

Capacity Building in use of Geoinformatics for Disaster Risk Reduction : *Experience of IIRS, India*

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Outline

- Indian Context including ISRO / NRSC Activities
- Capacity Building : IIRS Activities & UN CSSTE-AP
- Disaster (DRR) RS & GIS Trainings
- Examples of DRR research/projects using Geospatial Techniques

Disasters : India Context

- National : Policy, Operations & Implementation
 - National Disaster Management Authority (NDMA)
- National S&T Support
 - Ministry of Earth Sciences
 - **INDIA METEOROLOGY DEPARTMENT (IMD) : Forecasts, Early Warnings**
 - **INDIAN NATIONAL CENTRE for OCEAN INFORMATION SERVICES (INCOIS) : TSUNAMI WARNING CENTRE**
 - Indian Space Research Organisation
 - **MULTIPLE ACTIVITIES TO SUPPORT DISASTER MANAGEMENT & DRR (SPACE INFRASTRUCTURE, OPERATIONAL DATA PRODUCTS, RESEARCH & CAPACITY BUILDING)**
- Capacity Building
 - National : NIDM,,
 - International : SDMC,,

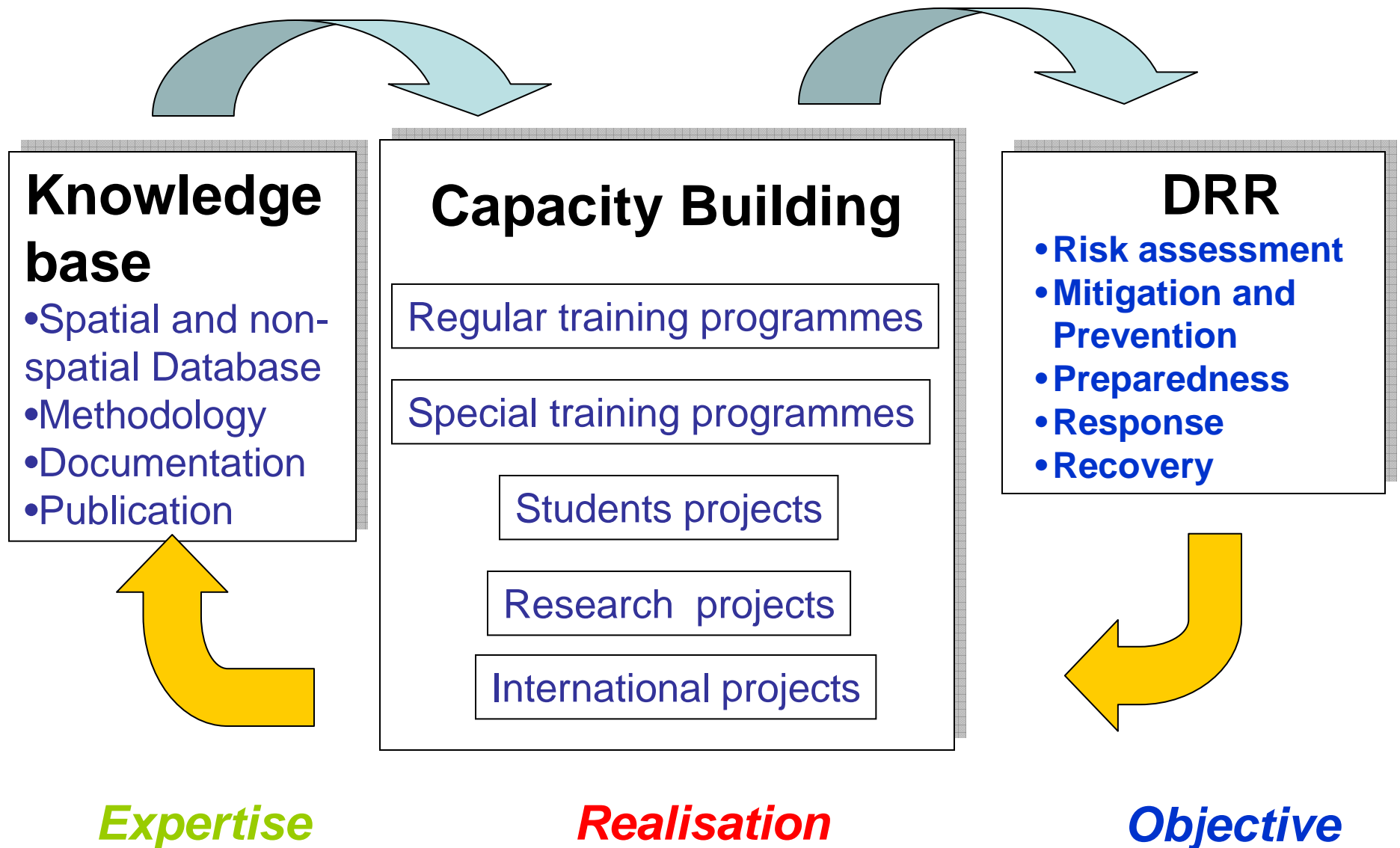
ISRO : Focus on Disasters

- Indian Space Research Organisation (ISRO)
 - National Focal Point for 'International Charter for Space and Major Disasters'
 - DMSP (Disaster Management Support Program)
 - DSC (Decision Support Centre; 24x7) at NRSC
 - **FLOOD, DROUGHT, FOREST FIRES, LANDSLIDES, ...**
 - NDEM (National database for Emergency Management) at NRSC
 - Aircraft (Rapid response aerial survey, incl SAR sensor)
 - Indian Institute of Remote Sensing/NRSC
 - **'CAPACITY BUILDING FOR GEOINFORMATICS', including its use in Disaster Risk Reduction**

Indian Institute of Remote Sensing

- Established as '*Indian Photo-interpretation Institute*' (IPI) in 1966, named IIRS in 1983
 - Student enrolment since 1966 exceeds 7200
- Offers a host of learning opportunities in Geospatial Technology & Applications
 - **Post-Graduate Education (MTech, MSc)**
 - **PG training (PG-Diploma, 10 month; Certificate, 4 months)**
 - **On demand Special Training Programs (Government Organisations (1-4 weeks), University Faculty (8 weeks))**
- International students join regular & special courses
 - "UN Centre for Space Science and Technology Education in Asia Pacific" (UNCSSTE-AP)
 - Govt of India sponsored 8 week program

ICT for DRR: IIRS Practice



IIRS – *Trainings with focus on Disasters*

- Master of Science in Geohazards (IIRS-ITC JEP)
 - 18 Months, with 3 months at ITC (Netherlands), 6 month project research
- PG-Diploma in Geohazards (IIRS-ITC Joint Logo Program)
 - 10 months at IIRS
- Certificate Program in Geohazards
- Specialisation offered in 3 streams

Hydrometeorological

- Flash floods, River floods, dam burst
- Cyclone and Coastal hazards
- Drought

Geological

- Landslide
- Earthquake
- Mining and Subsidence
- Groundwater pollution
- Glacier hazards

Environmental

- Forest fire
- Land degradation, Desertification and soil erosion

IIRS : *International Training Programs*

- Host Institute for CSSTE-AP HQ
 - RS & GIS Courses , PG-Diploma (9 months), Certificate (4 week)
- Ministry of External Affairs, (MEA, GOI) sponsored
 - ITEC/ SCAAP Short Courses
 - RS & GIS with specialization in Digital Image Processing (8 weeks, Jan-Feb each Year)
 - RS & GIS with empahsis on Geoinformatics (8 weeks, Sep-Oct each Year)
- On-Demand Special Courses

UN CSSTE-AP

- Centre for Space Science and Technology Education in Asia Pacific (CSSTE-AP), established Nov 1, 1995, with HQ at IIRS
 - **Affiliated to UNOOSA, centres at Mexico, Brazil, Nigeria & Morocco)**
- Offers training (PG Diploma: 9 months; Short Courses: 4 weeks) in 4 areas at 3 Indian host institutions
 - **RS & GIS** at IIRS, Dehradun
 - **Satellite Meteorology & Satellite Communication** at Space Applications Centre, Ahmedabad
 - **Space Science** at Physical Research Laboratory, Ahmedabad
 - 31 PG-Diploma (13 RS & GIS, 6 each in 3 disciplines)
 - **520 students (95 also completed MTech)**
 - 22 Short courses (**342 students**)



CSSTEAP/ IIRS : *SHORT TRAININGS*

- CSSTE-AP sponsored international short trainings at IIRS on Geoinformatics for DRR
 - Geoinformatics for Disaster Management (Aug 16 – Sep 10, 2004)
 - Application of space technology for disaster management support with emphasis on ***flood risk management*** (Aug 20 - Sep 14, 2007)
 - Application of space technology for disaster management support with emphasis on ***drought monitoring, desertification*** and crop yield prediction (July 14 - Aug 8, 2008)

Both RS & Satellite Communication as well as GPS/GNSS Covered in training

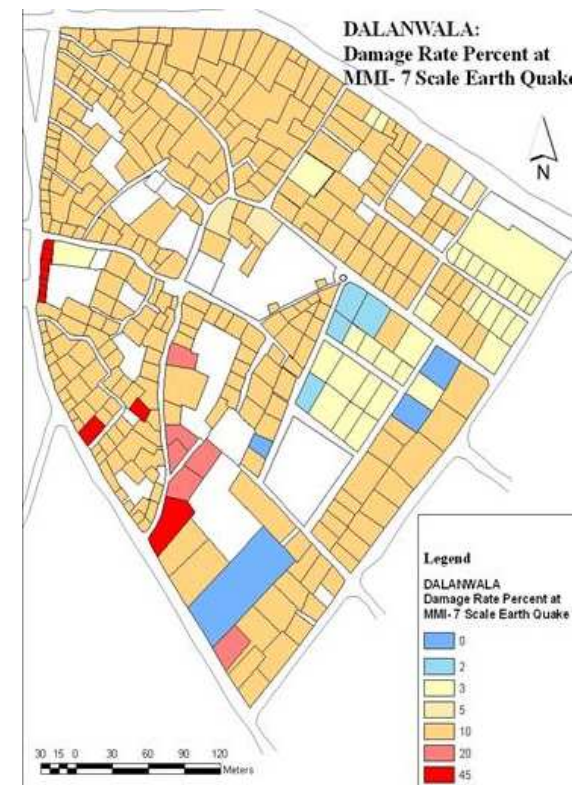
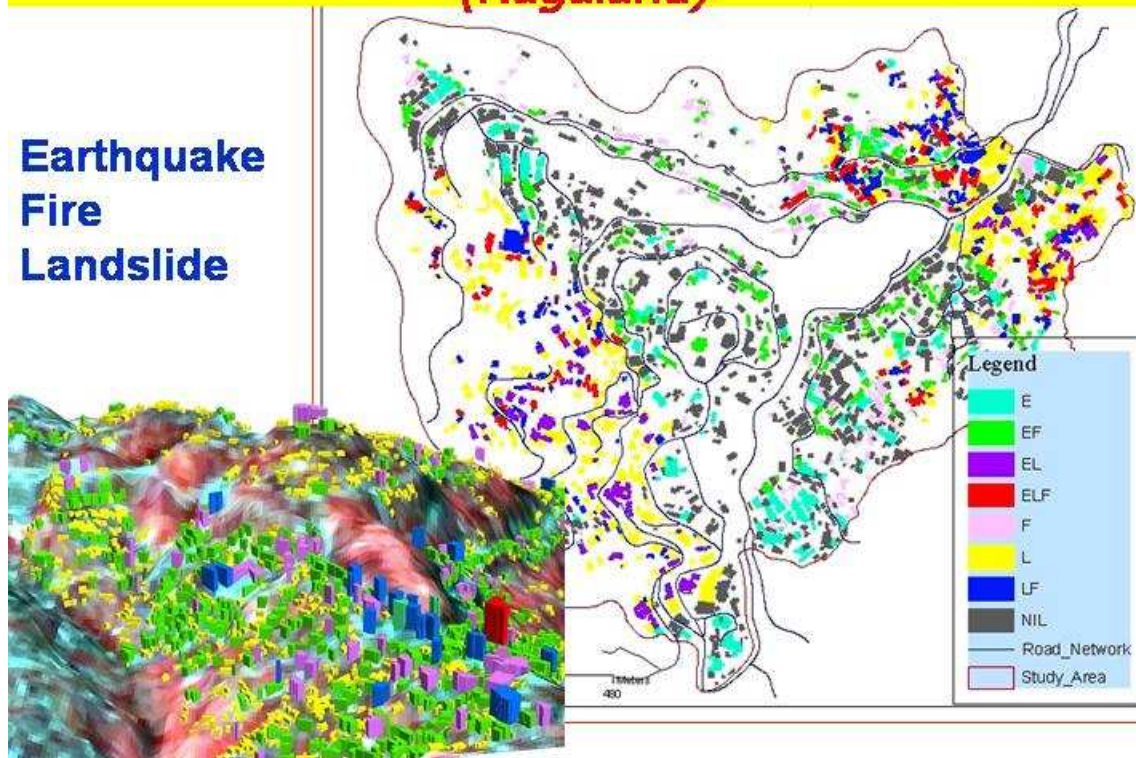
International Projects – *Disaster focus*

- IIRS-ITC JEP with focus on Geohazards & capacity building
- Asian Program for Regional Capacity Enhancement for Landslide Impact Mitigation (RECLAIM)
 - ADPC & NGI (Oslo) for capacity building in Institutes in 6 countries (Bhutan, India, Indonesia, Nepal, Sri Lanka, and Thailand)
- Sustainability Capacity Building on Urban Disaster Mitigation in Asia using IT and C learning tools (CASITA)
 - ADPC, ITC, ENSG (France)
- Strengthening Capacity on multi-hazard Risk Assessment in Tsunami affected Countries (SCRATCH)
 - ITC & AIT Bangkok, CB in Institutes in 4 countries India, Sri Lanka, Thailand, and Indonesia.

Geoinformatics for DRR - Urban

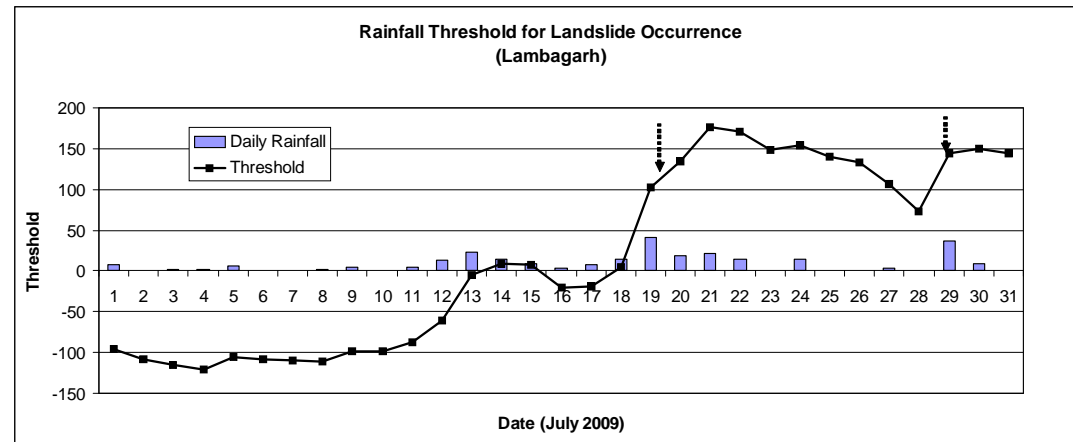
- Urban Environment
 - Microseismic Zonation
 - Earthquake vulnerability, transportation network
 - Industrial Hazard
 - Multi-hazard assessment (Earthquake, landslide, fire)

Urban Multihazard Mapping : Part of Kohima (Nagaland)

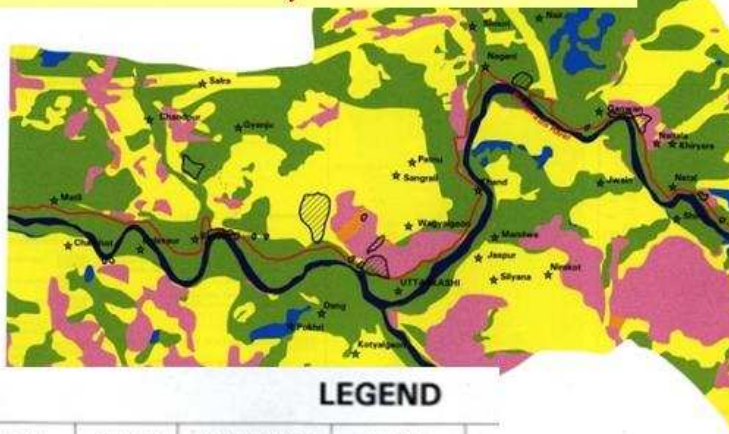


Geoinformatics for DRR - Landslides

- Landslides
 - Landslide Hazard Zonation
 - Early Detection with Differential Interferometry
 - Estalishing thresholds for rainfall induced landslides



VARUNAVRAT, UTTARAKHAND



MAP SYMBOL	HAZARD CLASS	PERCENT AREA (Total Area without river / waterbody = 77.30 Sq.Km)	MAJOR SETTLEMENTS IN EACH CLASS
■	SEVERE	0.0	0
■	VERY HIGH	0.285	0
■	HIGH	19.850	1
■	MODERATE	38.840	9
■	LOW	42.813	19
■	VERY LOW	2.210	1

FIELD PICTURE



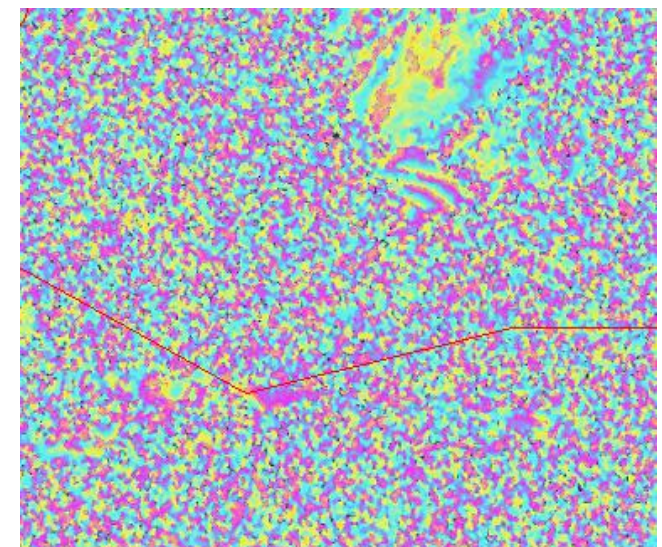
PRE-LANDSLIDE Interferogram



Base line and total displacement

13 April-22 June: 253, 56 mm

POST-LANDSLIDE

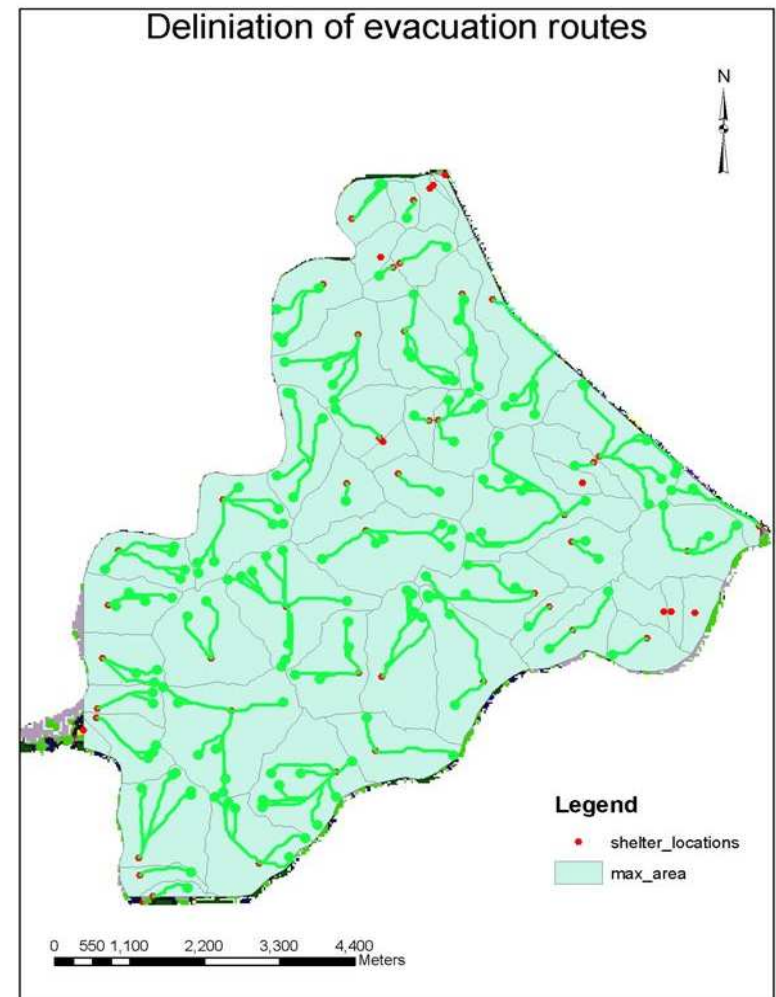
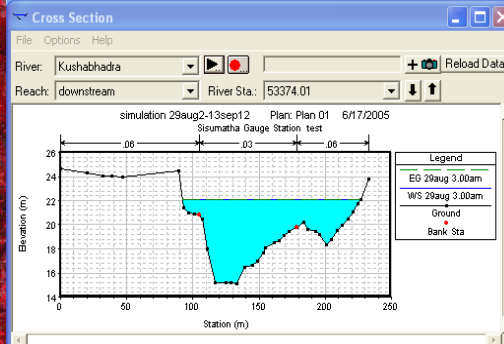
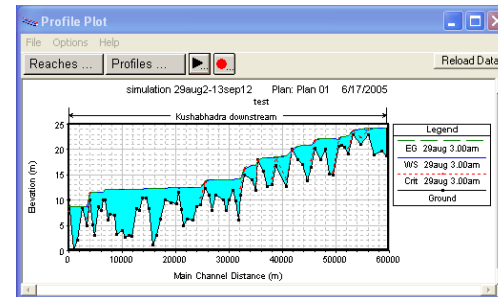
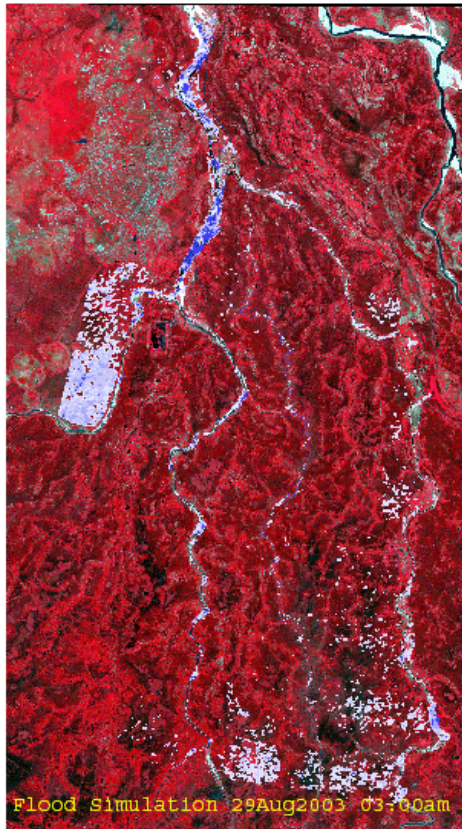


Geoinformatics for DRR - Flood

- Inundation mapping (depth, duration), prediction
- Mapping elements at risk
- Flood prediction
- Safe evacuation routes

ORISSA;

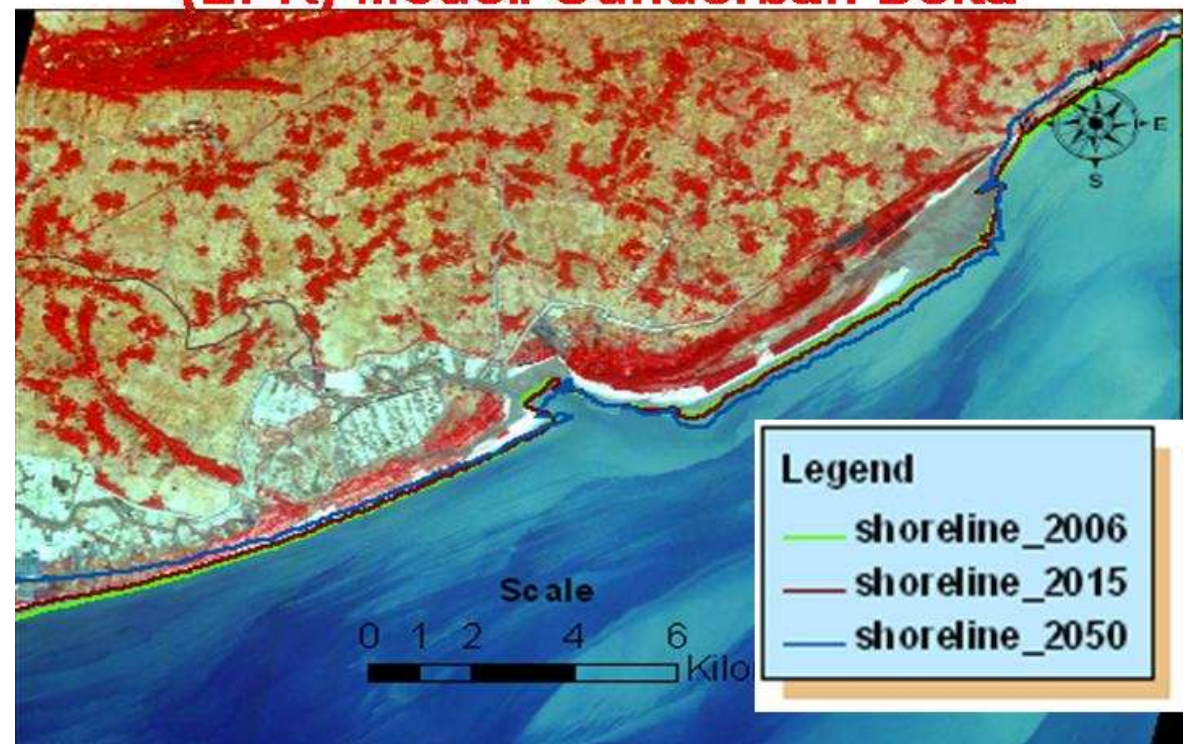
Model Input:: DEM, LULC, Flood depth/ Extent map, Road Network, Shelter Location, Flow Direction/ Accumulation



Geoinformatics for DRR – Coasts

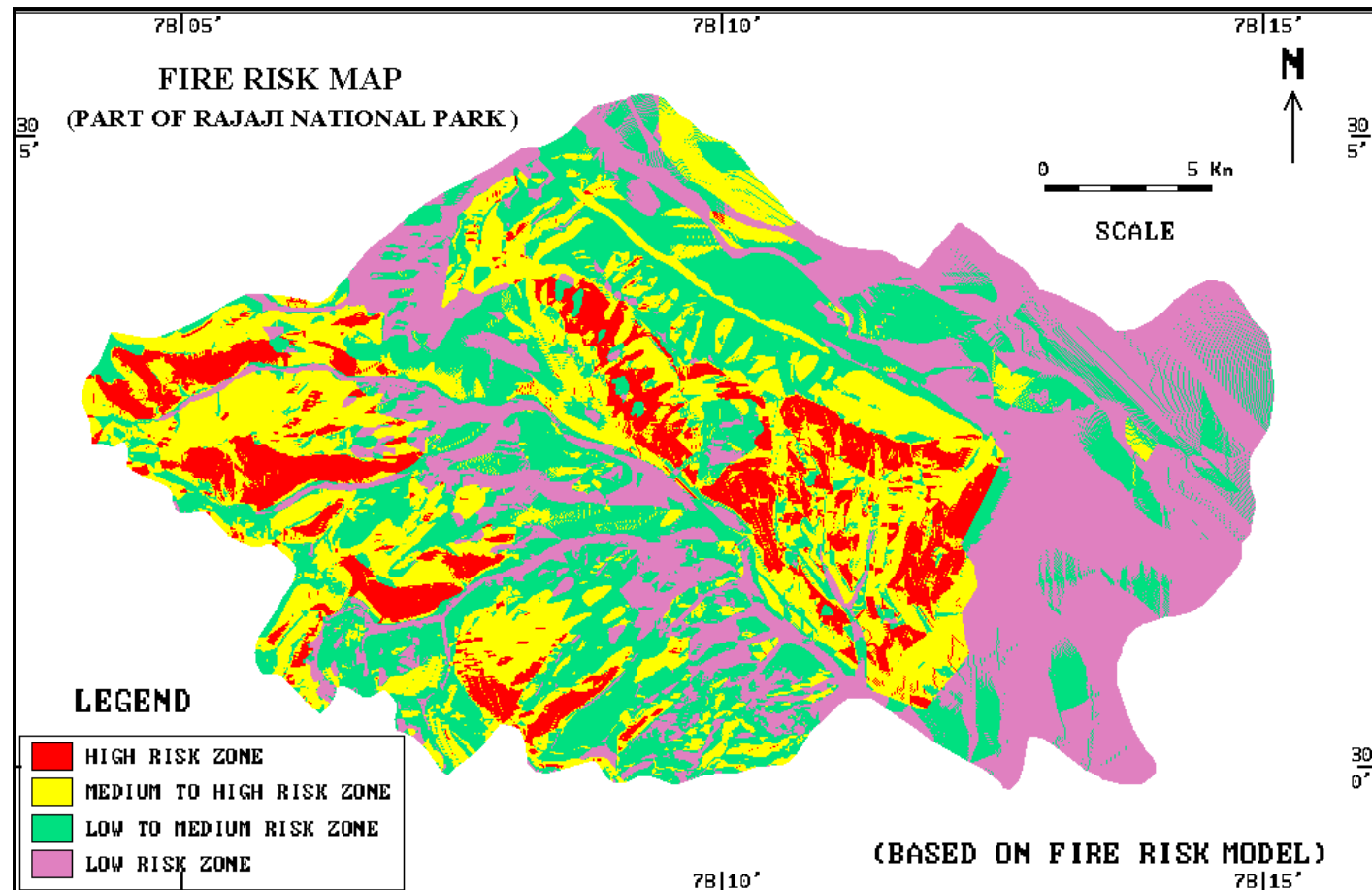
- Coastal Hazards
 - Storm Surge
 - Coastal Erosion
 - Salt water intrusion
 - Vulnerability to sea level rise

Shoreline Prediction: End Point Rate (EPR) Model/ Sunderban Delta



Geoinformatics for DRR : Forest fires

- Forest Fires
 - Active fire detection
 - Fire Risk Zoning



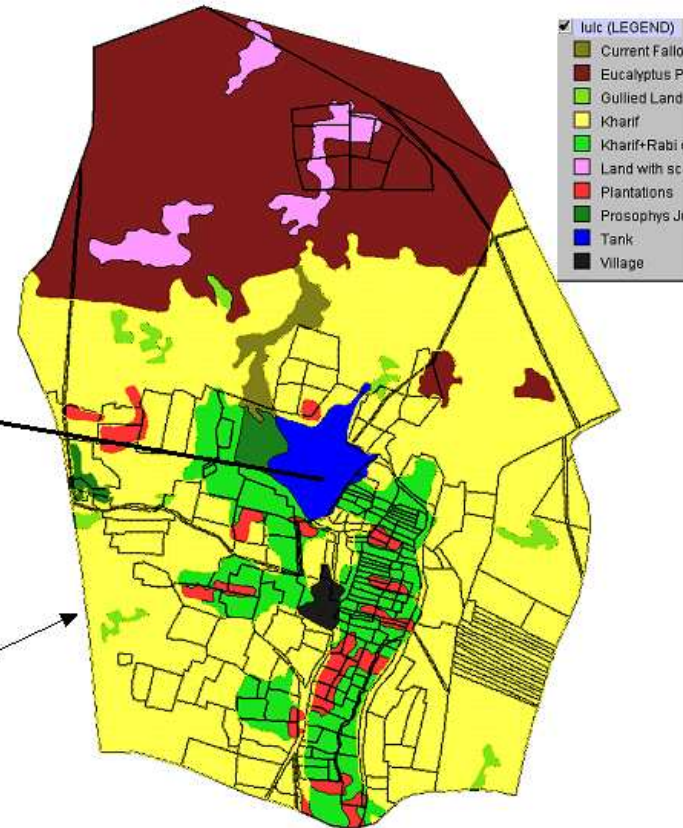
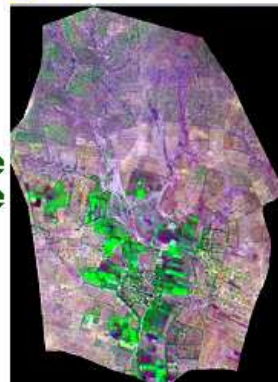
Participatory Rural Appraisal

- High Resolution RS Data, Open Source GIS & mobile mapping for PRA



Participatory planning by the local community through PRA

Satellite Image
True Color Composite

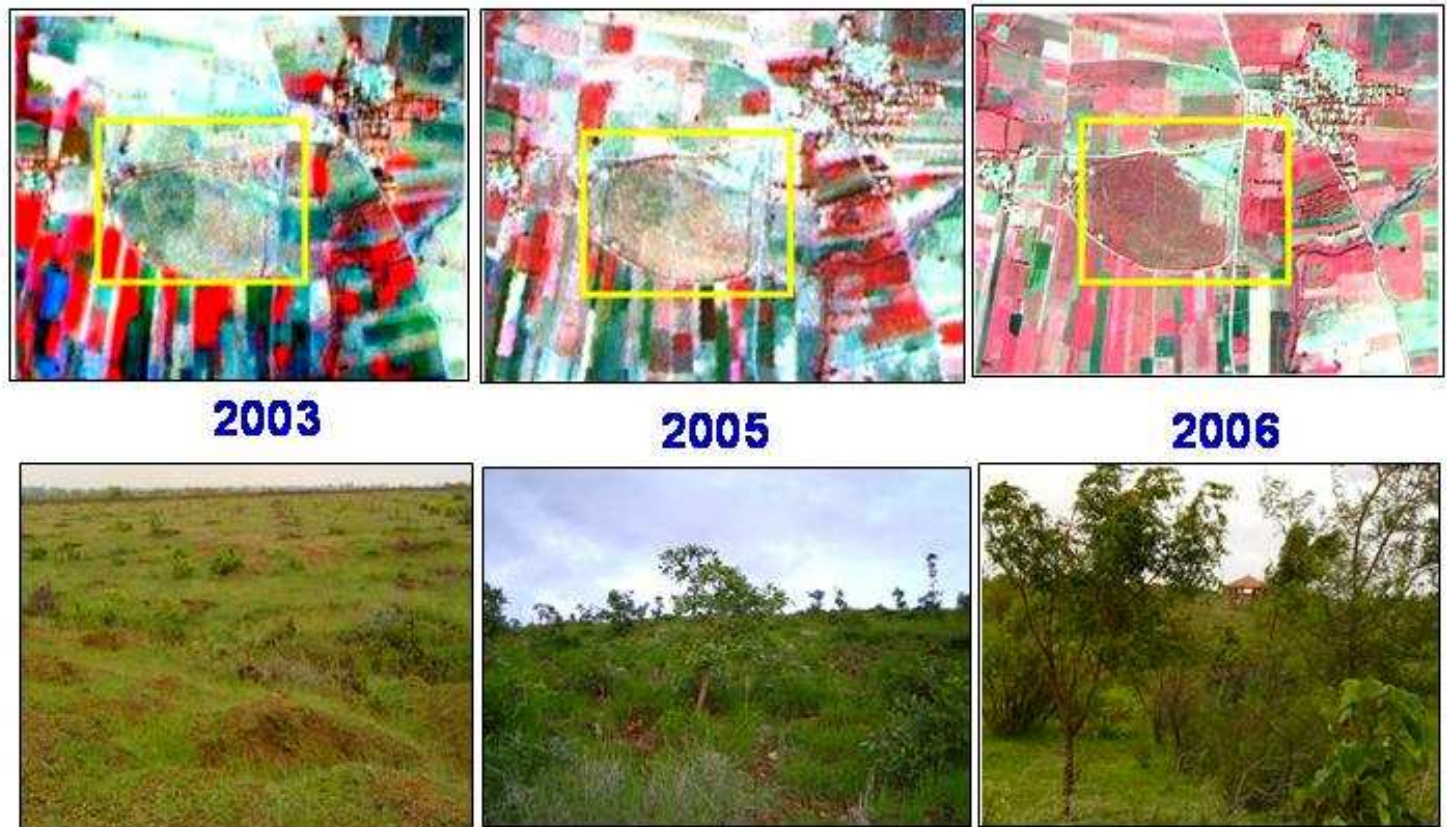


Satellite derived Land use \ Land cover Map
- facilitates resource mapping through PRA.

Jodibisalahalli Micro-watershed, Kolar District, Karnataka, India

WD - Monitoring & Evaluation

- Sujala – 738 watersheds treated (500,000 ha)
- World Bank funds US \$ 127 million
- Monitoring & Evaluation by Antrix/ ISRO



Field & LISS-IV monitoring of afforestation; Itagi SWS, Karnataka

Forthcoming International Trainings

- International Course on *'Geoinformatics and spatial information for Disaster Management'*,
 - Sponsored by SDMC during 19-25 Aug, 2009
 - for participants from SAARC Member countries (Afghanistan, Pakistan, Nepal, India, Bhutan, Maldives, Sri Lanka, Bangladesh)
- International Training Course on "Space Technology for Disaster Management Support with Emphasis on Geological Risk Mitigation",
 - Sponsored by CSSTE-AP, during April 1 - May 7, 2010
 - For participants from Asia-Pacific

Thank You !



www.iirs-nrsc.gov.in

EDUCATIONAL PROGRAMMES



Award of PG Diploma by CSSTEAP

By Merit since 2004 at IIRS

1 year follow-up project in home country

CSSTEAP 1 Yr Fellowship in India

Award of Masters (M. Tech) degree by Andhra University

In addition to PG courses, CSSTEAP also conducts short term courses & workshops in specific areas of RS & GIS, SATCOM, SATMET & Space Science.

OVERALL OUTPUT OF PG COURSE STUDENTS

Year	RS & GIS	SATCOM	SATMET	SPACE SC.
1996	25 Students 14 Countries			
1997 - 98	23 Students 14 Countries	13 Students 09 Countries		
1998 - 99	21 Students 11 Countries		17 Students 10 Countries	10 Students 07 Countries
1999 - 00	17 Students 11 Countries	18 Students 08 Countries		
2000 - 01	19 Students 13 Countries		21 Students 13 Countries	09 Students 05 Countries
2001 - 02	20 Students 13 Countries	14 Students 08 Countries		
2002 - 03	23 Students 13 Countries		19 Students 13 Countries	11 Students 03 Countries
2003 - 04	21 Students 16 Countries	15 Students 07 Countries		
2004 - 05	20 Students 11 Countries		15 Students 10 Countries	09 Students 05 Countries
2005 - 06	19 Students 13 Countries	12 Students 06 Countries		
2006 - 07	22 Students 14 Countries		18 Students 11 Countries	13 Students 07 Countries
2007 - 08	18 Students 11 Countries	20 Students 10 Countries		
2008 - 09	15 Students 10 Countries		16 Students 13 Countries	07 Students 03 Countries

COUNTRIES BENIFITED

Afghanistan
 Azerbaijan
 Bangladesh
 Bhutan
 Cambodia
 China
 DPR Korea
 Fiji
 India
 Indonesia
 Iran
 Japan
 Korea
 Kazakhstan
 Kyrgyzstan
 Lao PDR
 Malaysia
 Maldives
 Mongolia
 Myanmar
 Nepal
 Pakistan
 Papua N.G.
 Philippines
 Sri Lanka
 Thailand
 Tajikistan
 Taiwan
 Uzbekistan
 Vietnam