Innovative Finance for Flood Resilience: Lessons from the Capital Markets

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Resilience Finance: Changing Context

- Risk are increasing
- Data and Risk Analytics
- Metrics & Methodologies
- Capital Availability & Investor Appetite
Rediscovering Insurance as an Institution

An organizing framework for risk management

An *institution* of society, not an industry

A means of delivering on legal duties and agreements

A powerful multiplier of impact

A mechanism for incentives and influence
The Capital, Science & Policy Practice
Applying the methods and tools of risk management and finance to reach additional communities and assets

Hazard
Exposure
Vulnerability

Methodologies  Metrics  Models  Markets

Source: Cefas
Catastrophe Bond & ILS Risk Capital Issued & Outstanding By Year

Source: www.Artemis.bm Deal Directory
Insurance Accessibility and Affordability

The two most effective means to reduce insurance cost are:

1. Increase the market size particularly among lower-risk policyholders

2. Reduce risk so that policyholders suffer less loss when floods strike
The Tools: Indemnity / Parametric Insurance

**Indemnity**
- Pays on actual loss
- HIGH cost of loss adjustment
- Payment delays due to loss adjustment

**Parametric**
- Payment upon triggering event
- Simple, easy to understand
- Event trigger defined by independent agency data (USGS, NOAA)
- Basis Risk
Parametric Insurance & Resilience Bonds

- **Broader Scope**: Many individuals and entities are affected by the same event and parametric solutions can be rapidly adapted to a wide-range of perils, country conditions, vulnerable sectors.

- **Greater Flexibility**: Can be used to address a variety of financial risks, such as revenue losses, increased expenses, asset losses, liquidity shortages, and even mitigation measures (in the case of forecast insurance).

- **Lower Transaction Costs**: Significantly lower cost to assess the payouts as they are determined by parametric model (Limited moral hazard and adverse selection opportunities).

- **Faster Payments**: Parametric solutions allow for rapid calculations of payouts for faster settlement. Forecast insurance products have the potential to pay before an event even occurs.
Parametric Insurance for Dams and Levees

- Rainfall
- Flows, e.g. CFS
- Water Surface Elevation
- A word about basis risk...
Investing in Ecosystem Resilience
Risk management and finance for natural capital

Risk Reduction • Natural Capital
Quantification • Services -> Financial Value
Investment • Mitigation ROI

Healthy ecosystems vs. degraded ecosystems

Source: The Nature Conservancy
The Global Ecosystem Resilience Facility (GERF)
A framework for partnerships and collaboration

An umbrella facility to provide two key pillars of innovative finance for ecosystems and natural capital:

Risk Transfer

Project Finance
Case Study: Coral Reefs
Protect the ecosystems themselves: parametric insurance cover

Source: NOAA
Resilience Bonds Leverage Local Capacities & Authorities

Debt Instrument
Raise capital to fund resilience
- Municipal Bond
- Federal Credit or Loan
  - e.g. HUD s.108 Loan, FEMA Community Assistance Loan

Resilience Bond

Risk Transfer
Protect Investments
- Uses analytics for deep understanding of extreme risk
- e.g. Catastrophe Bond, Index Cover
Innovative Risk Transfer Solutions
CCRIF – Caribbean Catastrophe Risk Insurance Facility

<table>
<thead>
<tr>
<th>Storm Event</th>
<th>Payouts-To-Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hurricane Irma</td>
<td>$30.8 million</td>
</tr>
<tr>
<td>Hurricane Maria</td>
<td>$23.6 million</td>
</tr>
</tbody>
</table>

Since the inception of the facility in 2007, CCRIF has made payouts totaling US$123.5 million to 12-member governments – all made within 14 days of the event.
Description
- Legoland is part of a global leisure and hospitality company that operates outdoor theme parks
- Although geographically diversified, each location has individual budgets to achieve
- The Risk Manager of the park in California was concerned about rainfall reducing visitor numbers during key periods
- Willis structured and executed a weather-index program that responded to high rainfall days during specific weeks corresponding to school holidays
- Daily payment amounts set to reflect expected drop in daily revenue as a result of lower visitor numbers during high rainfall

Characteristics
- Coverage executed as surplus lines insurance
- Policy limit of $5 Million

Benefits
- Policy tailored to specific client exposures
- Client able to select specific days to include in the coverage
- Nearby weather stations reduce basis risk
- No cumbersome loss adjustment process requiring details of actual revenues compared to “normal”
- Use of claim payment receipts unrestricted

Carlsbad Palomar

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Parametric Solutions for Recreation, Leisure & Hospitality
US Tennis Association (Index-Based Rainfall Derivative)

Description
• The US Tennis Association operates the US Open Tennis Tournament in New York for 2 weeks in August/September.
• Tournament organizers and the concession operator both face reduced revenues if matches are cancelled due to rainfall.
• Willis structured and executed a rainfall derivative that pays an agreed-upon amount if there are more than a specified number of hours of rain during each session.
• The sessions and payment amounts reflect the number of matches and financial exposure on each day.

Characteristics
• Multi-Year Cover
• Policy Limit of $32 million

Benefits
• Highly tailored coverage responding to precise exposure for each tournament session.
• No protracted loss adjustment process.
• Claim paid within 2 weeks of rainfall event that triggered a claim in 2015.
Weather Solutions for Renewable Energy
Hydro Electric Plant (Low Rainfall Insurance)

Description
• A hydro-electric plant in Mexico relies on a regular flow of water to operate the turbines and produce power
• The lenders to the project wanted to protect their investment by seeking coverage for the impact of drought in the area on production and the resulting loss of income to the plant
• Willis structured and executed a weather-index program that responds to low annual rainfall

Characteristics
• Rainfall recorded at local weather station
• Annual policy
• Pre-agreed methodology for dealing with missing or erroneous data
• Policy limit of $12 Million

Benefits
• Satisfied project financing requirements
• Ensures debt service can be met
• Physical damage to assets not required for a claim to be triggered
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