Application of Satellite Rainfall Estimates in the Himalayas for Disaster Risk Reduction

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Astana, KAZAKHSTAN

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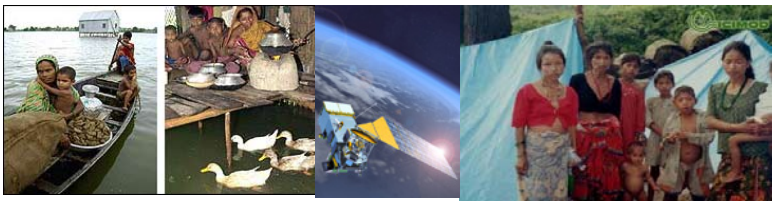
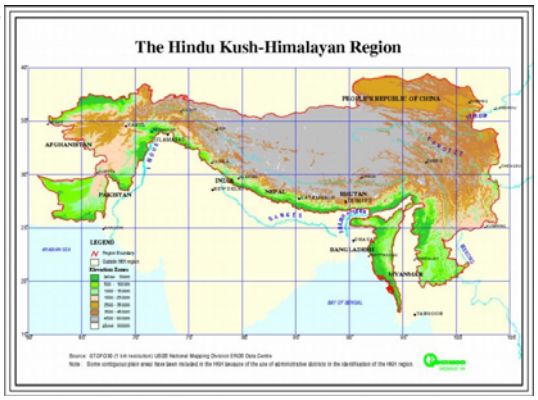
ICIMOD, Kathmandu, NEPAL

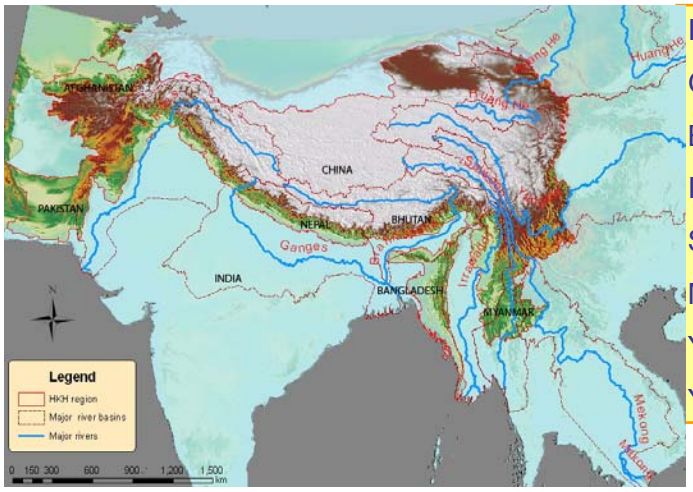


The Himalayan Region

- Extends 3500 km - Afghanistan, Pakistan, India, China, Nepal, Bhutan to Bangladesh and Myanmar;
- Youngest geological formation - dynamic & fragile mountain ecosystem;
- High spatial variations with widely varying physical and climatic conditions;
- Prone to floods and landslides



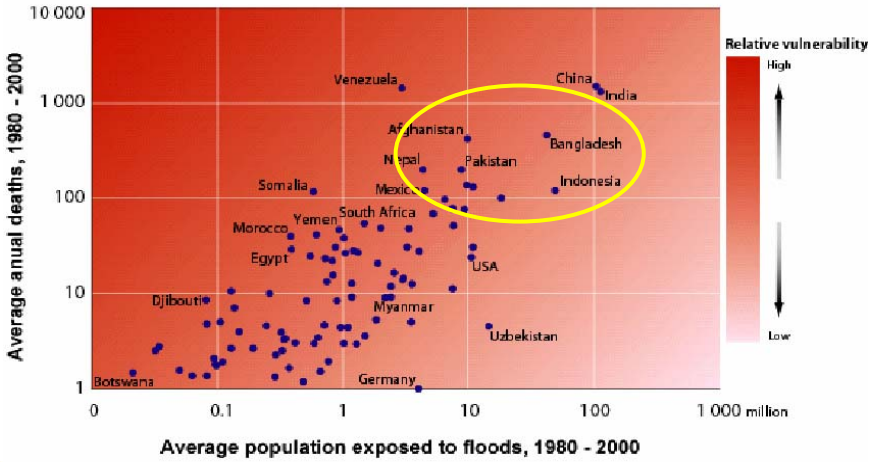
Major River Basins of the Himalayan region



- Indus
- Ganges
- Brahmaputra
- Irrawady
- Salween
- Mekong
- Yangtze
- Yellow

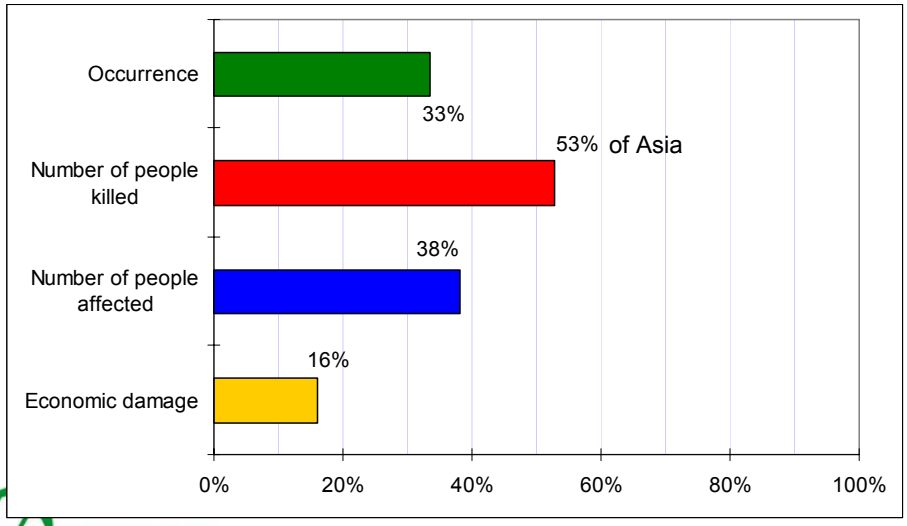
Sustenance to over 150 million people in the Himalayan Region

Relative Vulnerability for Floods



Source: The EM-DAT OFDA/CRED International Disaster Database and UNEP/GRID-Geneva

Flood Disaster in South Asia (1976-2005)



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Floods in the Himalayan region

Types of Floods

Riverine Floods

Flash Floods

- **Landslide and Dam bursts**
- **Glacial Lake Outburst Floods**
- **Rapid Snow melt**
- **Cloud bursts**

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Flood Risk Mitigatiion - Structural

Channel Construction at Tsho Rolpa Glacier Lake 4,500 masl, Nepal

Flood Risk Mitigation – Non Structural
Early Warning Systems

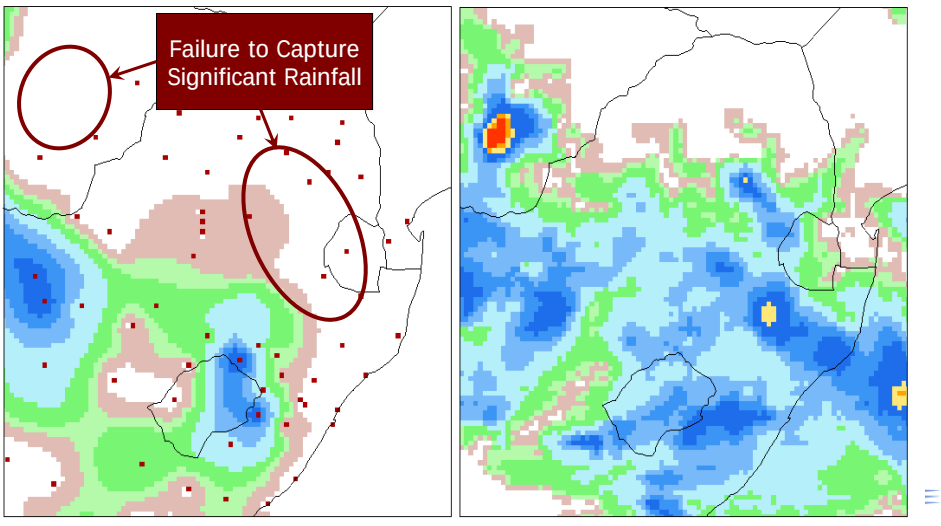
Early Warning Siren

Scientific Tools to reduce risk: examples

- Internet/Websites/Portal – Data sharing, warehousing, knowledge hub, evacuation plan, sharing of lessons learned and experiences etc.
- GIS (modeling and data integration)
- Remote Sensing (monitoring)
- Communication systems - VSAT, Mobile, Networks to collect, organize, transfer data and information
- Preparation through education e.g. Radio, TV can be used to raise awareness and accountability of policy makers to ensure polices are drawn

Why estimate rainfall from space?

Rain Gauge Interpolation | **Satellite-Estimated Rainfall**



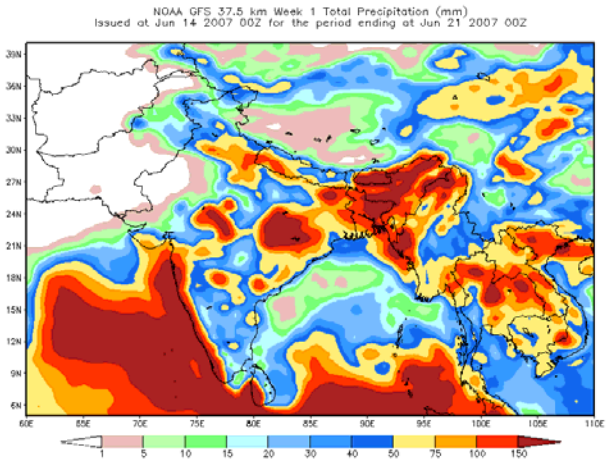
Legend

Satellite Rainfall Estimate - Rationale

- enable a more thorough, accurate, and timely analysis of weather and climate related phenomenon
- satellite-enhanced data will improve precipitation analyses which are currently interpolated solely from sparse rain gauge data
- value added to agricultural and hydrological applications such as crop monitoring and flood forecasting
- enable accurate and timely information in the decision making process for flood disaster mitigation

Satellite Rainfall Estimate (SRE)

June 2006 – December 2007



Application of space based earth observations, space technologies, remote sensing and GIS, Hazard modeling and prediction.

Objective 1: Validation of the Satellite Rainfall Estimate over the HKH region

Objective 2: Application of GeoSFM model for flood forecasting and drought monitoring

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Satellite Rainfall Estimate

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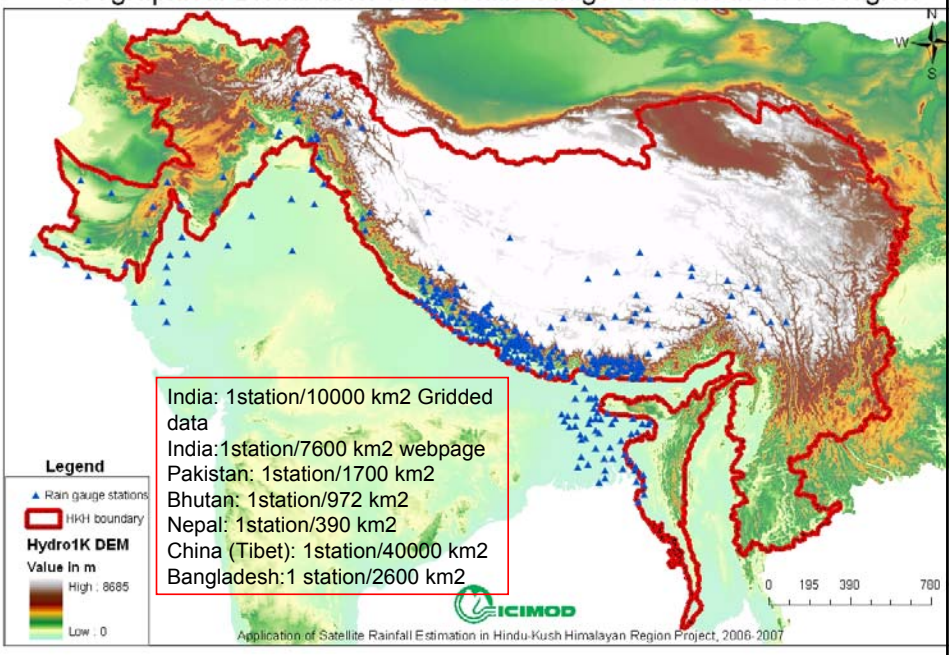
Geographical Distribution of the Rain Gauge Stations in HKH Region



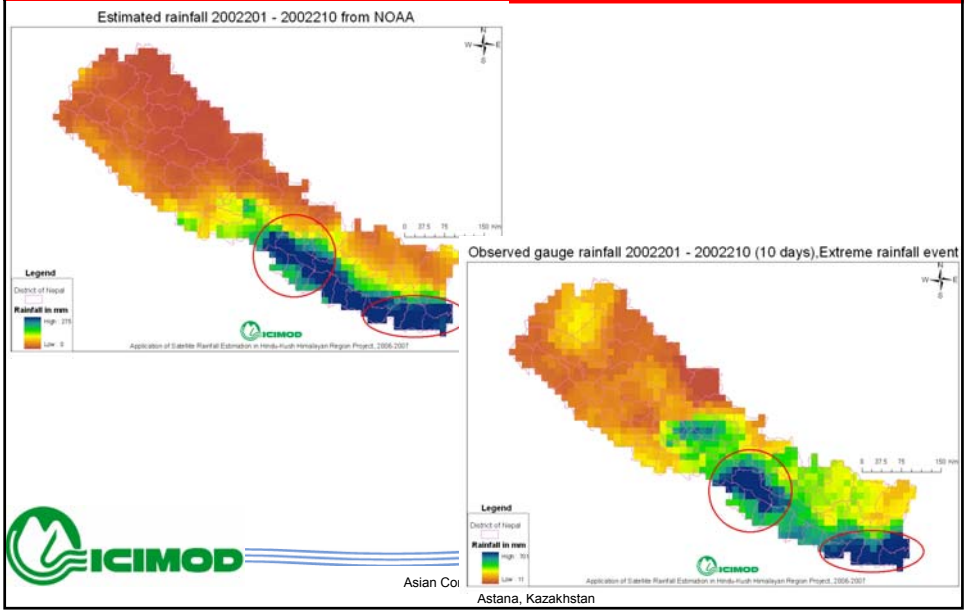
India: 1station/10000 km2 Gridded data
India:1station/7600 km2 webpage
Pakistan: 1station/1700 km2
Bhutan: 1station/972 km2
Nepal: 1station/390 km2
China (Tibet): 1station/40000 km2
Bangladesh:1 station/2600 km2

Astana, Kazakhstan

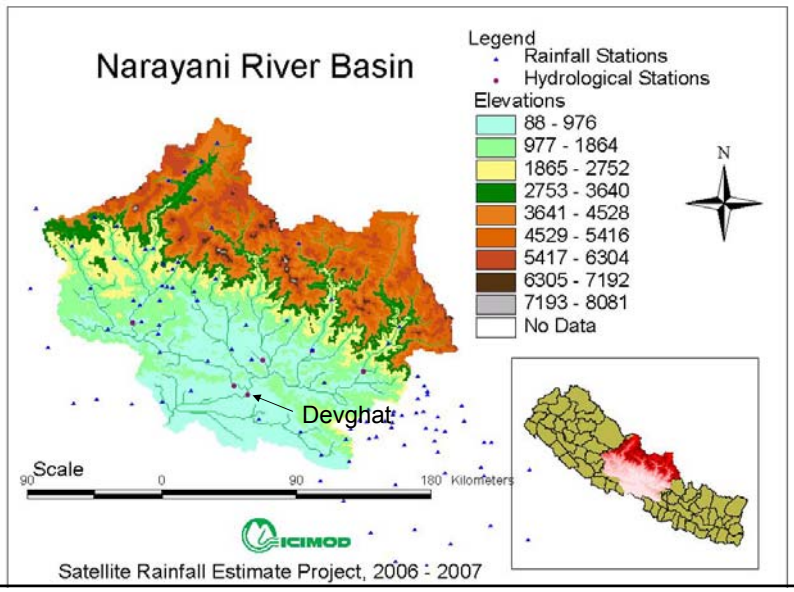
NOAA CPC RFE2.0

- Initial version became operational in January 2001
- Originally run over the African continent then expanded to southern Asia and western Asia / eastern Europe
- Product is a combination of surface and satellite precipitation information
- Spatial resolution: 0.1 degree
- Temporal resolution: daily
- Availability: 5° -35° N; 70° -110° E

Satellite Rainfall Validation



Geospatial Streamflow modelling



June, 2007

HFA – Role of Regional Organizations

- promote regional programmes, including programmes for technical cooperation, capacity development, the **development of methodologies** and **standards for hazard and vulnerability monitoring and assessment**, the sharing of information and effective mobilization of resources, in view of supporting national and regional efforts to achieve the objectives of HFA;
- undertake and publish regional and sub-regional baseline assessments of the disaster risk reduction status, according to the needs identified and in line with their mandates,
- coordinate and publish periodic reviews on progress in the region and on impediments and support needs, and assist countries, as requested, in the preparation of periodic national summaries of their programmes and progress;
- establish or strengthen existing specialized regional collaborative centers, as appropriate, to undertake research, training, education and capacity building in the field of disaster risk reduction;

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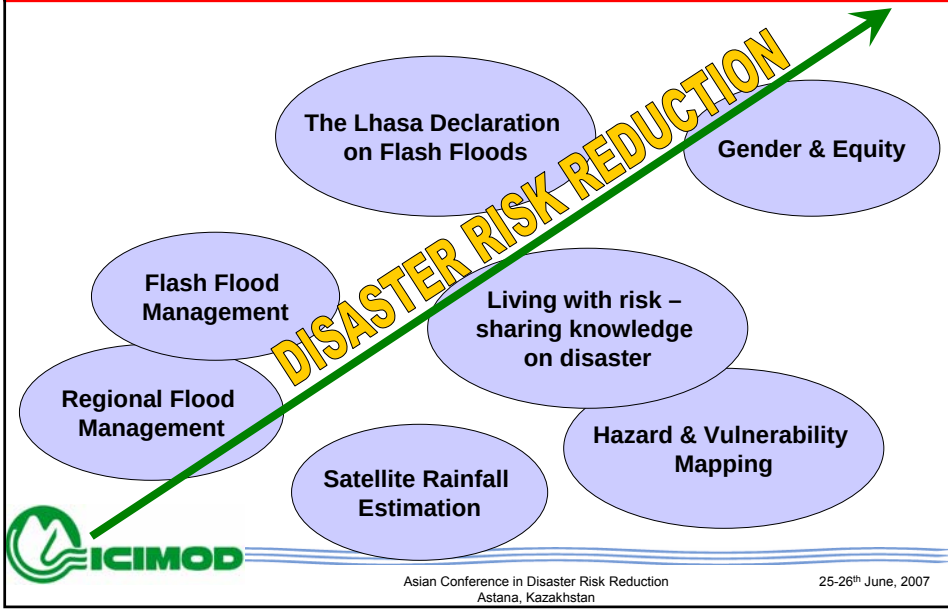
ICIMOD Activities



The Road Ahead

- Identify, assess and monitor disaster risks using advanced scientific knowledge
- Integrate scientific knowledge and indigenous knowledge in Disaster Risk Reduction
- Capacity building in disaster management – prevention, preparedness and mitigation
- Improved data and information sharing
- Training and public awareness
- Establishment of an institutional framework for cooperation
- Political will
- Strengthened regional cooperation in flood disaster mitigation


Thank You