

Overview Insurance and Risk Assessment for Extreme Weather Events

Joanne Linnerooth-Bayer
IIASA
M.J. Mace
Field
Roda Verheyen
University of Hamburg

Insurance-Related Actions and Risk Assessment in the Context of the UN FCCC

- Background
- The challenge
- Risk analysis for insuring extreme weather events

- Risk transfer, collective loss sharing and public-private partnerships
- International legal responses to risk and approaches to insurance

- Opportunities, challenges and possible partners

Overview

- Weather-extreme losses are worsening, evidence linking to climate change;
- Methodologies exist for assessing risks, extreme events becoming more insurable;
- Large uncertainties, however, contribute to high premiums of private catastrophe insurance;
- Many types of insurance-related instruments and systems, differential cost and incidence;
- Important precedents exist for building national and international burden-sharing regimes.

Negotiating Background

Article 4.8 of the UNFCCC calls upon Parties to consider actions, including those related to insurance, to meet the specific needs and concerns of developing countries with respect to both the adverse impacts of climate change and the adverse impacts of response measures.

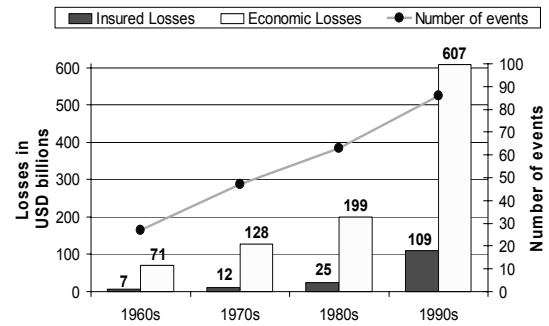
Article 3.14 of Kyoto Protocol calls for implementation and explicitly for consideration of the establishment of insurance.

These Articles had their genesis in a proposal by AOSIS on an international insurance fund to address damage from sea level rise.

Context and Challenge

- **The context:** Sudden onset extreme weather events
- **The challenge:** To develop a framework for the implementation of insurance-related activities for developing countries facing extreme weather events

Disaster losses on the rise



Loss increase

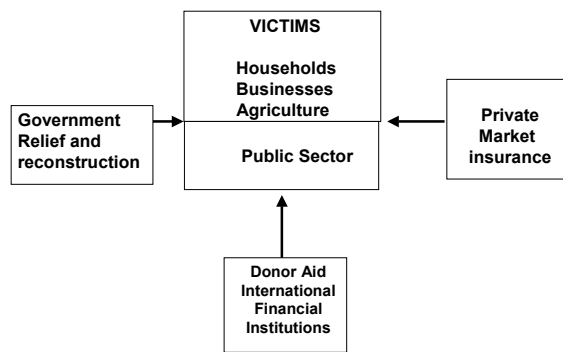
- Mainly from changes in land-use and increasing concentration of people and capital in vulnerable areas;
- IPCC has concluded that at least part of this loss is due to changes in climatic conditions
- IPCC predicts increasing frequency and intensity of extreme weather events.
 - Higher maximum temperatures
 - More intense precipitation
 - Increased wind intensities

Poor countries hit hardest

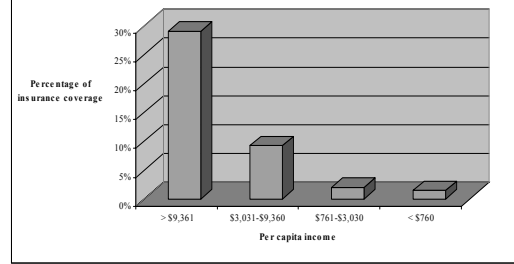
Per capita cost of disasters in relation to GDP is at least 20 times higher in the developing countries.

Ninety-five percent of the deaths from recent natural disasters have occurred in poor countries.

Burden sharing



Risk transfer/insurance in low-income countries



Insurability

- If insurers can identify and *quantify the risk*;
- If they are unrestricted in setting premiums.

Insurers do not insure all insurable risks

- Premium may be too high
- Adverse selection
- Moral hazard

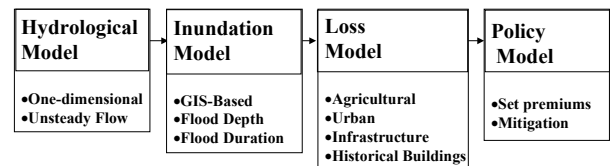
Estimating the risks of extreme events

- Risk: probability x consequence
- Independent events: Law of Large Numbers
- Dependent events: Heavy tails, lack of historical data, PML concept

Improved Risk Estimates with Catastrophe Modeling

- What is the probability of selected hazard?
- How vulnerable are structures/people to the hazard?
- What is distribution of structures/people exposed?
- What is probability distribution of losses (Monte Carlo simulation)

Flood Catastrophe Model



Incorporating climate change

- Empirical data on effects of climate change on weather-related disasters highly uncertain;
- Global circulation models cannot provide predictions on changes in regional climate (downscaling)

Limitations

- Data intensive
- Resource intensive
- Uncertainty

Note: Not necessary to have loss frequency for insurance – physical trigger

Insurability improving, but uncertainty remains

- Models for the most part give better estimates of risk and improve insurability
- Much uncertainty remains – high premiums

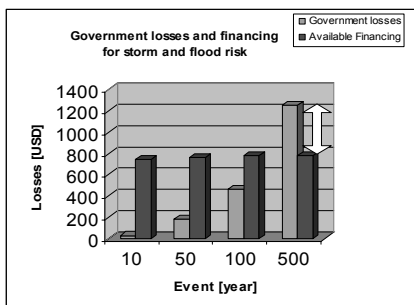
With 1 billion people living on less than \$1 a day, any discussion on insurance must take into account the capacity to engage in such efforts on the part of *citizens* and their *governments*.

Financial vulnerability

- Low: Most exposed households and businesses can afford to be part of a risk-sharing pool;
- Medium: The country as a whole can afford the pool, but regions where citizens cannot;
- High: Most exposed households and businesses cannot afford to be part of a risk-sharing pool.

Honduras financing gap

(Mechler and Pflug, 2003)



The dilemma

How can insurance-related pools be accessible to poor, very vulnerable countries – households, businesses, and governments?

- Private insurance is not only alternative;
- Many types of insurance-related instruments that spread burden differently, and even globally;
- New instruments, especially for public infrastructure insurance;
- Many ways for international community to support these systems.

**Insurance-related instruments:
Risk transfer and collective loss sharing**

Collective loss sharing: Non-contractual arrangement for sharing losses after a disaster. A pre-disaster instrument, e.g. fund, may be put into place. The collective can be

- Taxpayers (governments) e.g, Fondem calamity fund
- The international community, e.g. AOSIS
- Parties or enterprises imposing risks, eg nuclear power liability regime

The collective can transfer its risk through insurance or other risk-transfer instruments, e.g. nuclear power operator insurance

**Insurance-related instruments:
Risk transfer and collective loss sharing**

Risk Transfer: Contractual hedging instrument generally paid for by persons, enterprises or governments at risk, e.g., insurance, cat bonds. Governments, international bodies can subsidize risk-transfer systems, e.g., World Bank support of Turkish system.

Risk transfer instruments

- Insurance, re-insurance
- Catastrophe bonds
- Weather hedges

Private sector risk transfer

- Too expensive for households, businesses
 - Micro-insurance
 - Weather hedges
- Yet, governments cannot continue large liabilities
- Insurers increasingly reluctant to offer cat insurance

Turkish Catastrophe Insurance Fund (TCIF)	
	World Bank
	Private Reinsurance
	World Bank
	Government fund
•	Mandatory
•	Risk-based premiums

How can insurance-related actions be used to transfer risks and share losses associated with adverse effects of climate change *within the legal framework* of the climate change regime?

Examine insurance-related instruments in international civil liability and compensation regimes

Nuclear liability regime

Joint State Funds (Int'l solidarity pool)	
	State (taxpayers)
	Operators

Opportunities and Challenges for developing insurance framework

- Data collection and analytical capacity
- Collective loss-sharing funds
- Risk-transfer for governments
- Public-private partnerships
- Micro insurance

No regret strategy even with uncertainty of effects of climate change on extreme weather events.

International risk sharing

- Contributions on the part of emitters, countries based on emissions, GDP?
- Role of the public?
- Time frames for initiating action, based on observed effects?

Background

AOSIS Proposed fund for compensating victims of sea-level rise

- Mandatory contributions from industrialized countries based on GNP and emissions
- Trigger for claims: global and relative sea level rise
- Claims for retreat and accommodation measures
- COP-controlled “Authority”