Systematically accounting and assessing disaster losses and impacts
The economic damage from natural disasters has reached roughly 265 billion dollars, or about 21 trillion yen, in the first six months of 2011, surpassing the previous full-year record of 220 billion dollars in 2005, according to leading reinsurer Munich Re.
Global Disaster databases: EMDAT
An incomplete picture of disaster losses and impacts

- **EM-DAT**: Public domain coverage of large-scale mortality. Weak coverage of smaller disasters. Inconsistent reporting of economic loss.

- **NAT-CAT** and **SIGMA**: Re-insurance industry databases. Insured losses in developed markets. Restricted access.

- **ECLAC methodology evaluations**: comprehensive data for selected large disasters

- **National data**: heterogeneous, dispersed and inaccessible data held by governments, NGOs, universities and others.
National databases: Deconstructing disasters

EM-DAT: Global level of Observation, National level resolution

National database: Local level of Observation, municipality level resolution

Honduras

Losses in Honduras:
- 6,000 deaths
- 8,052 missing
- 2,100,000 affected
- 170 bridges destroyed
- 70% of roads damaged
A better picture of disaster losses and impacts

• Richer set of indicators

• Wider coverage of small and medium scale disasters.

• Disaggregation of data to usable units (county/municipality)

• Collected and validated locally within the country
Disaster loss accounting, analysis and reporting
Typical contents of a DesInventar dataset

Actual data capture screen.

Standard Effects (16 quantitative indicators, 12 qualitative).

Global databases: 3-5 indicators.

Extension (Sectorial detail information, unlimited additional indicators).
National databases: Trends and patterns of realized risk
SHELDUS database in the USA

National/Local level of Observation,
County level resolution
UNISDR support to countries building DLDB

Number of education facilities damaged (1970-2009) per province (Argentina, Bolivia, Chile, Colombia, Costa Rica, Ecuador, Panama, Peru, Venezuela)

Status of Progress in building National Disaster Datasets
June 2011
Informing risk governance and population...
Addressing the challenges

- Disaster loss data informing risk assessment and investment in DRR
- Account for both intensive and extensive disaster losses
- National governments institutionalising disaster loss accounting systems
- Standardised criteria, indicators and definitions to enable comparative/cross-boundary studies
- From physical damages to economic loss

- A global picture built from the local level upwards

Temporal distribution of storm surge reports

Mortality due to storm surges
Weather related disasters in S. America (1970 – 2009)

- Frequency of extreme precipitation events
- Mortality due to extreme precipitation events
- Housing sector damage/destruction due to extreme precipitation events
Classified Landsat images acquired on 1986 (left) and 1998 (right). The deforestation and environmental degradation can be seen easily as the lighter areas of the image, where forests have been turned into agricultural and bare soil.
Drivers of Risk: environmental degradation

Correlation between Deforestation in watersheds and disaster losses due to extensive risk

Left graph: Deforestation - Extensive Risk Mortality
- \( R^2 = 0.1855 \)

Right graph: Deforestation - Extensive Risk Housing impact
- \( R^2 = 0.2412 \)
CAPRA: Probabilistic Risk Assessment And Hybrid Risk Assessment Models

Intensity exceedance curve for each computation site

Hazard maps for several return periods

T = 100 years
ν = 0.01

T = 500 years
ν = 0.002

T = 1000 years
ν = 0.001
Modeled Loss Exceedance Curves

- **Return period [years]**
- **Loss exceedance rate [1/year]**
- **Economic loss [Million $USD]**

Analytical curve
Empirical loss exceedance curve and historic risk metrics for Colombia as generated by DesInventar
Reveal risk: integrate analytical and empirical views

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).
CAPRA Hybrid models for 3 countries

- Colombia
- Mexico
- Nepal
Risk Strategies

1 = High probability & low/moderate losses
2 = Medium probability & moderate/high losses
3 = Low probability & high losses
4 = Very low probability & very high losses
Overall Process

Loss Accounting

Hazard 1  Hazard 2  Hazard 3  ...  Hazard N

RISK MODELING

Assets at risk Portfolio 1  Assets at risk Portfolio 2  Assets at risk Portfolio 2  ...  Assets at risk Portfolio 2

TOOL KIT

Risk Reduction  Risk Retention  Risk Transfer  Other

RM Strategy 1  RM Strategy 2  RM Strategy 3  ...  RM Strategy n

MONITORING
THANK YOU