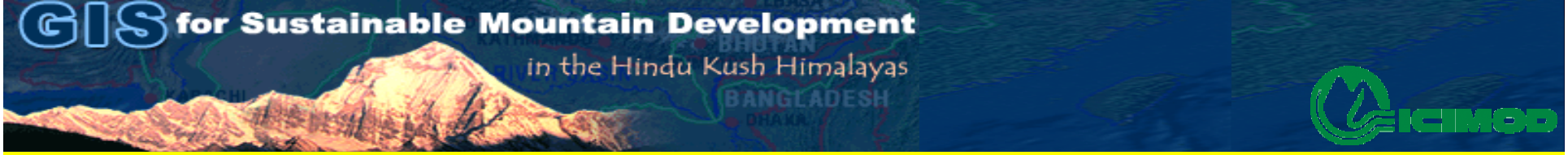

Training/workshop on

"Earthquake Vulnerability and Multi-Hazard Risk Assessment: Geospatial Tools for Rehabilitation and Reconstruction Effort"

13 – 31 March 2006, Islamabad, Pakistan

Sources of Elements at Risk

Samjwal Ratna Bajracharya

International Centre for Integrated Mountain Development (ICIMOD)

Material prepared from Lorena Montoya, Paul Hofste, and Cess van Western, ITC

CENTRE OF EXCELLENCE IN GEOLOGY UNIVERSITY OF PESHAWAR

ICIMOD

ITC

UNITED NATIONS UNIVERSITY

adpc

Elements at risk

Element at risk		Sources (bold = primary source)		
Lifelines	Main roads network	Map / register	Field	**Image**
	Bridges, tunnels	Map / register	Field	**Image**
	Waterways network	Map / register	Field	**Image**
	Railways network	Map / register	Field	**Image**
	Airport	Map / register	Field	**Image**
	Port	Map / register	Field	**Image**
	Drinking water network	**Map / register**		
	Electricity network	**Map / register**		
	Telephone networks	**Map / register**		
	Data networks	**Map / register**		

Elements at risk

Element at risk		Sources (bold = primary source)		
Buildings	Building type	Building type map	Field	**Image**
	Structural type	Structural type map	**Field**	
	# of floors	# of floors map	**Field**	
	Land use per floor	Floor land use map	**Field**	
	% built-up area	Footprint map	Field	**Image**
Population	# of inhabitants	**Census / register**	Sampling	
	Age composition	**Census / register**	Sampling	
	Distribution in space	Floor space map	Field	**Image**
	Distribution in time	Detailed land use map	**Field**	

Elements at risk

Element at risk		Sources (bold = primary source)		
Essential facilities	Hospital, clinic	**Map / register**	Field	Image
	Ambulance station	**Map / register**	Field	
	Fire brigade station	**Map / register**	Field	
	Police station	**Map / register**	Field	
	Government office	**Map / register**	Field	
	Schools	**Map / register**	Field	Image
	Community center	**Map / register**	Field	
	Religious center	**Map / register**	Field	Image
	Covered sports center	**Map / register**	Field	Image
	Sports field	Map / register	Field	**Image**
	Public green space	Map / register	Field	**Image**
	Vacant land	Map	Field	**Image**
	Non-built-up space	Map	Field	**Image**

Sources of elements at risk

1. Common (administrative) sources:

- Census (relating to census district): trustworthy, may be outdated
- Population register: may be incomplete or unreliable
- Land and building data registers: access may be problematic (not digital, no coordinates, privacy)
  Examples: cadaster, building permits, value assessment, taxation data

Sources of elements at risk

2. Remote Sensing:

- Buildings + roads + many other artefacts are recorded with the location, may be outdated, but date is known
- Non-built-up and vacant land can be detected
- Building densities, etc can be measured
- New high-resolution (< 1 m) satellite imagery with digital format is complementing aerial photos, cost may be high

Sources of elements at risk

3. Close Sensing: field data collection

- Observation by a trained person (especially with local knowledge) is a powerful data capture tool
- Professional judgement and estimation can be applied, e.g. for value estimates or structural quality assessment of buildings
- Analogue data capture requires time-consuming transcription to digital format.

  Mobile GIS will provide new solutions

Final Remarks (1)

- Many elements at risk can be identified through high-resolution satellite imagery.
  - OK for regional disaster management
  - complement with field data acquisition in the case of urban disaster management

Final Remarks (2)

- Focus on specific facilities, essential in case of a disaster:
  - essential facilities
  - high potential loss facilities
  - transportation systems
  - lifeline utility systems
- Data from multiple sources
  - RS, complemented with other sources
  - existing maps
  - existing registers
  - new field surveys