Indus Valley Civilisation (3300 BCE - 1300 BCE)
The Proserpina Dam (Merida, Spain) 2nd Century AD
Roman Aqueducts (Segovia, Spain), 1st Century AD
Udaipur, India: interconnected lakes (16th – 17th century AD)
108 ponds of Melikote, Karnataka
108 ponds of Melikote, Karnataka
“The world’s fastest-sinking city”
-The New York Times, 21 December 2017
Drivers of Infrastructure Transition
1. Urbanisation
Urban Growth in Chennai

[Maps showing water body and built-up area in Chennai for 1980 and 2010 with legends indicating Chennai boundary, Greater Chennai boundary, built up areas, water bodies, wetlands, and flood-affected areas.]
Proposed Reinforced Concrete perimeter wall
2. Interdependent Systems
Cascading effects of disaster
3. Scale
Infra Investments: Current Trend and Needs

Source: UNISDR, computed from Global Infrastructure Outlook
The Indian Example

Source: Projects announced and under-implementation, CMIE Capex database
Length of metro lines will go up 6 times by 2025
• Highways length will go up 1.5 times by 2025

• Electricity generation capacity will almost double by 2025
4. New Players in Infrastructure Development
5. De-carbonisation
Cost of not investing in resilience
How do infrastructure losses stack up as proportion of public losses in disasters?
Samoa 2012
Fiji 2016

47%
<table>
<thead>
<tr>
<th>Event</th>
<th>Total D&amp;L (mn US$)</th>
<th>Infra. D&amp;L (mn US$)</th>
<th>Infra D&amp;L % of Total Loss</th>
<th>Infra D&amp;L as % Public Loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001/India/ Quake</td>
<td>2.131</td>
<td>334</td>
<td>16%</td>
<td>n/a</td>
</tr>
<tr>
<td>2004/ Indonesia/ Tsunami</td>
<td>4.452</td>
<td>877</td>
<td>20%</td>
<td>56%</td>
</tr>
<tr>
<td>2004/ Sri Lanka/ Tsunami</td>
<td>970</td>
<td>127</td>
<td>13%</td>
<td>n/a</td>
</tr>
<tr>
<td>2005/ Pakistan/ Quake</td>
<td>2.852</td>
<td>472</td>
<td>17%</td>
<td>n/a</td>
</tr>
<tr>
<td>2006/ Indonesia/ Quake</td>
<td>3.134</td>
<td>59</td>
<td>2%</td>
<td>17%</td>
</tr>
<tr>
<td>2010/Pakistan/ Flood</td>
<td>10.056</td>
<td>2.025</td>
<td>20%</td>
<td>n/a</td>
</tr>
<tr>
<td>2012/ Samoa/ Cyclone</td>
<td>204</td>
<td>75</td>
<td>37%</td>
<td>66%</td>
</tr>
<tr>
<td>2014/ Cape Verde/ Volcano</td>
<td>28</td>
<td>2</td>
<td>8%</td>
<td>30%</td>
</tr>
<tr>
<td>2015/ Nepal/ Quake</td>
<td>7.065</td>
<td>668</td>
<td>9%</td>
<td>30%</td>
</tr>
<tr>
<td>2016/ Fiji/ Cyclone</td>
<td>1.327</td>
<td>116</td>
<td>9%</td>
<td>47%</td>
</tr>
</tbody>
</table>
What can be done?
Risk Management Framework for Infrastructure Development
Need for a Territorial Approach
A System of Systems Approach

Figure 2. Schematic overview of the use of Nismod for national infrastructure assessment
Preserve the existing systems
Those who don't smoke have to be given money and those who smoke having to be given cigarettes and biri.
Four areas of work...
Assessment of disaster risk (to and from) infrastructure

Standards of design and implementation, operations and maintenance

Financing new infrastructure and mechanisms for covering risks

Reconstruction and recovery of infrastructure after disasters
Assessment of disaster risk (to and from) infrastructure

Standards of design and implementation, operations and maintenance

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Assessment of disaster risk (to and from) infrastructure

Standards of design and implementation, operations and maintenance

Financing new infrastructure and mechanisms for covering risks

Reconstruction and recovery of infrastructure after disasters
It’s a commitment
Substantially reduce global disaster mortality by 2030, aiming to lower average per 100,000 global mortality between 2020-2030 compared to 2005-2015.

Substantially reduce the number of affected people globally by 2030, aiming to lower the average global figure per 100,000 between 2020-2030 compared to 2005-2015.

Reduce direct disaster economic loss in relation to global gross domestic product (GDP) by 2030.

Substantially reduce disaster damage to critical infrastructure and disruption of basic services, among them health and educational facilities, including through developing their resilience by 2030.
Choice is ours..
Locking in Risk / Resilience