



# ITC.

# Capacity building in Geoinformation Science and Earth Observation

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**Enschede, Netherlands**



Associated Institute of the  
UNITED NATIONS UNIVERSITY

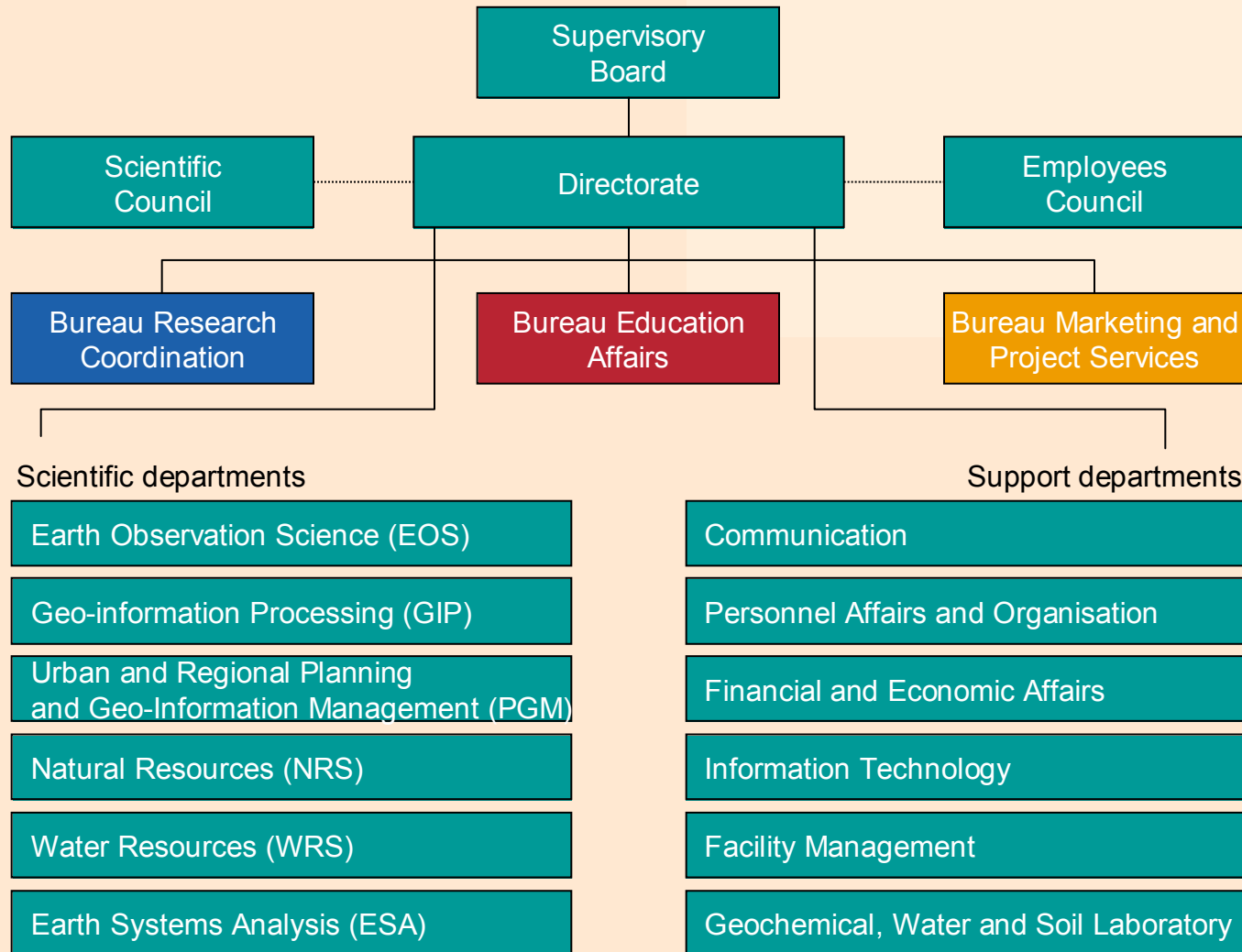


# ITC's mission

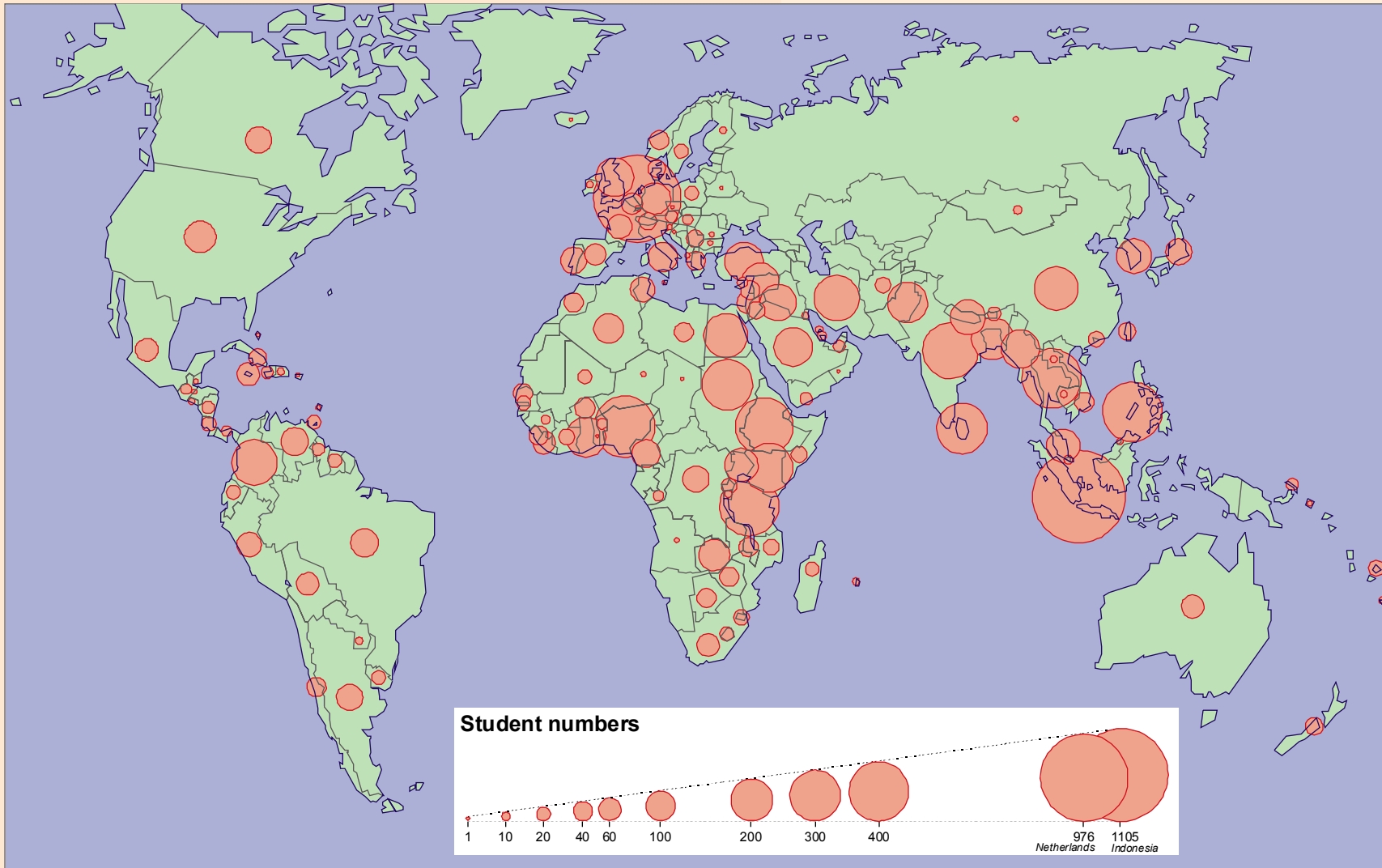


- Our aim is to provide **international postgraduate education** through knowledge exchange directed primarily at **capacity building and institutional development** for and in countries that are economically and technologically less developed (LCDs).
- Our knowledge field is centred on **geo-information science and earth observation** and consists of a combination of tools and methods for the collection, storage and processing of geo-spatial data, for the dissemination and use of these data and of services based on these data.
  - ITC is an institute for international higher education
  - Funded by NL ministry for development cooperation and ministry of science and education
  - Now formally linked to Technical University of Twente, Enschede

# Organisation



# Origin ITC alumni 1950 – 2004 (> 15.000)



# Earth Systems Analysis



- The Earth's surface and subsurface are the work field of the Department of Earth Systems Analysis (ESA).
- ESA concentrates on a number of societal issues and problem areas, including:
  - earth resources management, exploration and exploitation;
  - land (soil) degradation;
  - natural hazards and disasters;
  - geo-environmental hazards.
- ESA combines competence in the earth sciences with relevant know-how about state of the art remote sensing and GIS technology. The department's activities include:
  - spatio-temporal modelling for an improved understanding of earth systems and processes;
  - development of methods, techniques and tools for the assessment and monitoring of these earth systems and processes;
  - earth and land resource information provision for planning and decision-making on the multi-functional use of space.
- In short, ESA provides and applies relevant geo-information for an improved understanding of earth surface and subsurface processes in space and time, for the sustainable use of earth resources and the mitigation of natural and man-induced disasters.

# Educational programmes



- **Geoinformatics**
- **Geo-information Management**
- **Urban Planning and Land Administration**
- **Natural Resources Management**
- **Water Resources and Environmental Management**
- **Applied Earth Sciences (formerly EREG)**
  - Geo-hazards
  - Geo-Engineering
  - Geo-Exploration



Courses are 12 months Professional Master or 18 months MSc  
Consist of modules of 3 weeks, which can also be followed  
individually

# Short courses & joint courses



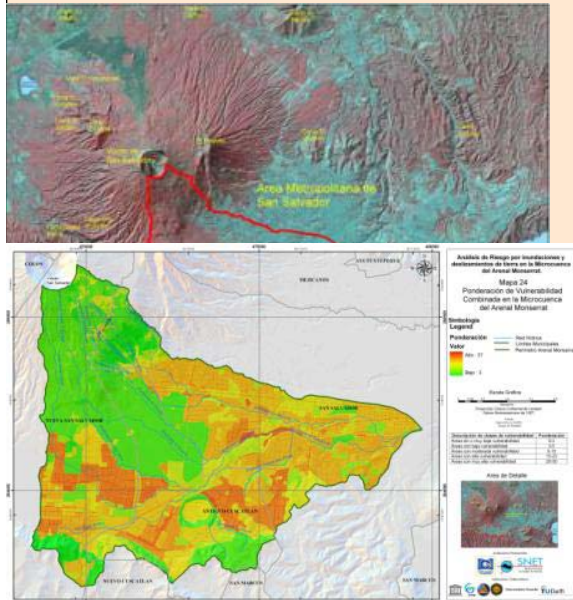
- **At ITC: short courses are offered annually with duration of 3 weeks – 3 months, e.g. on:**
  - Multi hazard risk assessment
  - Geostatistics
  - Hyperspectral
  - Geochemistry
  - Geophysics
  - Costs: Living costs: Euro 600, Tuition fee: Euro 600
- **Short courses in developing countries funded by NL government, for alumni and others**
- **Joint educational programmes with partner universities in other countries**

**Website: <http://www.itc.nl>**

# Research: SLARIM project.

## Strengthening Local Authorities in Risk Management

Development of a methodology for the implementation of risk assessment and spatial decision support systems for risk management by local authorities



- Users need assessment and organizational setting,
- Flood hazard and risk assessment
- Earthquake Hazard and risk assessment
- Landslide hazard and risk assessment,
- Volcanic hazard and risk assessment,
- Elements at risk mapping
- Geographic information systems and data bases,
- Use of Earth Observation data for disaster management

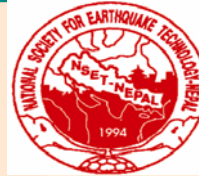


# Case study cities



## ● Kathmandu (Nepal)

- Earthquakes / liquefaction / landslides
- Partners: NSET, ICIMOD, ADPC, LSMC



NSET



## ● Naga city (Philippines)

- Flooding
- Partners: ADPC, PHIVOLCS, Naga City, PAGASA



## ● Dehra Dun (India)

- Earthquakes / landslides
- Partners: IIRS, NRSA, WIHG

## ● Tegucigalpa (Honduras)

- Flooding / landslides
- Partners: CEPREDENAC, COPECO

## ● Retalhuleu (Guatemala)

- Flooding / earthquake / volcanics
- Partners: FAUSAC, INSIVUMEH

## ● Others ?



# PhD research

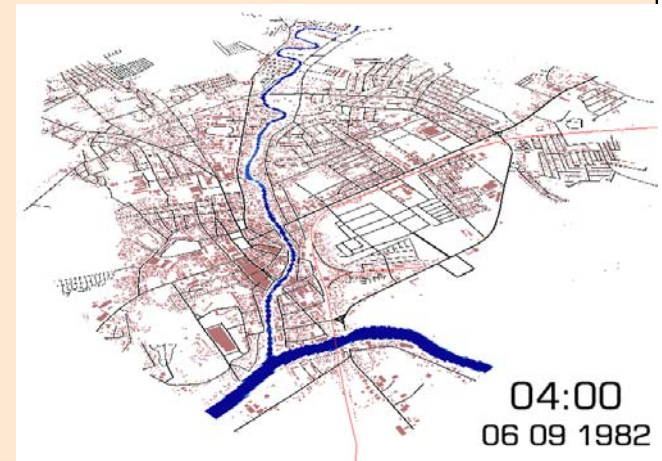


- Enrique Castellanos (Cuba)  
Spatial Landslide Risk Assessment in Cuba
- Graciela Peters Guarin (Colombia)  
Community-based flood risk assessment (case study from Naga, Philippines)
- Veronica Botero (Colombia)  
Spatial Data Infrastructure for Urban Vulnerability Assessment.
- Carolina Sigaran (Costa Rica)  
Empirical relations from 2-D and 3-D topographic and geotechnical effects on soil response
- Gabrielle Iglesias (Philippines)  
User needs assessment for GIS in urban vulnerability reduction
- Torsten Drey (Germany)  
Landslide mapping from high resolution satellite imagery
- Ajay Kumar Katuri (India)  
Spatial Decision Support systems for urban vulnerability reduction

# MSc research on flooding



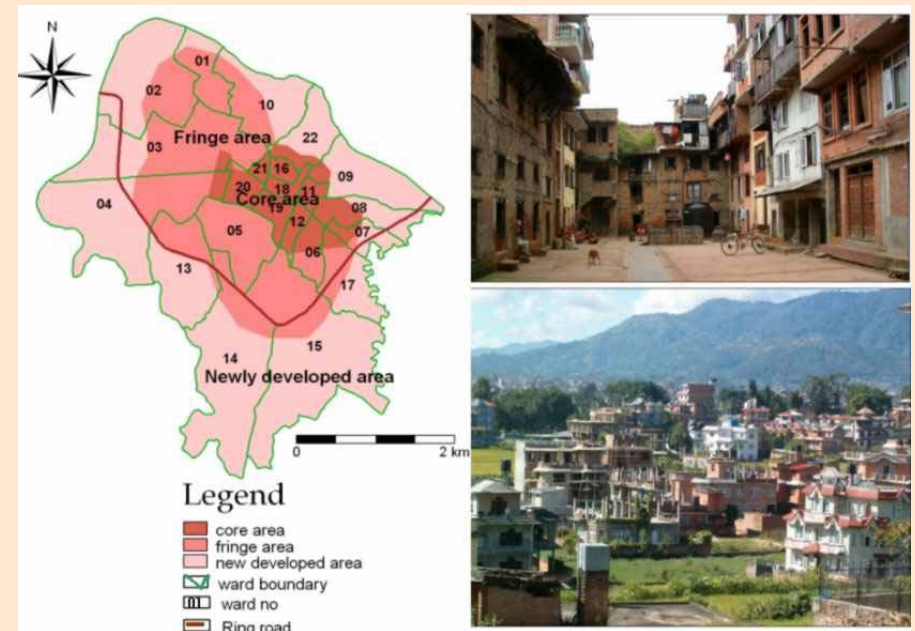
- Tennakoon (Sri Lanka)
  - **Generation of base data and flood modeling for Naga city using single typhoon event**
- Jennifer Otieno (Kenya)
  - **Flood modeling for lower Bicol catchment, including both riverine and coastal flooding**
- Mudibuddin (Indonesia)
  - **Flood hazard assessment based on flood modeling using SOBEK model**
- Milagros Monnroy (Peru)
  - **Flood impact assessment using community-based approach**
- Mafe Reganit (Philippines)
  - **Community-based capacity assessment**
- Graciela Peters Guarin (Colombia)
  - **Flood vulnerability assessment**



# MSc research on earthquakes



- Birendra Piya (Nepal)
  - **Subsurface database & liquefaction hazard assessment**
- Umut Destegul (Turkey)
  - **1-D soil response modelling**
- Jayaweera Somasekeera (Sri Lanka)
  - **Building density analysis**
- Jeewan Guragain (Nepal)
  - **Building loss estimation**
- Mazharul Islam Khan (Bangladesh)
  - **Population loss estimation**
- Pho Tan Tun (Vietnam)
  - **Road vulnerability**
- Jimmy Avenado Castillo (Honduras)
  - **Decision support system**



# Background



On 4th April 2005, the United Nations University ([UNU](#)) and the International Institute for Geo-Information Science and Earth Observation ([ITC](#)) entered into an agreement, appointing ITC as an Associated Institution of the UNU.

# Missions are similar



## **United Nations University:**

**"to contribute, through research and capacity building, to efforts to resolve the pressing global problems that are the concern of the United Nations, its Peoples and Member States",**

## **International Institute for Geo-Information Sciences and Earth Observation (ITC)**

**“ITC develops and transfers knowledge on geo-information science and earth observation ITC aims at capacity building and institutional development of professional and academic organizations and individuals specifically in countries that are economically and/or technologically less developed “**

# Two Schools



The UNU-ITC programme will develop two Schools on the following themes:

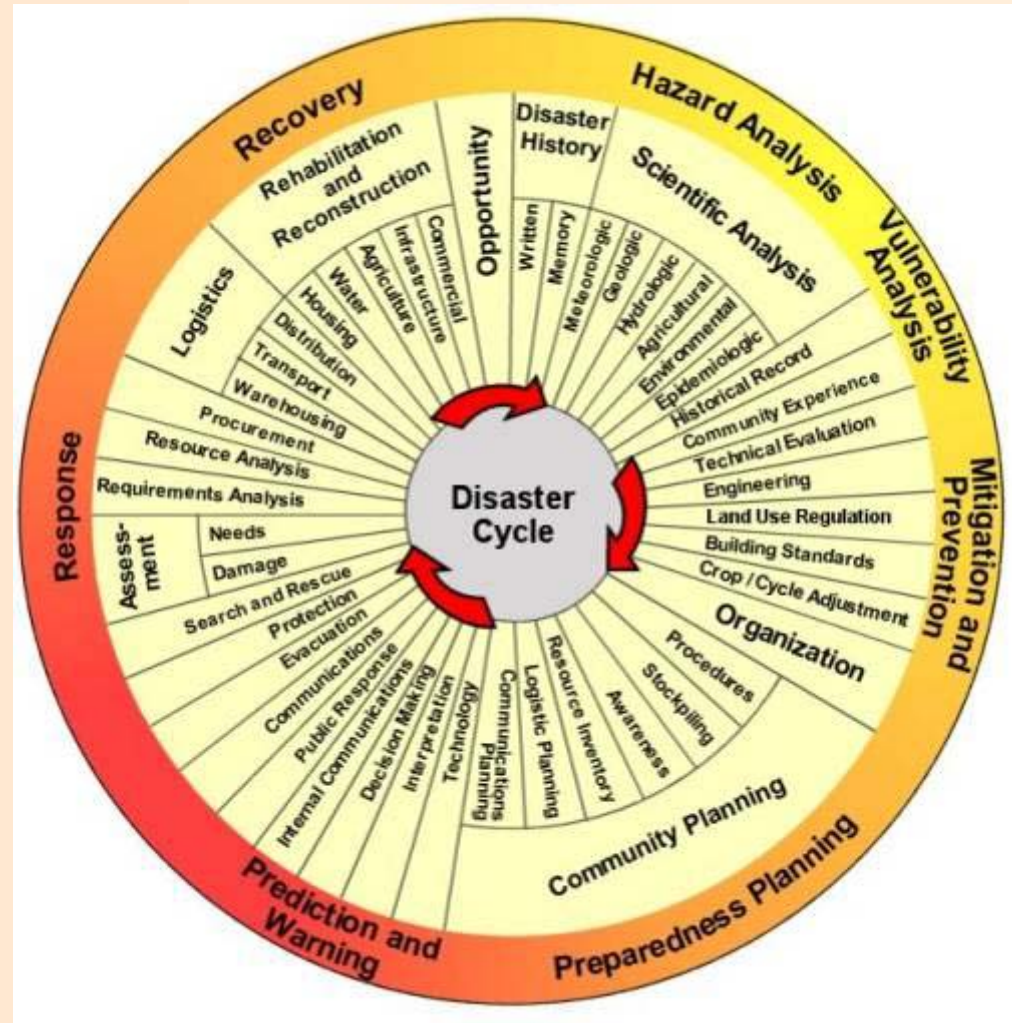
- **UNU-ITC School on Land Administration**
- **UNU-ITC School on Disaster Geo-Information Management**



# UNU-ITC DGIM Objectives



- “ to strengthen the capacity of institutions at national and local level in developing countries to reduce the vulnerability to natural hazards”
- the main objective of the programme will be capacity building for the collection, management, analysis and dissemination of spatial information before, during and after disaster events.

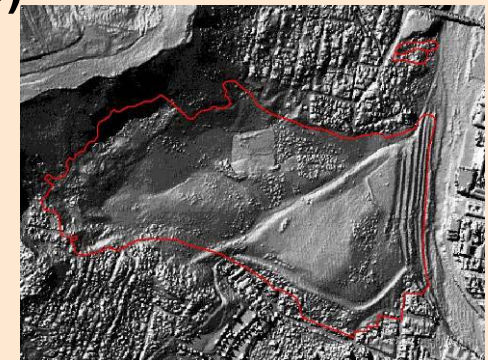
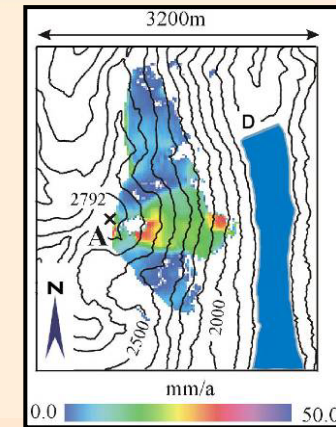




# Focus (1) : Content



- Hazard modeling
- Elements at risk databases
- Vulnerability assessment
- Loss estimation / risk assessment
- Spatial Decision Support Systems
- Damage assessment (semi automated)
- DEM generation (SRTM, Lidar, Aster, InSar)
- Higher spatial resolution (e.g. Quickbird, IKONOS, IRS coming up)
- Higher spectral resolution (e.g. Aster, Modis)
- Mobile GIS
- Participatory GIS
- Web GIS
- Spatial Data Infrastructure



# UNU-ITC DGIM: Activities



- **Capacity Building** of organisations in **Developing Countries** involved in **Disaster Management**, through:
  - Educational cooperation and training;
  - Knowledge development and research collaboration;
  - Advisory services and consulting;



# Education



- Organization of decision maker workshops,
- Short courses,
- Medium duration tailor-made training courses,
- Joint educational programs (JEP's),
- Distance education courses,
- University networks and through
- Development of a specialization on “Geo-information Science and Earth Observation for Disaster Risk Management” at MSc level.



# Target: education & training

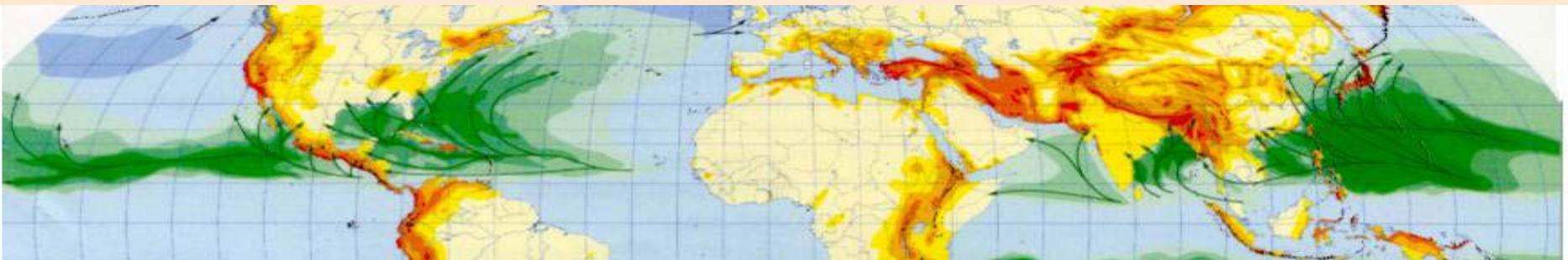


- 3 decision maker's seminars per year = 15 in total
- 5 short courses outside ITC per year = 25 in total
- 1 advanced summer course per year = 5 in total
- 2 short courses in ITC each year = 10 in total
- 1 tailor-made training course per year = 5 in total
- Development of specialisation "Disaster Management" in all educational programmes
- 5 Distance education courses
- 6 Joint Educational Programmes
- 3 University Networks

# Networks and Regions



- **Africa**, with the development of the University Network for Disaster Risk Reduction in Africa (**UNEDRA**).
- **E Asia**, as a follow-up of existing activities, such as the **CASITA project**, where the collaboration with the Asian Disaster Preparedness Center (ADPC), AIT, and several Universities and Institutes where JEP's are implemented or planned.
- **Latin America**, as a follow-up of the **UNESCO RAPCA** project, but also taking into account the current ITC partners in the region such as USS (Bolivia), UNAM (Mexico) and FAUSAC (Guatemala).



# Plans for 2006: education



## Africa

- One decision-makers seminar in East-Africa (RCMRD)
- Two-week course with RCMRD in East-Africa in droughts/land degradation
- Two-week course with RECTAS on DMC satellites for DM

## Asia

- Two-week course Pakistan in collaboration with ICIMOD
- Two-week RC course EVRC in collaboration with AIT & ADPC

## Latin America

- Two-week DM course in collaboration with UNAM for Central America

# Plans for 2006: education



- **Development of MSc specialisation in DGIM**
- **Distance education supported course multihazard risk assessment, jointly with ADPC**
- **Development of JEP collaborations:**
  - Asia: IIRS (India), UGM (Indonesia), PGIS (Sri Lanka)
  - Latin America: UNAM (Mexico)
  - Africa (to be decided)
- **Development of networks in Asia, Africa and Latin America.**
- **4 MSc fellowships with specialisation in DM starting September 2006**
- **4 Short course (3 month) fellowships for DM related courses in March-June**

# Research



- **Application of Geo-information Science in the modeling and quantification of risk in urban and rural environments to hazardous events with a rapid-onset;**
- **Application of Remote Sensing for disaster monitoring and damage assessment;**
- **Development and application of Early Warning systems with a main Earth Observation component (e.g. drought, flooding, forest fires)**
- **Development of Spatial Data Infrastructure for Disaster Management, at both local as national level.**
- **Supporting disaster risk management at the local level, involving participatory GIS and decision support systems;**



# Research



- **Research projects**
- **PhD researchers**
- **Visiting scientist exchange programme**

## **Target:**

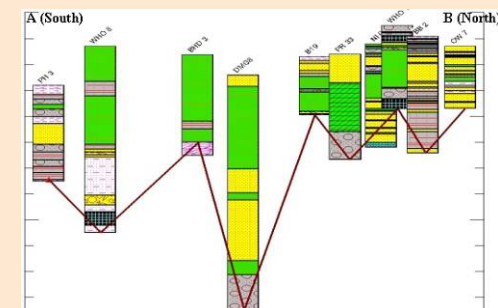
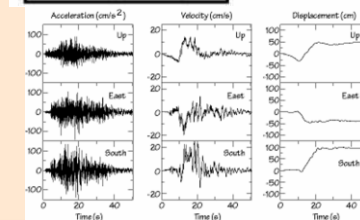
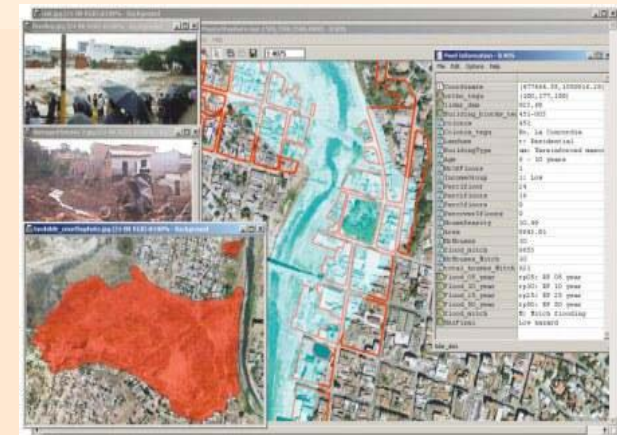
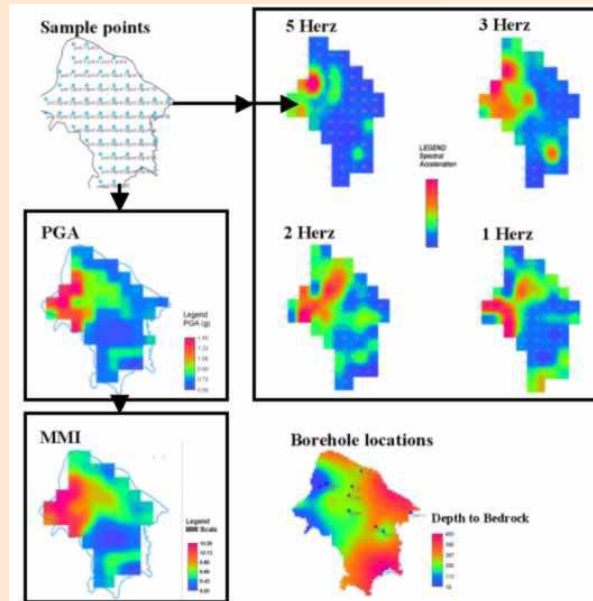
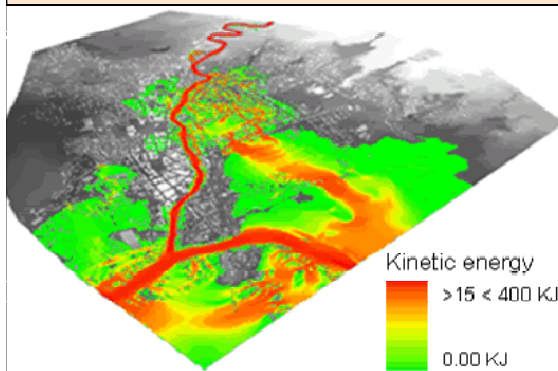
- **25 papers in internationally peer reviewed journals per year**
- **10 Fte for Internal Research Projects**
- **5 PhD fellowships per year**
- **5 Visiting scientist positions per year**
- **Increasing external funding**
- **Increasing presence in international fora**

# Research: SLARIM project.



**Strengthening Local Authorities in Risk Management**

**Development of a methodology for the implementation of risk assessment and spatial decision support systems for risk management by local authorities**

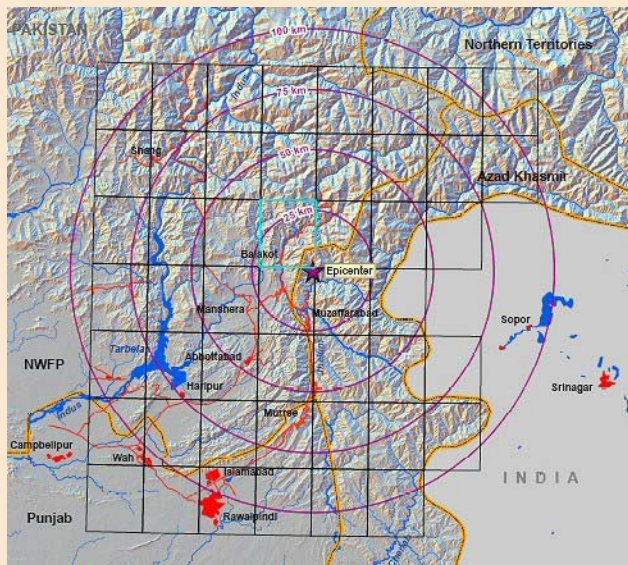


# Disaster Information Analysis Group



The main objective of the ITC Disaster Information Analysis Group (DIAG) would be to support capacity building of organizations in developing countries through assistance in the collection, management, analysis and dissemination of spatial information after major disaster events in developing countries

## ● Pakistan earthquake



## ● Tsunami



# Partners



THE WORLD BANK

International Strategy  
**ISDR**  
for Disaster Reduction



PACIFIC DISASTER CENTER



PROVENTION CONSORTIUM

**EMI** Earthquakes and Megacities Initiative



NSET



Asian Disaster Reduction Center

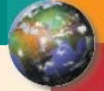


GEOHAZARDS  INTERNATIONAL

A Nonprofit Working Toward Global Earthquake Safety



# UNU – EHS



- **UNU-EHS explores threats to human security arising from natural and human-induced hazards. The Institute spearheads research, capacity building and policy-relevant advisory activities relating to the broad interdisciplinary field of 'risk and vulnerability'.**

<http://www.ehs.unu.edu/>



# Communication

- **Own website, <http://www.itc.nl/unu/dgim/default.asp>:**
  - Announcements of UNU-ITC related activities;
  - Workshop and training materials
  - Access to spatial data related to disaster management
  - Links to other relevant organisations
- **Newsletter and announcements**
  - Through <http://update.unu.edu>
  - Own e-mail newsletter
  - Newsletters of other relevant organisations
- **Database with organisations related with disaster management;**
- **Database with persons trained, or interested in training;**



The screenshot shows the website for the International Institute for Geo-Information Science and Earth Observation (ITC) at UN University. The page features the ITC logo on the left and the UN University logo on the right. The main content area is titled "A UNU-ITC programme on Capacity Building for Disaster Geo-Information Management (DGIM)". The navigation menu includes links for "About ITC", "Research", "Education", "Project Services", "Alumni", "Partnerships", and "News". The page also includes a search bar and a contact link.

International Institute for Geo-Information Science and Earth Observation

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UN University

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ITC and UNU  
DGIM ↓  
[Overview](#)  
DIAG ↓

A UNU-ITC programme on  
**Capacity Building for Disaster Geo-Information Management (DGIM)**

UNITED NATIONS UNIVERSITY