Models As The Universal Currency For Disaster Risk Financing And Management

Discussion of model use by governments, IFOs, emergency management organizations, and others for disaster risk financing, risk management, and risk reduction, as well as key considerations for model improvement and adoption.

Session Lead:
Dr. Akshay Gupta
SVP and Director, Catastrophe Risk Engineering
AIR Worldwide

Panelists

Dr. Olivier Mahul
Program Manager, DRF & Insurance Program
World Bank Group

Ivo Menzinger
Head of Global Partnerships, Asia-Pacific
Swiss Re

Dr. Milan Simic
SVP and Managing Director of Int’l Operations
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Dr. Eugene Gurenko
Senior Insurance Officer
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Andrew Eddy
President and CEO
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Simon Young
Lead Advisor – African Risk Capacity
Former CEO of Caribbean Risk Managers Ltd.
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Catastrophe Modeling Framework

HAZARD

EVENT GENERATION
LOCAL INTENSITY CALCULATION

EXPOSURE DATA

POLICY CONDITIONS

ENGINEERING

DAMAGE ESTIMATION

FINANCIAL

INSURED LOSS CALCULATION

Base Damage Functions

Concrete
Masonry

Sa (0.3s)

0
0.5
1
1.5

MDR

Philippines Aggregate Combined Loss Curve

Mean Loss ($B per yr)

Mean Return Period (Years)

Combined Flood Loss
Earthquake Loss
Tropical Cyclone Loss
RCC Precipitation Loss

Note:
- Includes river floodplain and estuarine high ground
- Includes commercial, industrial, and mixed-use buildings
- Does not include off-site structures
- Based on 10,000-year precipitation event range
Catastrophe Modeling Framework

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Philippines Aggregate Combined Loss Curve

Combined Flood Loss
Earthquake Loss
Tropical Cyclone Loss
HID Pecipitation Loss

Mean Loss (5% prob)

Mean Return Period (Years)

20
50
100
250
500
1,000

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Catastrophe Modeling Framework

HAZARD
- EVENT GENERATION
- LOCAL INTENSITY CALCULATION

EXPOSURE DATA

POLICY CONDITIONS

ENGINEERING
- DAMAGE ESTIMATION

FINANCIAL
- INSURED LOSS CALCULATION

Base Damage Functions

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Masonry

Philippines Aggregate Combined Loss Curve
- Combined Peel Loss
- Earthquake Loss
- Tropical Cyclone Loss
- HTO Precipitation Loss

Legend:
- Ground-located ground-up rental
- Aggregate coverage losses and insured
- Total government, works and private assets
- Based on 50,000-year wind speed and wave criteria

Mean Loss ($) per year

Mean Return Period (Years)
Model Usage in Disaster Risk Financing

Tropical Cyclone Ian (Jan 2014)

- Residential Buildings - 66%
- Crops - 20%
- Public Buildings and Infrastructure - 9%
- Commercial, Industrial and Other Buildings - 5%

Total Modeled Ground-Up Mean Loss per Division

Modeled Accumulated Precipitation

Modeled Maximum Winds
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Facilitate growth of catastrophe risk insurance markets through the development of new models for new regions.
Facilitate growth of catastrophe risk insurance markets through the development of new models for new regions.
Model Usage in Disaster Risk Reduction

Earthquake Loss to School Buildings

- Elementary School
- High School

Without Mitigation
With Mitigation

Benefit of Mitigation

As-Is
Improved

Mean Return Period (Years)

Mean Return Period (years)

Total Loss

AAL  20  50  100  500

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Model Usage in Disaster Risk Reduction

Earthquake Loss to School Buildings

- Full Country Loss (Billions PHP)

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<th>Mean Return Period (Years)</th>
<th>As-Is</th>
<th>Improved</th>
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- Benefit of Mitigation

Without Mitigation

With Mitigation
Disaster Risk Reduction

Manhattan – Sandy 2012
Disaster Risk Reduction

Manhattan – Sandy 2012
Plan to Protect Lower Manhattan, New York, USA
The Big U - Rebuild By Design Winner

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## Model Usage in Disaster Risk Reduction

### Plan to Protect Lower Manhattan, New York, USA
The Big U - Rebuild By Design Winner

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