Resilient societies?

Stephane Hallegatte
Global Facility for Disaster Reduction and Recovery (GFDRR)
The World Bank
Puerto Rico lost $43 billion after Hurricane Maria, according to govt. report

“Given the magnitude of the natural disaster, the economic sectors will keep feeling the impact for an undetermined amount of time,” the report says.
Hurricane Irma's Damage Could Cost Us $300 Million, Antigua and Barbuda PM Says

BY TARA JOHN / ANTIGUA  SEPTEMBER 12, 2017
Increased flooding may cost the world $1 trillion by 2050

John Roach
Published 4:42 AM ET Mon, 19 Aug 2013

Reyes Garcia wades through floodwater to inspect flood damage to a building April 19, 2013 in Des Plaines, Illinois.
ASSET LOSSES
1. Hazard
2. Exposure
3. Vulnerability
Avoiding disasters/impacts

**ASSET LOSSES**
1. Hazard  
2. Exposure  
3. Vulnerability

**WELL-BEING LOSSES**
1. Hazard  
2. Exposure  
3. Vulnerability

4. Socioeconomic resilience

Managing residual risk/impacts
LIFELINES
The Resilient Infrastructure Opportunity
People wait in line for water after the 2010 earthquake in Port au Prince, Haiti.
A traffic jam after flooding in Chiangrai, Thailand
Diagnosis

Solutions

Recommendations
The lack of resilient infrastructure is harming people and firms.

Diagnosis

Solutions

Recommendations
Repair costs matter, but they are only part of the problem.

$391–$647 billion

The annual cost of infrastructure disruptions on households and firms in developing countries.

**Firms**
- Reduced utilization rate ($151 billion)
- Lost sales ($82 billion)
- Self-generation costs ($65 billion)
- Increased inventories
- More expensive localization choices
- Higher barriers for entry of new firms
- Less competition and innovation
- Labor-biased technologies

**Household**
- Willingness-to-pay ($90–$343 billion)
- Health expenditures ($3–$6 billion)
- Income impact and gender implications
What fraction is caused by natural hazards?
Zoom on Tanzania.

- Weather-related losses per year:
  - Power: $250 million or 0.7 percent of GDP
  - Transport: $640 million or 1.8 percent of GDP

Total utilization losses per year:
- Power: $250 million or 0.7 percent of GDP
- Transport: $640 million or 1.8 percent of GDP
Investing in more resilient infrastructure is sound, profitable, and urgent
We start from engineering options
We use criticality analyses to identify where strengthening is most important and beneficial.
We consider opportunities for cheaper resilience by making users better able to manage disruptions.
With the right data, strengthening assets would cost $11–$65 billion per year—3 percent of total needs.
Investigating the uncertainty on benefits using 3000 scenarios
Altogether: Investing in resilience is sound, profitable, and urgent

$4
In net benefit for each $1 invested in infrastructure resilience

$4.2 trillion
Net benefit from building new infrastructure to higher resilience standards

$100 billion
Cost of delaying action by one year
Good infrastructure management is the necessary basis for resilient infrastructure—but targeted actions are also needed.
Priority areas for financial support—how can we spend better?

FULL INFRASTRUCTURE COSTS

COST TO REGULATORS AND GOVERNMENT
- Master planning, regulation design, and enforcement
- Data and model development, research, training, education

LIFECYCLE COST TO (PUBLIC OR PRIVATE) INFRASTRUCTURE SERVICE PROVIDERS
- Project design and preparation
- Upfront investment cost
- Operational costs
  - Maintenance and repair costs (and decommissioning)
Priority areas for financial support—how can we spend better?

**FULL INFRASTRUCTURE COSTS**

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For instance, $1 invested in maintenance is worth $1.5 in new investment
Team members

- The report has been prepared by a team led by Stephane Hallegatte, with Jun Rentschler and Julie Rozenberg.
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