Reducing the Risk of Disasters: from integrated research to effective sustainable development policies

Public session on Science and Expertise in Disaster Risk Reduction
Macedonian Academy of Sciences and Arts
Skopje, 11 October 2011

Sálvano Briceño
Chair-elect, Science Committee, IRDR
“Natural“ catastrophes worldwide 1980 – 2010
Number of events with trend
“Natural” catastrophes worldwide 1980 – 2010
Overall and insured losses with trend
### Significant “natural” catastrophes worldwide 1980 – 2010

#### 10 costliest natural catastrophes ordered by overall losses

<table>
<thead>
<tr>
<th>Period</th>
<th>Event</th>
<th>Affected Area</th>
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</thead>
<tbody>
<tr>
<td>25-30.8.2005</td>
<td>Hurricane Katrina</td>
<td>USA: LA, New Orleans, slidell; MS, Biloxi, Pascagoula, Waveland, Gulfport</td>
<td>125,000</td>
<td>62,200</td>
<td>1,300</td>
</tr>
<tr>
<td>17.1.1995</td>
<td>Earthquake</td>
<td>Japan: Hyogo, Kobe, Osaka, Kyoto</td>
<td>100,000</td>
<td>3,000</td>
<td>6,400</td>
</tr>
<tr>
<td>12.5.2008</td>
<td>Earthquake</td>
<td>China: Sichuan, Mianyang, Beichuan, Wenchuan, Shifang, Chengdu, Guangyuan, Ngawa, Ya'an</td>
<td>85,000</td>
<td>300</td>
<td>84,000</td>
</tr>
<tr>
<td>17.1.1994</td>
<td>Earthquake</td>
<td>USA: Northridge, Los Angeles, San Fernando Valley, Ventura, Orange</td>
<td>44,000</td>
<td>15,300</td>
<td>60</td>
</tr>
<tr>
<td>6-14.9.2008</td>
<td>Hurricane Ike</td>
<td>USA, Cuba, Haiti, Dominican Republic, Turks and Caicos Islands, Bahamas</td>
<td>38,300</td>
<td>18,500</td>
<td>170</td>
</tr>
<tr>
<td>May-September 1998</td>
<td>Floods</td>
<td>China: Jangtsekiang, Songhua Jiang</td>
<td>30,700</td>
<td>1,000</td>
<td>4,200</td>
</tr>
<tr>
<td>27.2.2010</td>
<td>Earthquake, tsunami</td>
<td>Chile: Bio Bio, Concepción, Talcahuano, Coronel, Dichato, Chillán, Del Maule, Talca, Curicó</td>
<td>30,000</td>
<td>8,000</td>
<td>520</td>
</tr>
<tr>
<td>23.10.2004</td>
<td>Earthquakes</td>
<td>Japan: Honshu, Niigata, Ojiya, Tokyo, Nagaoka, Yamakoshi</td>
<td>28,000</td>
<td>760</td>
<td>50</td>
</tr>
<tr>
<td>23-27.8.1992</td>
<td>Hurricane Andrew</td>
<td>USA: FL, Homestead; LA. Bahamas</td>
<td>26,500</td>
<td>17,000</td>
<td>60</td>
</tr>
<tr>
<td>27.6-13.8.1996</td>
<td>Floods</td>
<td>China: Guizhou, esp. Guiyang; Zhejiang; Sichuan; Hunan; Anhui; Jiangxi; Hubei; Guangxi; Jiangsu</td>
<td>24,000</td>
<td>445</td>
<td>3,050</td>
</tr>
</tbody>
</table>

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Significant “natural” catastrophes worldwide 1980 – 2010
10 costliest natural catastrophes ordered by insured losses

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<td>Earthquake</td>
<td>USA: Northridge, Los Angeles, San Fernando Valley, Ventura, Orange</td>
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<td>15,300</td>
<td>60</td>
</tr>
<tr>
<td>7-21.9.2004</td>
<td>Hurricane Ivan</td>
<td>USA, Trinidad and Tobago, Venezuela, Colombia, Mexico</td>
<td>23,000</td>
<td>13,800</td>
<td>130</td>
</tr>
<tr>
<td>19-24.10.2005</td>
<td>Hurricane Wilma</td>
<td>USA, Bahamas, Cuba, Haiti, Jamaica, Mexico</td>
<td>22,000</td>
<td>12,500</td>
<td>40</td>
</tr>
<tr>
<td>20-24.9.2005</td>
<td>Hurricane Rita</td>
<td>USA, LA, Lake Charles, Holly Beach, Cameron, New Orleans, MS, TX, Houston</td>
<td>16,000</td>
<td>12,100</td>
<td>10</td>
</tr>
<tr>
<td>27.2.2010</td>
<td>Earthquake, tsunami</td>
<td>Chile, Bio Bio, Concepción, Talcahuano, Coronel, Dichato, Chillán, Del Maule, Talca, Curicó</td>
<td>30,000</td>
<td>8,000</td>
<td>520</td>
</tr>
<tr>
<td>11-14.8.2004</td>
<td>Hurricane Charley</td>
<td>USA, Cuba, Jamaica, Cayman Islands</td>
<td>18,000</td>
<td>8,000</td>
<td>40</td>
</tr>
<tr>
<td>26-28.9.1991</td>
<td>Typhoon Mireille, floods</td>
<td>Japan, Kyushu, Hokkaido, Hakata</td>
<td>10,000</td>
<td>7,000</td>
<td>60</td>
</tr>
</tbody>
</table>
## Significant “natural” catastrophes worldwide 1980 – 2010

### 10 deadliest events

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<tr>
<td>12.1.2010</td>
<td>Earthquake</td>
<td>Haiti: Port-au-Prince, Petionville</td>
<td>8,000</td>
<td>200</td>
<td>222,570</td>
</tr>
<tr>
<td>2-5.5.2008</td>
<td>Cyclon Nargis</td>
<td>Myanmar: Ayeyawaddy, Yangon, Bugalay, Irrawaddy, Bago, Karen, Mon, Laputta, Haing Kyi</td>
<td>4,000</td>
<td>100</td>
<td>140,000</td>
</tr>
<tr>
<td>29-30.4.1991</td>
<td>Tropical cyclon</td>
<td>Bangladesh: Bay of Bengal, Cox's Bazar, Chittagong, Bola, Noakhali districts, esp. Kutubdia</td>
<td>3,000</td>
<td>100</td>
<td>139,000</td>
</tr>
<tr>
<td>8.10.2005</td>
<td>Earthquake</td>
<td>Pakistan. India. Afghanistan</td>
<td>5,200</td>
<td>5</td>
<td>88,000</td>
</tr>
<tr>
<td>12.5.2008</td>
<td>Earthquake</td>
<td>China: Sichuan, Mianyang, Beichuan, Wenchuan, Shifang, Chengdu, Guangyuan, Ngawa, Ya'an</td>
<td>85,000</td>
<td>300</td>
<td>84,000</td>
</tr>
<tr>
<td>July-August 2003</td>
<td>Heatwave, drought</td>
<td>France. Germany. Italy. Portugal. Romania. Spain. United Kingdom</td>
<td>13,800</td>
<td>20</td>
<td>70,000</td>
</tr>
<tr>
<td>July-Sept. 2010</td>
<td>Heatwave, drought</td>
<td>Russia</td>
<td>2,000</td>
<td>20</td>
<td>56,000</td>
</tr>
<tr>
<td>21.6.1990</td>
<td>Earthquake</td>
<td>Iran: Caspian Sea, Gilan Provinz, Manjil, Rudbar, Zanjan, Safid, Qazvin</td>
<td>7,100</td>
<td>100</td>
<td>40,000</td>
</tr>
</tbody>
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- **US$ m, original values**
- **Fatalities**
What is Disaster Risk Reduction (DRR)?

- A conceptual framework consisting of ways and means:
  - To minimize disaster risks by reducing the degree of vulnerability and increasing resilience capacity
  - To avoid (prevention) or to limit (mitigation and preparedness) the adverse impacts of natural hazards with a sustainable development approach
Global Trends - Disasters are NOT natural

Greater exposure to natural and human-induced hazards, climate change and variability

Socio-economic: poverty & unsustainable development styles, unplanned urban growth and migrations, lack of risk awareness & risk governance institutions & accountability...

Physical: insufficient land use planning, housing & critical infrastructure in hazard prone areas, little safety awareness...

Ecosystem & natural resource depletion (coastal, mountains, watersheds, wetlands, forests...)
Traditional perceptions and obstacles when addressing disasters…

- **Public policy priorities relevant to disasters:**
  - In disaster management & humanitarian action: EMERGENCY MANAGEMENT, *less risk reduction*…
  - In development, SECTORAL & SHORT-TERM, *less policy integration*, *long-term sustainable development vision and holistic approach*
  - In climate change: mainly MITIGATION, *less adaptation*

- **People’s perception of disasters:** «natural» disasters = acts of god = FATALISTIC = focus on preparedness for response, hence need for a paradigm shift to understand disasters as a human and development creation and to focus on human and social vulnerability, comparison with health and accidents, in which prevention has become a routine (this is the challenge with hazards…)

- **Academic policy priorities:** NATURAL SCIENCES, ECONOMICS & QUANTITATIVE ANALYSIS and not enough social sciences, psychology, anthropology, sociology, communications, management and leadership, ethics, governance, «new economics»… or knowledge-based, applied or policy oriented-research (DRIP syndrome)
World Conference on Disaster Reduction
2nd WCDR, Kobe, Hyogo, Japan, 18-22 January 2005

Hyogo Framework for Action 2005-2015: Building the resilience of nations and communities to disasters (HFA)

✓ 3 Strategic goals
✓ 5 Priorities for action
✓ Implementation and follow-up

Expected outcome:

The WCDR resolved to pursue the following expected outcome for the next 10 years: the substantial reduction of disaster losses, in lives & in the social, economic & environmental assets of communities & countries. The realization of this outcome will require the full commitment & involvement of all actors concerned, including governments, regional & international organizations, civil society including volunteers, the private sector & the scientific community.
3 strategic goals:

- The integration of disaster risk reduction into sustainable development policies & planning

- The development & strengthening of institutions, mechanisms & capacities to build resilience to hazards

- The systematic incorporation of risk reduction approaches into the implementation of emergency preparedness, response & recovery programmes
Hyogo Framework for Action 2005-2015 (continued)

Five priorities for action:

1. Governance: ensure that disaster risk reduction is a national and local priority with strong institutional basis for implementation

2. Risk identification: identify, assess and monitor disaster risks and enhance early warning

3. Knowledge: use knowledge, innovation and education to build a culture of safety and resilience at all levels

4. Reducing the underlying risk factors in various sectors (environment, health, construction, private sector etc.)

5. Strengthen disaster preparedness for effective response
Key questions:

• Why, despite advances in the natural and social science of hazards and disasters, do losses continue to increase?

• To what extent is the world-wide growth in disaster losses a symptom and indicator of unsustainable development?
Partners

• National and international science institutions
• National and international development assistance agencies and funding bodies
• National Committees

Co-Sponsors
The Science Plan

Addressing the challenge of natural and human-induced environmental hazards

An integrated approach to research on disaster risk through: an international, multidisciplinary (natural, health, engineering and social sciences, including socio-economic analysis) collaborative research programme.

IRDR Science Plan at:
http://www.irdrinternational.org/
Scope of IRDR

- Effects of human activities on creating or enhancing disasters, including land-use practices
- Space weather and impact by near-Earth objects
- NOT disasters triggered by technological failure (but technological failure triggered by geophysical and climate-weather events), warfare...
Objective 1:

Characterization of hazards, vulnerability and risk
- 1.1: identifying hazards and vulnerabilities leading to risks;
- 1.2: forecasting hazards and assessing risks; and
- 1.3: dynamic modelling of risk
- HFA-2. Identify, assess and monitor disaster risks and enhance early warning
Objective 2:

Effective decision making in complex and changing risk contexts

– 2.1: Identifying relevant decision-making systems and their interactions
– 2.2: Understanding decision making in the context of environmental hazards; and
– 2.3: Improving the quality of decision-making practice

– HFA-1. DRR-national priority
– HFA-5. Strengthen disaster preparedness
Objective 3:

Reducing risk and curbing losses through knowledge-based actions

- 3.1: Vulnerability assessments;
- 3.2: Effective approaches to risk reduction
- Long-term database, monitoring systems and tools
- HFA-4. Reduce the underlying risk factors
- HFA-3. knowledge - culture of safety and resilience
Cross-Cutting Themes

1. Capacity building
2. Case studies and demonstration projects
3. Assessment, data management and monitoring
   • HFA-2. Identify, assess and monitor disaster risks
   • HFA-1, -HFA-3, - HFA-4, HFA-5...

IPCC Special Report on Managing Risk of Extreme Climate Events
IRDR Forensic Disaster Investigations (FORIN)

- Probe further into complex and underlying causes of growing disaster loss
- Fundamental cause of disasters
- Trace out and assign causal explanation of losses
- Intervening conditions that increased or reduce losses

- Series of case studies
- Common template and methodology
Risk Interpretation and Action (RIA)

• What do people (especially those at risk) think is likely to happen? & What will they do about it?
• Estimation of the likelihood and magnitude
• Evaluation of the vulnerability/resilience of the physical infrastructure
• Consideration of social and behavioral factors that place the local population at greater or lesser risk
• **Disaster Loss Data Project (DATA)**

Need for more systematic and reliable information on such events ... generate new information and data and to leave a legacy of coordinated and integrated global data and information sets across hazards and disciplines, with unprecedented degrees of access.

• **Assessment of Integrated Research on Disaster Risk (AIRDR)**

First systematic and critical assessment of research on disaster risk, provide baseline to measure effectiveness of multiple programmes.
Sponsors: ICSU, ISSC, UN-ISDR

Scientific Committee

Consultative Forum

IPO

Dr. Jane E. Rovins, Executive Director
Lang Lang, Administrative Officer
Anna Rudashko, Communications Vacant, Science Officer

Located at CEODE, CAS, Beijing, China

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Lang Lang, Administrative Officer
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Located at CEODE, CAS, Beijing, China

Cutler, Susan, University of South Carolina, USA

Eiser, Richard, University of Sheffield, UK – Ferrigni Ferrucio, Naples, Italy

Johnston, David, Massey University, New Zealand

Lavell, Allan, FLACSO, Costa Rica

McBean, Gordon, University of Western Ontario, Canada – CHAIR

UN ISDR Global Platform
Geneva, June 2011 (2013, 2015, ...)

Pacific Science Congress - Kuala Lumpur, June 2011

ICSU GA, Rome, September, 2011

IRDR Conference
Beijing, October /November 2011

Planet Under Pressure
London, March 2012

...
Sponsors: ICSU, ISSC, UN-ISDR

Consultative Forum

Collaborating Organizations: UNESCO WMO ...

Scientific Committee

IPO

Working Group-Task Teams:
- FORIN
- RIA
- Long-term database and Monitoring systems and tools
- Socio-economic research activity

Scientific Steering Groups

International Centres of Excellence

National Committees

Capacity building

Regional Programmes

Partners in research:
- Unions and National Members of ICSU, Unions of ISSC
- IUGG – ENHANS
- CoDATA
- WWRP
- WCRP- Extremes
- IHDP-IRG
- IHDP-IGBP-LOICZ
- ICL
- Int. Floods Initiative
- IOC tsunami prog.
- ...

German
Japan

ICSU- ROAP
IRDR Legacy

• An enhanced capacity around the world to address hazards and make informed decisions on actions to reduce their impacts.

• Societies to shift focus from response-recovery towards prevention-mitigation, building resilience and reducing risks, learning from experience and avoiding past mistakes.
Registration and Abstract Submission Open

IRDR Conference 2011
Oct. 31 - Nov. 2, Beijing
www.irdrinternational.org/conference2011

Why, despite advances in the natural and social science of hazards and disasters, do losses continue to increase?

To what extent is the world-wide growth in disaster losses a symptom and indicator of unsustainable development?

Disaster Risk: Integrating Science & Practice
Thank you

www.irdrinternational.org