



GOVERNMENT OF INDIA
MINISTRY OF HOUSING AND URBAN AFFAIRS

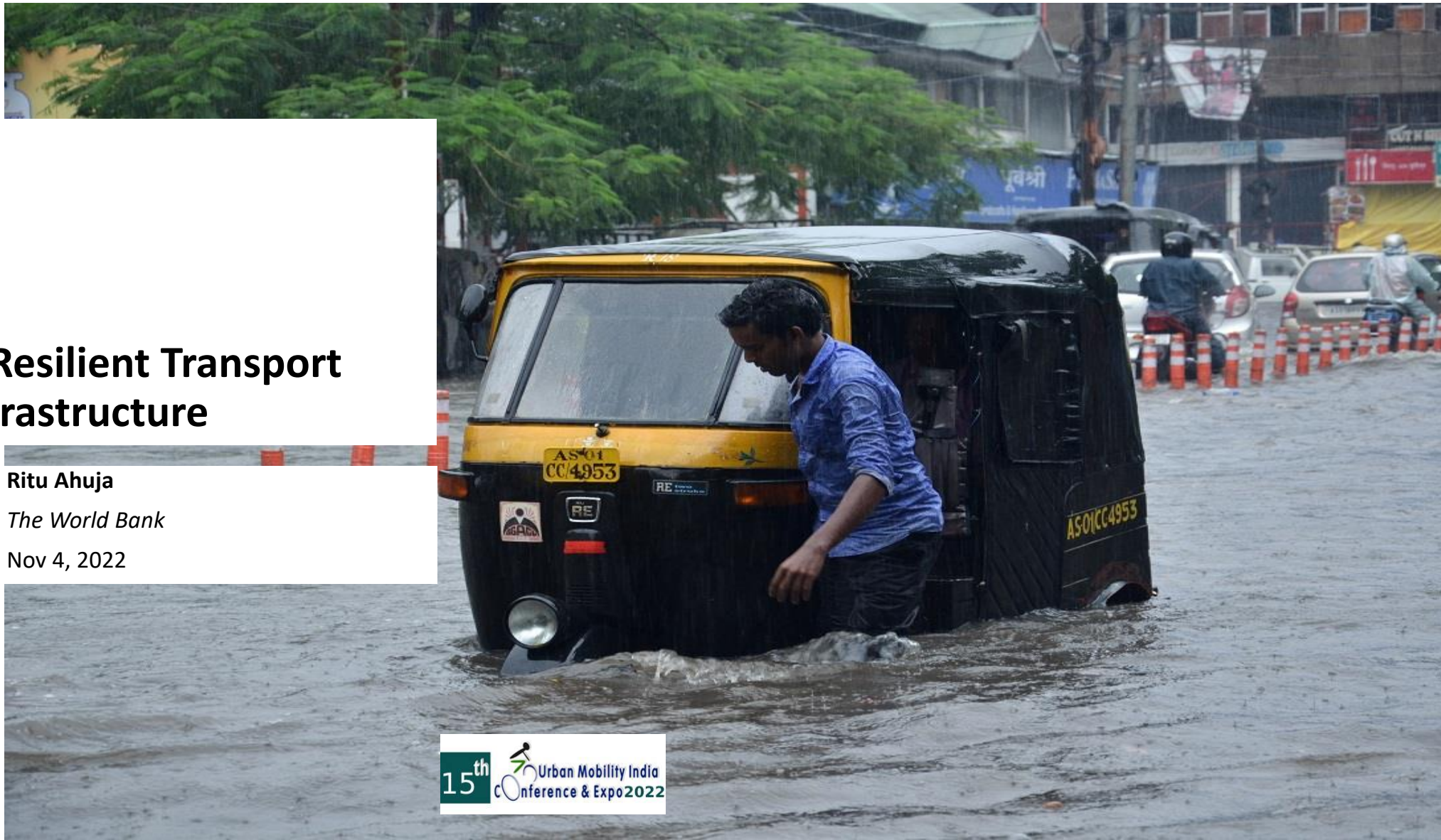


Enabling Resilient Transport Infrastructure

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The World Bank

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India Climate and Disaster Risk Profile

Vulnerabilities and Impact

Varied geography characterised by deserts, mountains, forests, a long coastline; tropical climate with variable monsoonal and other weather patterns

Ranked 7

most climate- affected country in 2019 out of 1181 as per the Global Climate Risk Index

75%

districts prone to hydromet disasters

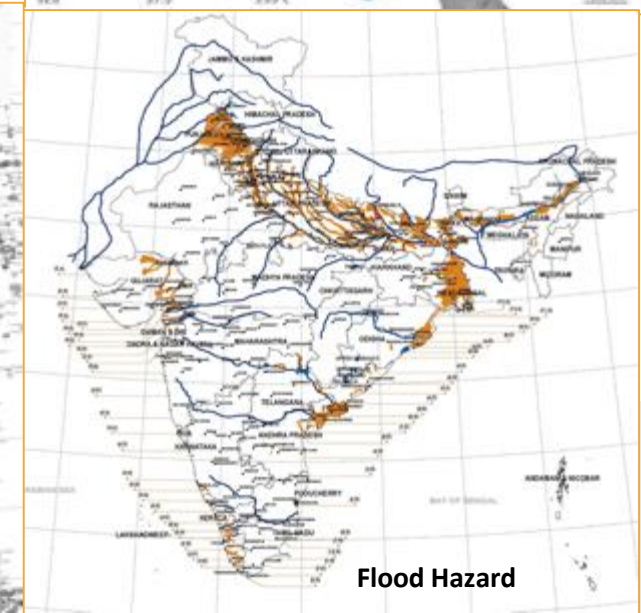
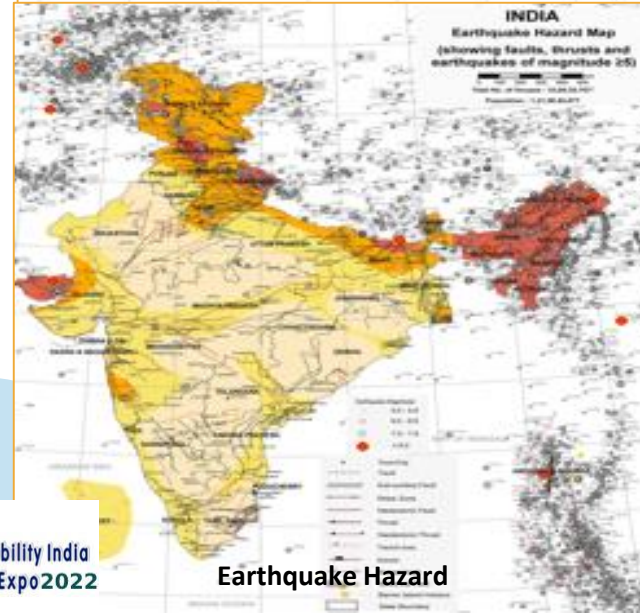
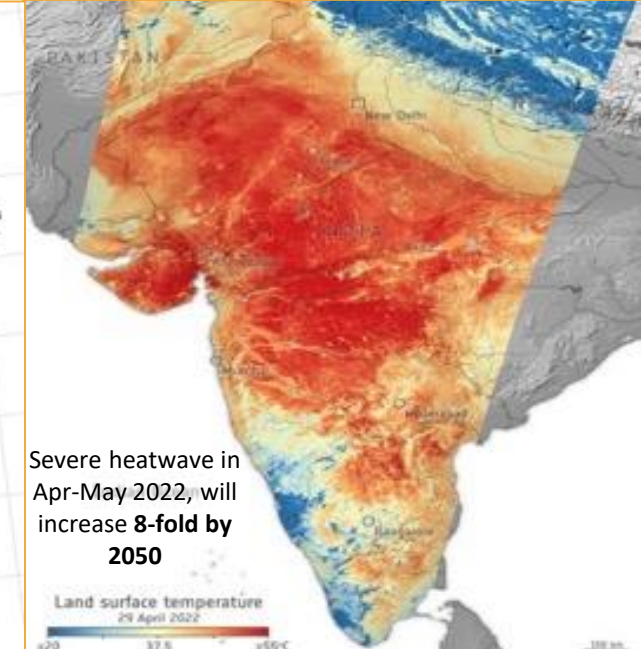
~\$180 Bn

losses due to climate disasters in past 2 decades

~50%

population will face lower living standards by 2050

~3.5-34 inches (2.8 ft) sea level rise by the end of the century



Increased and Uneven Incidences of Extreme Events

2022 alone witnessed severe extreme weather events of flooding which have lead to devastating impacts on transport services and infrastructure in addition to reduced overall wellbeing

Indian States Witnessed Extreme Flooding...

In 2022, Bangalore received rainfall 368% more than average, Tamil Nadu and Puducherry, 93% more rain than average

While Rainfall over the country was 8% below Average...

States like Assam and Meghalaya recorded highest rainfall in 121 years, others such as Kerala saw the lowest

Along with Severe Economic Losses and Disrupted Services

Telangana reported a loss of Rs 498 cr. Intense rainfall impacted potentially 84,000 km of the road network; 1,755 km of railway tracks

Transport being a key driver towards low-carbon pathway, resilience of public transport and related infrastructure as a critical component to ensure sustainable long term development

Impact of Climate Induced Extreme Weather Events on Urban Mobility and Public Transport

Impact of Extreme Weather Events on Transport Infrastructure

Impact on Physical Transport Infrastructure

Over the past 6 decades, **the average annual damage value of public infrastructure due to flooding is INR 8050 crores (USD 1.15 bn)**

The area affected by floods has been reduced by 40% (between 1960-2018) whereas, the damage of has been significantly increased by about 240%.

Impact on Service Delivery- Delays and Associated Opportunity Cost

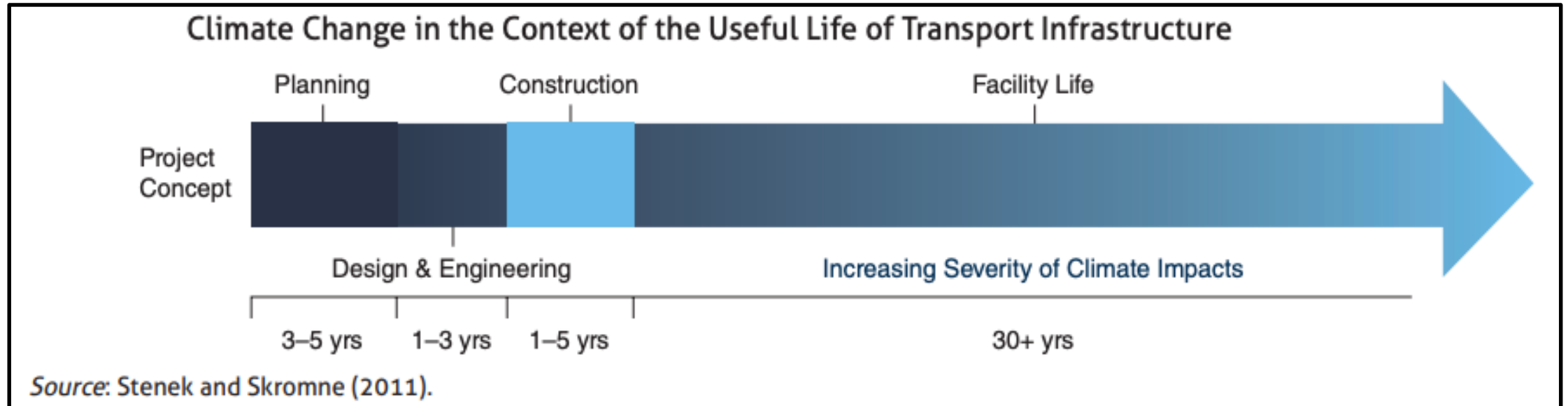
Socio-economic impacts of disrupted public transport systems

*The estimated daily total cost of flood disruption to commuters' trips in Kinshasa, DRC is over **USD 1.2 Million***



Need for Low-Carbon and Climate Resilient Infrastructure for Transport sector towards Net-Zero

Transport contributes about 10 percent to India's GHG emissions inventory, while efforts are being made to decarbonize the transport sector, it is essential that it is also made climate resilient.



- Existing infrastructure must be made increasingly climate resilient, but considering the span of new infrastructure, there is a need to incorporate stronger engineered codes for climate resilient infrastructure, urban planning and designs and especially elements of green and gray infrastructure.

This requires robust action and readily available climate finance

Framework to Integrate Climate Resilience in Transport Systems

There is need for adaptive and resilient infrastructure, early warning systems, creating redundancy and emergency planning to ensure resilience for public infrastructure

Activity

**Assessing
Vulnerabilities and
Developing Sectoral
and Spatial Plans**

**Designing Resilient
Infrastructure
Solutions**

**Post Disaster Risk and
Recovery**

**Enabling
Environments and
Capacity Building**

Indicative Interventions

Vulnerability
assessment using
multi hazard risk
assessment and
other adaptive tools
for mapping climate
vulnerability

Investments in
physical
infrastructure to
ensure robustness,
redundancy and
resilience

Ensuring short and
long term climate
change risk and
resilience is integrated
into rebuilding efforts

Regulatory
framework,
resource
mobilisation,
capacity building
and robust data
collection

Mobilizing Scalable Climate Finance

Additional investment in climate resilient infrastructure requires only 3% of overall investment needs (BAU), but provide a USD 4 benefit for each dollar invested in resilience.

This needs to be complemented by capacity building, vulnerability mapping, resilient financial institutions in addition to financing infrastructure. This requires three kind of financing:

Readiness Financing

- Development of urban resilient plans to support transport infrastructure, reduce incidence of EWE and climate induced calamities
- Early warning systems, mainstreaming climate and disaster resilience in policy planning and investments, vulnerability assessment

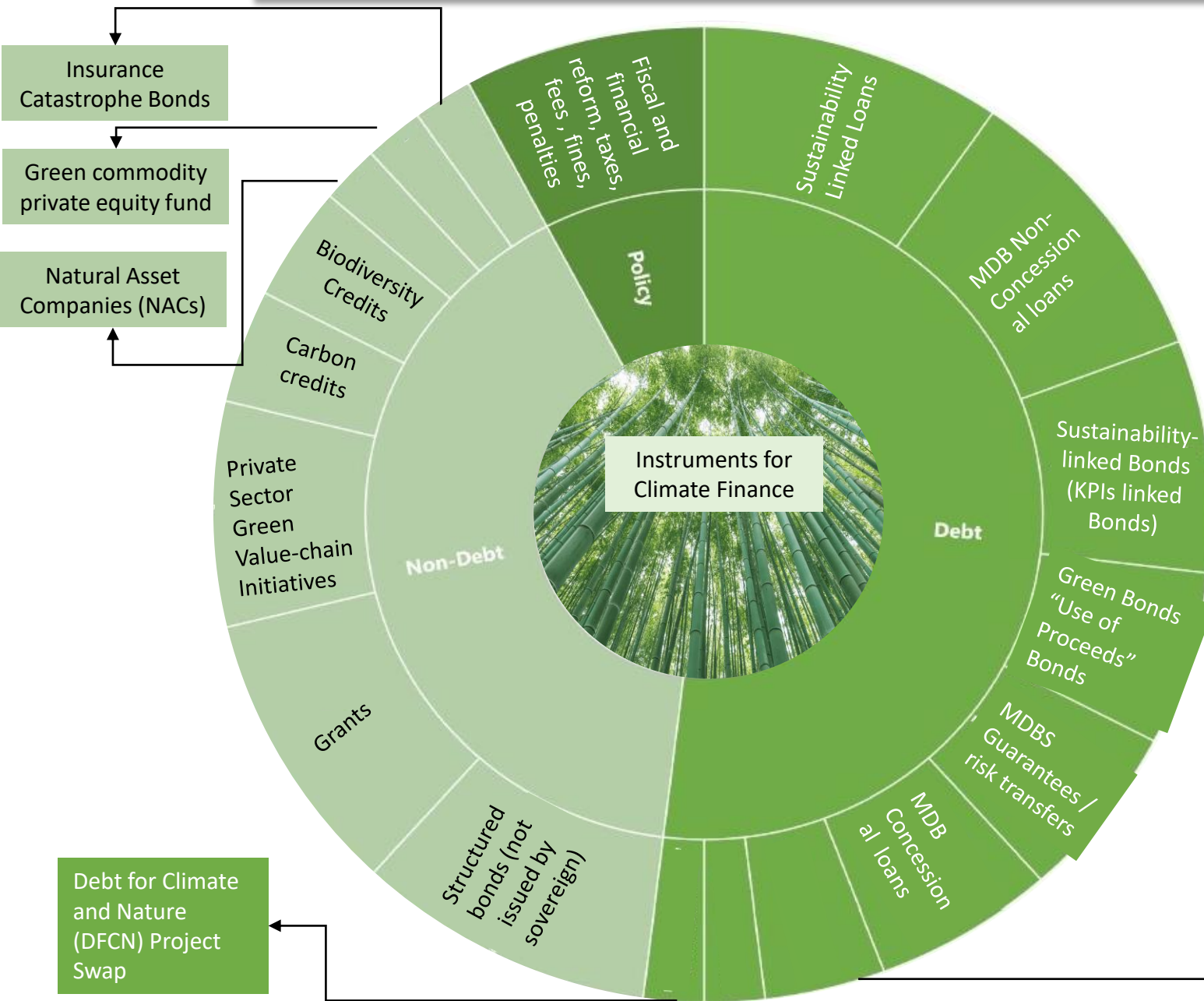
Risk Mitigation Financing

- Reduce real and perceived risks associated with driving long-term, low-cost private financing for climate action and resilience building
- De-risking nascent technologies and facilitating
- Increasing resilience of financial sector and incorporating resilience building measures in commercial infrastructural lending

Investment Financing

- Developing and supporting long-term low carbon and climate resilient investments in the form of projects, instruments, infrastructure

Climate Finance Instruments



Type	Instrument
Policy	Fiscal and financial reform, taxes, fees, fines, penalties
Debt	MDB Concessional loans
	MDB Non-Concessional loans
	MDB Guarantees/ risk transfers
	Social, Green/SDG Bonds "Use of Proceeds" Bonds
	Sustainability-linked Bonds (KPIs linked Bond)
	Sustainability-linked loans
	Debt for Climate and Nature (DFCN) Project Swap
Non-Debt	DFCN programmatic swap
	Asset based securities (ABS)
	Grants
	Structured bonds (not issued by sovereign)
	Insurance: Catastrophe bonds
	Biodiversity offsets
	Carbon offsets
	Green commodity private equity fund
	Natural Asset Companies (NACs)
	Private Sector Green Value-chain Initiatives

Learnings for Policy Design and Key Takeaways

The Economic and Opportunity cost of damaged transport infrastructure is very high. Considering the lifetime of infrastructure it is imperative to consider vulnerability, climate analytics in assessing risks and channel finance to facilitate resilience.

- **Resilience requires long term planning** which in turn needs a four pillared approach- assessing vulnerabilities, designing resilient infrastructural solutions, building capacity and increasing post disaster resilience.
- These need adequate finance **towards building capacities**, developing the ecosystem for financing, private and commercial lending and towards financing resilient public transport infrastructure.
- Transport sector attracts climate finance in terms of scalable decarbonization including under domestic and international carbon markets but resilience must be embedded.

Thank You