

# LIFELINES

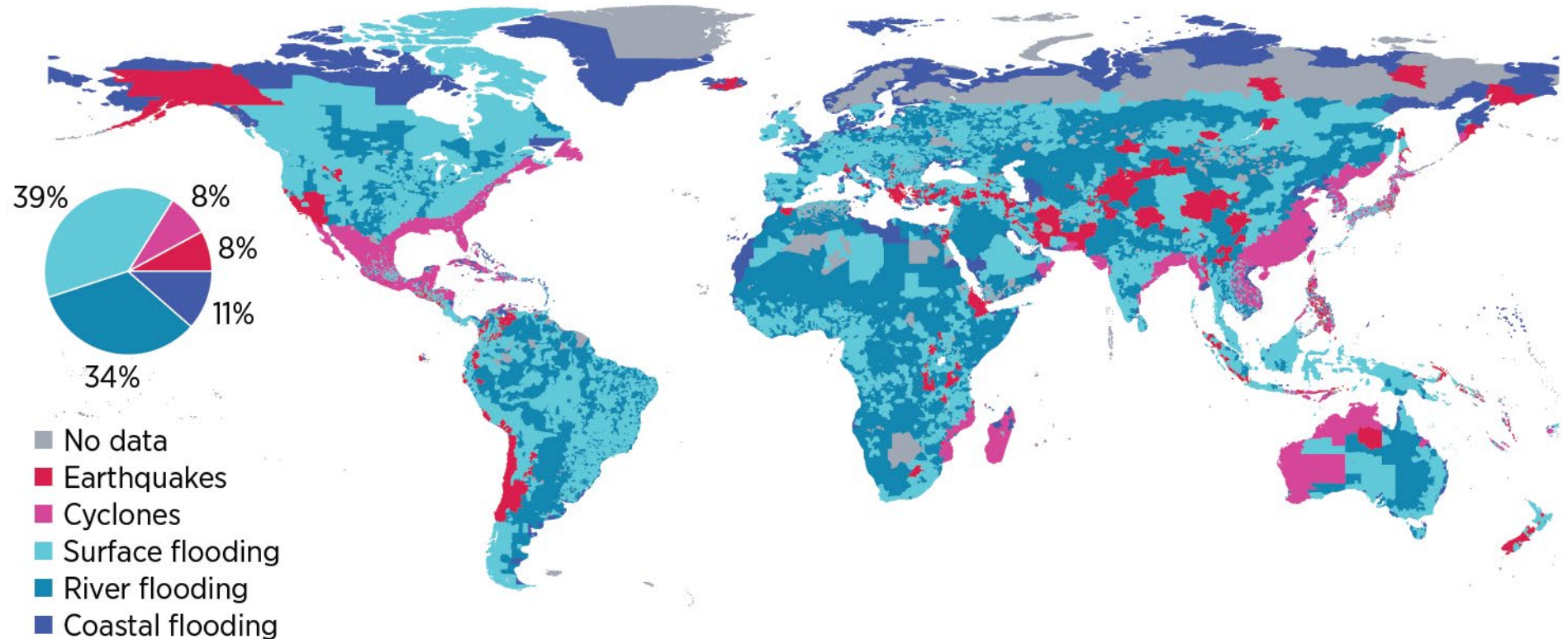
The Resilient Infrastructure Opportunity

Sameh Wahba





# Damages and repair costs are significant ...



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**\$30 billion**

Annual global damages to transport and power generation

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**\$18 billion**

Annual damages to low- and middle-income countries

# ... but repairs are only part of the problem.

## \$391–\$647 billion

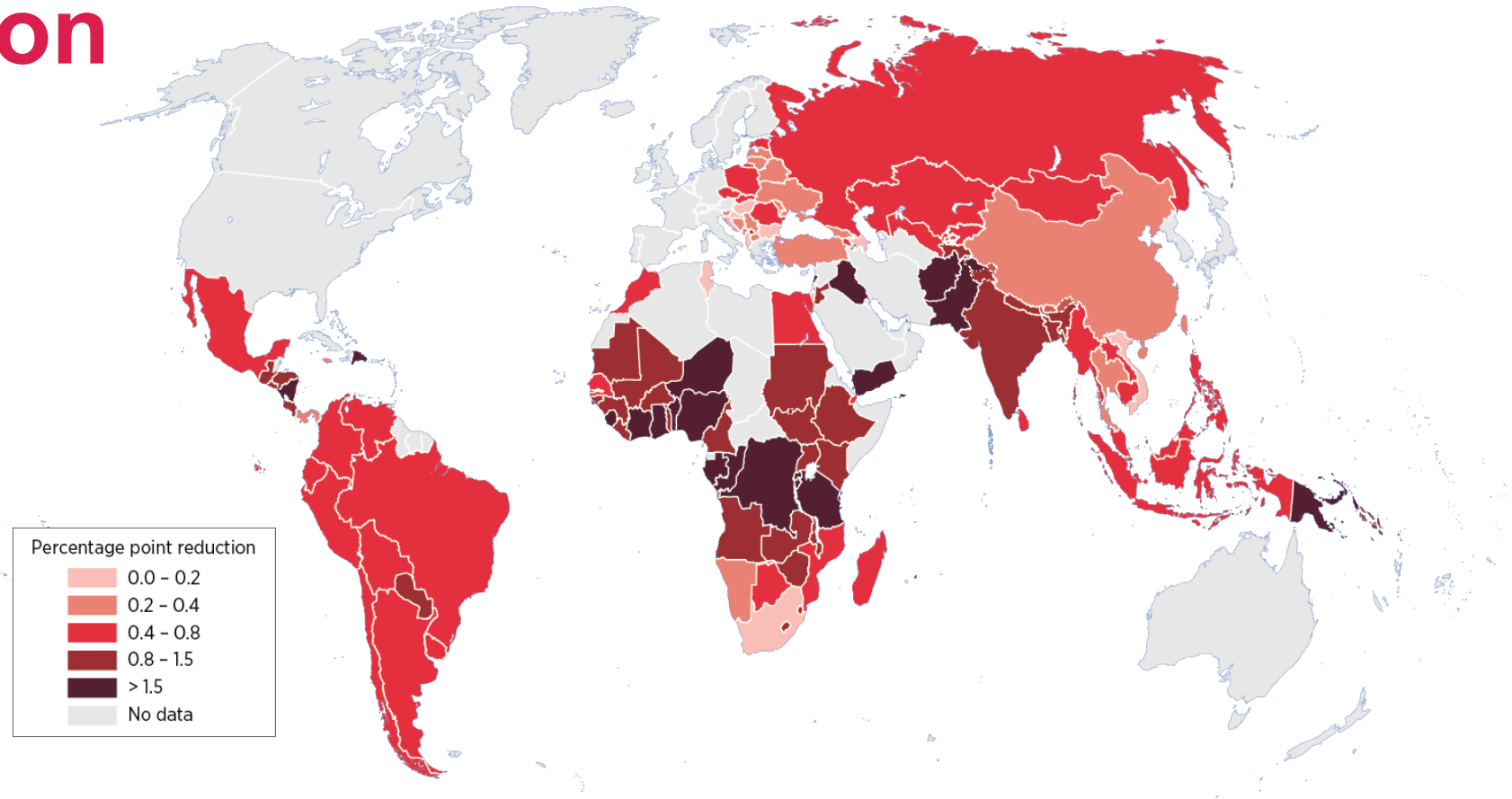
The annual cost of infrastructure disruptions on households and firms in developing countries.

### 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







People wait in line for water after the 2010 earthquake in Port au Prince, Haiti.



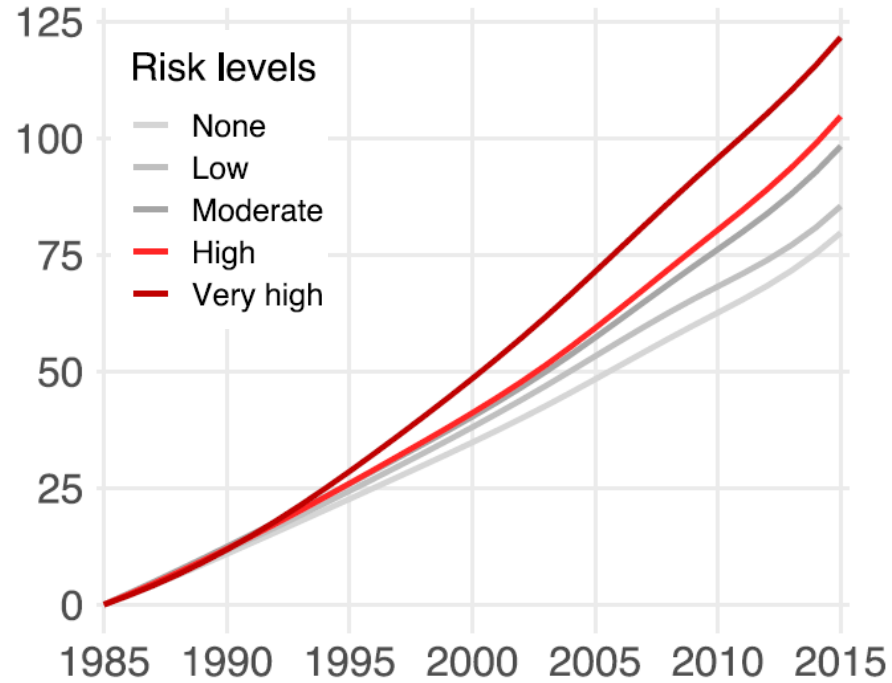


A traffic jam after flooding  
in Chiangrai, Thailand

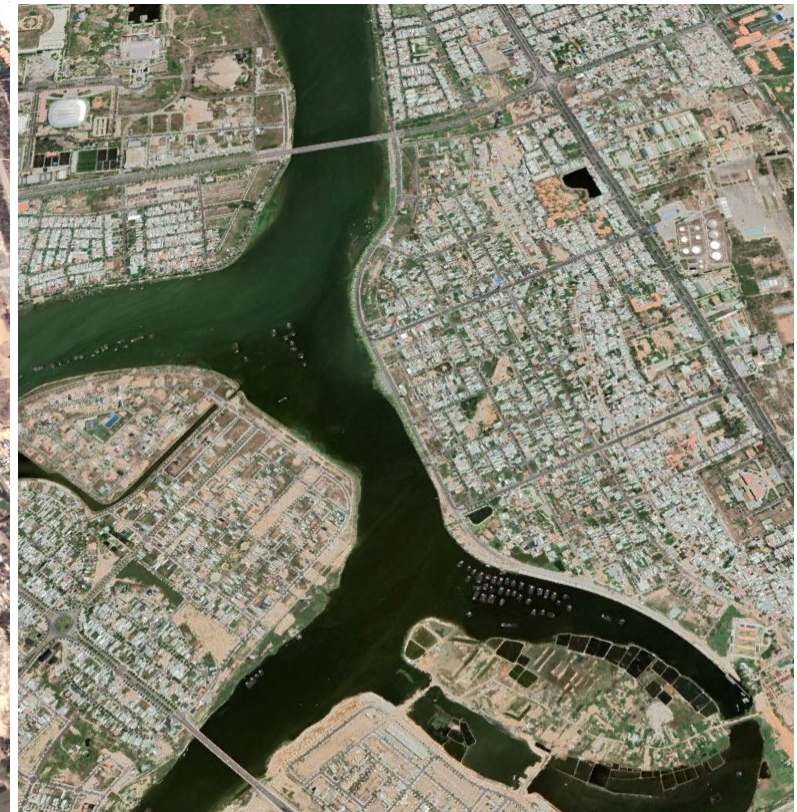




# Exposure is increasingly rapidly...



2002



2021

Settlement growth rates for different flood risk levels (global)

Quảng Nam, Vietnam





# **Resilient Infrastructure?**



# A menu of actions for countries to build their strategy

## Recommendation

## Actions

### 1: Get the basics right

- 1.1: Introduce and enforce regulations, construction codes, and procurement rules
- 1.2: Create systems for appropriate infrastructure operation, maintenance, and postincident response
- 1.3: Provide appropriate funding and financing for infrastructure planning, construction, and maintenance

### 2: Build institutions for resilience

- 2.1: Implement a whole-of-government approach to resilient infrastructure, building on existing regulatory systems
- 2.2: Identify critical infrastructure and define acceptable and intolerable risk levels
- 2.3: Ensure equitable access to resilient infrastructure

### 3: Create regulations and incentives for resilience

- 3.1: Consider resilience objectives in master plans, standards, and regulations and adjust them regularly to account for climate change
- 3.2: Create economic incentives for service providers to offer resilient infrastructure assets and services
- 3.3: Ensure that infrastructure regulations are consistent with risk-informed land use plans and guide development toward safer areas

### 4: Improve decision making

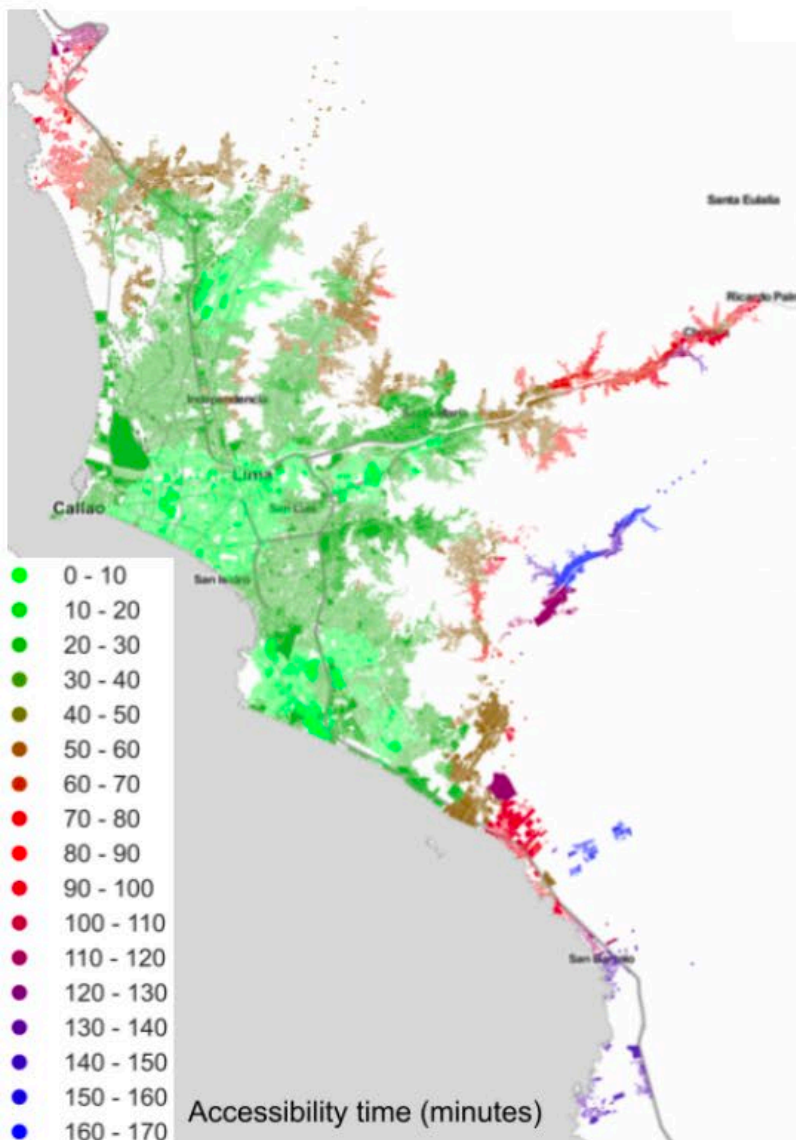
- 4.1: Invest in freely accessible natural hazard and climate change data
- 4.2: Make robust decisions and minimize the potential for regret and catastrophic failures
- 4.3: Build the skills needed to use data and models and mobilize the know-how of the private sector

### 5: Ensure adequate financing

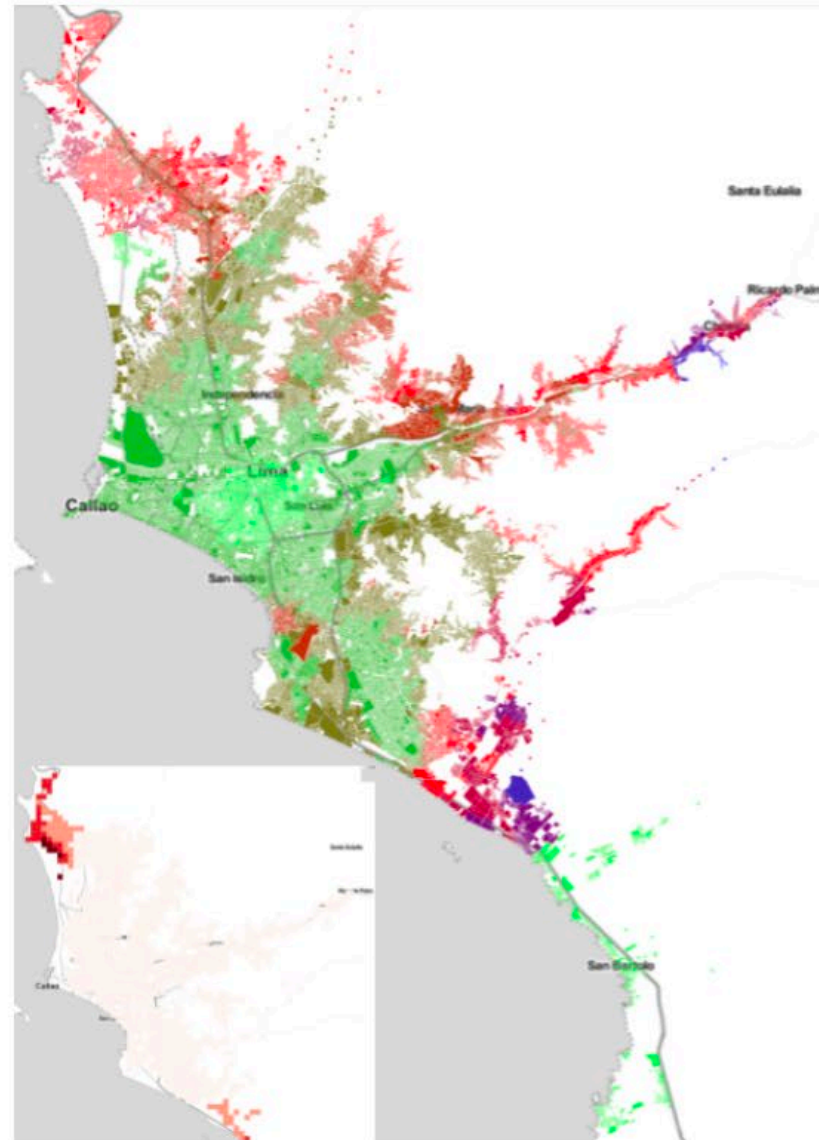
- 5.1: Provide adequate funding to include risk assessments in master plans and early project design
- 5.2: Develop a government-wide financial protection strategy and contingency plans
- 5.3: Promote transparency to better inform investors and decision makers



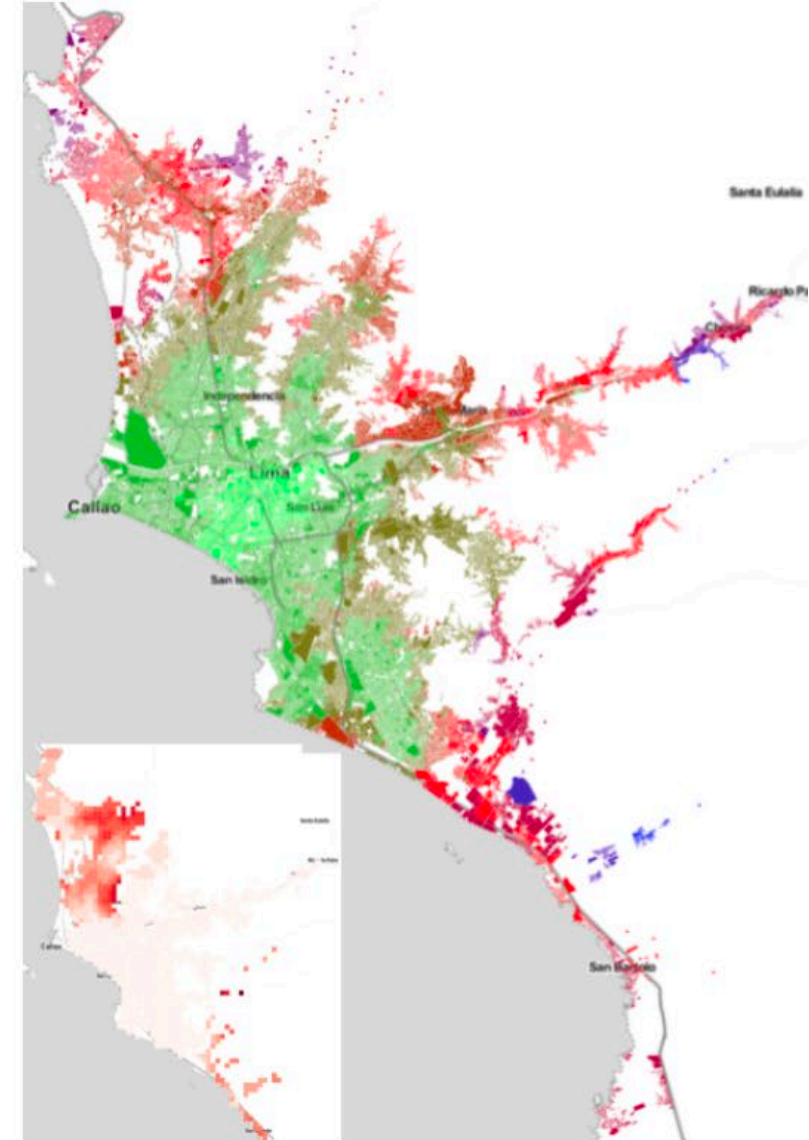
# Lima, Peru | Transport systems & health care access



(A) Undisrupted

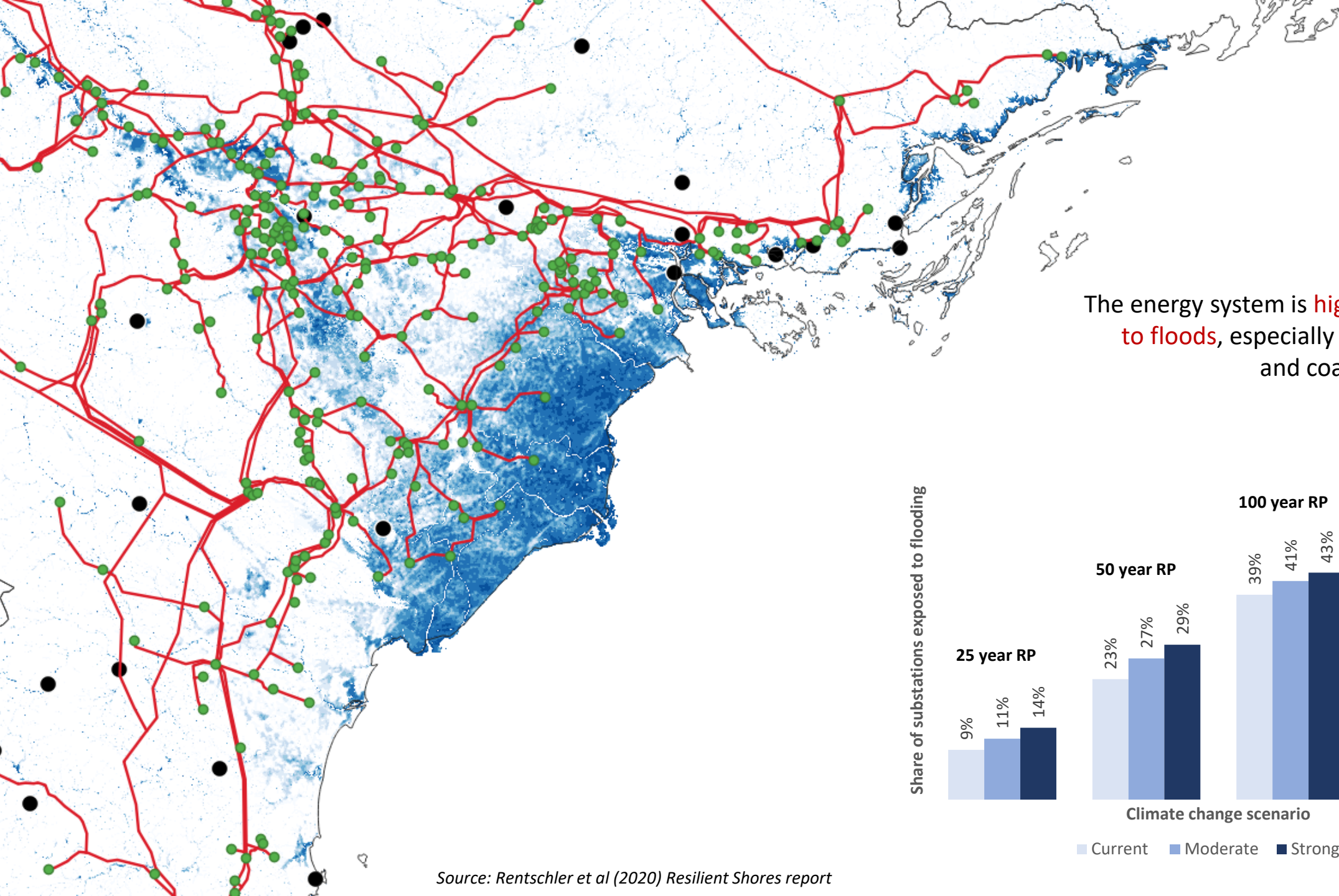


(B) Faultline

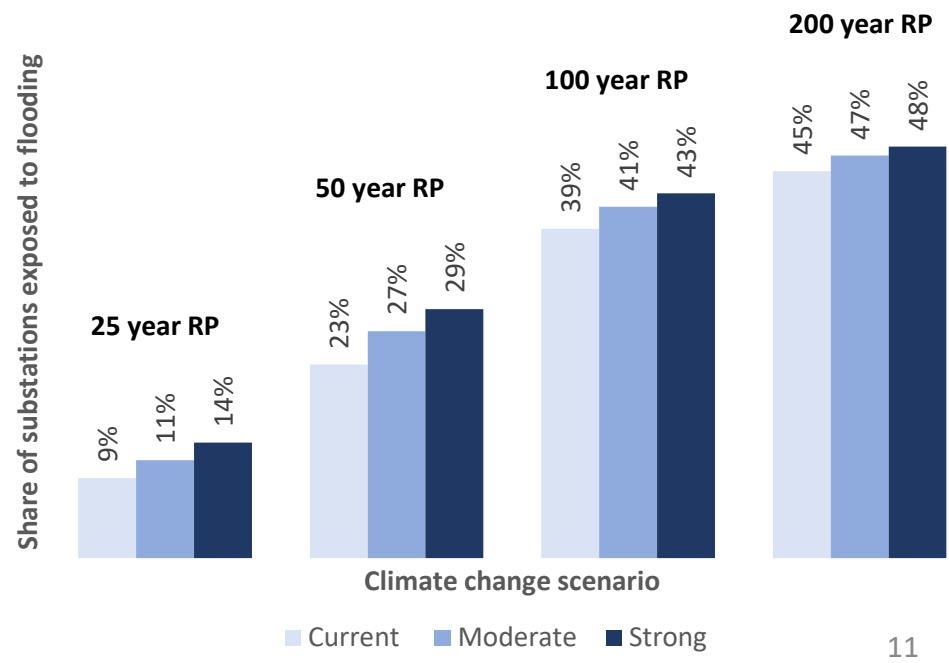


(C) Flood





The energy system is **highly exposed to floods**, especially in the deltas and coastal regions.



Source: Rentschler et al (2020) Resilient Shores report

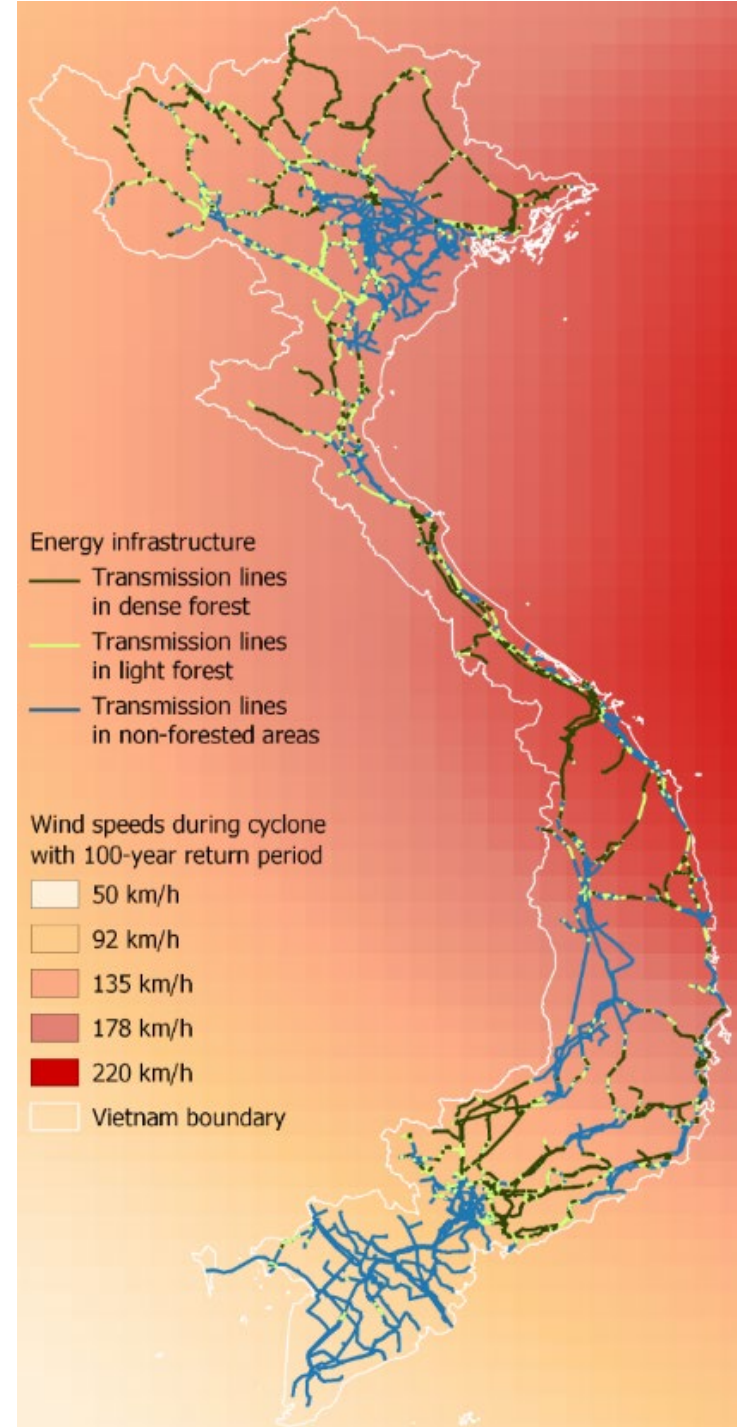


# Vietnam | Energy sector

→ Vietnam's energy infrastructure is highly exposed to storms.



Source: Rentschler et al (2020) Resilient Shores report





# Altogether: Investing in resilience is sound, profitable, and urgent

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**\$4**

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

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**\$4.2 trillion**

Net benefit from building new infrastructure to higher resilience standards

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**\$100 billion**

Cost of delaying action by one year





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