



*Empowered lives.
Resilient nations.*

Integrating Disaster Information: Key Issues and Possible Solutions

THEORY, TECHNOLOGY & PRACTICE

Dr. Jianping YAN

Outline

- Key Issues around Disaster Information
- Modeling Disaster Information
- Designing National Disaster Database
- Developing Technologies for National Disaster Observatory (NDO)
- Practice in Countries

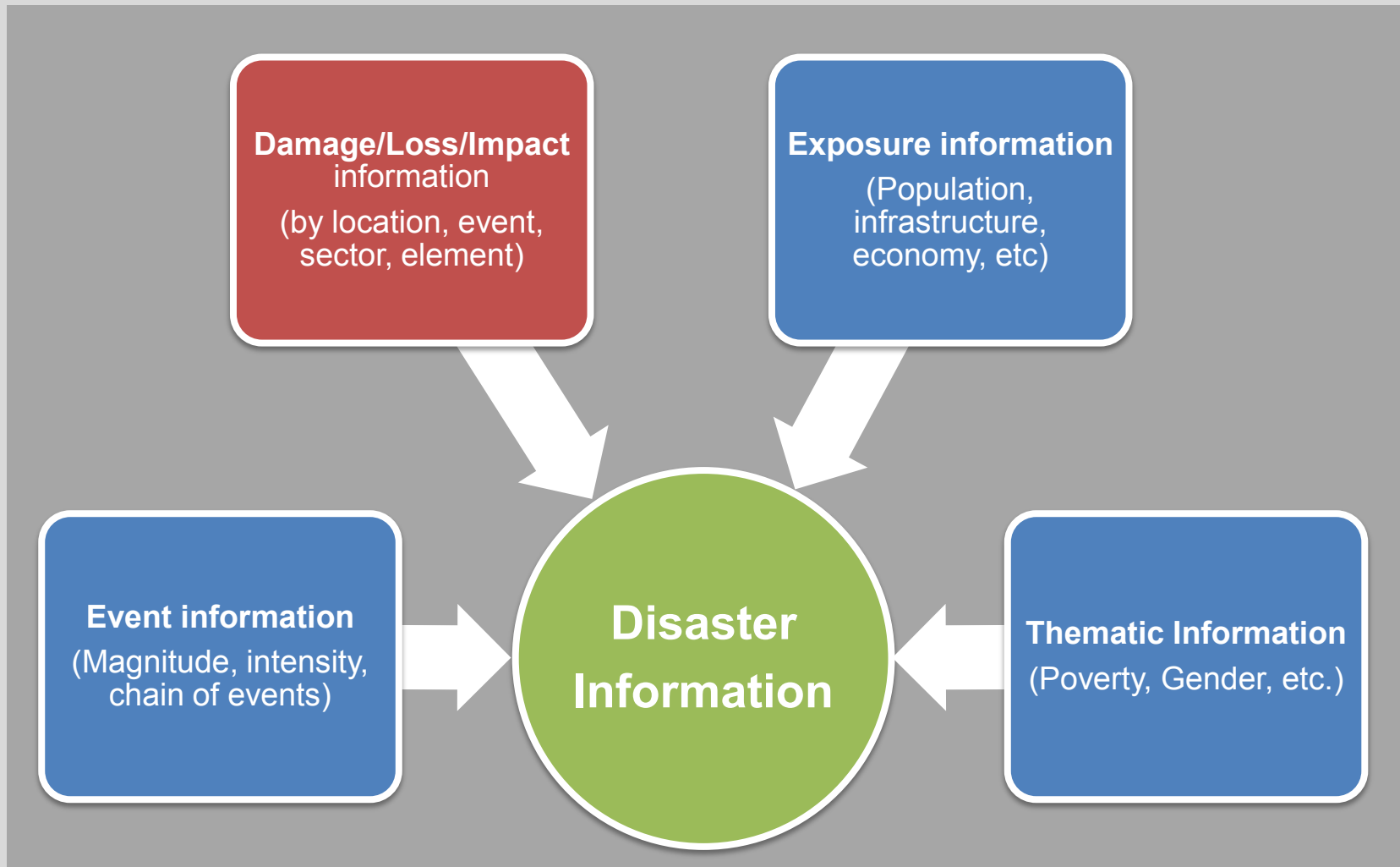
Common Issues with Disaster Information

- No systematic collection of information about hazard events and their impacts for better disaster preparedness and response;
- Disaster-related information are scattered among various agencies without any coherence and coordination;
- No standardized methodologies and tools for disaster information collection;
- No meaningful analysis to understand the trends, spatial and temporal impacts and hence poor understanding of potential risks and their impacts;
- Not used to learn from the past to improve the safety of our community and disaster response.

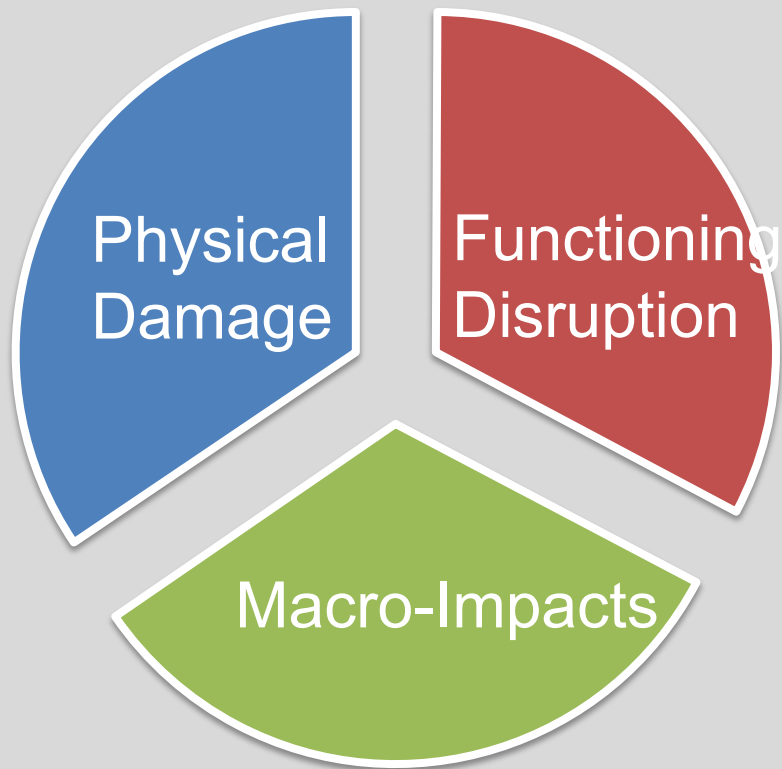
What is Disaster Information?

- Information on Extreme Events and their Impacts
 - Date, location, damage and loss, intensity and impact severity, etc.
- Information on Disaster System
 - Hazard events + Disaster events + Geophysical settings + Human system
- Information on Disaster Process
 - Disaster Impact Spreading over space and time

Conceptual Disaster Information Model



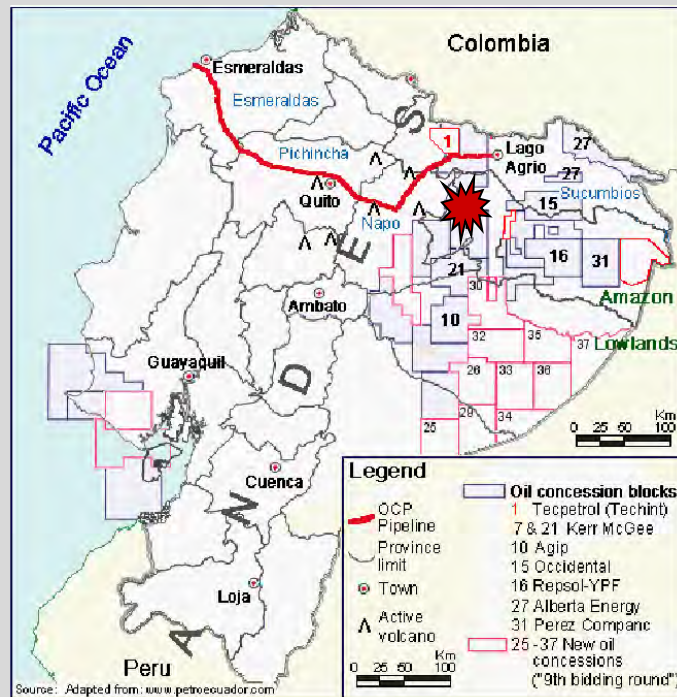
Loss Information for Public Decision Making



Public policy & decision makers are more concerned about functioning disruption and macro-impacts.

Impacts of the 1987 Earthquake of Ecuador

Physical damage to the oil
Pipeline in Amazon Forest



Physical Damage:

- 60 km pipeline, \$\$?

Functioning Disruption:

- Six months no oil export
- 70% annual revenue lost, \$\$\$?

Macro-Impact:

- Five year economic recession, \$\$\$\$\$\$?
- The whole nation was affected.

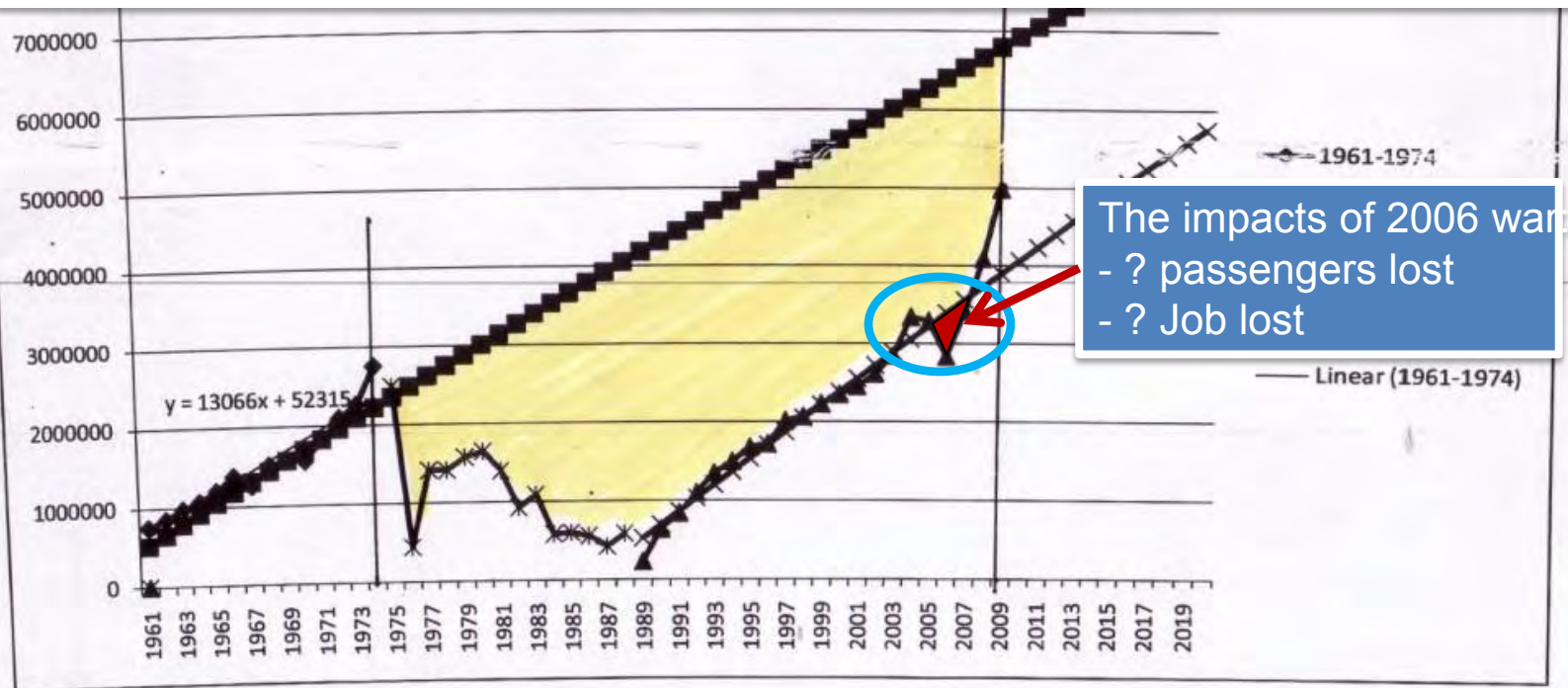
Impacts of Iceland Volcanic Disaster

- **Physical Damage:** minor
- **Functioning Disruption:** (by April 19, 2010, EASO):
 - Around 30 countries' airspace closed or restricted
 - 313 airport closed or paralyzed
 - 63,000 flights cancelled
 - 6.8 million passengers stranded
- **Impacts:**
 - important socio-political occasions cancelled or affected
 - Decrease in tourism growth rate by 1-2% in EC
 - Kenya flower export lost 2 million US\$/per day
- **Total Direct Loss:** 1.7 billion US\$ globally (IATA)

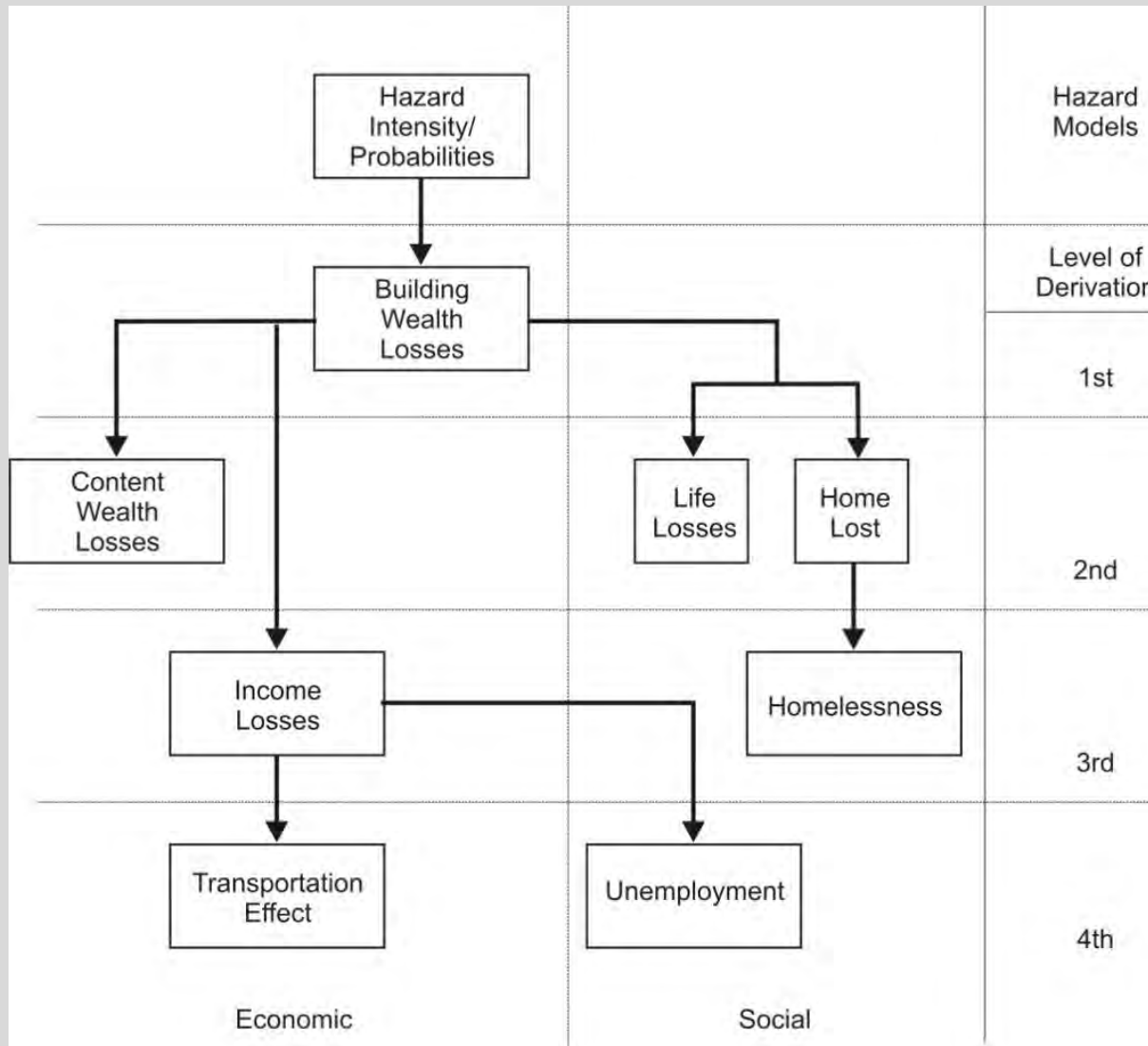
Long-term Impacts of a Disaster

The Impacts of the 1975 War on Lebanon's Aviation:

- 99 million passengers lost
- 500,000 jobs lost



HazUS' Loss Model



Comprehensive loss determination methodology
by order of computation (from Hirschberg et al., 1978).

Generic Loss Model

	Tangible		Intangible
	Primary	Secondary	
Direct	Building structure, contents, critical infrastructure, agriculture	Land & environment recovery	Loss of life, injuries, Displacement, effected population
Indirect	Business interruption, livelihood	Impact on regional & national economy	Health, mental damage

Key Issues in Disaster database Design

- 1) Disaster loss information is not geospatially disaggregated
- 2) Incompleteness of disaster loss information
- 3) Criteria for the inclusion of disaster events are not normalized
- 4) Lack of necessary disaster-related context information
- 5) No disaster classification
- 6) No tracking of event chain
- 7) No tracking of disaster impact spreading
- 8) Aggregation of different losses vertically and laterally

Two Ways to Record Disaster Damage & Loss

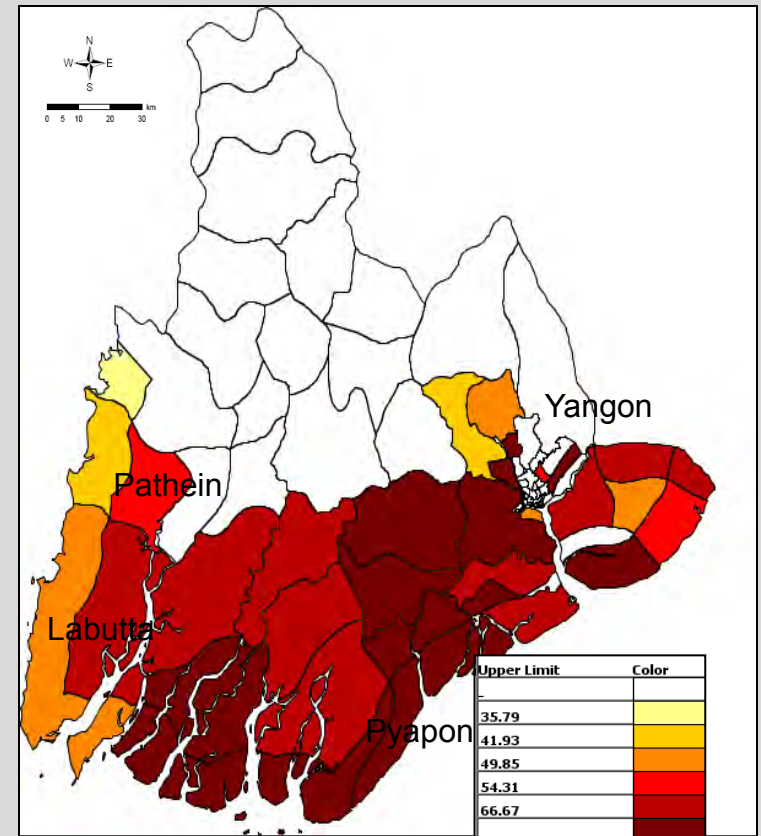
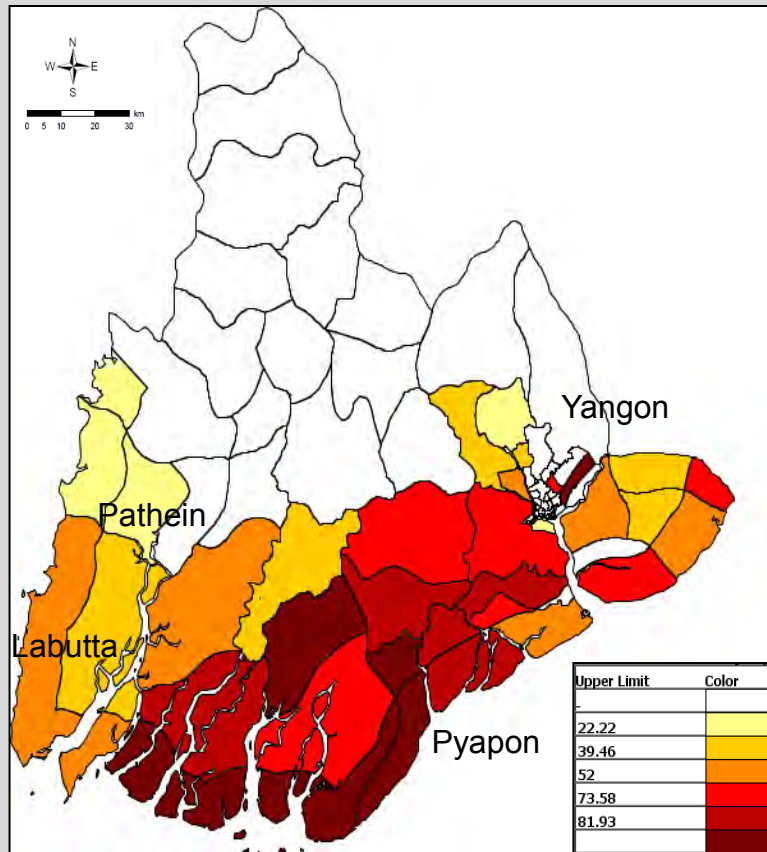


Records	Hazard Type	Damage & Loss
Record 1	Flood	

Records	Hazard Type	Damage & Loss
Record 1	Flood	
Record 2	Flood	
Record 3	Flood	
Record 4	Flood	

Impacts of Nargis Cyclone Disaster:

Houses destroyed (Left), Houses in Bamboo after the disaster



Source: Village Tract Assessment (VTA) component of the PONJA (Post Nargis Joint Assessment) project developed jointly by the ASEAN, the Government of Myanmar, and the UN.

Three Approaches for Disaster Database Design

Approach	Disaster Information	Data Analysis	Outputs
Event-based	Disaster damage & loss	Statistic analysis	Disaster pattern and trend over time
System-based	Damage & loss + Context information	Spatial, sectoral, and thematic analysis; disaster mapping	Spatial distribution of damage and loss; spatial correlation among various components of a disaster system
Process-based	Damage & loss + Context information + Process information	Dynamic risk and disaster modeling and mapping	Chain of events; Cascading effects; systemic risk

Disaster Databases: Examples and Practice

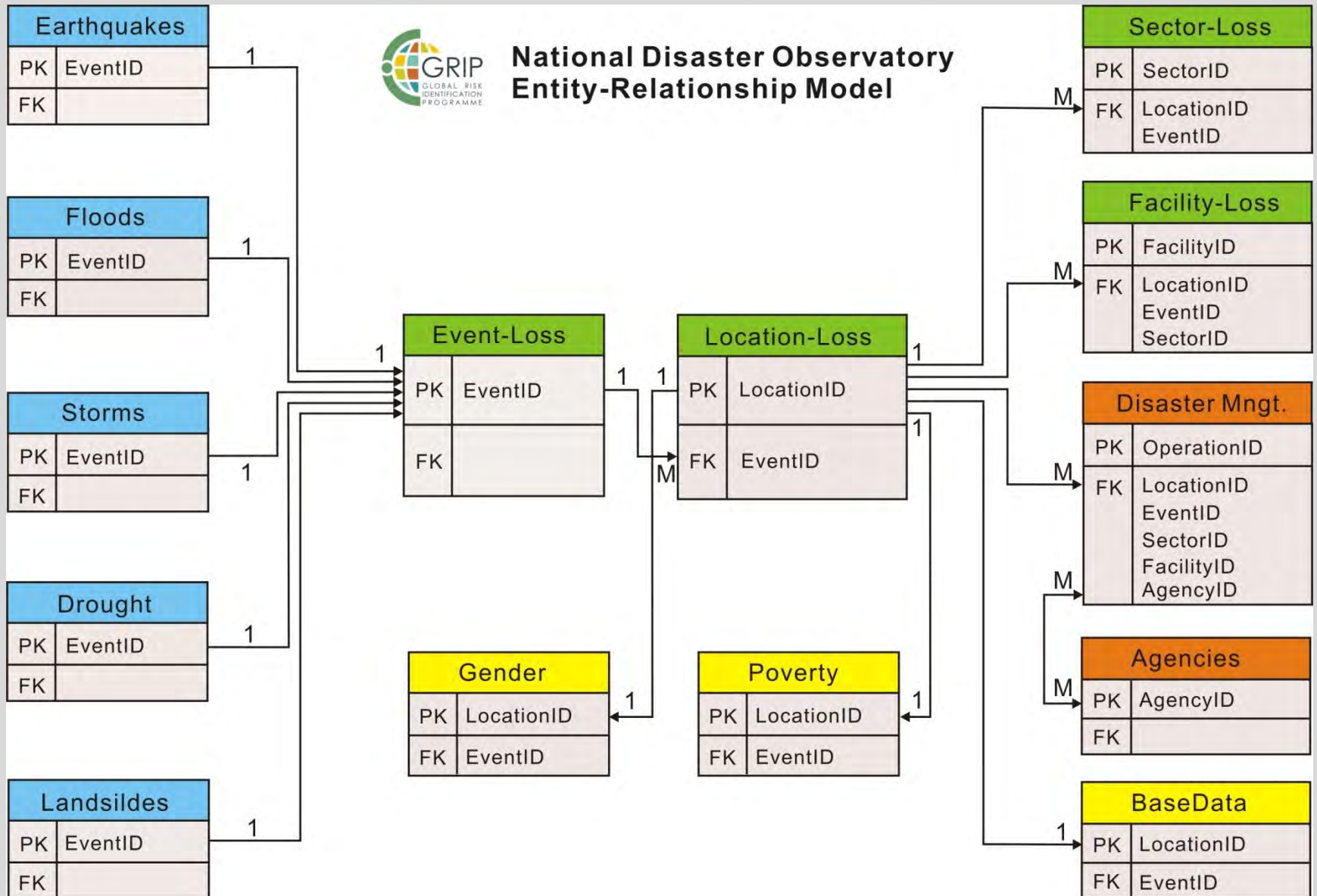
Coverage	Examples	Database Type	Practice
Global	EM-DATA, NatCat, Sigma, GDACS, ReliefWeb, IFRC's Disaster Database	Event-based	
Regional	ADPC's, ADRC,	Event-based	Asia Pacific, LAC
National	DesInventar	System-based	LAC, Asia Pacific, partially Africa
	NDO Disaster Database (GRIP)	System-based	Pilot in Bolivia, Armenia, since 2010

Five Emerging Issues with Recording Disaster Information by Administrative Unit

- Necessary disaster-related context information should be included.
- Disasters must be classified.
- Event chains must be tracked to avoid duplicating disaster loss accounting.
- Changes in administrative boundaries must be tracked.
- Records in the database can't be directly used to statistic analysis.



National Disaster Observatory Entity-Relationship Model



Developing Technologies for National Disaster Observatory (NDO)

National Disaster Observatory (国家灾情观测系统) is a Disaster Information Management System designed for systematically collecting, storing, analyzing, and disseminating of disaster-related data and information (Disaster Information), with key applications to:

- Disaster Loss Accounting (灾损统计)
- Disaster Forensics (灾情分析)
- Disaster Risk Modeling (灾难风险建模)

Key Functionalities of National Disaster Observatory

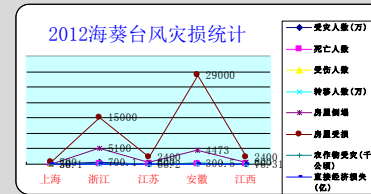
Customized Information Dissemination



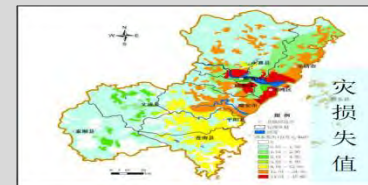
Access to the public



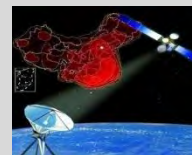
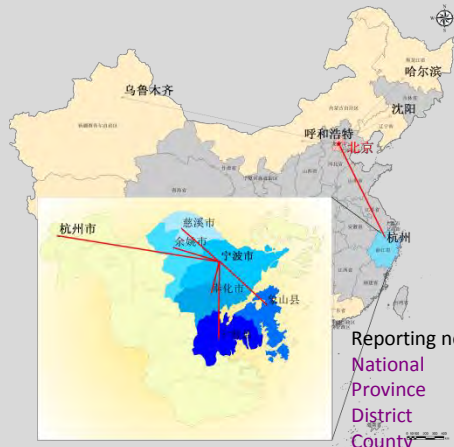
Instant Disaster Analysis and Mapping



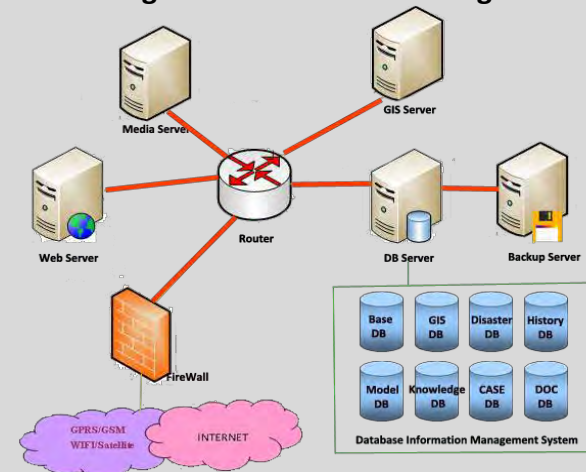
Disaster Loss Statics



Innovative Data Collection



Integrated Information Management



GUI of NDO Disaster Database

Disaster Observatory

Hello, c1 Log Out

Data Management Information Query Statistical Analysis System Management PDA Management Map Display User's Manual

Business Menu

Disaster Information

- Event Information
- Damage Loss Data
- Multimedia Information
- Context Information
- Data Entry Approval
- Data Entry Auditing
- Statistical Report

Data Management : Disaster Information - Disaster Event

Event Name: Starting Date: Ending Date: Hazard Type: Please Query Add

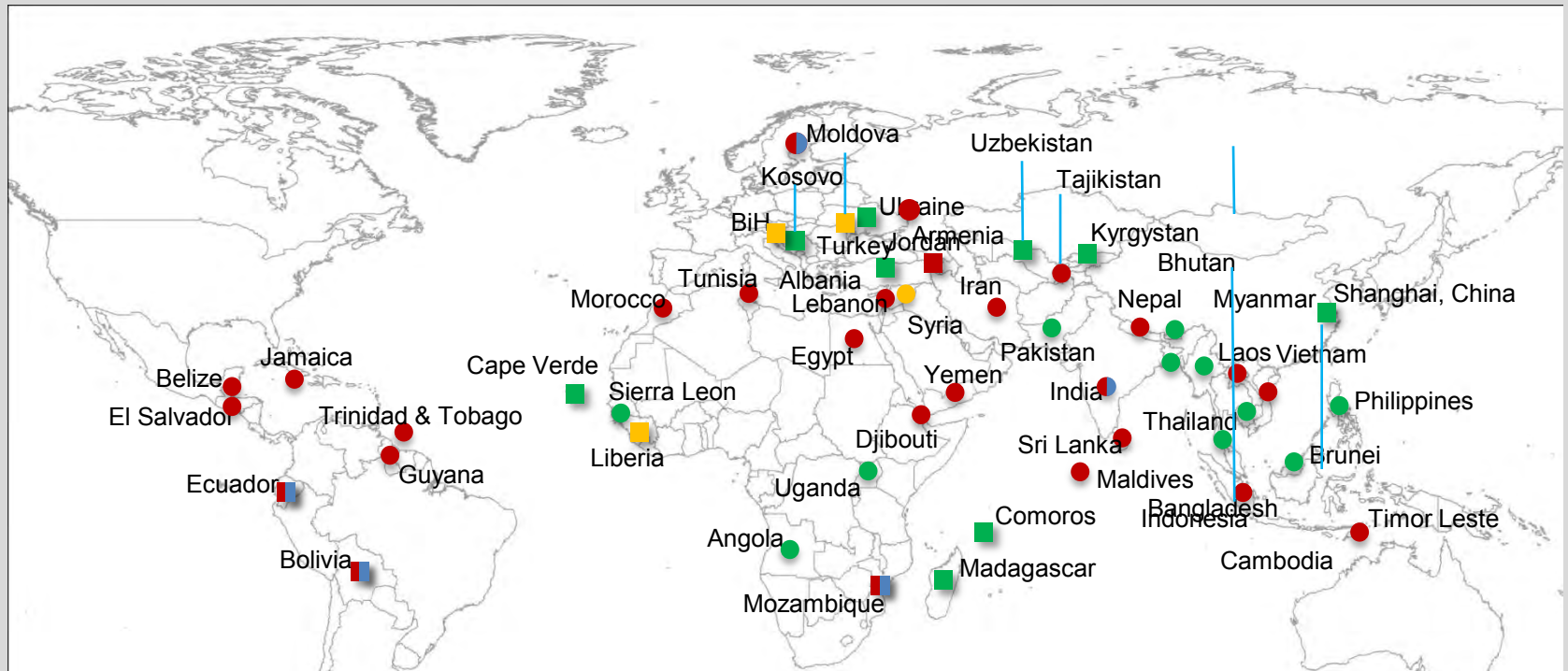
Numbering	Event Name	Hazard Type	Event Type	Affected Extent	Starting Date	Recorder	Operate
249	宁波大风	暴风	二级事件	宁波周边地区	2012/08/08	严丽军	Attr Edit Del
248	岱山县风暴雨	风暴雨	三级事件	岱山县附近及周围地区	2012/08/08	严丽军	Attr Edit Del
247	舟山大风	暴风	二级事件	浙江舟山群岛附近及周围	2012/08/08	严丽军	Attr Edit Del
246	金山大风	暴风	二级事件	金山附近及周围地区	2012/08/08	严丽军	Attr Edit Del
245	青浦暴雨	暴雨	二级事件	上海青浦地区	2012/08/08	严丽军	Attr Edit Del
244	金山暴雨	暴雨	二级事件	上海金山暴雨	2012/08/08	严丽军	Attr Edit Del
243	灾害事件名称	热带气旋			2012/07/27	s3	Attr Edit Del
228	汶川地震灾难	构造地震	主要事件		2008/05/12	严丽军	Attr Edit Del
227	映秀洪水灾难	山洪	主要事件		2012/08/08	d1	Attr Edit Del
221	海门泥石流	泥石流	四级事件	江苏周边地区	2012/08/08	严丽军	Attr Edit Del
220	海门滑坡	滑坡	四级事件	江苏周边地区	2012/08/08	严丽军	Attr Edit Del
219	苏州内涝	洪水	三级事件	江苏周边地区	2012/08/08	严丽军	Attr Edit Del
218	南通洪水	洪水	三级事件	江苏周边地区	2012/08/08	严丽军	Attr Edit Del
217	苏州暴雨	暴雨	二级事件	江苏周边地区	2012/08/08	严丽军	Attr Edit Del
216	海葵台风	热带气旋	主要事件	长三角地区	2012/08/05	c1	Attr Edit Del

total 16 item per 15 item First Prev Next Last current 1/2 item skip item Go

Use of Satellite Imageries in Developing National Disaster Observatory (NDO)

- Geo-referencing historic hazard events
- Building historic exposure inventories
- Rapid interpretation of damage and losses during an emergency and/or disaster

UNDP-supported NDO Practice in Countries



Legend

National Damage & Loss Database

- Fully Established
- Partially Covered
- Ongoing
- Initiated, but little progress

National Disaster Observatory (NDO)

- Fully Established
- Partially Established
- Ongoing
- Initiated, but little progress

Facts and Achievements (2005-2013)

- 50 countries supported to collect, integrate, and analyze disaster information through two practices – Developing Damage & Loss databases and National Disaster Observatories (NDO).
- 23 fully-established damage & loss databases
- One established NDO; three partially established NDOs
- Six historic country disaster profiles developed for initiating national DRR strategy.

Loss Databases using DesInventar

DesInventar on-line : PDNA Pre-configured databaseData Entry - Windows Internet Explorer

http://desinventar/DesInventar/inv/datacardtab.jsp

DesInventar on-line : PDNA Pre-configured database...

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Region | Geography | Events | Causes | Extension | Query | Edit Data | Data Entry | Admin | Security

Region PDNA Pre-configured database - [pd]

Serial: 1234 Date (YMD): 2007 11 30 Duration (d): 2 Source: WHO - RHA initial assessment

Departamento: ANTIOQUIA Municipio: MEDELLIN Corregimiento:

Event: LANDSLIDE Location: Comuna 12 - Barrio las Cruces (Cra 75E -Cl. 25sur) GLIDENumber: LS-20070023-COI

Cause: Earthquake Description of Cause: Minor Earthquake triggered several landslides; Previous rain

EFFECTS

Deaths: 12 ☒ Missing: 3 ☒ Injured: 5 ☒ Magnitude: 4.5 richter

Affected: 45 ☒ Relocated: 11 ☒ Houses Damaged.: 2 ☒ Losses \$Local: 0.0

Evacuated: 0 ☐ Victims: 0 ☐ Houses Destroyed: 4 ☒ Losses \$USD: 0.0

Affected Sectors

☒ Transportation ☒ Communications ☐ Relief

☐ Agriculture ☒ Water supply ☐ Sewerage

☐ Power and Energy ☐ Industries ☐ Education

☐ Other sectors ☐ Health sector

Damages in roads Mts: 0.0

Damages in crops Ha: 0.0

Lost Cattle: 0

Education centers: 0

Hospitals: 0

OTHER LOSSES:

Comments:

By: UNDP Date: 2007-11-30

Population | Housing | Education | Health | Energy | WASH | Transport | Comm | Agriculture | Industry | Tourism | Environ | GOV | Other

Population under 5: 0

Population 6-20: 0

Population 21-60: 0

Population over 60: 0

Population total women: 0

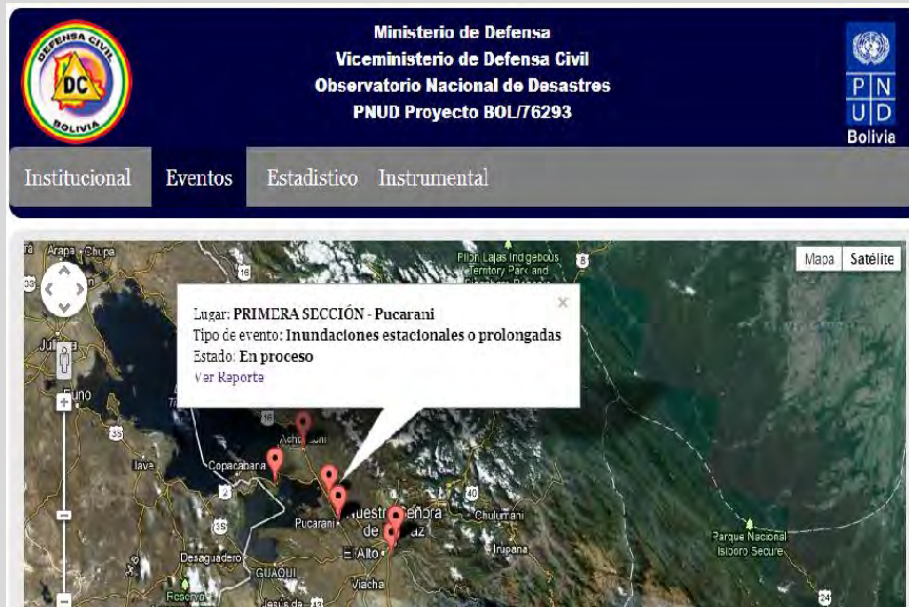
The actual screen for data capture.

It can be customized by users.

Standard Effects (killed, injured, affected, etc.)

Extension (Sectorial detail information)

National Disaster Observatory of Bolivia



Event Visualization

Event Report

The screenshot displays the "Formulario Preliminar e Información de Linea Base" (Preliminary Form and Baseline Information) for an event report. The form is titled "Reporte Individual" and contains the following sections:

- DATOS DE FORMULARIO BASICO**
 - EVENTO**
 - Grupo: -
 - Categoría: -
 - Tipo: 030102 - inundaciones estacionales o prolongadas
 - LOCALIZACION**
 - Departamento: 02 - La Paz
 - Municipio: 021201 - PRIMERA SECCIÓN - Pucarani
 - DATOS BASICOS**
 - Fecha Ocurrencia: 2013-01-23
 - Descripción: -
 - DATOS POBLACION**
 - Nro. de Familias Afectadas: -
 - Nro. de Familias Damnificadas: -
 - Nro. de Personas Desaparecidas: -
 - Nro. de Personas Heridas: -
 - Nro. de Personas Fallecidas: -

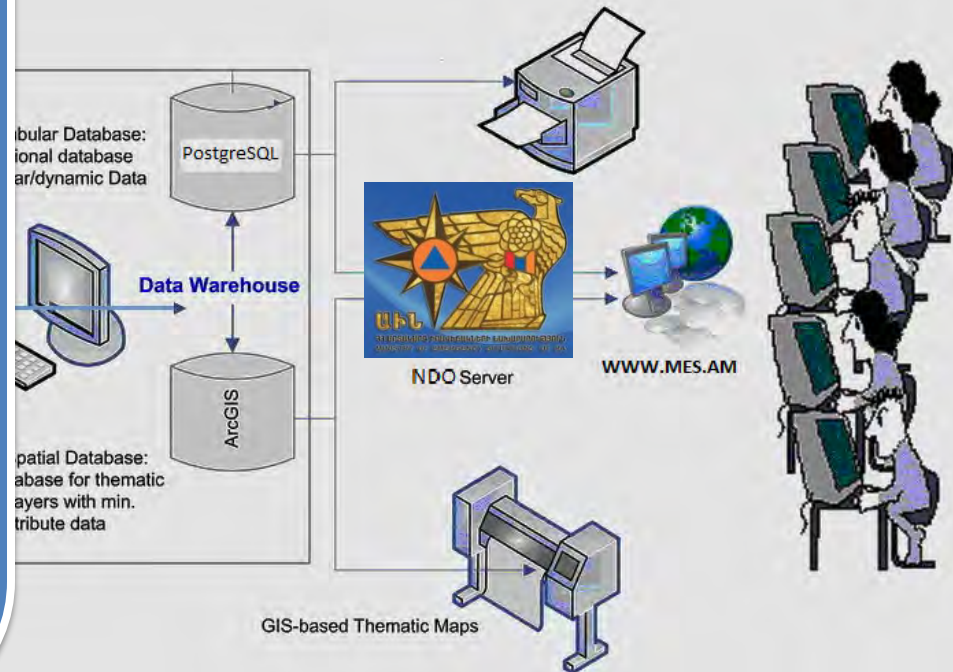
Below the form is a map of Bolivia with a red pin indicating the event location. The map includes labels for "Acre", "Rondônia", "Bolivia", "Arequipa", "Nueva de la Paz", "Santa Cruz de la Sierra", and "Mapa Satélite".

National Disaster Observatory of Armenia

Network of Disaster Observers

- Ministry of Emergency Situations
 - Armenian Rescue Service
 - Hydrometeorological and Monitoring Service
- Ministry of Territorial Administration
 - State Committee of Water Management
- Ministry of Urban Development
- Ministry of Nature Protection
- Ministry of Agriculture
- Ministry of Economy
- Ministry of Health
- Ministry of Energy and Natural Resources
- Ministry of Transport and Communication
- National Academy of Sciences
- Marzs (local governments)
- State Nuclear Regulatory Commission by the Government
- State Committee of Cadaster of Real Estate
- Armenian Electrical Line Company
- Armenian – Russian Gas Company
- Viva sell, Beeline, Orange Communication Company
- Geocom LTD
- Georisk LTD
- GIS LLC
- Armenian Red Cross
- SF “International Center Garni”
- Armenian Association of Seismology and Physics of Earth

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Summary

- A useful disaster database should include geospatially disaggregated disaster information, which consists of disaster loss and associated context information such as hazard events, exposure, other thematic data, etc.
- The impacts of direct damage / losses should be evaluated, either quantitatively or qualitatively.
- Disaster events should be classified in terms of their severity and the chaining effects and the criteria for inclusion should be normalized.
- National Disaster Observatory (NDO) provides a comprehensive solution to develop an integrated national disaster information system.

Contact Information

Dr. Jianping YAN

Senior Disaster Risk Assessment
and Management Specialist
United Nations Development
Programme

jianping.yan@undp.org

jianping.yan@gmail.com

skype: yanjp06

www.undp.org/cpr

www.gripweb.org