

Innovation in Research on Disaster and Global Sustainability: The Role of Geospatial Technology and Community Resilience Building in India



R.B. Singh

Vice President, International Geographical Union (IGU)

Head-Department of Geography

Delhi School of Economics

University of Delhi, Delhi-110007, INDIA

e-mail: rbsgeo@hotmail.com

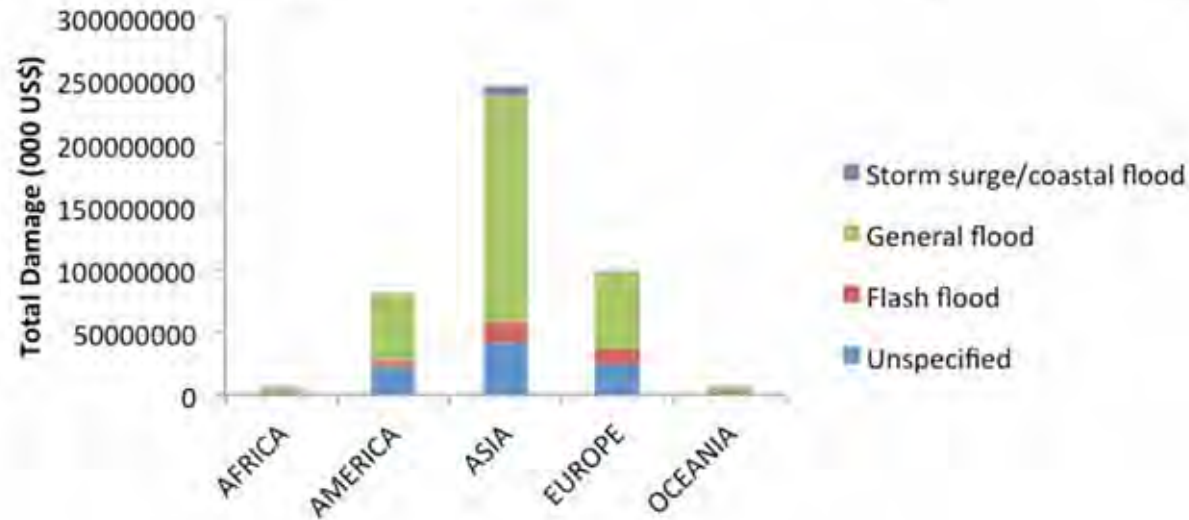
Outline of Presentation

- **Philosophy of Disaster Management and Global Sustainability**
- **Disaster Scenario of India**
- **Innovations in Science and Geospatial Technology**
- **Best Practices in Disaster Risk Reduction**
- **Science and Policy Interface towards Community Resilience Building for Global Sustainability**
- **Education and Research in Disaster Management for Sustainability**
- **Conclusion**

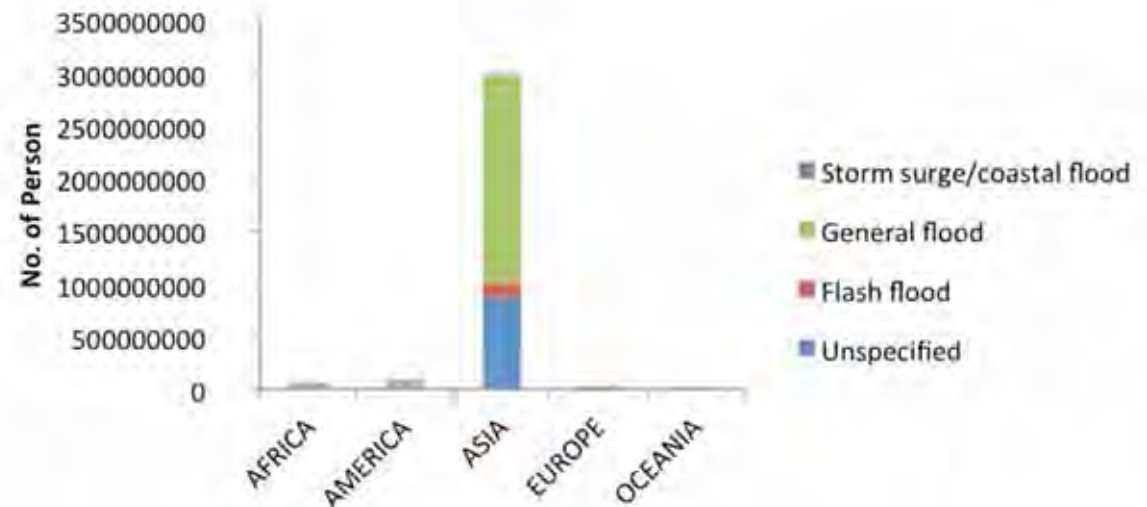
Introduction

- The world is becoming increasingly vulnerable to natural disasters. Nearly three million people worldwide may have been killed in past 20 years due to natural disasters.
- Ninety per cent of the natural disasters and ninety five per cent of the total disaster related deaths worldwide occur in developing countries in which India has the second largest share.
- Innovations in Science and Technology for Disaster Risk Reduction is one of the key challenges for Trans-disciplinary future earth research towards promoting global sustainability.

Total Property Damaged due to Disasters (1975-2010)



Total Casualties due to Disasters (1975-2010)

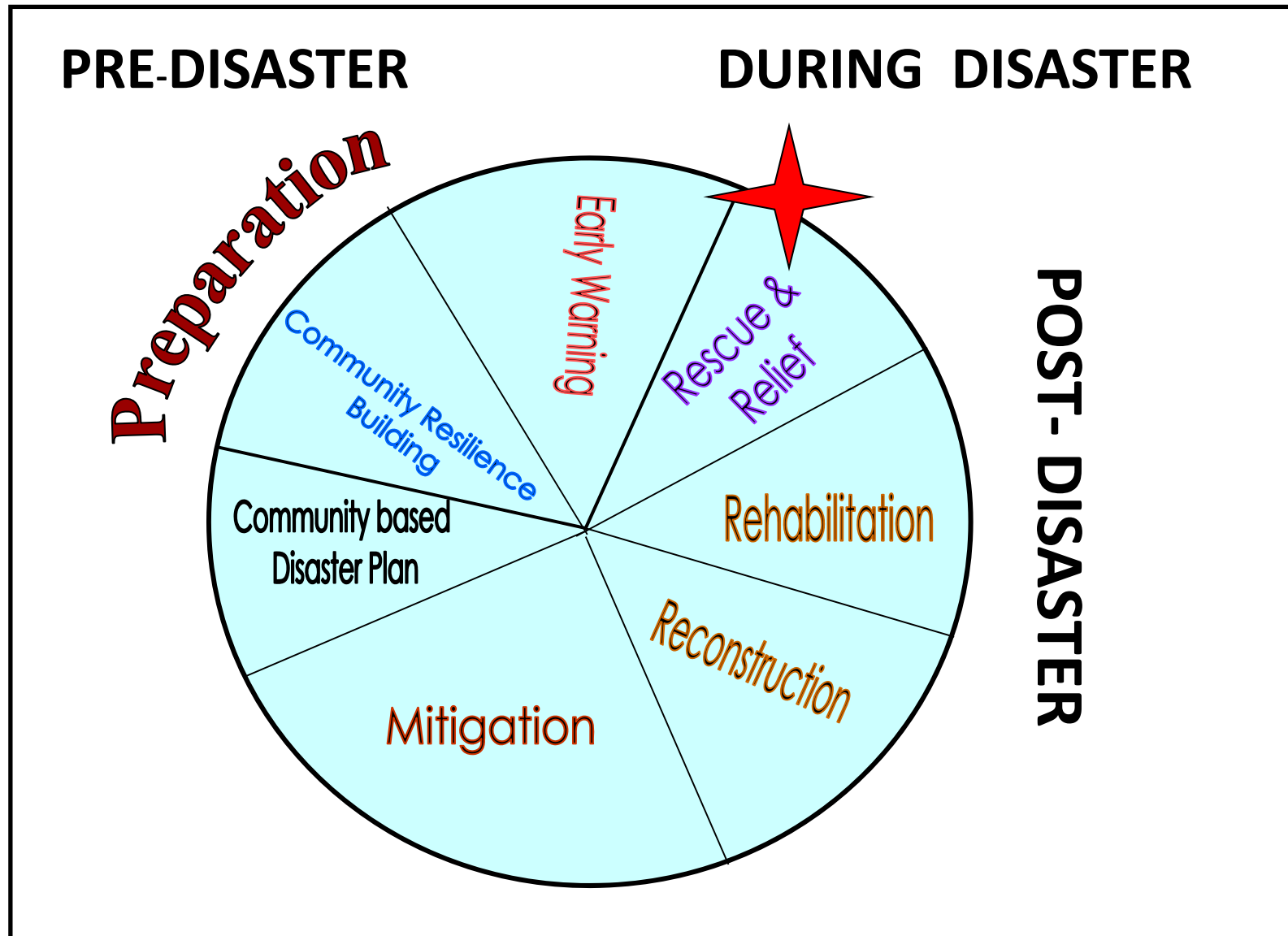


Asia being a developing economy leads in damage caused by Disasters hence disaster reduction in Asia may contribute significantly towards global sustainability

Academic and Policy Responses to Hyogo Framework of Action in India

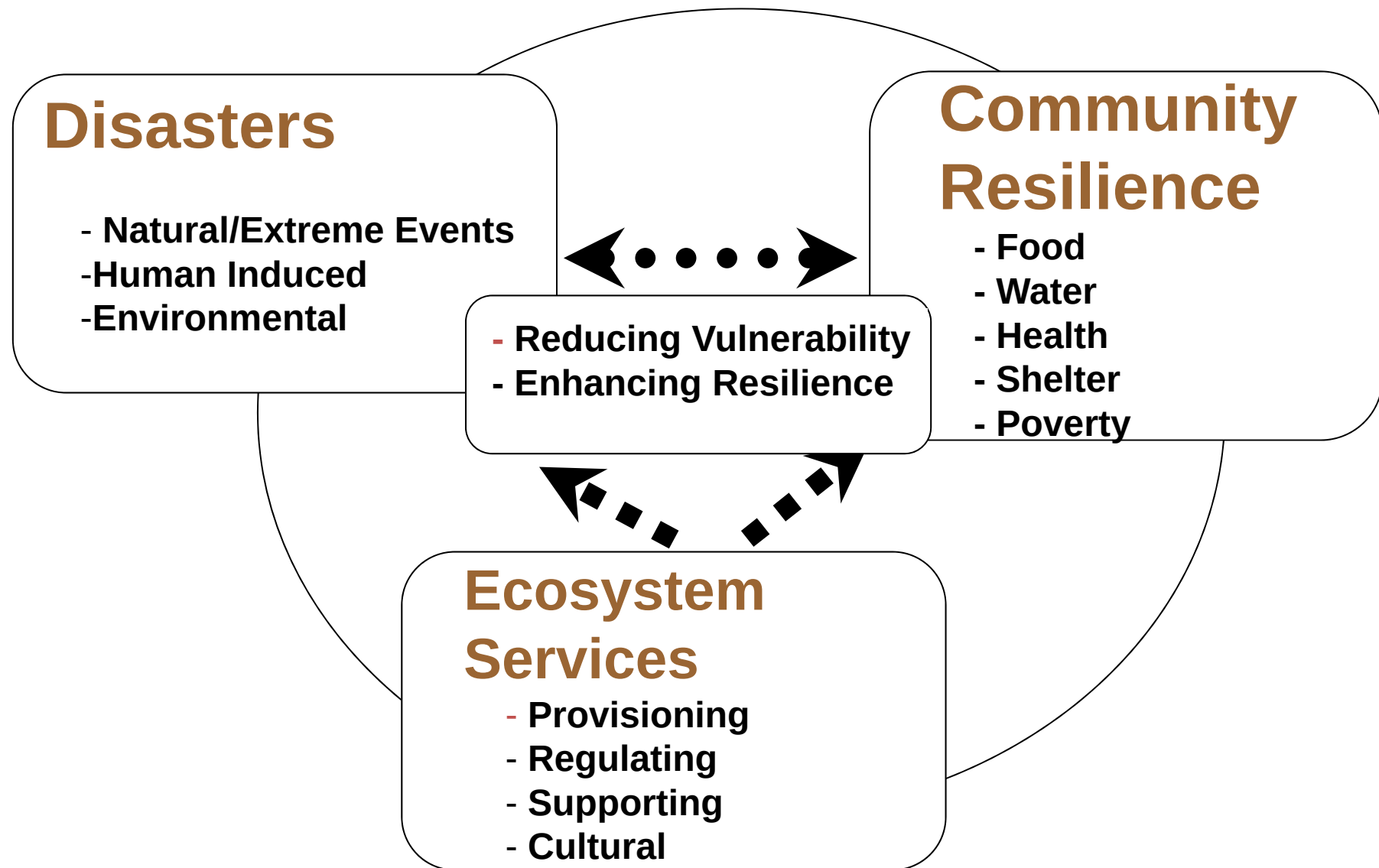
- Reviewing and monitoring of existing risk management practices and frameworks at all levels.
- Relief and emergency response are looked for facilitation of assistance to the disaster affected people for their rehabilitation.
- Disaster Management Authorities are encouraged to review their relief codes and prepare disaster management codes.
- State Disaster Management Authorities are supported to develop post disaster recovery and reconstruction framework during the period of normalcy with systematic incorporation of disaster risk reduction measures.

Components of Disaster Management



Emphasis needed on Disaster Preparedness. Focusing early warning and community resilience.

Disaster, Ecosystem Services and Community Resilience



Disaster Research should develop understanding between above three linkages

Priority Issues

- Collecting and compiling geospatial data, satellite information and local knowledge on disaster history and traditional response patterns.
- Activating an Early Warning System network and its close monitoring.
- Strengthening communication links which generally collapse in the event of a rapid onset disaster.
- Integrating the scientific, technological, administrative and community agencies for effective disaster management.
- Vulnerability Assessment of critical infrastructures (power supply, communication, water supply, transport, etc.) to disaster events
- Focusing on Preparedness and Mitigation.
- Challenging areas continue to be modeling, risk prediction, simulation and scenario analysis, etc.

Disaster Scenario of India

- India is amongst the World's most disaster prone areas (85% of Geographical Area).
- 26 out of 36 States/UTs are affected by frequent Disasters.
- 58.6% land vulnerable to Earthquake.
- 68% of cultivable area is prone to drought.
- 8.5% land vulnerable to cyclones - 570 KMs out of 7516 Kms of coastline.
- 12% land vulnerable to floods in the Indo-Gangetic-Brahmaputra plains.
- 15% area is prone to landslides.

History of India's Most Severe Disasters

Name of the Event	Year	State and Area	Fatalities
Earthquake	1618	Mumbai, Maharashtra	2,000 deaths
Bengal Earthquake	1737	Bengal	300, 000 deaths
Cyclone	1864	Kolkata, West Bengal	60,000 deaths
The Great Famine	1876-1878	Southern India	58.5 million people affected 5.5 million deaths due to starvation
Cyclone	1882	Bombay, Maharashtra	100,000 deaths
The Indian famine	1896-1897	Whole India	1.25 million to 10 million deaths
Earthquake	1905	Kangra, Himachal Pradesh	20,000 deaths
Earthquake	1934	Bihar	6,000 deaths
Bhola Cyclone	1970	West Bengal	500,000 deaths (including Hindu Kush Himalayas and surrounding areas)
Drought	1972	Large part of the country	200 million people affected
Drought	1987	Haryana	300 million people affected
Cyclone	1977	Andhra Pradesh	10,000 deaths hundreds of thousands homeless 40,000 cattle deaths. Destroyed 40% of India's food grains.

Sources: Disaster Management of India (2011) Ministry of Home Affairs Government of India

Earlier earthquake, cyclone and drought were prominent disasters in India

Latur Earthquake	1993	Latur, Marthawada, region of the Maharashtra	7,928 people died and another 30,000 were injured
Orissa Super Cyclone	1999	Orissa	10,000 deaths
Gujarat Earthquake	2001	Bhuj, Bachau, Anjar, Ahmedabad, and Surat in Gujarat State	25,000 deaths 6.3 million people affected
Tsunami	2004	East Coast of India	10,749 deaths, 5,640 persons missing, 2.79 million people affected
Maharashtra floods	July 2005	Maharashtra State	1094 deaths 167 Injured 54 Missing
Kashmir Earthquake	2005	Kashmir State	86000 deaths (includes Kashmir & surrounding Himalayan region)
Kosi Floods North	2008	Bihar	527 deaths 19323 Livestock perished 222754 Houses damaged 3329423 persons affected
Cyclone Nisha	2008	Tamil Nadu	204 deaths \$800 million worth damages

Major Disasters in India since 2011

Event	Month/Year	Area Affected	No. of Deaths
Odisha Floods	Sep-11	19 Districts of Odisha	45
Sikkim Earthquake	Sep-11	Sikkim, West Bengal, Bihar	60
Cyclone Thane	Dec-11	Tamil Nadu, Puducherry	47
Assam Floods	July-August2012	Assam	0
Uttarakhand Floods	August-September2012	Uttarkashi, Rudraprayag and Bageshwar	52
Cyclone Nilam	Oct-12	Tamil Nadu	65
Cyclone Mahasen	May-13	Tamil Nadu	8
Flood/Landslides	Jun-13	Uttrakhand and Himachal Pradesh	4094
Cyclone Phalin	Oct-13	Odisha and Andhra Pradesh	23
Andhra Floods	Oct-13	Andhra Pradesh	29 till 26 October 2013
Odisha Floods	Oct-13	Odisha	21

Source: National Disaster Management Authority

In recent years floods and cyclone induced flood dominate the disaster scenario of India

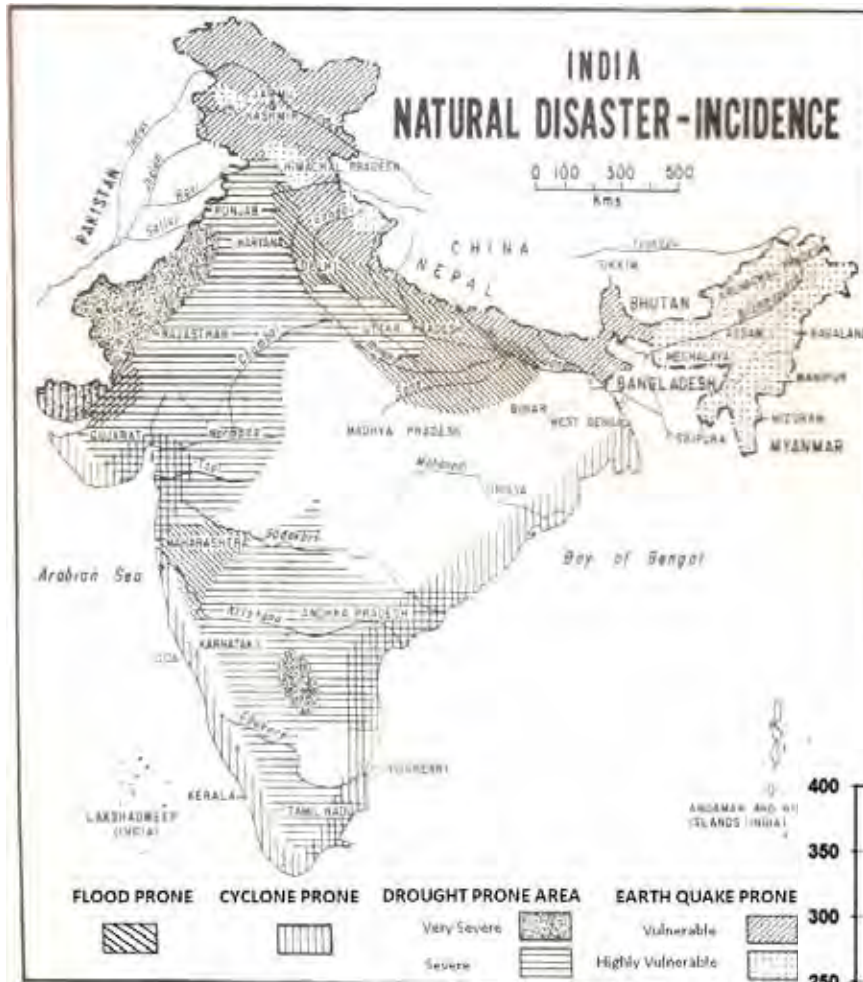
Increasing damages caused due to floods, cyclonic storms, landslides etc. during last ten years in India

Year	Live Lost human (in No.)	Cattle Lost (in No.)	Houses damaged (in No.)	Cropped areas affected (in million hectares)
2001-02	834	21,269	3,46,878	1.872
2002-03	898	3,729	4,62,700	2.100
2003-04	1,992	25,393	6,82,209	3.198
2004-05	1,995	12,389	16,03,300	3.253
2005-06	2,698	1,10,997	21,20,012	3.552
2006-07	2,402	4,55,619	19,34,680	7.087
2007-08	3,764	1,19,218	35,27,041	8.513
2008-09	3,405	53,833	16,46,905	3.556
2009-10	1,677	1,28,452	13,59,726	4.713
2010-11	2,310	48,778	13,38,619	4.625

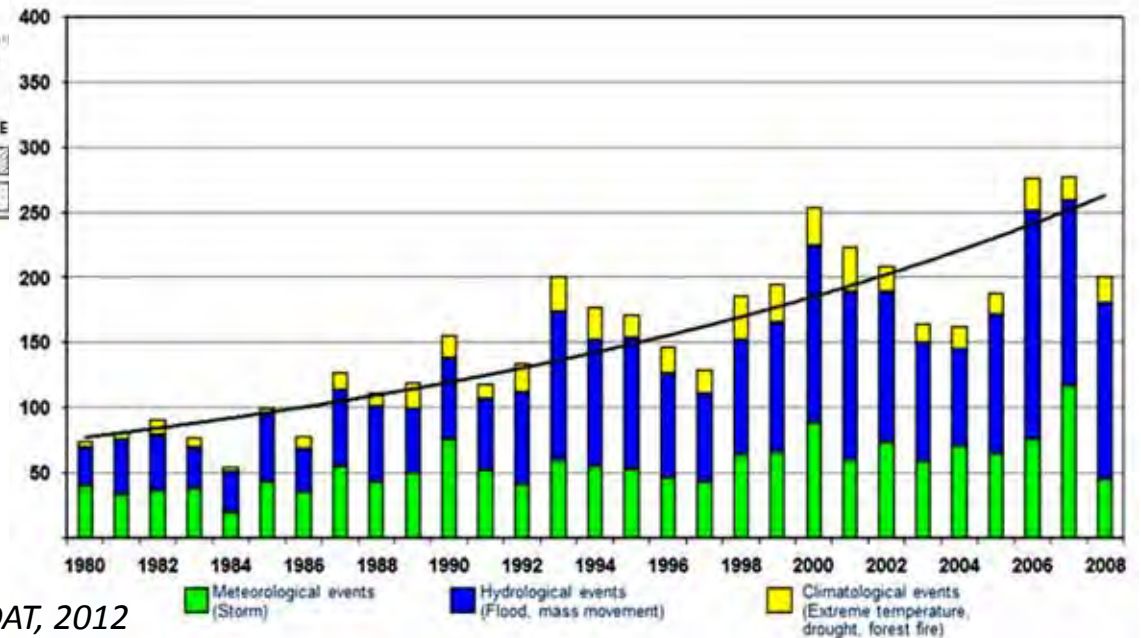
Source: Ministry of Home Affairs (MHA)

The loss due to disasters has increased substantially in recent years

Large part of India is vulnerable to one or another disaster

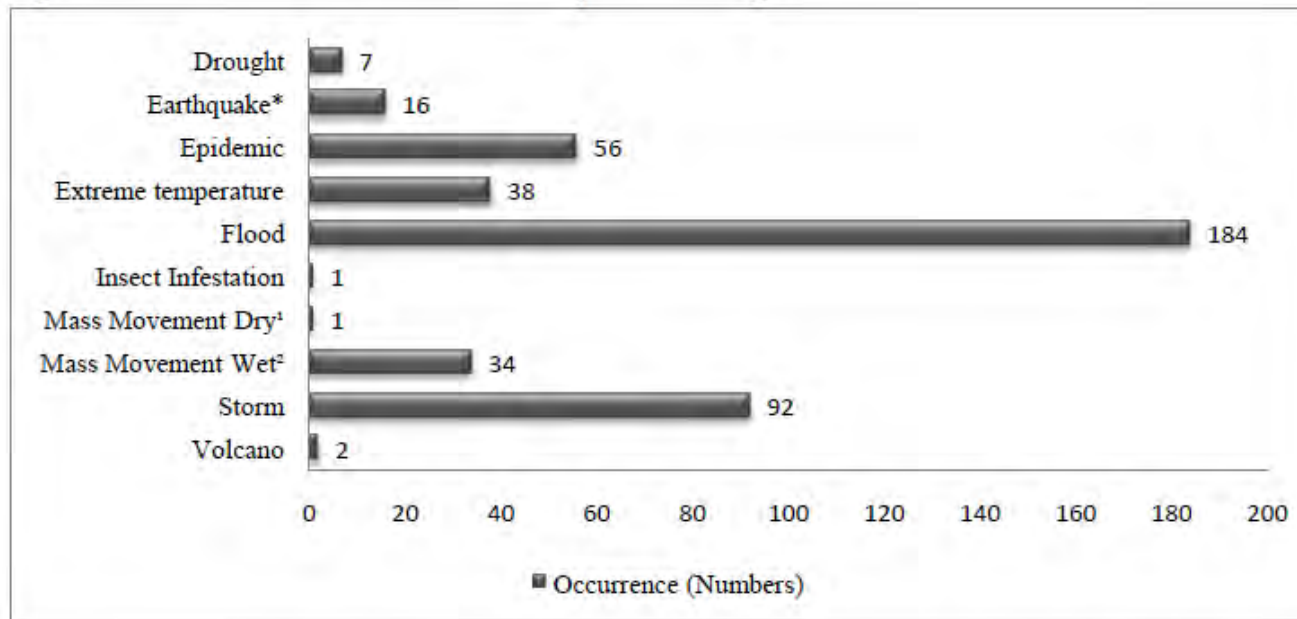


The number of disasters events since 1980 – 2008 showing an increase in trend over the time

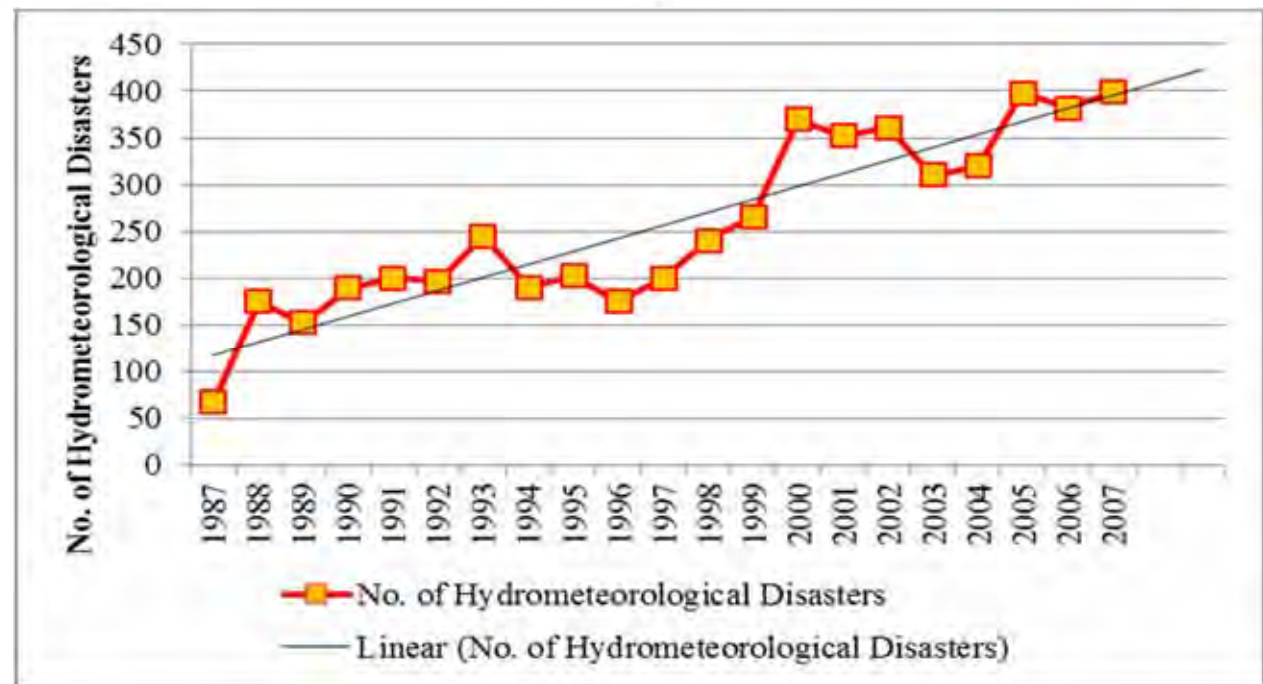


Source: EM-DAT, 2012

Natural Disaster Occurrence Reported during 1980-2010 in India

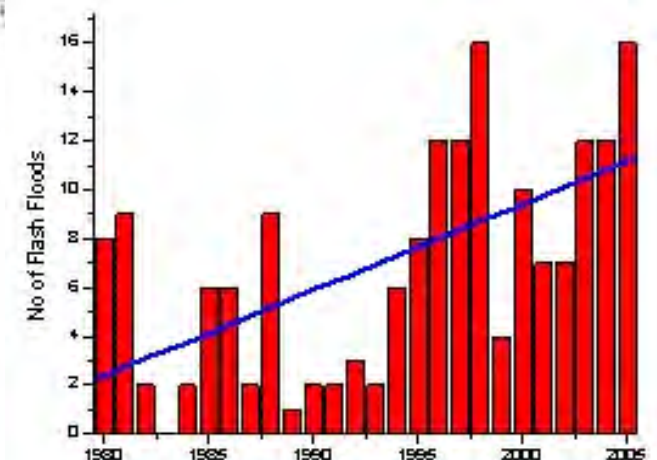
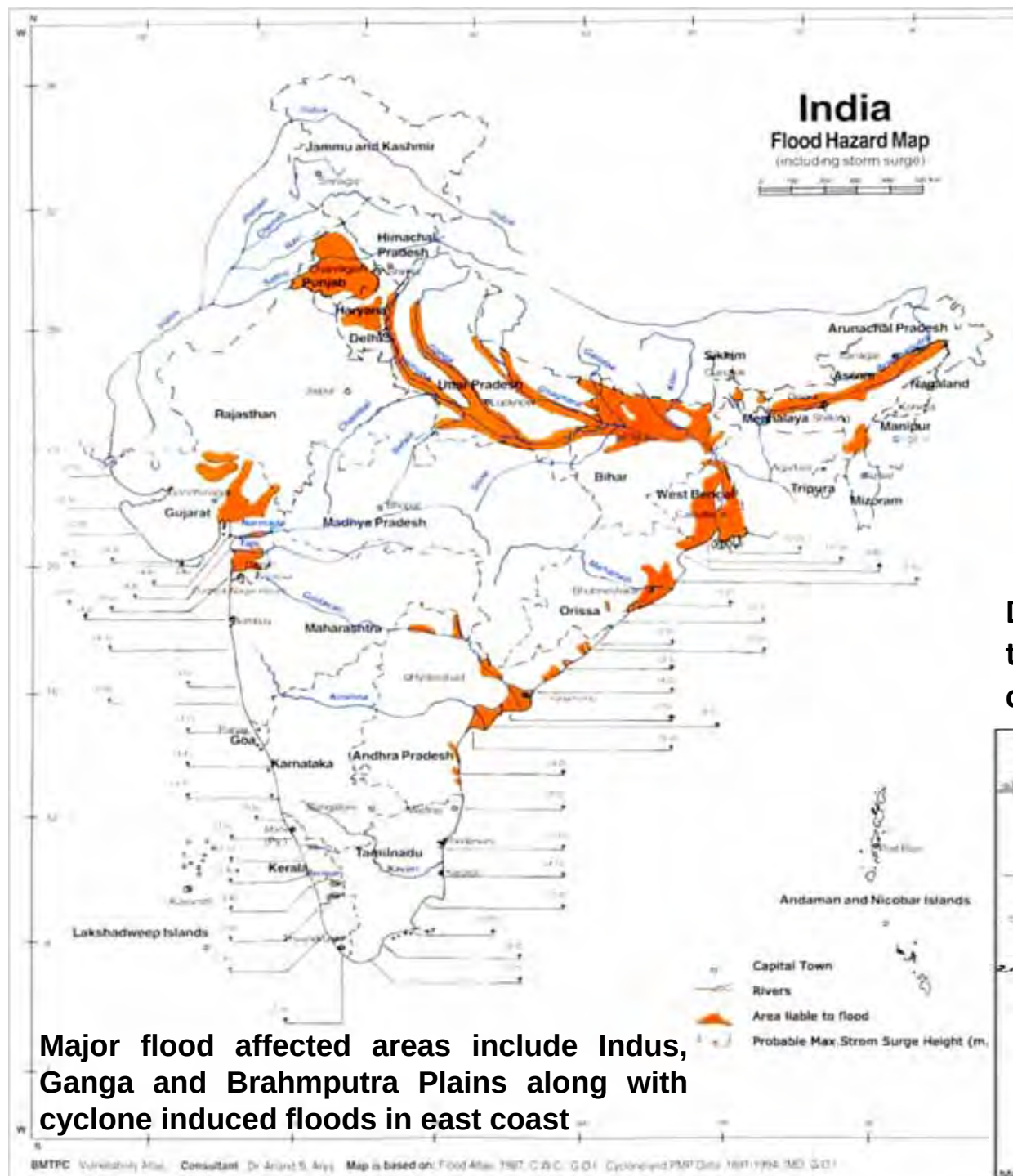


Increasing trend in number of Hydro meteorological disasters during 1987 to 2007



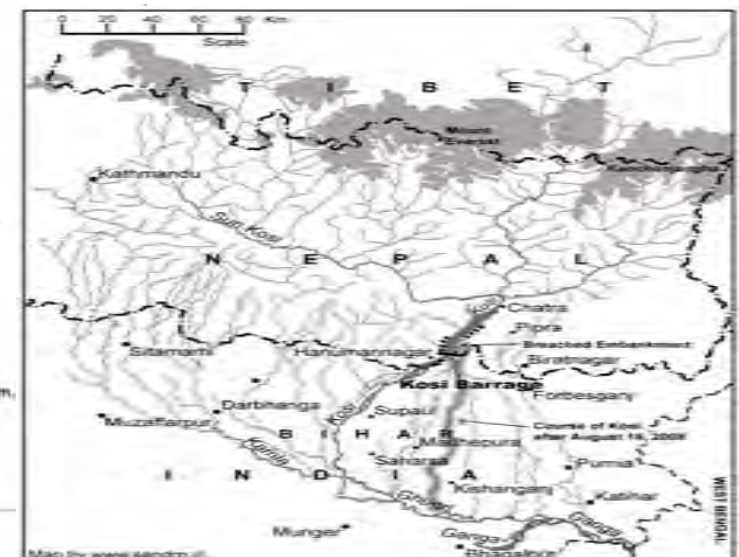
Source: Ministry of Home Affairs (2010)

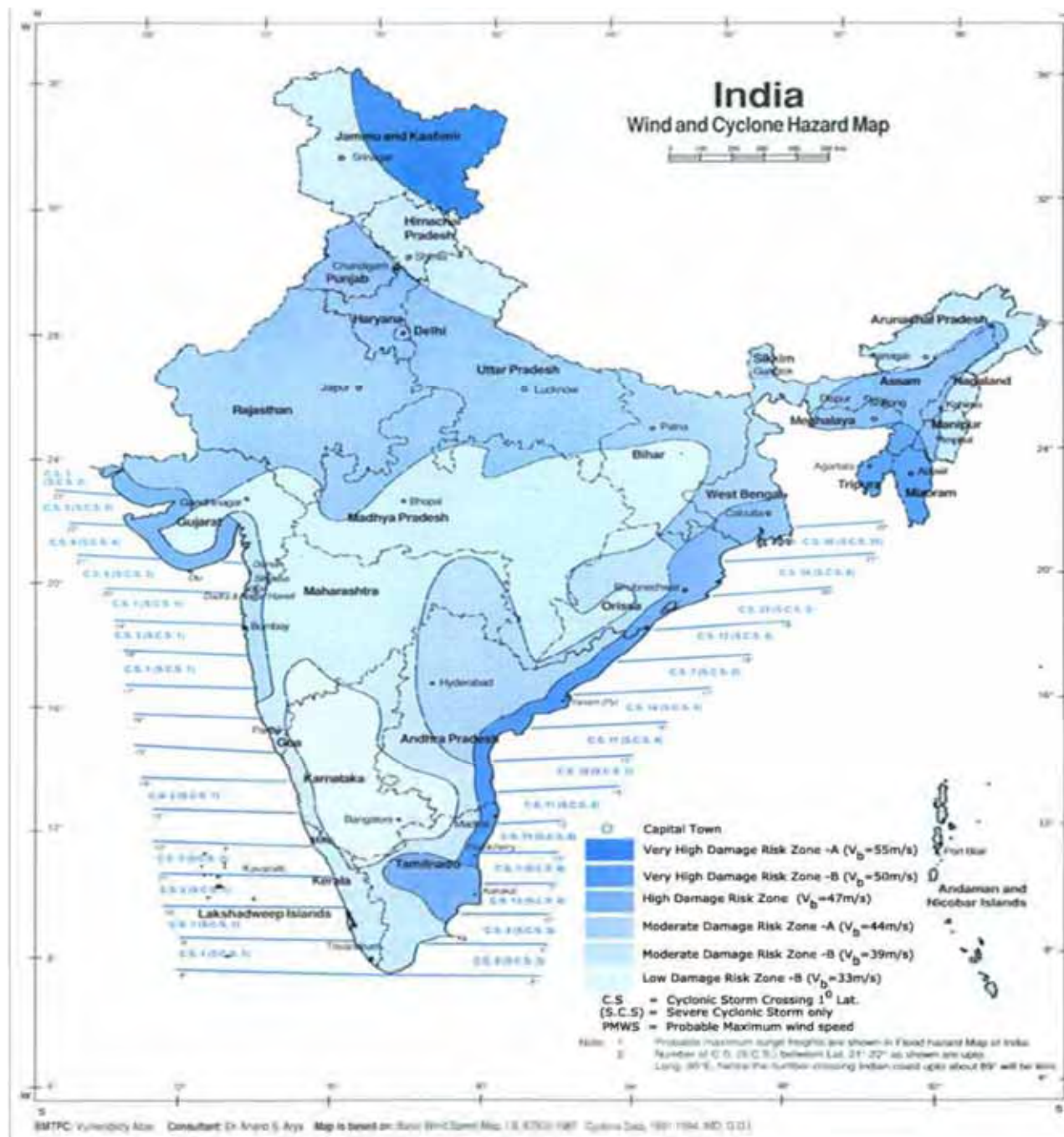
Since 1980 the floods have been leading disasters in India followed by storms



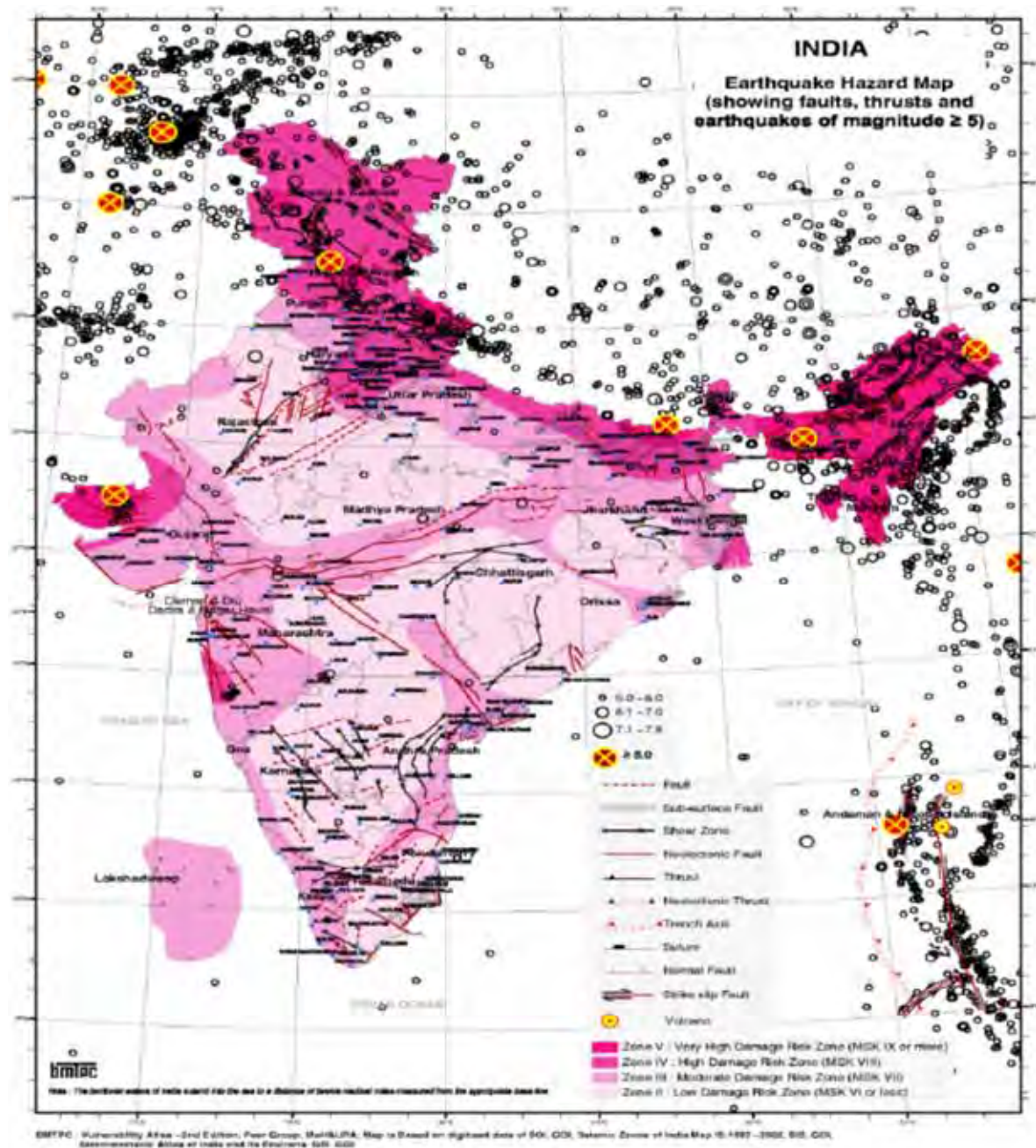
Number of flash floods increasing due to climatic variability

During 2008, Kosi floods occurred due to break of embankment and drastic change in river course

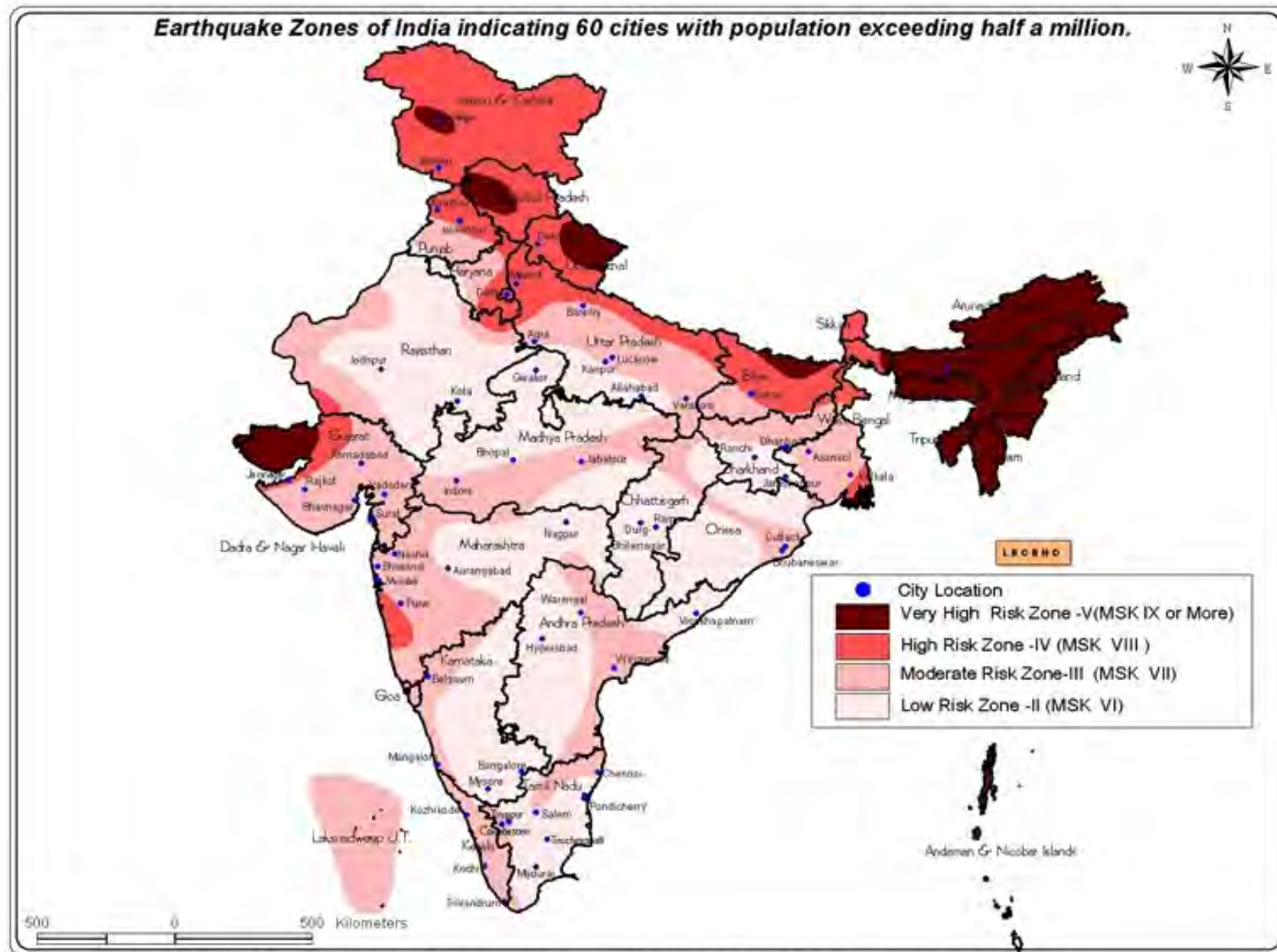




East coast continues to be vulnerable from cyclone and tsunami



Himalayan zone lying on plate boundary between Indian and Eurasian plate experiences a number of earthquakes



Many big cities of India including the National Capital are situated in high risk zone of earthquake

Economic Vulnerability: Innovations Needed from Education and Research

- Livestock
- Rural Housing Stock
- Houses
- Crops, Trees, Telephone, Electric poles
- Boats and Working Implements
- Personal Property
- Electricity, Water and Food Supplies
- Infrastructure Support

Social Vulnerability: Innovations Needed from Education and Research

- Poor sections of society
- Rights of the child
- Gendered nature of disaster loss and management
- Violence against women during disasters
- Vulnerability assessment of old and disabled people and patients
- Socially deprived weaker sections
- Disaster illiteracy
- Lack of Insurance

Health Vulnerability: Innovations Needed from Education and Research

- Immediate or Short-term Impacts:
 - Illness, disability or deaths
 - Direct losses in infrastructure
 - Losses and disruption in health care industry
- Long-term impacts:
 - Damage to health care economy
 - Loss of medical care
 - Loss of laboratory
 - Increased communicable diseases

Innovations in Geospatial Technology

- **Earthquake**
 - Drawing Seismic zones
 - Seismological centers for prediction of earthquake
 - Modern test for building resistance and earthquake resistant buildings
- **Floods**
 - Forecasting rainfall and flood incidence
 - Flood zonation map and Integrated Flood Management
 - Calculate river and sea erosion
 - Real time flood monitoring
- **Drought**
 - Determine aridity index with new approaches
 - Invention of drought resistant crop
 - Developing micro-irrigation networks
 - Soil moisture conservation techniques
- **Tsunami and Cyclone**
 - Hazard Zonation map
 - Early warning and prediction
 - Seawater-Ground Water Interaction
 - Afforestation in Coastal Zone

Recent Science and Technological Developments in Disaster Management: International Experiences

- (i) Predict the adverse effects of disasters on lives, livelihoods, economies, and societies** (Japanese bullet train warnings, the Hazard Atlas of China);
- (ii) More focused risk assessment** (Flu monitoring in Cambodia, Assessing Vulnerability, Mapping out Multi Hazard, Vulnerabilities in Sri Lanka by SAARC);
- (iii) Minimise the impact by better forecasting** (Flood Early Warning in Bangladesh, Sahel Rain watch);
- (iv) Improve disaster risk mitigation** (Netherlands flood risk reduction, UNDP India Disaster Preparedness and Response Plan).
- (v) Structural Reinforcement** (Japanese Earthquake Resistance Building Technology, Building codes in Chile)

Indian Experiences

- India has advanced its technology for tsunami preparedness by successfully setting up a tsunami warning system.
- Deep Drilling Project in Koyna supported by the Ministry of Earth Sciences (MoES) is also a very ambitious project highlighting many new interesting facts about the region.
- The predictability of Indian Summer Monsoon has also improved. Under initiative “National Monsoon Mission” improved prediction of rainfall over India in short time framework.
- The geo-scientific investigations in the Himalayan seismic zone. The imaging of internal structures of Himalaya collision belt in terms of resistivity based on the fluid content analysis will be very helpful in predicting earthquakes in the future.
- Vulnerability assessment related to agriculture and livestock taking empirical evidences from Indian desert region, Himalayan Region and East-coast of India.

Emergency communication during and post-Disaster

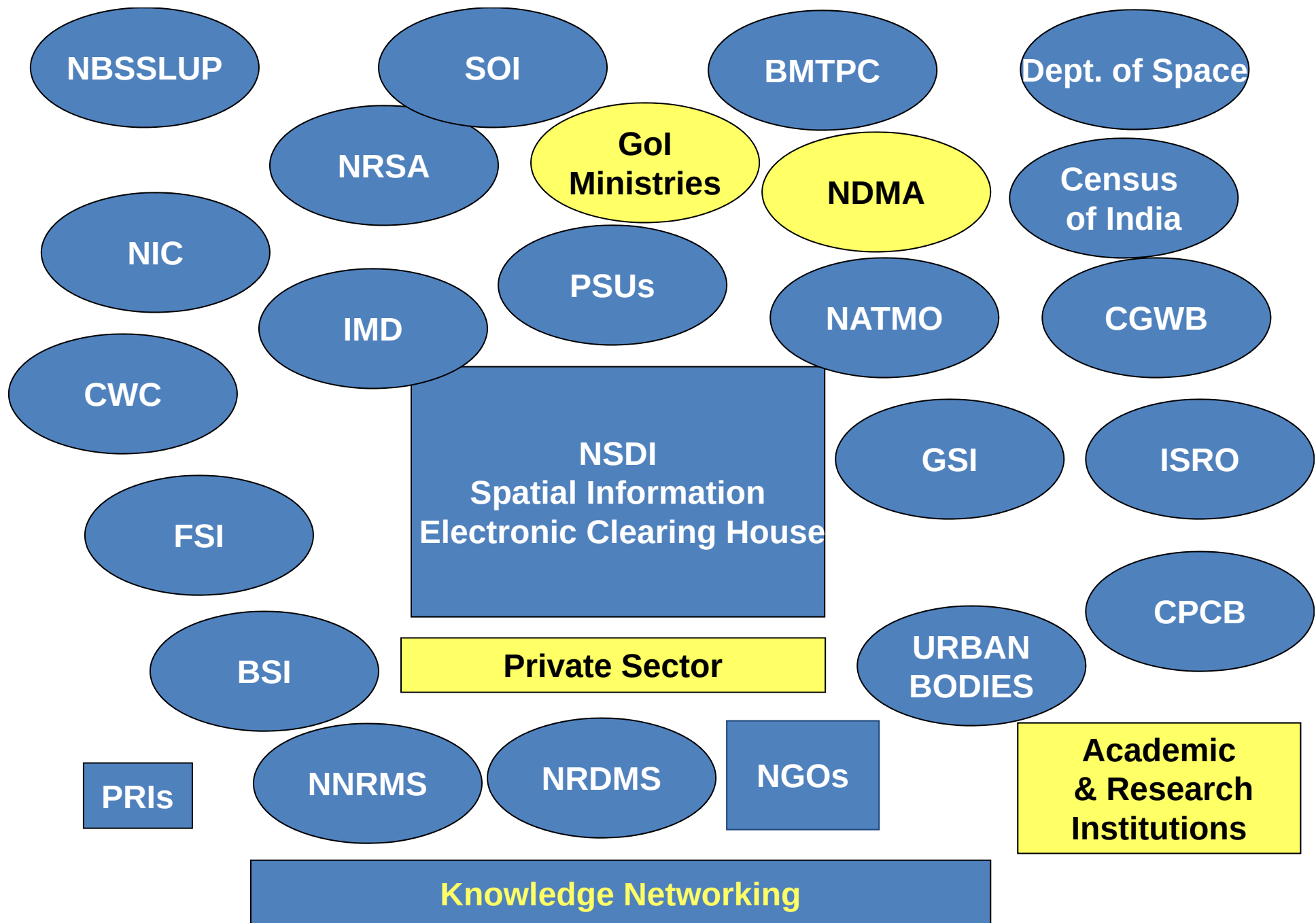


Information and Communication Technology (ICT)

- Help in designing early warning system
- Emergency communication and timely relief and response measures
- Catalyze the process of preparedness, response and mitigation
- Facilitate Post disaster relief operations

Gol is undertaking the National Emergency Communication Plan (Map for Phase 1 and 2)





Knowledge network for disasters constitute governmental, non-governmental and private agencies

Managing Disasters using Remote Sensing, GIS and GPS

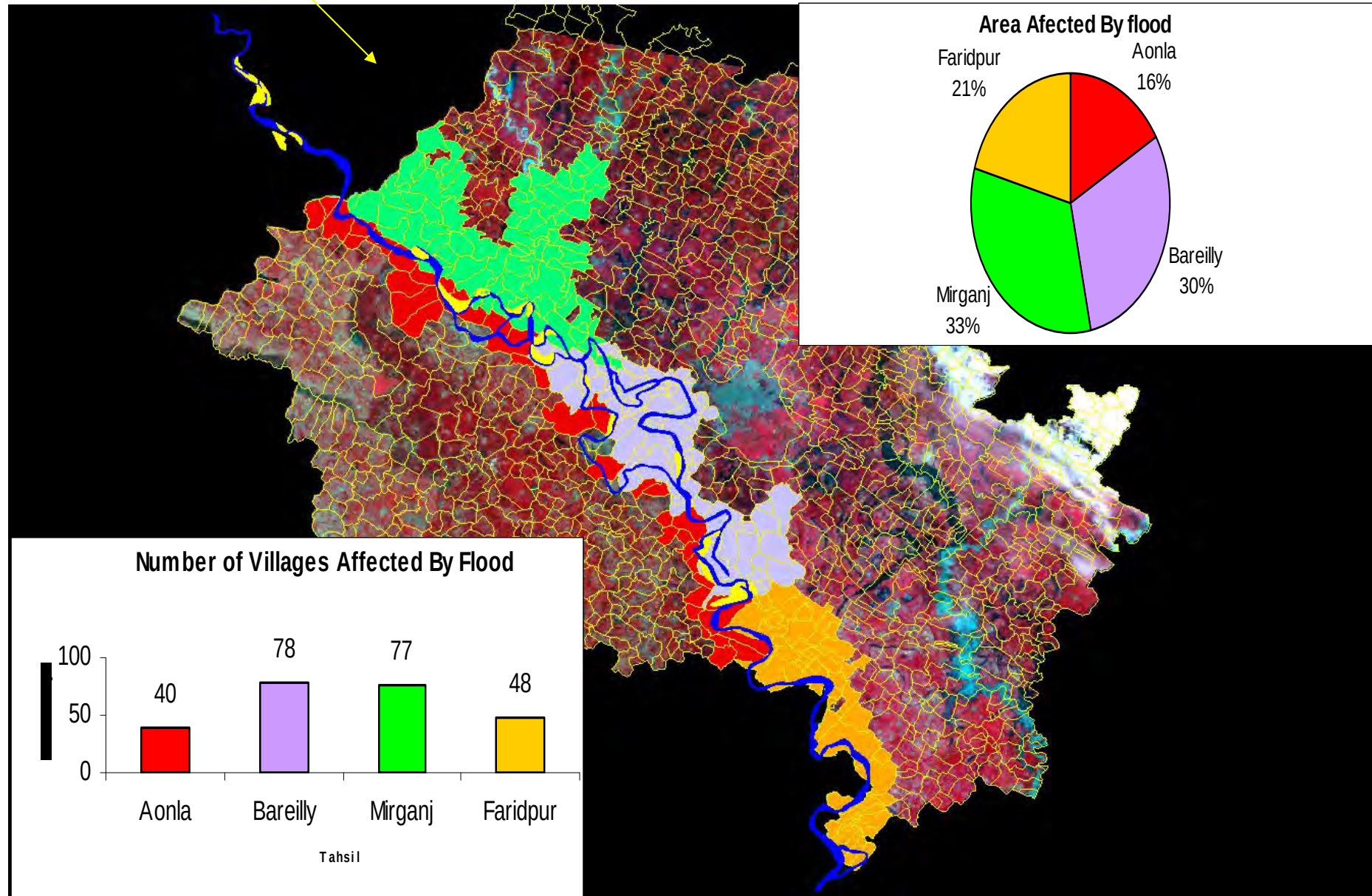
- (i) To create hazard inventory maps**
- (ii) Locate critical facilities in reference to disasters on the physical location of shelters, drains and other facilities**
- (iii) Create and manage disaster associated database under National Disaster Management Information System (NDMIS)**
- (iv) Vulnerability assessment**

GIS in During Disaster Situation

- GIS provides platform for Decision Support by **furnishing multilayer geo-referenced information** which includes hazard zoning, incident mapping, natural resources and critical infrastructure at risk, available resources for response, real time satellite imagery etc.
- GIS-based information tools allow disaster managers to **quickly assess the impact of the disaster/emergency** on geographic platform and plan adequate resource mobilization in most efficient way.



Remote Sensing and GIS based Flood Monitoring



Flood zoning helps in efficient management of recurring flood disasters in India

Adopted Vulnerability and Adaptation Index

Based on the IPCC and USCSP the following steps have been adopted to assess vulnerability and assessment in the lower Brahmaputra basin, Assam case-study area in regard to three recent EFEs (extreme flood events), 1998, 2002 and 2012.

Weighted matrix index value is measured on a scale of 0-100.

$$\frac{\text{No. of respondent, reply to yes}}{\text{Total no. of respondent}} \times 100$$

Category of vulnerability index

	Category of vulnerability index	Category of vulnerability weighted index scale	No. of vulnerability issues
1	High Vulnerability (HV)	76-100	26
2	Medium Vulnerability (MV)	51-75	12
3	Low Vulnerability (LV)	26-50	02
4	Very low vulnerability (VLV)	0-25	02
	Total no. of vulnerability issues		42

Reported vulnerable issues	1998 Per cent of respondent	2002 Per cent of respondent	2012 Per cent of respondent	Agreed weighted index, (Index calculate by average	76-100 HV 51-75 MV 26-50 LV 00-25 VLV
One time entire crop loss	80	67	84	76.8	HV
Three times entire standing crop loss	70	13	70	51.1	MV
Loss of stored seeds	80	70	83	77.7	HV
Seed bed erosion	87	67	85	79.5	HV
Sand deposition on the agriculture lands	53	47	57	52.1	MV
Occupational loss, primary	100	100	100	100	HV
Occupational loss, secondary	87	70	84	80.2	HV
Occupational loss, Tertiary	19	13	16	15.9	VLV
Cattle loss	100	80	87	88.8	HV
Chicken loss	100	80	100	93.3	HV
Goat loss	80	55	97	77.3	HV
Pond fish loss	53	50	80	61.3	MV
Poultry loss	17	17	15	16.16	LV
Plant loss	100	80	80	86.6	HV
Household damage related loss	100	80	95	91.5	HV
Livestock shed loss	80	70	87	78.8	HV
Storage place loss	60	52	60	57.3	MV
Latrine washed out/loss	57	57	37	50.4	LV
Tubewell washed out/ loss	27	19	23	22.8	VLV
Cropland loss due to erosion	92	70	80	80.6	HV
Agriculture input loss (Fertiliser)	100	80	100	93.3	HV

Calculation Based on Primary Survey

Reported vulnerable issues	1998 Per cent of respondent	2002 Per cent of respondent	2012 Per cent of respondent	Agreed weighted index, (Index calculate by average	76-100 HV 51-75 MV 26-50 LV 00-25 VLV
Watering cost loss	70	57	87	71.06	MV
Labouring cost loss	80	70	94	81.1	HV
Land preparation cost loss	90	90	97	92.2	HV
Ploughing tools loss	80	70	87	78.8	HV
Loss of land soil due to erosion	100	90	97	95.5	HV
Crop land loss due to sand deposition	53	55	60	55.9	MV
Homestead erosion related loss	70	80	90	80	HV
Disease related loss (e.g. Diarrhoea, dysentery)	97	60	60	72.2	MV
Injury related loss	80	70	87	78.8	HV
Fuel wood loss	53	70	60	61.1	MV
Village linked road erode	87	90	90	88.8	HV
Main road damaged	60	70	60	63.3	MV
School damaged related loss	87	80	80	82.2	HV
Utensil related loss	60	85	93	79.5	HV
Evacuation cost loss	70	60	80	70	MV
Bedding loss	57	60	60	58.8	MV
School book loss	43	60	63	55.5	MV
Clothing loss	90	60	87	78.8	HV
Agriculture land loss due to flood	100	100	100	100	HV
Vehicle, boat loss due to flood	90	70	87	82.2	HV
Leave home during or after flood	90	87	95	90.4	HV

Out of total 42 indicators 26 have high vulnerability, 12 has medium vulnerability and 2 each in low and very low vulnerability

Lack of fodder due to flood



Anti- erosion work with wire-mesh of Stone



Drainage problem due to congestion in Dibrugarh city



Using local adaptation method during flood



ADAPTATION MEASURES

Adaptation measures are categorised into six forms (UNEP and IES Handbook, 1996) viz. Bearing the losses; Share losses; Modify the threat; Prevent effect; Change use; and Change location

Weighted matrix index value is measured on a scale of 0-100.

$$\frac{\text{No. of respondent, reply to yes}}{\text{Total no. of respondent}} \times 100$$

Category of Adaptation index

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3	Low Adaptation (LV)	26-50	02
4	Very low Adaptation (VLV)	0-25	01
	Total no. of Adaptation issues		24

Reported adaptation issues	1998, Per cent of respondent	2002, Per cent of respondent	2012, Per cent of respondent	Agreed weighted index,(Index calculate by average per cent)	76-100 HV 51-75 MV 26-50 LV 00-25 VLV
Look for loan for seeding from professional/lender/ /rich relative/bank/ NGOs	93	83	90	89	Urgent
Look for loan for livelihood	53	40	57	50	Intermediate
Shifting house due to river erosion	70	80	90	80	Urgent
To move temporarily to other cities in search of work	80	70	87	79	Urgent
Change the occupation (rickshaw- pulling, day labourer etc)	53	55	80	63	Intermediate
Partial starvation (one meal per day instead of two or three)	92	70	80	81	Urgent
Migration to other cities	36	37	40	81	Urgent
Looking for fishing facilities	37	17	59	38	Low
Looking for small boats for transport	40	47	50	46	Low
Need for immediate food (Puffed rice)	87	70	84	80	Urgent
Need for immediate shelter	87	67	85	80	Urgent
Need of material for building temporary shelter /bamboo plate on top of the roofs	80	55	57	64	Intermediate
Need to raise the boundary of the ponds or need to put net around the boundary of bonds in order to prevent fish being carried away by food water	13	16	15	15	Very low
Need local variety <i>Aman</i> (HYV) seeding	84	87	100	90	Urgent
Need for money for next season's/ transition period's cropping and agriculture inputs. Labouring/ land preparation and watering	60	52	60	57	Intermediate
Need for meditation/health –care	80	80	100	87	Urgent

Reported adaptation issues	1998, Per cent of respondent	2002, Per cent of respondent	2012, Per cent of respondent	Agreed weighted index,(Index calculate by average per cent)	76-100 HV 51-75 MV 26-50 LV 00-25 VLV
Need to establish dam for river flow control to prevent river bank erosion/ submerge	100	100	100	100	Urgent
Need to do river dredging for quick drainage of river water	70	80	90	80	Urgent
To provide production equipments /seeds/fertilizers/agriculture inputs through local agriculture officers	80	87	95	87	Urgent
Need for veterinary help (medicine and expertise)	46	45	67	53	Intermediate
Need for immediate relief facilities (by the army)	90	80	100	90	Urgent
Need to ensure effective distribution of relief goods	100	100	100	100	Urgent
Rebuilding homesteads after floods	80	67	70	72	Intermediate
Need to establish flood shelter in flood free high lands, these should be multi-purpose	85	60	90	78	Urgent

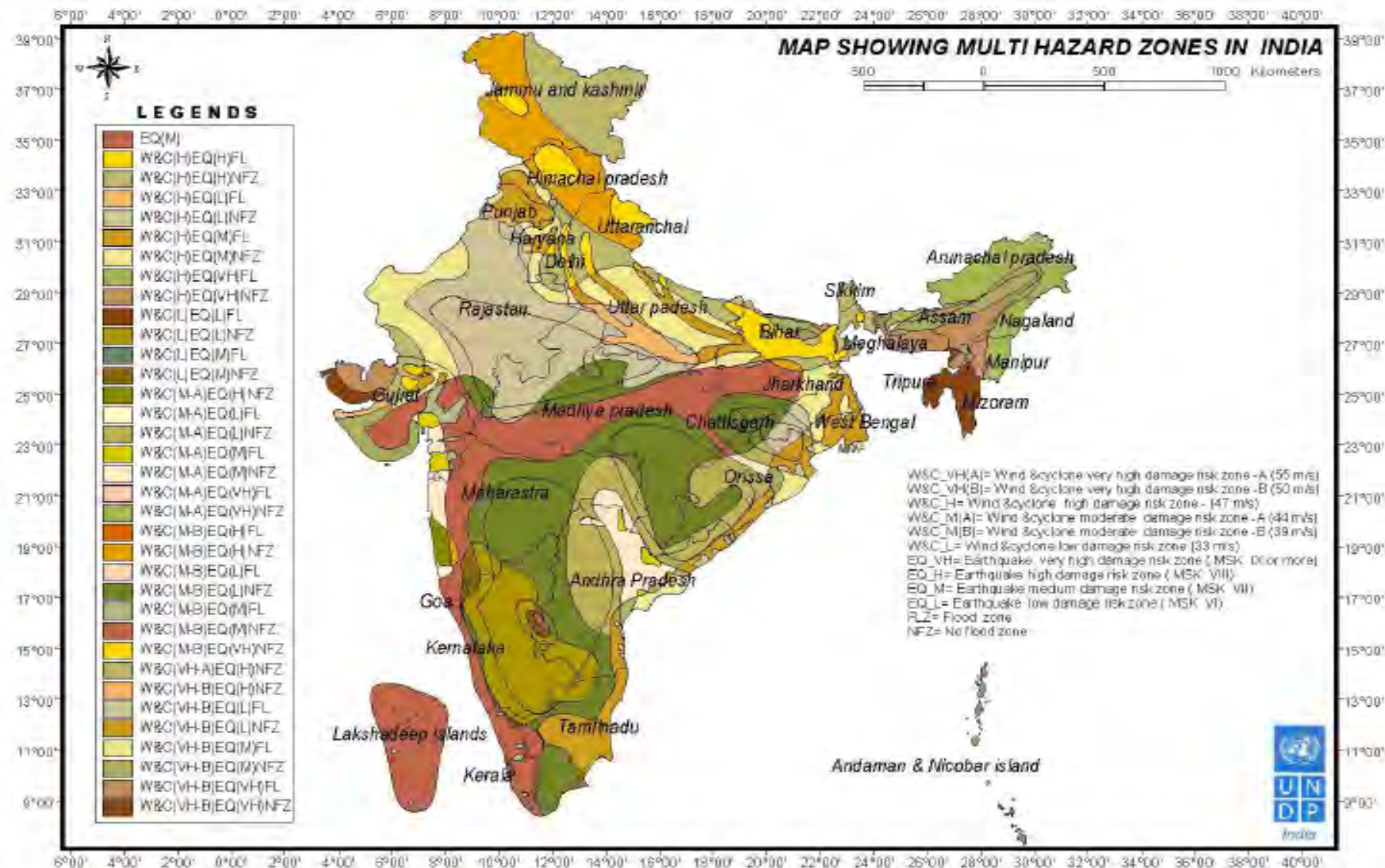
Out of total 24 indicators 15 have high vulnerability, 6 has medium vulnerability, 2 in low and 1 in very low vulnerability.

Best Practices for Disaster Risk Reduction

- Appropriate, Indigenous and solution-orientated research for sustainability and survivability.
- Accessible effective interdisciplinary collaboration within the arena of human geoscience with physical, natural and social sciences.
- Available and timely information relating to disaster for decision /policy-makers.
- Increased capacity building through participation of policy-makers, academicians, industrial establishment and other sectors of civil society.

Multi-Hazard Map of India

Need for incorporating socio-economic aspects in Disaster mapping



Disclaimer: This map was collated based on the data/information compiled by the Ministry of Urban Development and Poverty Alleviation, UNDP has not verified the accuracy of information of the Map. Source: BMTPC, India

GIS-based Flood Risk evaluation for parts of Kosi plains (Pilot study at IIT Kanpur)

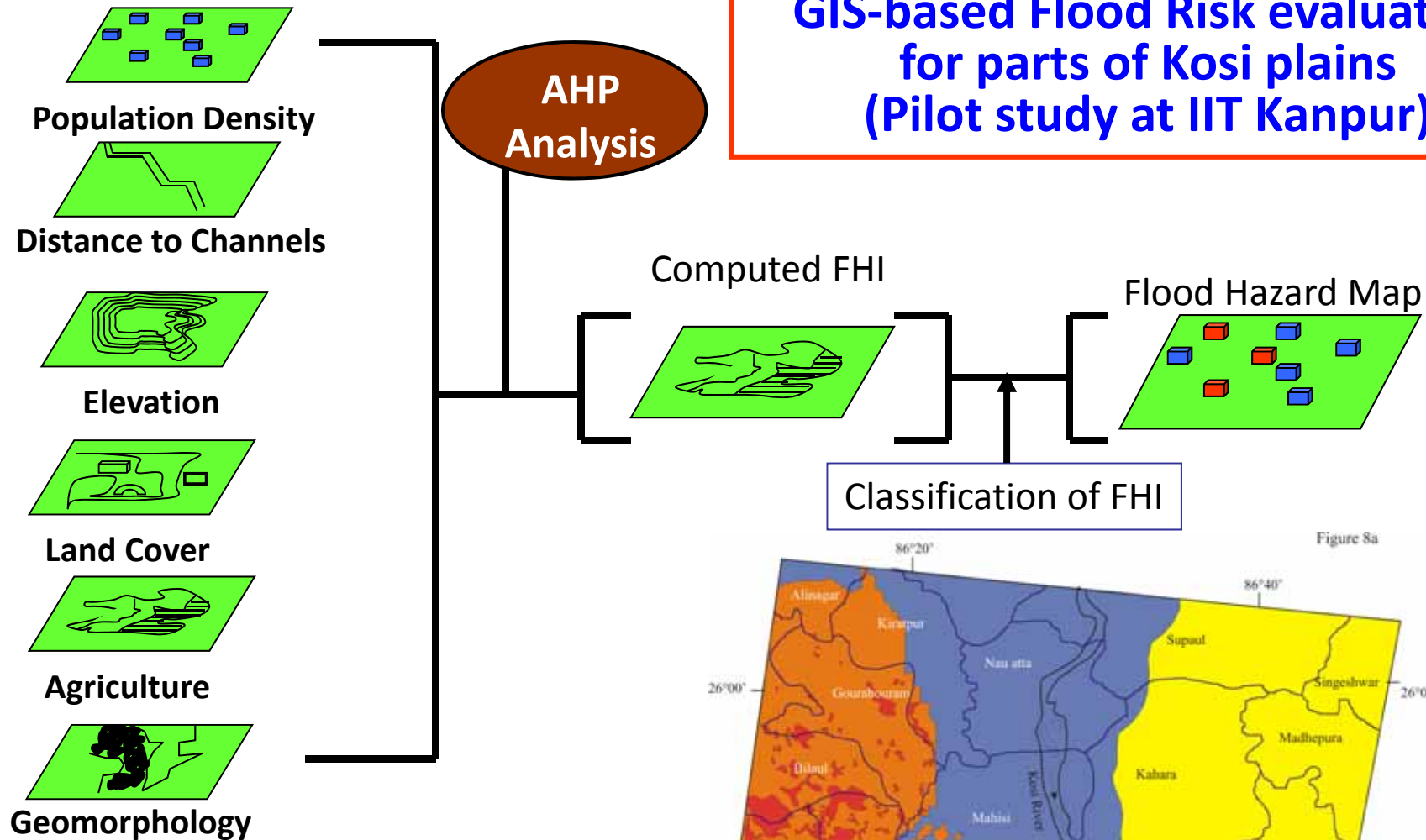
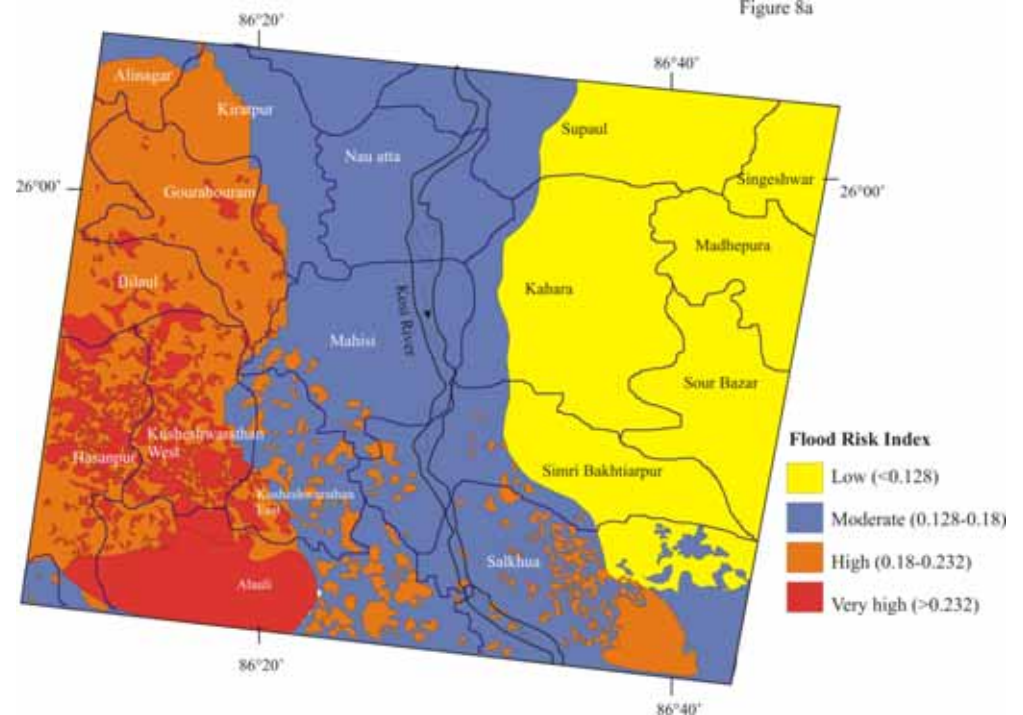


Figure 8a



**Flood Risk Map of Kosi plains
– needs refinement and
further research**

Source: Rajiv Sinha

Community based Disaster Management

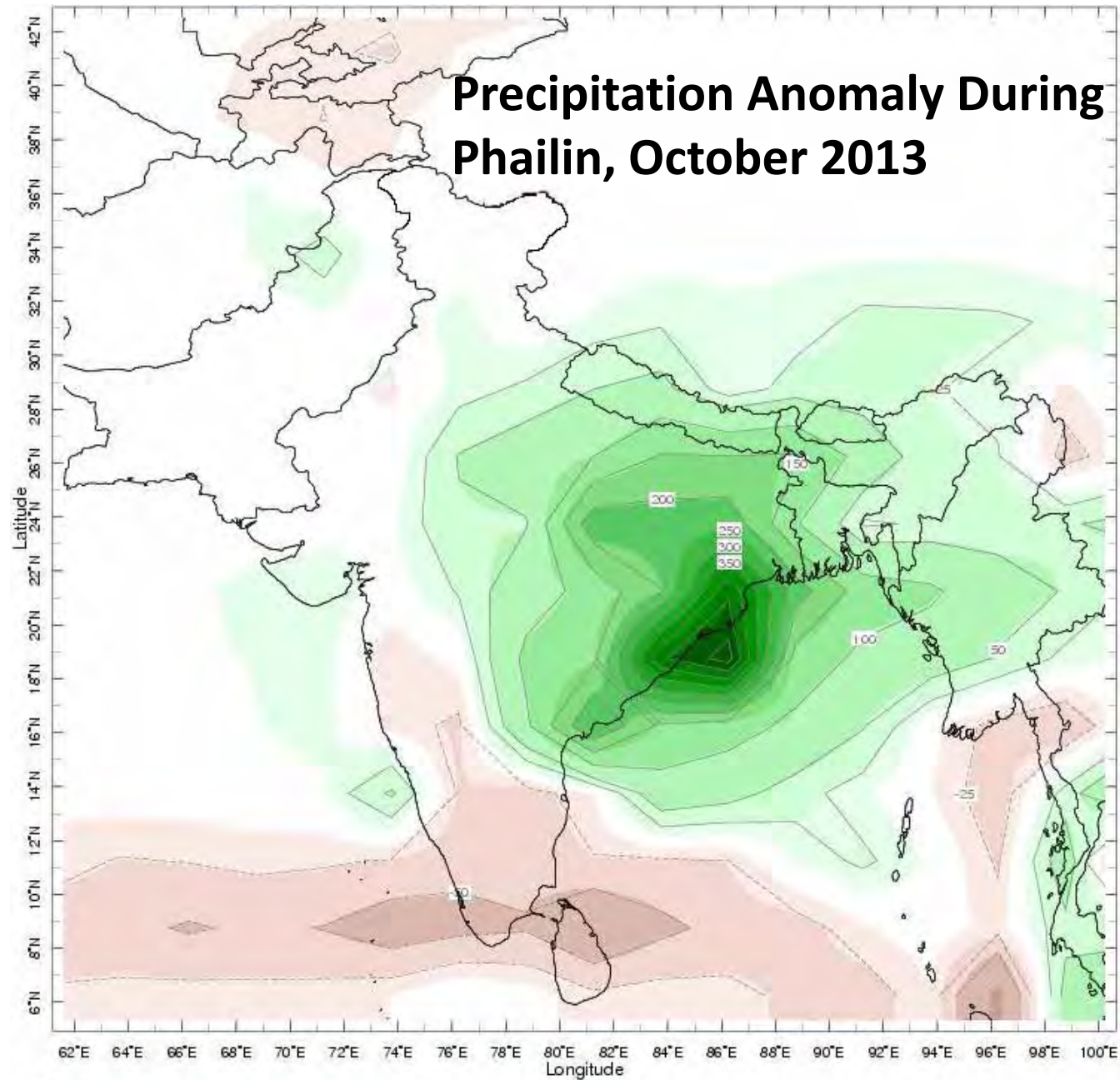
- Ever since the Orissa super cyclone of October 1999, Community Based Disaster Preparedness (CBDP) projects have been implemented in several parts of the country by UNDP, International and national NGOs, charitable trusts and corporate entities.
- The Ministry of Home Affairs, Government of India and UNDP had also implemented a comprehensive Disaster Risk Management (DRM) project in 176 districts in 17 states of the country and the project had helped in the formation of Village Level Disaster Management task Forces, preparation of village level disaster management plans, the training and capacity building of officials, elected representatives and community representatives.

Community Resilience Building through Government Programmes and Policies

- 73rd and 74th Amendment Act for empowering local government
- National Coastal Zone Management Authority and ICZM, 1998
- Disaster Management Act, 2005 and Disaster Management Policy, 2009 through Multi-tier structure
- Mahatma Gandhi National Rural Employment Guarantee Act, 2005
- Civil Defense Act, 1962 amended in 2012
- National Food Security, 2013
- New Companies Act, 2013
- India Disaster Resource Network (IDRN) and Corporate Disaster Resource Network (CDRN)

Cyclone Disaster in India: Case of Prompt Action through Good Governance

- 1877-2012: More than 300 cyclones (110 severe) in 50 km wide strip on the East Coast.
- Less severe cyclonic activity on West Coast (36 cyclone in the same period).
- In 19 severe cyclonic storms death toll more than 10,000 in each event. In 21 cyclones in Bay of Bengal (India + Bangladesh) 1.25 million lives have been lost.
- Recent Cyclone *Phailin*- Odisha government issued high alert in 14 District limiting casualties to 44 persons and property losses reduced to 700 million USD.
- It is as a typical Human Geoscience disaster prevention model with effective governance and utilizing science-policy interface.



Composites²⁰¹² of precipitation anomaly during Phailin. Contour shows the intensity of high rainfall

**1,154,725 people were persuaded to move at safe shelters
and Mass evacuation reduced the causality**



Corporate Social Responsibility in India

For long, the corporate sector had been viewed as a separate entity but, now it is seen as **complementary to the society**

Ministry of Home Affairs, Government of India envisages **“involvement of corporate sector in awareness generation and disaster preparedness and mitigation planning”** through sensitization, training and co-opting of the corporate sector and their nodal bodies in planning process and response mechanisms.

The industrial and corporate organizations like the Confederation of Indian Industry (CII), the Federation of Indian Chambers of Commerce and Industry (FICCI), the PHD Chambers of Commerce and Industry and other industry have been in the forefront of providing much-needed help

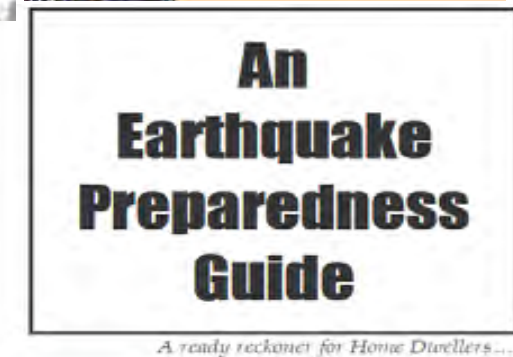
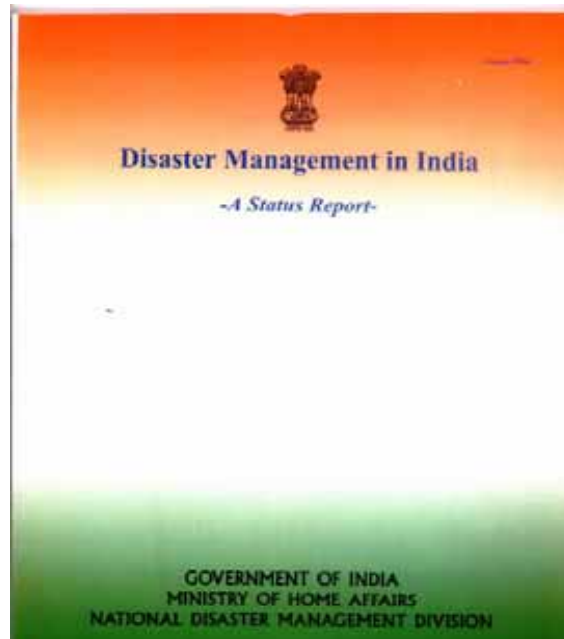
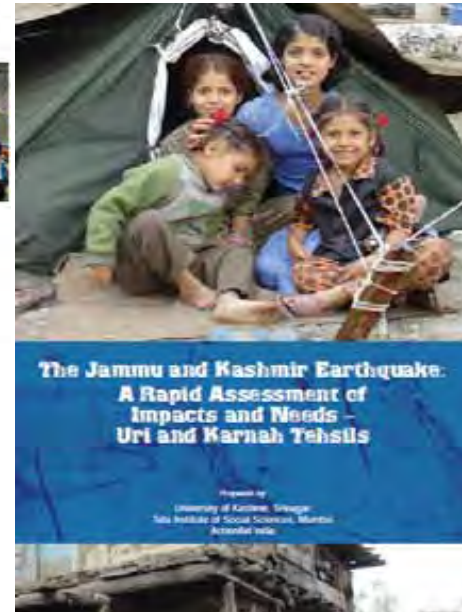


Managing river disasters in partnership with Corporate Sector, Academics and Community Groups

National Disaster Rescue Force in Action – Very effective during Rescue and Relief through its 8 Battalions all over the country



Innovative Reports by Government of India and Educational Institutions



Science and Policy interface towards Community Resilience Building for Global Sustainability

- Target sustainability within the local community from a trans-disciplinary perspective, i.e., economic, social, cultural, institutional and ecological;
- Achieving efficiency through limited resources and local knowledge to the community;
- Focus on local capacity building at sectoral, spatial and sectional levels using innovations in spatial information technology;
- Promoting stewardship in the community for sharing problems, priorities and responsibilities; Involving kinship ties, family, neighbourhood and other alliance of the community;
- Mobilize local resources, materials, knowledge and talents;
- Negotiating institutions for resolving community conflicts and collaborating towards minimizing government and maximizing governance.

Community Resilience: Definition and Approaches

- DFID Sustainable Livelihoods Framework (1999)
- Centre for Community Enterprise (2000)
- Colussi's Community Resilience Manual (2000)
- CARE Household Livelihood Security Framework (2002)
- IFRC, World Disaster Report (2004)
- UNISDR (2005 and 2009)
- IPCC (2007)
- TANGO Livelihoods Framework (2007)
- DFID Disaster Resilience Framework (2011)
- Practical Actions Vulnerability to Resilience Framework (2011)
- Benson et al. (2012) for World Bank
- UNDP (2013)

Community Resilience Building Projects in India

Major Projects

- National Cyclone Risk Mitigation Project
- National Earthquake Risk Mitigation Project
- National Flood Mitigation Project
- National Landslide Mitigation Project

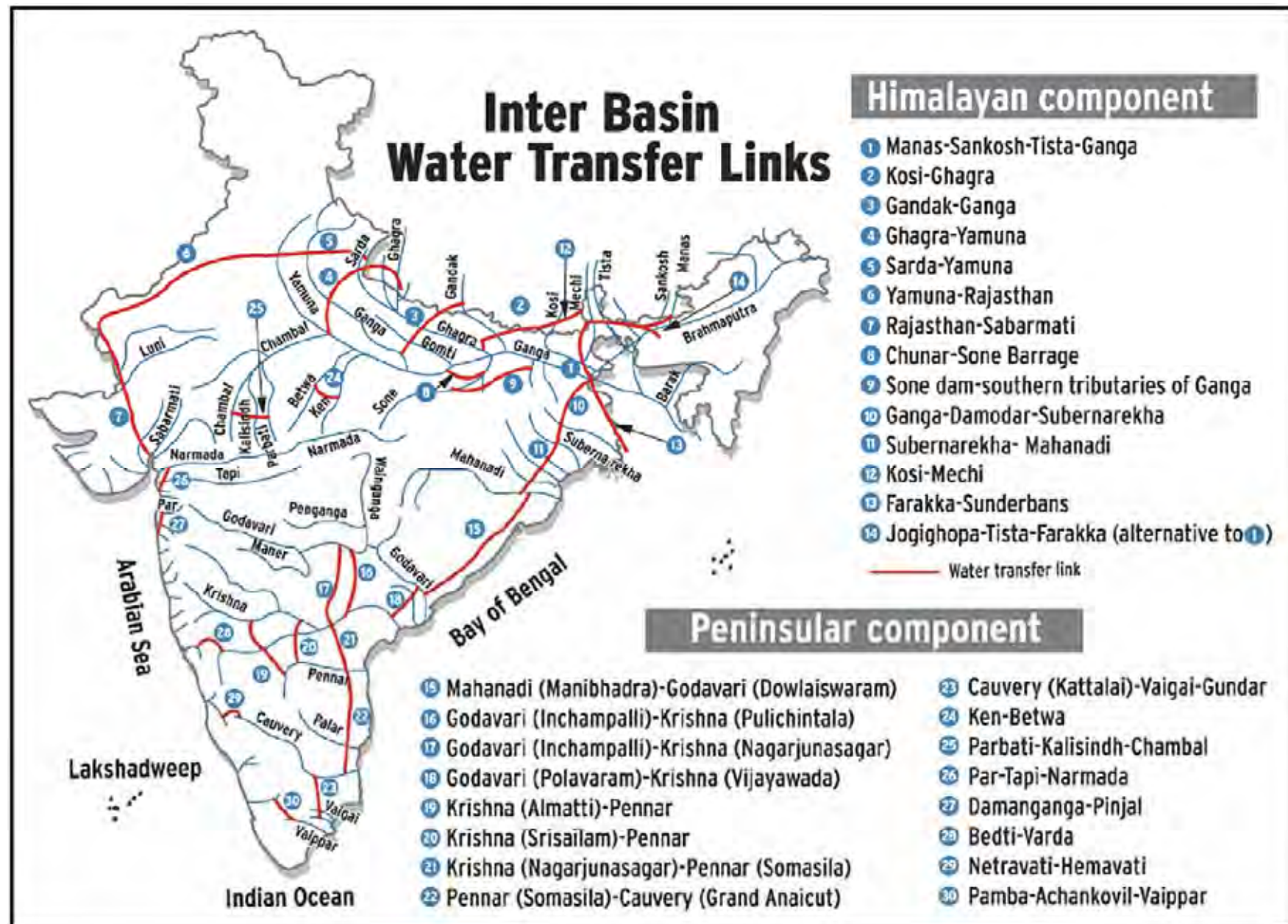
Other Disaster Management Projects

- Expanded Disaster Risk Mitigation Project
- Information, Education, and Communication (IEC) Programme
- Micro-Zonation of Major Cities
- Upgradation of National Institute of Disaster Management and other Institutes

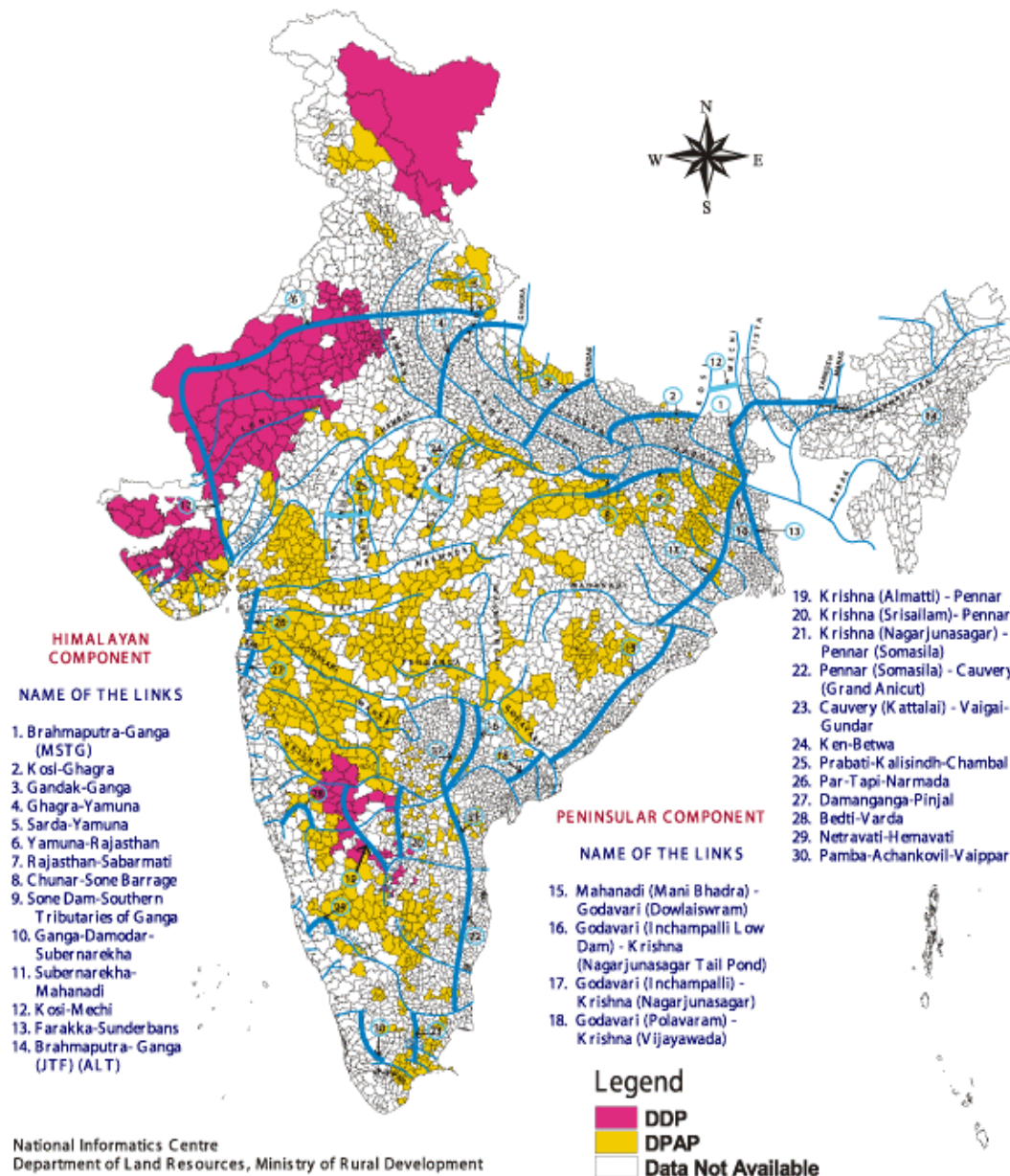
Components of Community Resilience: Towards Livelihood Security for Glocal Sustainability



Policy Initiative for Integrated Management of Flood and Drought



Drought Prone Areas of India



Traditional Wisdom for Drought Mitigation



Village pond for rainwater harvesting



Agriculture transformation in dry regions due to village pond

Human Right Standards for Disaster Resettlement and Rehabilitation

- Disasters brings enormous potential to restore the human rights of the affected and to overcome historical inequalities and discrimination.
- The rehabilitation process gives us the opportunity not only to provide relief to survivors, but also create a sustainable human right culture.
- The applications of international human rights standards will ease tensions as well as use the situation to contribute positively towards building an sustainable society.
- Human rights standards will enable all parties involved, from relief and governmental organizations to civic groups, to implement, assess and monitor relief and rehabilitation work.

Capacity Building in Disaster Management for officials and representatives of Panchayati Raj Institutions and Urban Local Bodies at District Level (NDMA)

- Training programme (FFTPs) in State **Administrative Training Institute** (ATIs) and 432 FFTP in IGNOU study centres of 54 selected districts (8 in each district) will be organised.
- In each district, 300 people will be trained under the project of which 75 will be Govt. officials and 225 will be the representatives of Panchayati Raj Institutions (PRIs) and Urban Local Bodies (ULBs).
- Thus, in all, 16,200 Government officials and representatives of PRIs/ULBs are aimed to be trained in Disaster Management.

Education and Research in Disaster Management for Sustainability

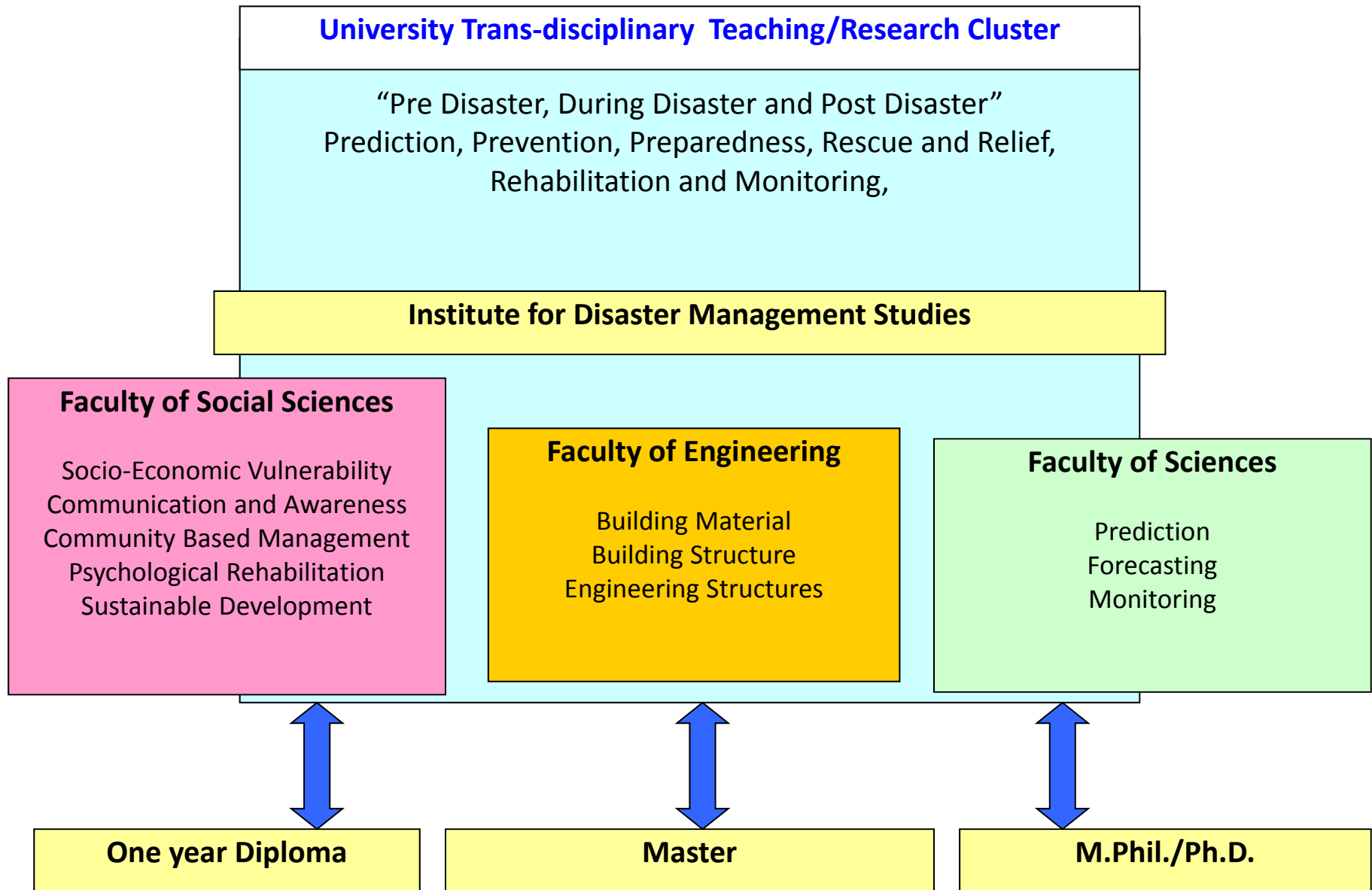
- World Conference on Disaster Reduction (WCRD) of 2005 in Kobe emphasizes the need of formal education and educational policy.
- Thematic Group 3 tells: Synergy of field based knowledge and implementation oriented, multi-disciplinary research.
- Expanding field of disaster management from first responders to rehabilitation, but lacking young professionals.
- Capacity building should be linked with ecological setup and quality of communities.

Trans-disciplinarity and Innovation in Education and Research: Priority for Action 3 of the HFA

- Inter-Disciplinary Research with subjects like Anthropology, Social work, Geography, Geology, Economics, Psychology, Communication, Education, Engineering and Management can help in uncovering complex disasters
- Link education, research and action
- Provide / facilitate affordable solutions, as per local context (Cultural Calibration of Technology)
- Involve wider stakeholders
- Maintain and expand network of key persons (Change Agents/ Facilitators)
- Spreading disaster awareness for effective response through use of various options like electronic and print media and traditional media

Education and Capacity Building

- Amendment of *Affiliation Bye Laws of schools and colleges to put in place disaster mitigation personnel and infrastructure*;
- Training for School Administrative Staff to undertake safety related programmes and schedules at the school and college;
- Training modules for teachers for innovative disaster mitigation strategies;
- Internship of disaster management degree holders in schools and colleges in rural areas. The existing infrastructure of National Cadet Corps (NCC), National Service Scheme (NSS) and clubs in the university and colleges could be trained into disaster response skills;
- Curriculum introduction/change at all levels. At least one university from each state of India to create a multi-disciplinary research and teaching Centre for Disaster Mitigation.







e-learning on Disaster Risk Management



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Thematic Courses

Risk Analysis



Start Date: 07-01-2012

Financial Strategies for Managing Economic Impacts of Disasters



Start Date: 10-12-2011

Risk Sensitive Land Use Planning



Climate Change and Disaster Risk





Comprehensive Course

Thematic Courses

- Risk Analysis
- Financial Strategies for Managing Economic Impacts of Disasters
- Safe Cities
- Risk Sensitive Land Use Planning
- Climate Change and Disaster Risk
- Earthquake Risk Reduction
- Community based Disaster Risk Management
- Damage and Reconstruction Needs Assessment
- Gender aspects of Disaster Recovery and Reconstruction

A new initiative by National Institute for Disaster Management through e-learning with a variety of thematic courses

Conclusion

- Traditionally, disaster management consisted primarily of relief based reactive mechanisms. However, the past few years witnessed a gradual shift towards a more proactive, mitigation-based approach. Thus, education and research can play an effective role.
- Transferring Scientific and Traditional Knowledge for policy and implementation for skill development of communities for undertaking preventive and rehabilitative measures together with emphasis on disaster risk reduction.
- In this context, an exploration of the concept of 'sustainable development' with four dimensions of economic efficiency, social equity, environmental protection and institutional effectiveness, all four of which contribute to, and are affected by natural disasters. Both formal and informal education should focus on above interlinked / interactive issues.

Traditional relief based to CBDM for Future Sustainability

- Traditional relief approach
- Sustainable development approach
- Vulnerability reduction approach
- Vulnerability to resilience approach (V2R)
- Community based disaster management
- Glocal sustainability approach

Way Ahead.....

- Strong inter-linkages between Governmental and non-governmental agencies for promoting community resilience.
- Trans-disciplinarily research cluster at educational institutions for undertaking innovations.
- Increased role of corporate sector under Corporate Social Responsibility for Capacity Building.
- Active public participation through local self government and Panchayati Raj Institutions (Village Governments) for Participatory Geospatial Technology.
- All above measures will contribute substantially for achieving sustainability at global level in general and Asian region in particular.

“Investing **TODAY**
for a
Safer **TOMORROW**”

Thank you

“**EDUCATION** is key to
SUSTAINABILITY”