Resilient Transport
TRANSPORT AND ICT GLOBAL PRACTICE

ACTIVE PORTFOLIO

- LAC: $7.0 bn
- ECA: $7.1 bn
- MNA: $1.9 bn
- SAR: $8.3 bn
- AFR: $9.7 bn

Legend:
- Rural and Inter Urban Roads
- Urban Transport
- Railways
- Other Transport
- ICT
- Other
COUNTRIES WITH TRANSPORT SECTOR COMMITMENTS

Total Commitments with Adaptation Climate Co-benefits (USD Millions)

- 0.0
- 0.2
- 2.0
- 4.0
- 6.0
- 8.0
- 10.0
- 20.0
- 40.0
- 60.0
- 80.0
- 100.0

* Regional Projects not represented in the Map
* P111017 removed

Climate Finance (Mitigation, Adaptation) (Cumulative FY11-15)

91%
9%
INCREASING NUMBER OF INCIDENTS

$1.2 trillion

Loss between 2001 and 2010, due to natural disasters
Climate models try to project what the future climate will be like... But they disagree with each other and we have a lot of models...
**ADAPTATION**

**MAINTENANCE**

Road becomes increasingly vulnerable to climate events.

<table>
<thead>
<tr>
<th>Status</th>
<th>Maintenance Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very good</td>
<td>Routine maintenance</td>
</tr>
<tr>
<td>Good</td>
<td>Periodic maintenance</td>
</tr>
<tr>
<td>Fair</td>
<td>Without maintenance</td>
</tr>
<tr>
<td>Poor</td>
<td>Corrective maintenance</td>
</tr>
<tr>
<td>Very poor</td>
<td></td>
</tr>
</tbody>
</table>
Map of flooding in the area to identify stress points.
ADAPTATION

NETWORK RESILIENCE

1. Least-cost routes for each OD pair of interest

2. Measuring criticality with:
   - Increase in costs when a link is disrupted
   - Agriculture and fishery potential
   - Poverty

3. Measuring exposure (1/100 floods)

4. Prioritizing links by combining criticality and exposure
• Design standards appropriate & observed

• Innovation in Materials
  • Pacific geocells, geo-reinforced soil

• Spatial Planning
• Data & Technology
  • Flood maps, updated, local rain IFD
What will the future be?

What is the best near-term decision?

How sensitive is our decision to our predictions?

“Predict Then Act”

What are the available strategies?

Identify vulnerabilities of these strategies

Develop strategy adaptations to reduce vulnerabilities

Robust Decision Making
ADAPTATION

DECISION MAKING UNDER UNCERTAINTY

![Graph showing the net present value of interventions in Piura. The x-axis represents different interventions: More frequent maintenance, Increasing redundancy, Increasing redundancy (for some routes only), Flood-proof road. The y-axis shows the net present value in million USD. The graph visualizes the impact of these interventions on the net present value.]
• Emergency response. CER, budgets & procurement: flexibility vs efficiency
• Materials: geo-reinforced soils
• Early warning, core infrastructure for evacuation & recovery
To facilitate **Sustainable Mobility for All** through four goals:

**UNIVERSALITY**
Achieve accessibility for all to modern mobility solutions and ultimately to economic and social opportunities

**EFFICIENCY**
Increase the efficiency of transport systems and services

**SAFETY**
Improve the safety of mobility (with a focus on roads)

**GREEN**
Shift transport infrastructure and services to a green, clean and resilient path

Progress on these goals will improve the lives and livelihoods of billions of people across the world—their health, their environment, their quality of life—and help stabilize climate change over the long term.
Maintenance is at the core of resilient systems

Good engineering practice
Identifying vulnerability: slopes, drainage, maintenance
Network & systems: redundancy analysis, critical infrastructure

Deep uncertainty
Flexibility, non-structural solutions, standards

Emergency planning & protocols
Data collection, learning

Effective coordinated action needs a Coalition