Fifth Expert Group Meeting on
The Regional Initiative for the Assessment of the Impact of Climate Change on Water Resources and Socio-Economic Vulnerability in the Arab Region (RICCAR)

11-12 December 2013
Amman, Jordan
Analysis of Trends and Patterns of Historical Losses and Impacts Associated with Climate Risks using National Disaster Loss Databases

The Open-source, Open-data Collection Initiative Based on DesInventar

Fifth Annual Expert Group Meeting of the Regional Initiative for the Assessment of the Impact on Climate Change and Socio-Economic Vulnerability in the Arab Region (RICCAR) 11-12 December, Amman, Jordan.
National Disaster Loss Databases: A detailed picture of disaster losses and impacts

- Rich set of damage & loss indicators
- Wide coverage of small and medium scale disasters.
- Disaggregation of data to usable units (county/municipality)
- Collected and validated locally within the country

Low cost, low complexity, high impact initiative
Typical contents of a National Disaster Database

Actual data capture screen.

- **Standard Effects** (16 quantitative indicators, 12 qualitative).
- **Global databases**: 3-5 indicators.
- **Extension** (Sectorial detail information, unlimited additional indicators).
Full Arabic version, including documentation
Disaster loss accounting, analysis and reporting.
Informing risk governance and population...
UNISDR support to countries building DLDB
(through various funded initiatives by SDC, EU, SIDA/ESCWA/RICCAR, and partners UNDP and WB)
Usage of Disaster Loss Databases

- Historical Risk Profiles
- Monitoring risk: trends and patterns
- Climate related disasters and CCA
- Input, Validation and Calibration of models
- Economic impact of past disasters
- Generation of Empirical Risk Measures
- Hybrid (Empirical + Analytical) Risk Models

and many more…
Composition Analysis: Jordan

Mortality

- FLASH FLOOD: 56 (33%)
- FLOOD: 31 (18%)
- SNOWSTORM: 19 (11%)
- COLD WAVE: 17 (10%)
- EPIDEMIC: 13 (7%)
- LANDSLIDE: 8 (4%)
- LIQUEFACTION: 2 (1%)
- OTHER: 2 (1%)

Frequency

- FLOOD: 95 (14%)
- SNOWSTORM: 164 (24%)
- COLD WAVE: 92 (13%)
- FLASH FLOOD: 81 (12%)
- FROST: 94 (14%)
- Drought: 92 (13%)
- Other: 12 (1%)
- STRUCTURAL COLLAPSE: 7 (1%)
- LANDSLIDE: 7 (1%)
- EARTHQUAKE: 17 (3%)
- PLAGUE: 29 (4%)
- FOREST FIRE: 26 (3%)
- HEAT WAVE: 12 (1%)
- RAINS: 19 (2%)

Housing Sector

- SNOWSTORM: 386 (56%)
- FLASH FLOOD: 54 (7%)
- LANDSLIDE: 12 (1%)
- FLOOD: 54 (7%)
- EARTHQUAKE: 91 (13%)
- RAINS: 68 (9%)
- STRUCTURAL COLLAPSE: 18 (2%)
- Other: 12 (1%)
- LANDSLIDE: 7 (1%)
- COLD WAVE: 9 (1%)
- EPIDEMIC: 10 (1%)
- HEAT WAVE: 12 (1%)
- RAINS: 19 (2%)
- PLAGUE: 29 (4%)
- FOREST FIRE: 26 (3%)
- EARTHQUAKE: 38 (5%)
Inventaire national des catastrophes en Tunisie (1980–2013)

- 28 différents type d’aléas. (10 hydrométéorologiques ; 2 Géologiques ; 1 feu de forêts ; 1 infestation d’insectes ; 4 biologiques etc…)
- 2495 cartes de données (par contre, EMDAT 21 catastrophes)
Inventaire national des catastrophes en Tunisie

La sécheresse
Frequency of climate related disasters (Lebanon, Jordan, Syria, 1980–2011)
Weather related disasters in South America (1970 – 2011)

- Frequency of extreme precipitation events
- Mortality due to extreme precipitation events
- Housing sector damage/destruction due to extreme precipitation events
DRR and CCA: Storm surges in Peru (1970 – 2011)

Temporal distribution of storm surge reports

Mortality due to storm surges
Most historical risk is climate-related

97% of loss reports are climate related

- Extensive - Climate: 96%
- Intensive - Climate: 1%
- Extensive - Geological: 3%

81% of economic loss is climate related

- Extensive - Climate: 55%
- Intensive - Climate: 26%
- Extensive - Geological: 2%
- Intensive - Geological: 2%

From 274,656 loss and damage reports in 56 countries
Historical data used to validate Risk/Hazard maps

Comparison of Cyclone/wind reports, deaths, damages and Hazard Atlas – ORISSA
Historical data used to validate Risk/Hazard maps

Comparison of Flood reports, deaths, damages and Hazard Atlas – ORISSA

Direct Mortality due to Floods in Orissa

Number of Flood Reports in Orissa

Damaged and Destroyed houses due to Floods in Orissa
Measuring Risk: Loss Exceedance Curves

![Graph showing loss exceedance rates for economic losses in Colombia.](image)
Annual Average Loss AAL

It represents, the annual average of future expected losses, including catastrophic risk (disasters that have not happened yet but may, and eventually will happen).

Risk Pure Premium RPP

It is computed as the AAL divided by the portfolio exposed elements. It represents, in relative terms, the amount to be paid annually in order to cover future expected losses.

Probable Maximum Loss PML

PML is the anticipated value of the biggest loss that could result from a disaster caused by a “maximum credible event”
Measuring Risk: ‘Empirical’ Loss Exceedance Curves from DLDB

Hystorical Events Losses and Accumulated Loss

New Event: 10/5/2009
Category: Hydro-meteorological

Affectation:
Physical:
- Damaged houses: 779
- Destroyed houses: 0

Human:
- Injured: 0
- Killed: 0

Economical loss: 6,232,400 USD

Time frame: 41 years

Accumulated loss: 14,956 million USD

Loss Exceedance Frequency

<table>
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<tr>
<th>Economic Loss [USD]</th>
<th>Number</th>
<th>Frequency [times/year]</th>
<th>Period [years]</th>
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<tr>
<td>≥ 10,000</td>
<td>6346</td>
<td>15.561</td>
<td>0.006</td>
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<td>2.722</td>
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<td>0.633</td>
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Loss Exceedance Curve (LEC)
Measuring Risk: ‘Empirical’ Loss Exceedance Curves from DLDB

Empirical loss exceedance curve and historic risk metrics for Tunisia as generated by DesInventar
Calibrating and complementing analytical models: Hybrid curves

A loss exceedance rate of 10 means it is likely that the associated loss will be exceeded 10 times a year in events with a return period of 0.1 years (1.2 months).
Risk Management Strategies

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**Layer 1**
- High probability & low/moderate losses

**Layer 2**
- Medium probability & moderate/high losses

**Layer 3**
- Low probability & high losses

**Layer 4**
- Very low probability & very high losses

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- Retrofittng /Risk reduction /Mitigation, ... (Corrective)
- Insurance/Reserve funds (Compensatory)
- Codes and Norms, Public Investment, ... (Prospective)

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Economic loss [Million $USD]

- Reduction and Retention
- Transfer
- Retention (residual)

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Loss exceedance rate [1/year]

- Return period [years]
Risk financing structure

- **Unprotected**
- **Long term actions** (Cat bond, taxes, long term loans, etc)
  - National government
  - IDB / World Bank
- **Insurance and reinsurance**
- **Contingent loan**
- **Reserve fund**

**Retention**

**Transfer**

**Total exposed value**

**PML**

**Upper limit**

**AAL**

**Lower limit**

**Deductible**
THANK YOU

http://www.preventionweb.net/gar
http://www.desinventar.net

Julio Serje
serje@un.org