Capacity Building Activities in Geospatial technologies in India

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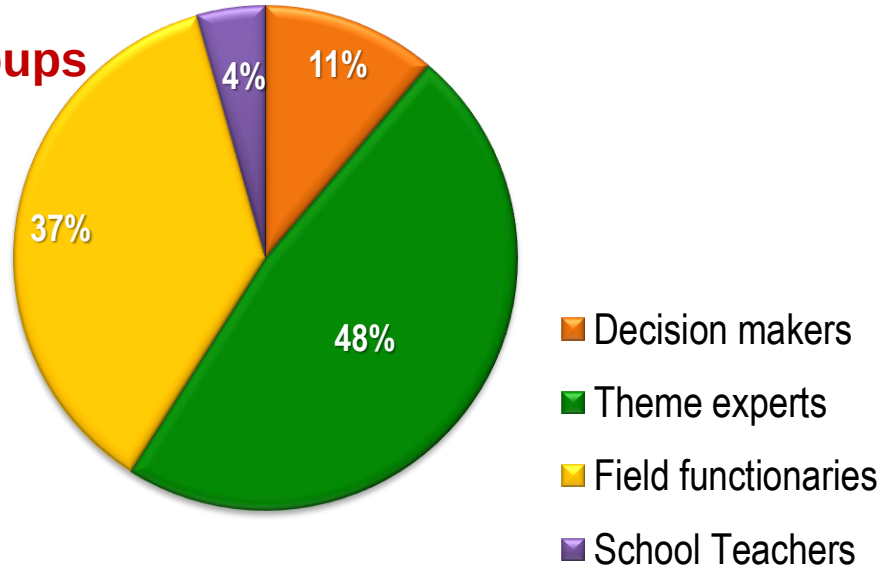
Capacity Building in Geospatial Technologies : Indian Perspective

- **Geospatial industry is one of the largest consumers of EO data and provider of value added products and services.**
- **Current geospatial economy : $ 390 billion**
- **Geospatial economy by 2025 : $ 630 billion**
- **In next 5 years, water resources & irrigation, infrastructure, utilities, and land administration will lead the geospatial industry growth.**

Target groups



- Capacity building is more than education & training.
- Organizational strengthening (Decision maker to data interpreter)
- Technology penetration & Adoption
- Building policies, programmes and structures

Capacity Building

Capacity Generation Capability
(Space & ground segment to generate products & services)

⇩

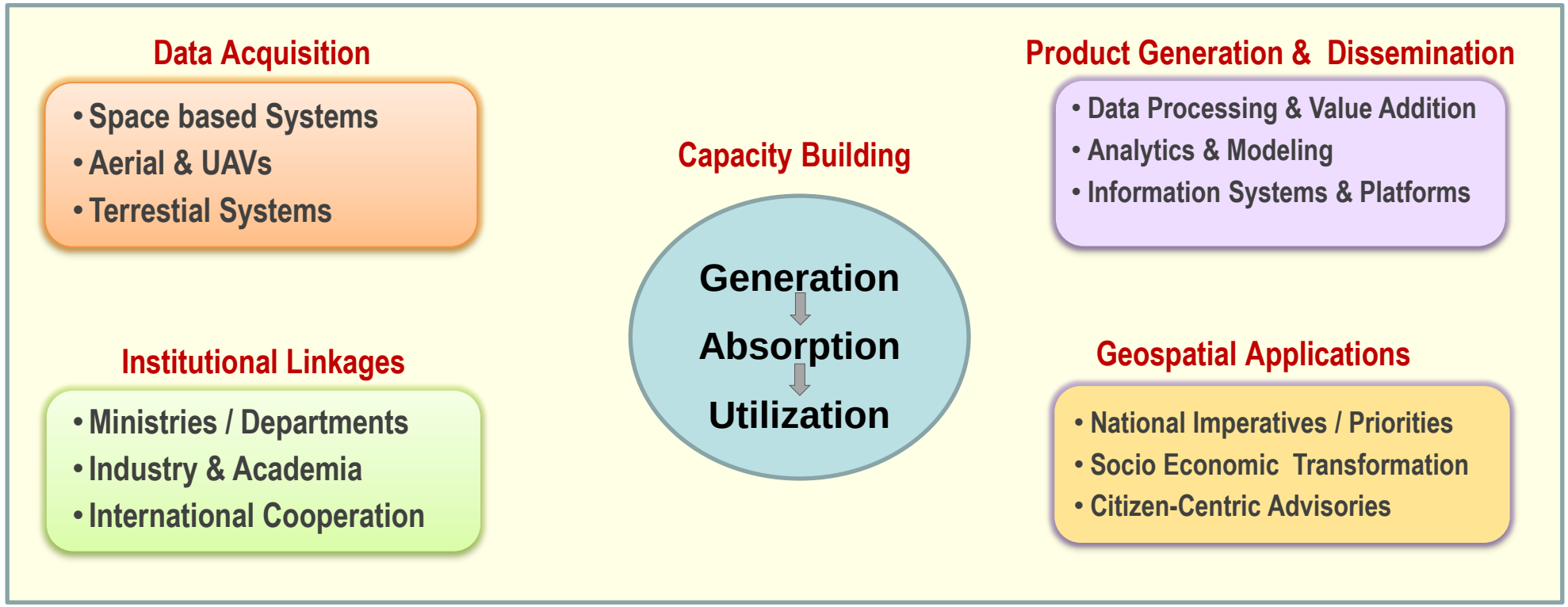
Capacity Absorption Capability
(Users awareness and skill building)

⇩

Capacity Utilisation Capability
(Integration of products & services at the user end)

Geospatial Technologies : Vision & Dimensions

To strengthen the value chain of geospatial technology, effectively linking capacity generation and its optimum exploitation enabling national development and delivering citizen centric advisories for ease of business & improving quality of life



GOALS

- Position space, Aerial & terrestrial infrastructure tuned to priorities of Government
- Build applications, analytics & models to enable governance & development
- Enable building & enriching National Spatial Data Infrastructure
- Information systems with decision tools & citizen centric services.

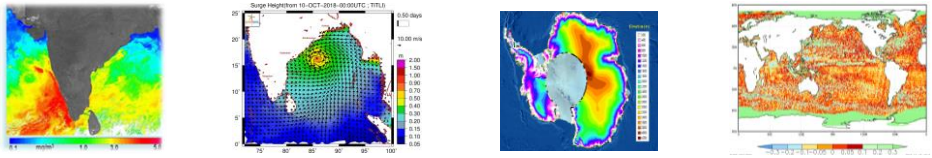
Geospatial Data Acquisition System : Space, Aerial & Terrestrial

Space Segment

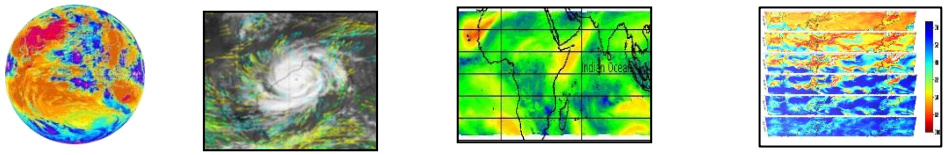
RESOURCESAT
Natural Resources & Disaster Management

CARTOSAT
Cartography & Large Scale Mapping

OCEANSAT, SARAL, SCATSAT
Ocean State Forecast ; Ocean Altimetry, Wind Vector



INSAT 3D & 3DR ; MEGHA-TROPIQUES
Weather Forecasting; Atm. and Climate studies



Aerial & UAVs

- **Two Beechcraft Aircrafts**
- **Sensors / Instruments**
  - **LiDAR – DC (5cm GSD)**
  - **L & S band SAR**
  - **Hyperspectral**

- Hex Copter & Quad Copter
- Fixed Wing UAV
- Capacity across various Departments & industry

Terrestrial

Automatic Weather Stations

Doppler Weather Radars

Atmospheric BL Lidars

Buoys

Floats

Geospatial Data Acquisition : Product Generation, Analytics & Dissemination

Product Generation & Value Addition

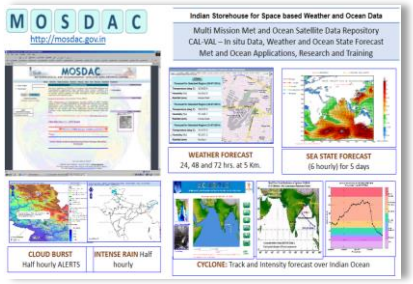
- **Integrated Multi-Mission Ground Segment for EO Satellites (IMGEOS)**

- Payload Planning to Data Dissemination
- Cloud Services / GPGPU Clusters
- Automated Chain: 2100 Products/ Day
- Standard and Value Added Products

- **Indian Geospatial Portal for Geospatial Analysis: BHUVAN**

- Thematic, Disaster & Citizen services
- Online Mapping & Data Collaboration
- 200+ Applications for Governance & Devp.
- Support to Regional countries
- > 2 lakh registered Users

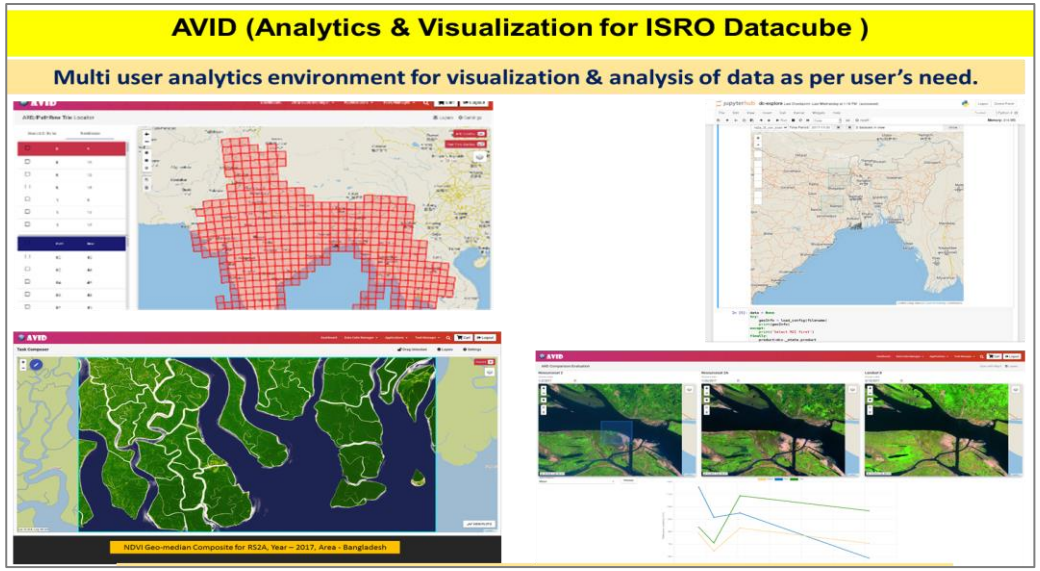
- **Meteorology & Oceanography Satellite Data Archival System: MOSDAC**



- Weather & Ocean State Forecast
- Cyclone warning & Extreme weather events
- Citizen-Centric Advisories
- 140 Countries Accessing the portal
- Met & Ocean Research & Training

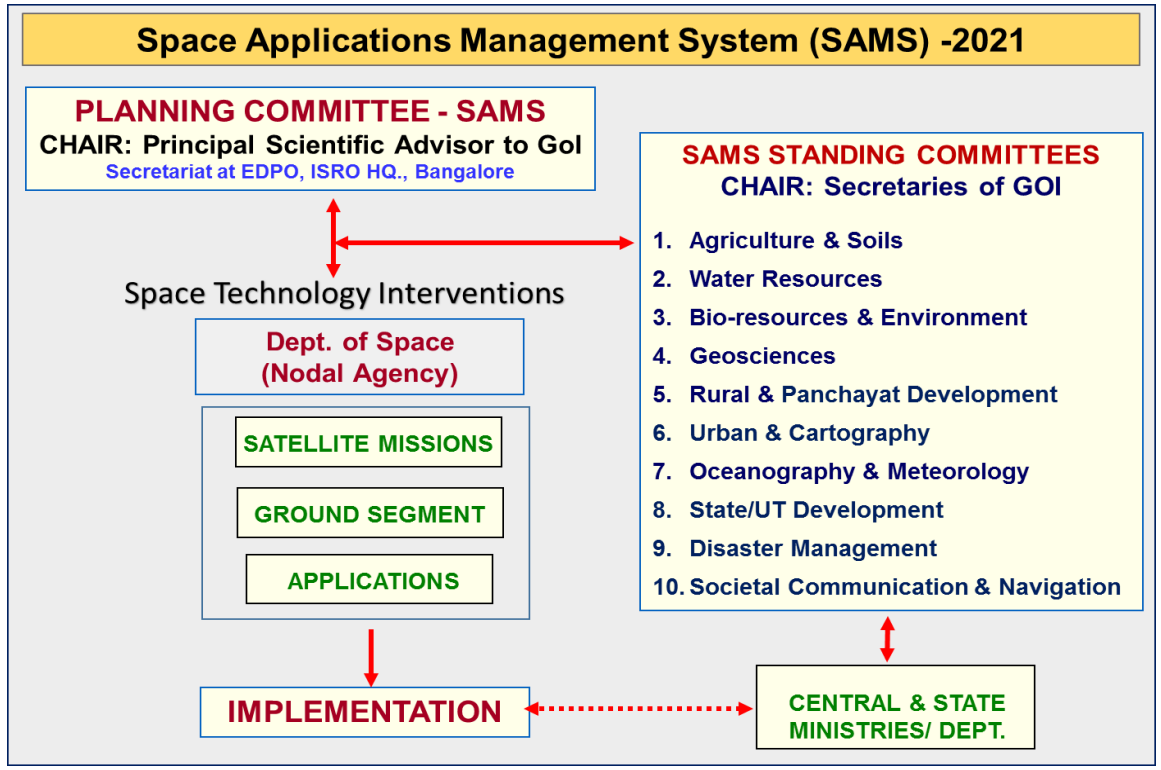
Analytics & Modeling

- Big Data Analytics
- Virtual Reality & Augmented Reality
- Cloud Computing & Edge Computing
- AI and ML based Applications
  - Object Detection & Pattern Recognition
  - Prediction & Forecast
  - Change Detection / Monitoring



Geospatial Eco-System : Institutional Linkages

National Natural Resources Management System (NNRMS)



- User Demand Aggregation & Demand-Gap Assessment
- Realization of Satellite & Associated Ground Segment
- Evolve Application programmes and Science Plans
- Creation of Space Applications Centre in all States in India
- Institutionalization of Operational Applications in 20 Ministries
- Space technology cells in stakeholder departments
- Enabled multi-thematic Geospatial data repository in the country
- Capacity Building & Technology Transfer

Strong institutional linkages

- Amongst Government initiatives viz. NSDI, BISAG-N, GATISHAKTI,
- Association of Geospatial Industry (Consortia), Indian Space Association, Academia, CII

Geospatial Eco-System : Policies, Guidelines & Regulations

Geospatial mapping is an integral part of almost all developmental planning activities from National level to Local level

Geospatial Guidelines: Steered by Dept. of S&T

- Promote mapping industry and Indian companies to excel in global geospatial arena.
- **Self-certification:** No prior approval, security clearance, or license for Geospatial Data & Maps within India
- Ensure updated data on time with utmost ease and no restrictions.
- Enable more **e-governance applications**, citizen-centric services, promote **ease-of-doing-business** and enrich national repository of digital data.

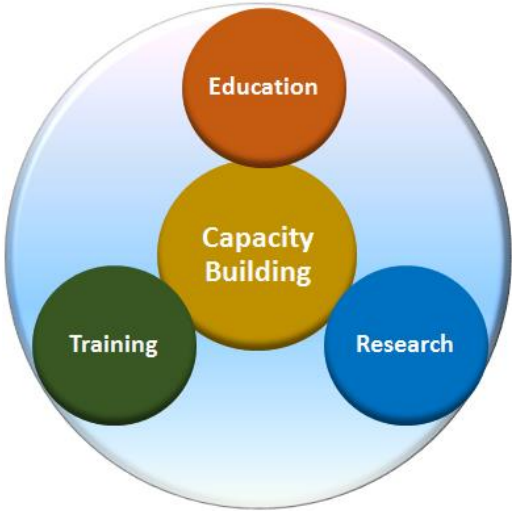
RS Policy (Proposed) : Steered by Dept. of Space

- More open, inclusive & forward-looking
- Encompasses all activities of space based remote sensing, viz. **building & orbiting satellites**, **Ground stations for tele-command & data reception and data dissemination**
- Enable easy access to space based remote sensing data
- Promote Indian entities to carry out remote sensing activities within & outside India

Geospatial guidelines and Remote Sensing policy will build a forward looking Geospatial ecosystem in the country and bring in new avenues for Research, innovative solutions and employment generation.

Capacity Building in Geospatial Technologies : Programmes

- **Capacity building through education, training & research**
  - **M .Tech. in RS & GIS** (9 Specializations)
  - **M.Sc. in Geo-information Science & EO** (JEP with University of Twente, The Netherlands)
  - **PG Diploma** (1 year, 10 Specializations) ; **8-weeks Certificate Course** (ITEC/ MEA)
  - **Decision Makers Course** (1 week) ; **Special /Tailor made Courses** (for User Depts.)



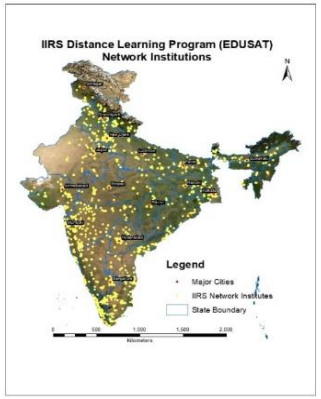
- Distance Learning Programme
  - **Live & Interactive courses**
  - **Massive Online Open Courses**

- RESPOND programme for promoting quality research

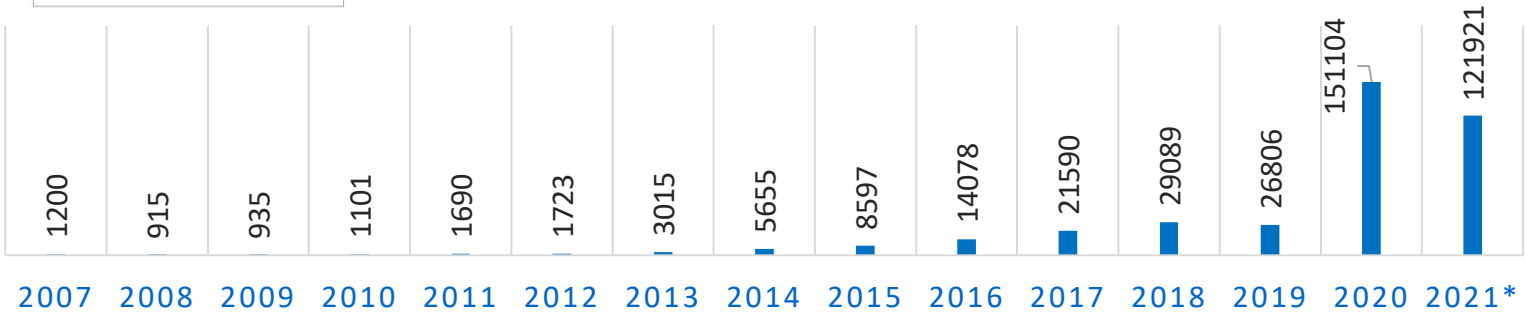
- State Remote Sensing Applications Centres and many Academic institutions offer education & training programs in geospatial technology & its applications

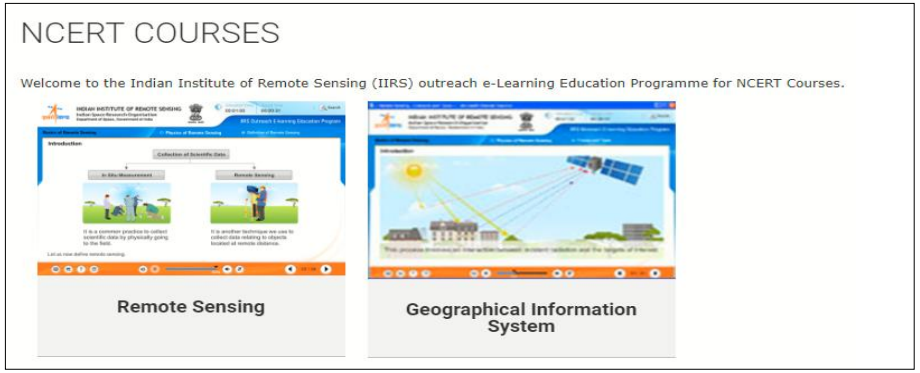
Capacity Building in Geospatial Technologies : Online Learning Programs and Resources

- **Modes:** (1) Live & Interactive and (2) MOOC
- **Courses:** Basic, Theme-oriented, Advanced
- **Target Group:** Academia, Research Inst. & Govt. Organizations
- **Number of programmes:** ~30 / year
- **Total Network Institutions:** ~3000
- **Total Beneficiaries in Live courses:** ~ 4.3 lakhs



Year-wise Distribution of the participants)





- **E-learning:** **Remote Sensing** & **Geographic Information Systems** as per NCERT syllabus of Class-XI & XII.

Capacity Building (Ministerial): A few examples

- **AMRUT Program:** ~2500 professionals
- **Forest sector:** ~900 Officers + ~30,000 field staff / year
- **Disaster Management**: ~700 professionals / year
- **Earth Eco-System:** ~1200 Officials

Capacity Building in Geospatial Technologies : Outreach & Incubation

- Centralized Outreach Facility for Academia, NGOs, Public, Industries - integrating all activities of Outreach, Training, Outsourcing, Exhibition, Information Dissemination, Web Services, etc.

Capacity Building – NE Region

- About **300 trainings & workshops** (regional/ national)
- **YU**va **VI**gyani **KA**ryakram **(YUVIKA) -** 27 students representing 9 states
- Training course on the Space Technology Applications for 24 personnel of **BIMSTEC countries** in January 2020
- 12 regular & 9 customized training courses
- About **250 students -** Internship program

Participants from BIMSTEC countries

Outsourcing & Incubation

- Two shift operations
- > 275 personal working
- Technical consultation / mentoring
- VDI infrastructure for outsourcing
- Thin Client Infrastructure
- Access to Application Software
- Access to Laboratories

Capacity Building in Geospatial Technologies : International Programmes

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

PG: Remote Sensing & GIS (RS & GIS) Every Year

PG: Satellite Communication (SATCOM) & Global Navigation Satellite Systems (GNSS) Alternate Year

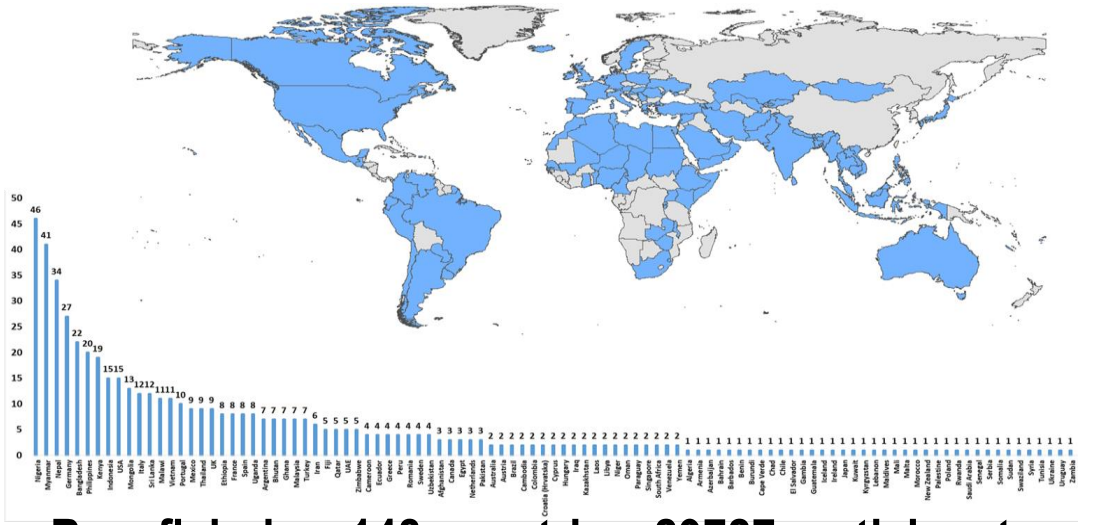
PG: Satellite Meteorology & Global Climate (SATMET) Alternate Year

PG: Space and Atmospheric Sciences (SAS) Alternate Year

Short Courses on RS&GIS, Small Satellite Missions (every year) and user demand based courses

2831 participants from 36 countries benefitted through 61 PG courses & 68 Short courses

MOOC on Geospatial Applications for Disaster Risk Management



Beneficiaries: 148 countries, 29727 participants

THANKS...