

Welcome
to
Dehradun, India
for WGCapD-3
February-March 2014

Thank You



Indian Institute of Remote Sensing

Indian Space Research Organisation

Department of Space, Government of India.



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