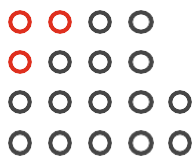
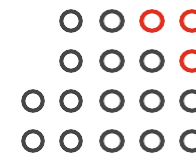


# Mainstreaming disaster resiliency in infrastructure development projects

## *Draft Presentation*

CDRI Pavilion at COP29:  
Building Resilience from the Ground-Up:  
Upstream Interventions in Project Finance

**Date:** 12 November 2024



# Contents

1. *Impact of natural hazards on infrastructure assets*
2. *Focus areas for resilience*
3. *Cost benefit analysis – RCBA tool*
4. *Disaster resilience toolkit – for government and private players*
5. *Recommendations and action areas*
6. *Outcomes envisaged – how it will change the landscape*





# Infrastructure assets increasingly getting affected by natural hazards

## Impact of natural hazards on infrastructure assets

Sectors	Earthquake	Cyclone	Flood	Tsunami	Wildfire	Extreme Heat
Roads	Very High	High	High	Very High	Medium	High
Energy	High	Very High	High	High	Very High	High
Railway	High	Medium	Very High	High	Medium	Very High
Real Estate	High	High	High	Very High	High	Medium
Urban Public Transport	High	High	High	High	Medium	Medium
Healthcare	High	Medium	High	High	Medium	High
Telecommunication	Medium	Very High	Medium	High	Medium	Medium

Degree of impact: Very High High Medium Low

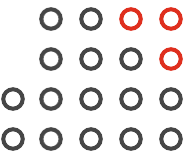
Source: Adapted from Dawson,(2015) as cited in OECD(2017) and McKinsey (2019).

➤ Major opportunity of incorporating resilience in critical infrastructure.



- **Average annual loss** estimated to be \$732 billion-\$845 billion ~ **14% of global GDP growth**. (CDRI)
- **70%** of the world we imagine in **2050** is yet to be built. (UNEP)

# Areas for incorporating resilience



## Provisions for disaster resilience in:

### 1 Infrastructure Development processes



Resilience in all stages of project lifecycle

- Project planning
- Approval
- Procurements
- Implementation
- Operation and maintenance

### 2 Capacities and institutional ecosystem



Strengthen capacities and support

- Governments
- DRR cells
- Private developers
- Financiers

### 3 Financing disaster resilience



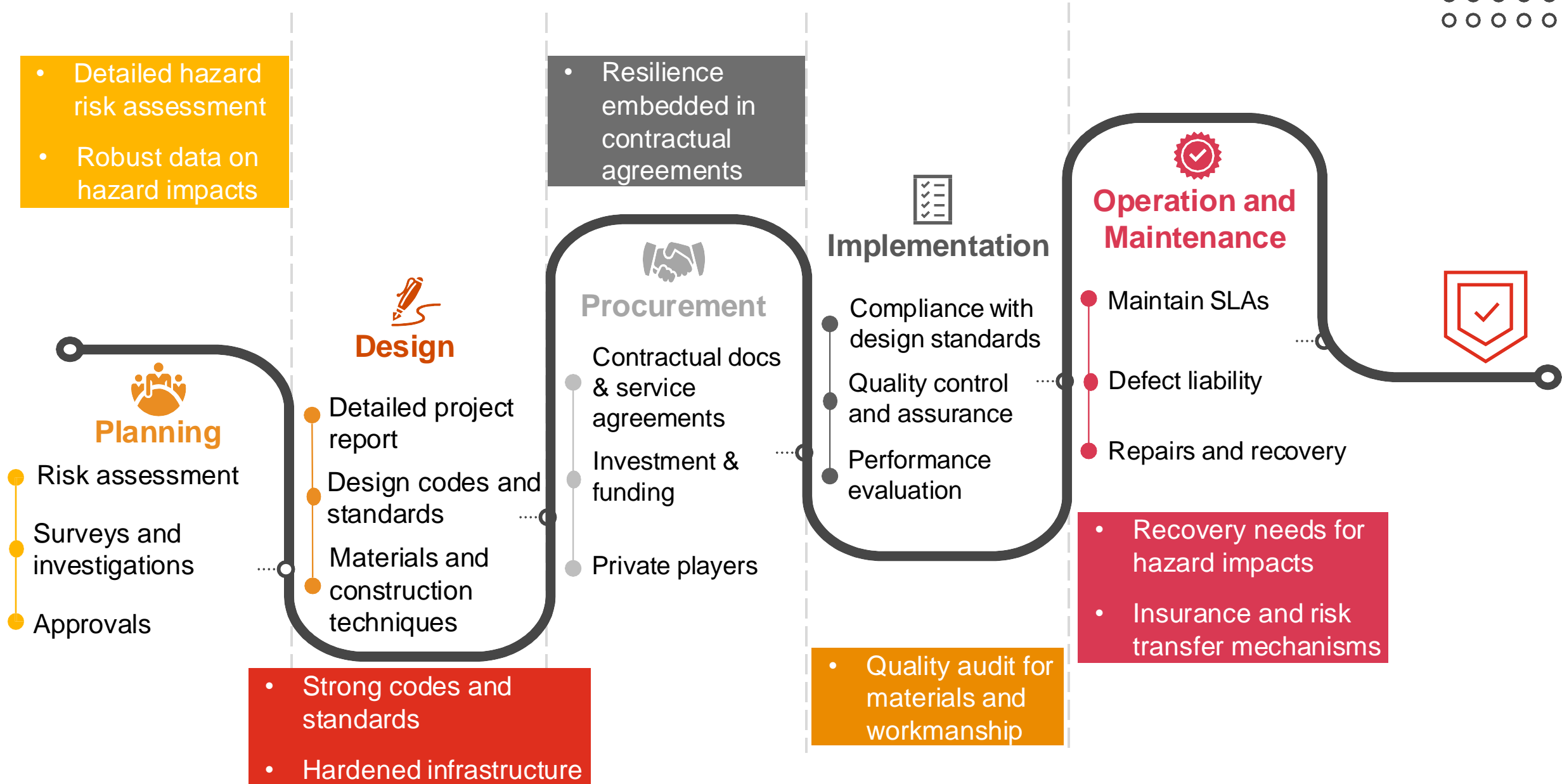
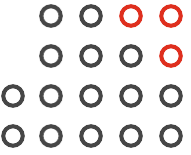
Fund for additional cost of resilience

Viability Gap Funding

Mobilisation of relief funds

Understanding financial risks

# Resilience in development process – over project lifecycle



# Resilience in institutional ecosystem

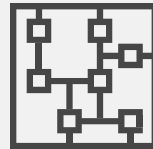
**Stakeholders to include resilience goals aligned with their roles and responsibilities**

## Central Agencies

- Hazard data capture and governance

## Private players

- Awareness and capacity
- Resilience in design and financials



## Central Ministries

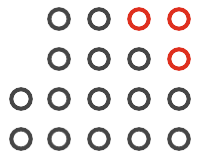
- Resilience lens for fund allocation and model documents

## Implementing agencies





- Downstream capacity building on Central initiatives



# Gaps in fund allocation and financial assessment of hazard risks



The existing financial assessments misses out on the lifecycle cost of hazard impacts

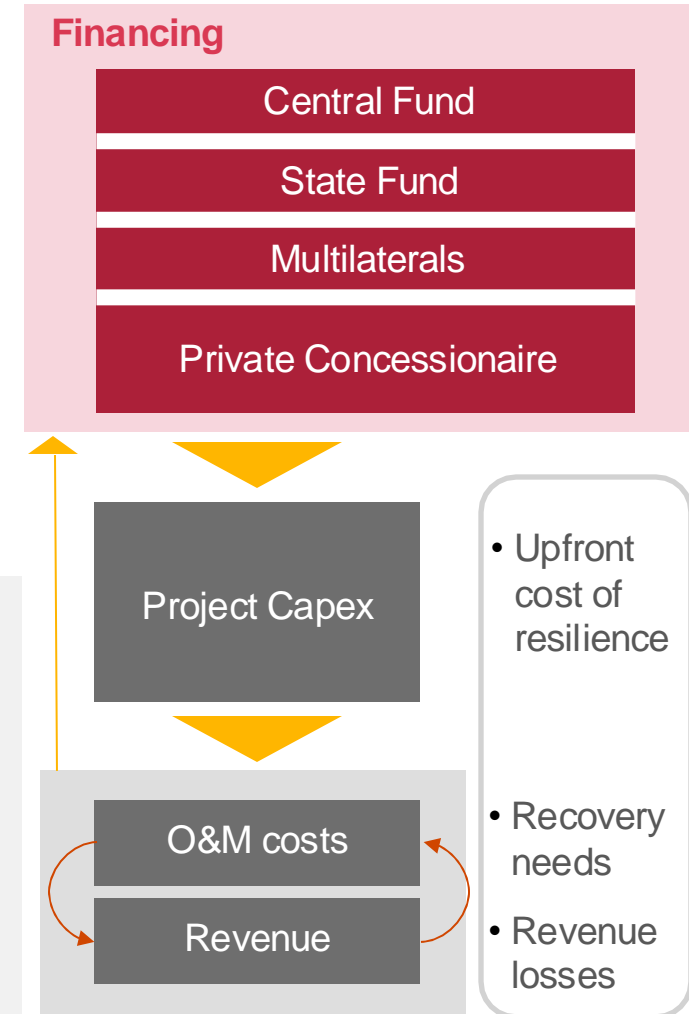
-  Financial risks of natural hazards not considered upfront
-  Limited insurance coverage
-  Cost of damage repairs borne by Government
-  Approval of funds like VGF and Donor fund does not consider recovery costs from natural hazards in financial feasibility.

## India good practice - Focused fund for disaster mitigation projects

15th Finance Commission, India shifted to Risk Management Funds from Relief Funds.

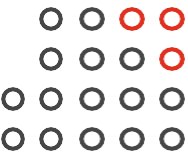
- **20% for mitigation and 80% for response.**

- National Disaster Risk Management Fund (NDRMF) – Rs. 68,463 crores (2021-2026)
- State Disaster Risk Management Funds (SDRMF) – Rs. 1,60,153 crores (2021-2026)
- Mitigate flood, earthquake, landslide, drought and erosion
- **Funds measures in regional projects but majorly focuses on local interventions.**

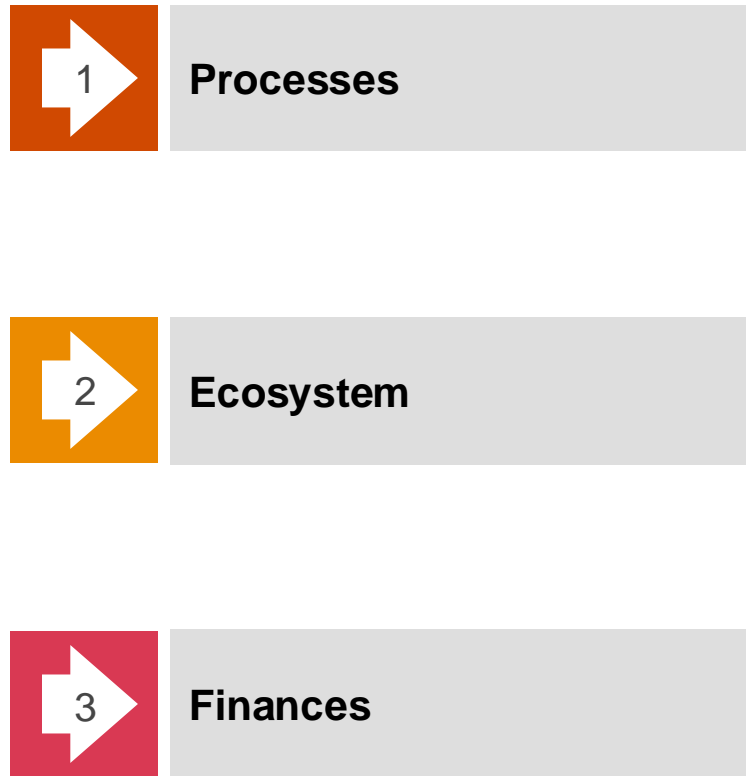




# Mainstreaming disaster resilience in infrastructure development in India



## Targets areas



## Outputs of the study



### Resilience Cost-Benefit Analysis Tool

Understand the benefit of investing in resilience

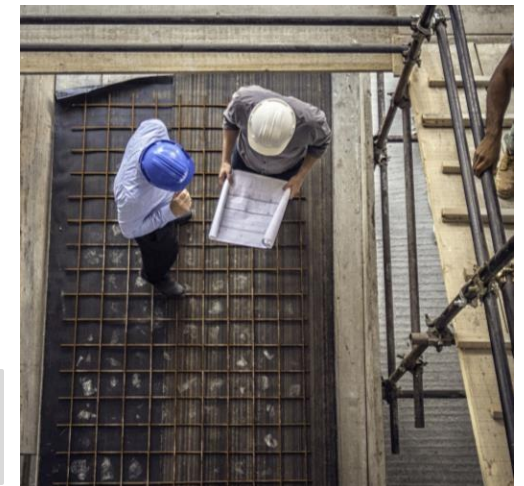
*Asset level resilience*



### Toolkit for disaster resilience

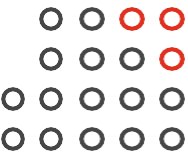
Guide government and private players embedding resilience in contractual agreements and project implementation

*Sector & Ecosystem level resilience*

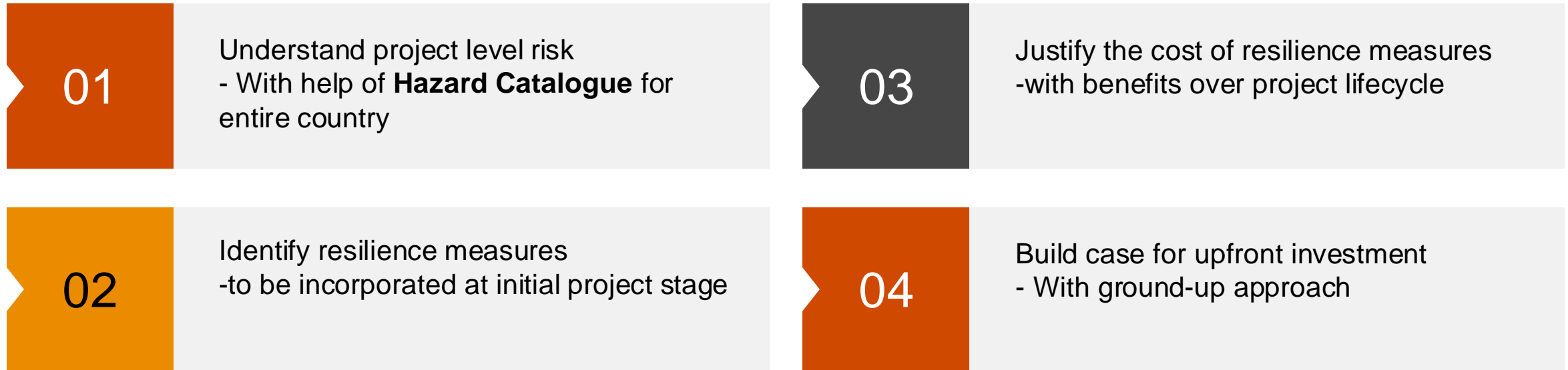




# Output 1: RCBA tool - An interactive tool to guide resilience investment decisions



## Resilience Cost Benefit Analysis (RCBA) Tool – User benefits

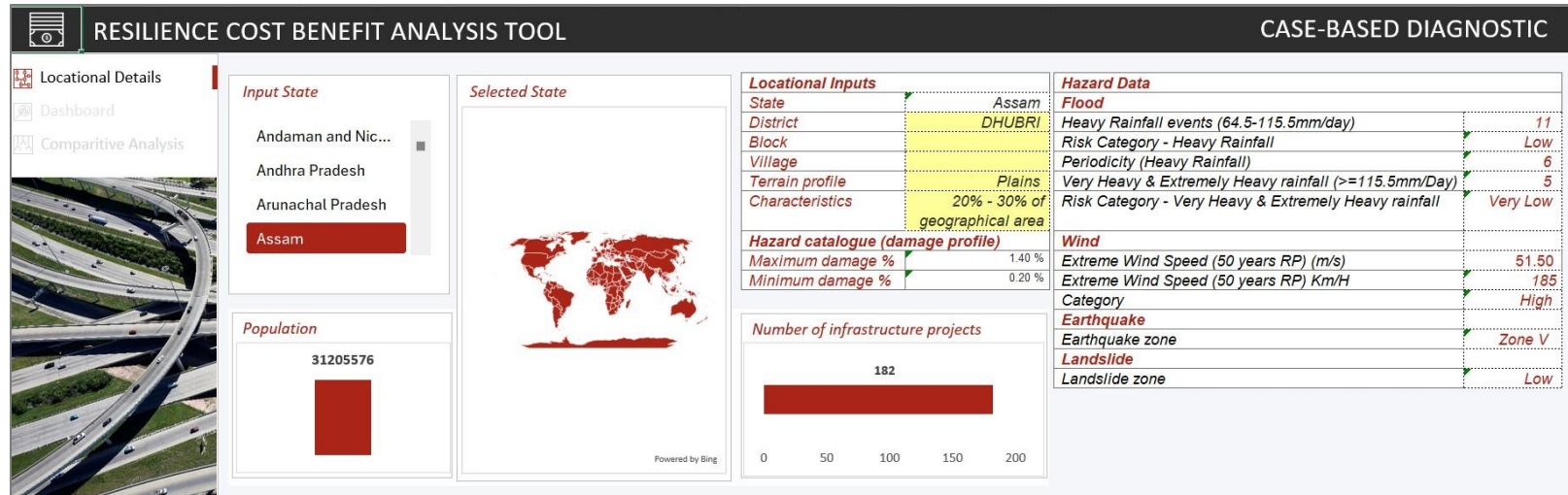
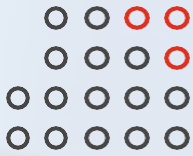


**Hazard catalogue** – A country level database with high resolution hazard and losses data that can integrate with GIRI 2.0

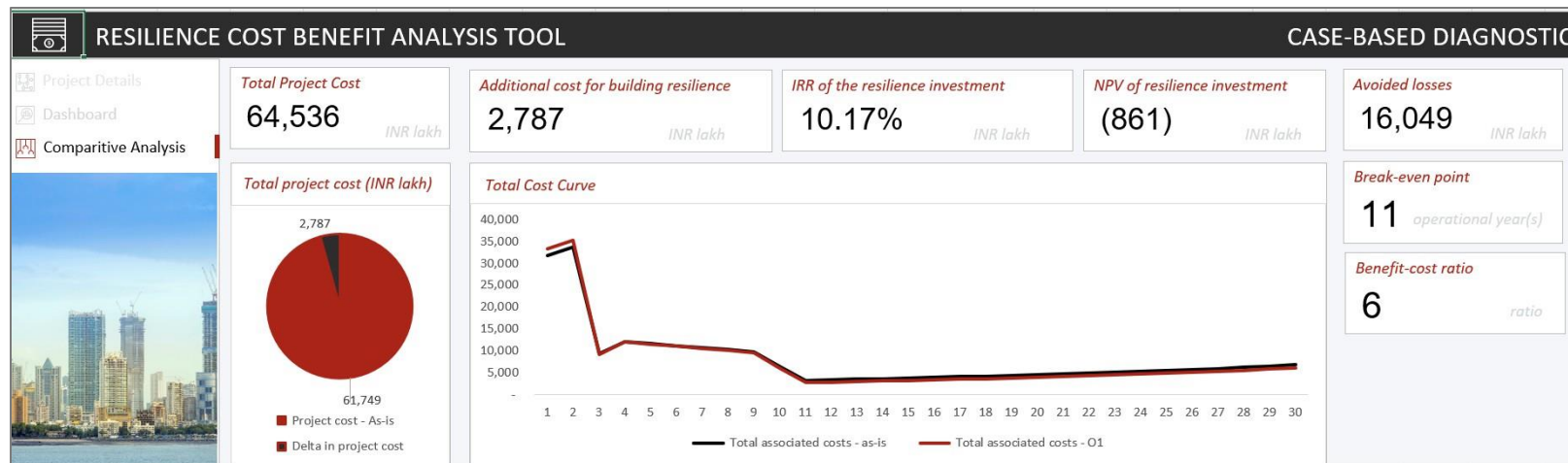
*Approach:*



# Components of the tool for simplified assessment



## Input Dashboards



## Output Dashboard

Sample Test on tool

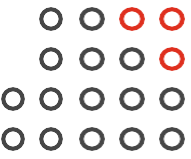
## Costs considered:

- Costs of resilience
- Repair and reconstruction costs
- Revenue loss
- Insurance premium

## Financial parameters for investment decisions:

- Net Present Value (NPV)
- Internal Rate of Return (IRR)
- Benefit : Cost ratio
- Break even period

# Findings of tool on sample road infrastructure projects



## Findings from testing live projects



*Road assets susceptible to*



*Floods  
in river plains*



*Landslides  
in hilly region*



*Benefit of \$ 8*

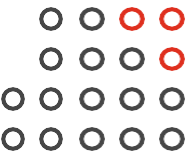


*Benefit of \$ 7*

*for every \$ invested in resilience*



# Findings of tool on sample transmission infrastructure projects



## Findings from testing live projects



*Transmission assets  
susceptible to*



*Cyclones  
In coastal area*



*Flash Floods  
in hilly region*



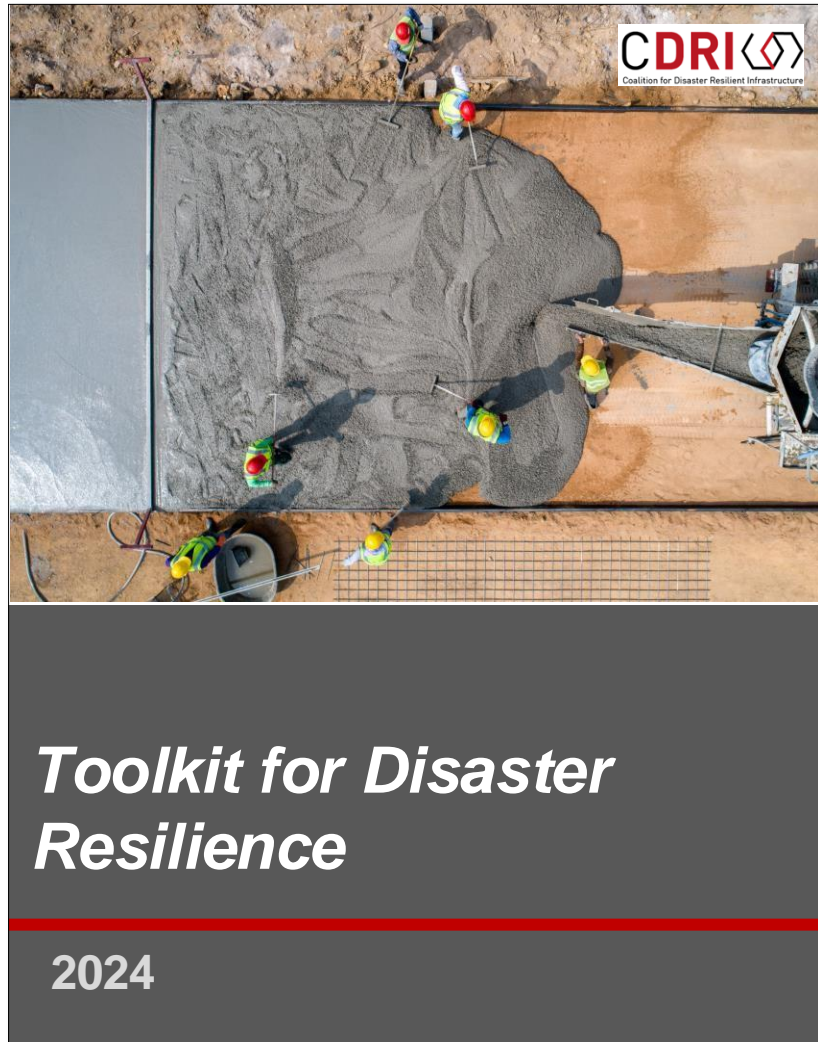
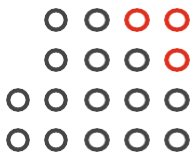
*Benefit of \$ 12*



*Benefit of \$ 7*

*for every \$ invested in resilience*

# Output 2 - A toolkit for government and private players to build resilience in infrastructure projects

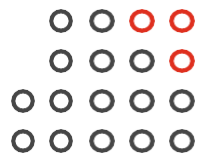


## *Purpose of the toolkit*

- ➔ Assist line ministries integrate disaster resilience into project identification and appraisal phases
- ➔ Enable private sector bidders address disaster risks in proposals and increase eligibility for funding
- ➔ Incorporate resilience in standard agreements with defined responsibility sharing
- ➔ Ensure disaster risk management and development of more resilient projects



# Toolkit for disaster resilience



## Part 1

*Bidding and contracts checklist for resilience measures*



## Part 2

*Design options checklist for asset resilience*



## Part 3

*Project identification and appraisal guidance document for **line ministries***



## Part 4

*Project proposal guidance document for **potential bidders***

1

2

3

4



Design stage



Procurement stage



Implementation stage



O&M stage

Benefit Line Ministries,  
Implementing authority,  
Contractors



Planning stage



Design stage



Implementation stage

Benefit Implementing  
authority, DPR consultant,  
Contractors



Planning stage



Design stage



Implementation stage

Benefit Line Ministries and  
Implementing authority



Design stage



Implementation stage



O&M stage

Benefit Implementing  
Authority, Developers and  
Contractors



# Key Recommendations and action areas - resilience in development process

## 01 Mainstream RCBA tool to justify cost of resilience – by line ministries

Include resilience costs and benefits in financial feasibility.

## 02 Consider locational hazards and disaster risk – by implementing agencies

at planning stage itself can ensure sufficient budgeting of project cost for a resilient design.

## 03 Design assets with additional resilience – by project designer

Design codes for hardened infrastructure include protective measures, redundancies, and increased preparedness.



### 1 Infrastructure Development processes



### 2 ecosystem Capacities and institutional



### 3 Financing disaster resilience

# Key Recommendations and action areas - for conducive institutional ecosystem

**01** **Clear hazard risk allocations  
– by Implementing agencies**  
Defined hazard thresholds in Force Majeure

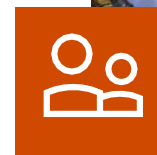
**02** **Sector level resilience through Standard agreements  
- by Line ministries**  
Resilience in scope of work, force majeure, event of default, maintenance manuals, etc.

**03** **Capacity building in DRR and DRFI with toolkits and training programs - By National agencies**  
targeted training modules for government officials and private players.

**04** **Improved data governance**  
- By Line ministries and National agencies  
To create and house hazard related datasets



**1** Infrastructure Development processes



**2** Capacities and institutional ecosystem



**3** Financing disaster resilience

# Key Recommendations and action areas - for enhanced financing

## 01 **Create Infrastructure Resilience Fund – by Ministry of Finance**

Finance projects/interventions enhancing infrastructure durability and adaptability and use RCBA tool for eligibility of such funds.

## 02 **Create Risk Insurance Facility – by Ministry of Finance**

To absorb risk by transferring to insurance markets.

## 03 **Development of a national-level risk pool - By participation of individual states**

Reinsurers & insurers would join with insurance companies retaining some risk and transferring the rest to the internal market.



1 Infrastructure Development processes



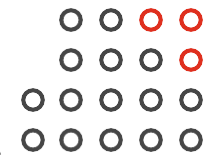
2 Capacities and institutional ecosystem



3 Financing disaster resilience



# Outcome- resilience in project development landscape



## Center Level

### Ministry of Finance

Fund allocation and policy formulation

- **RCBA tool** to evaluate projects

### Multilateral agencies

Project financing and technical assistance

- **RCBA tool** as fund eligibility criteria

- **Use of study outputs**

### Central Level Line Ministries

Develop schemes, policies and Model contract

- **Toolkit** to embed resilience in model documents.
- Mainstream **RCBA** use

### Standard making bodies

Survey, Design and implementation standards viz. IRC, IRICEN, CEA, etc

- Enrich **toolkit** with engineering measures

## State Level

### Line Ministries of Infrastructure sectors

Implement schemes and evaluate projects for sanctioning

- **RCBA tool** to sanction funds
- **Toolkit** to ensure resilience

### Parastatal / Project Implementing Agencies

Plan and implement projects  
Procure based on model documents

- Use **RCBA tool** for design and cost finalisation
- Use **toolkit** and suggest modification in design and procurement documents.

## Private players

### Private Players

Project design, bidding and implementation

- **RCBA tool** for design and cost estimation
- **Toolkit** for design, bidding and contractual agreements.

### Insurers and Insurance regulators

Disaster risk insurance and transfer

- **Risk insurance facility**
- Risk pooling and risk transfer mechanisms

Source: Adapted from DEA Taskforce report on NIP, Respective ministries

# Key Outcomes – towards resilient infrastructure

01

## Enhanced Processes

- Resilience measures at all project stages with **toolkit**
- Approval for justified cost of resilience with **RCBA tool**
- **Hazard Catalogue data** to help design

02

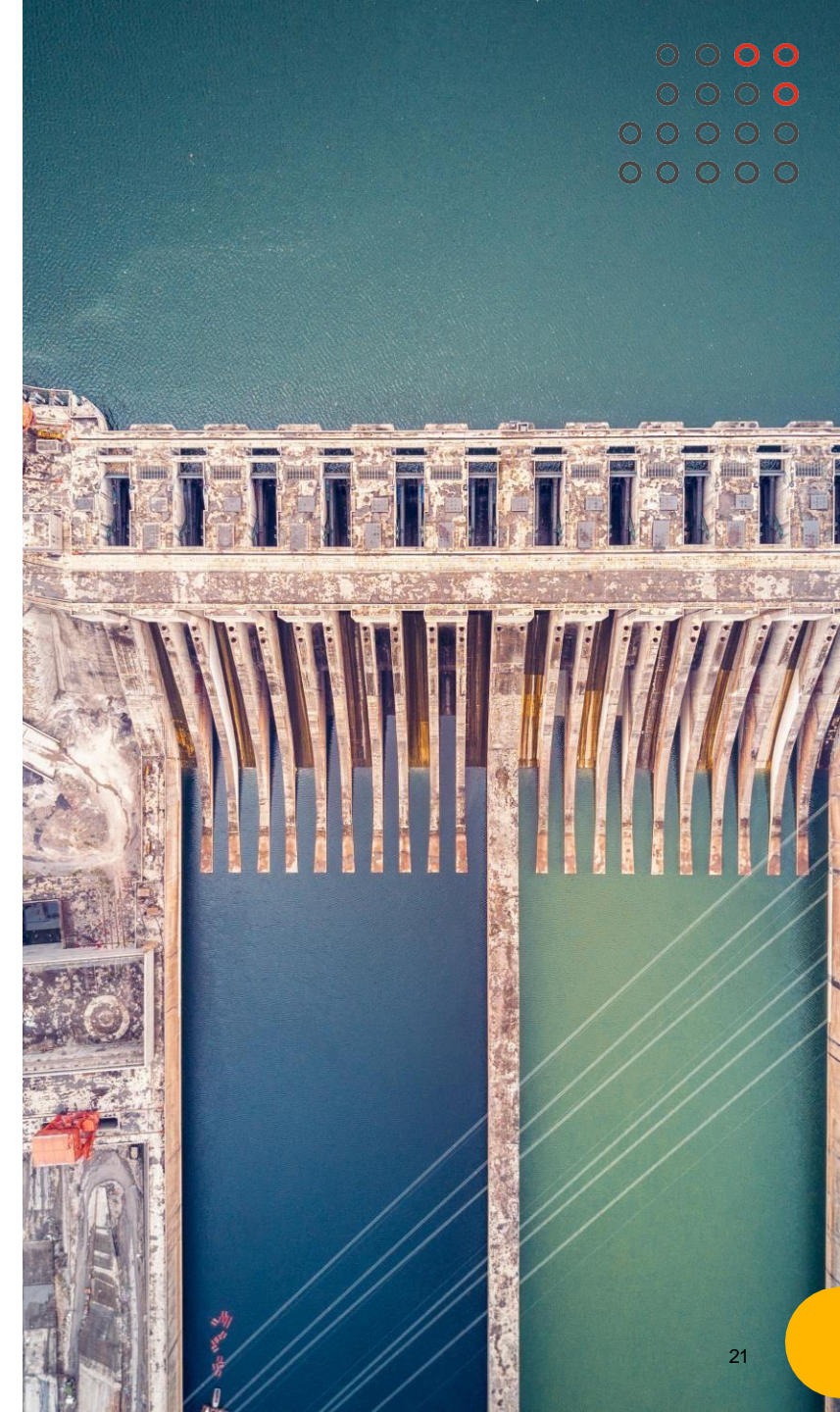
## Enhanced Ecosystem

- Trainings modules and **toolkits**
- Modified standard contractual agreements using **toolkit**
- Defined approach used in **RCBA tool** to capture hazard data and integration with **GIRI 2.0**.

03

## Enhanced Finances

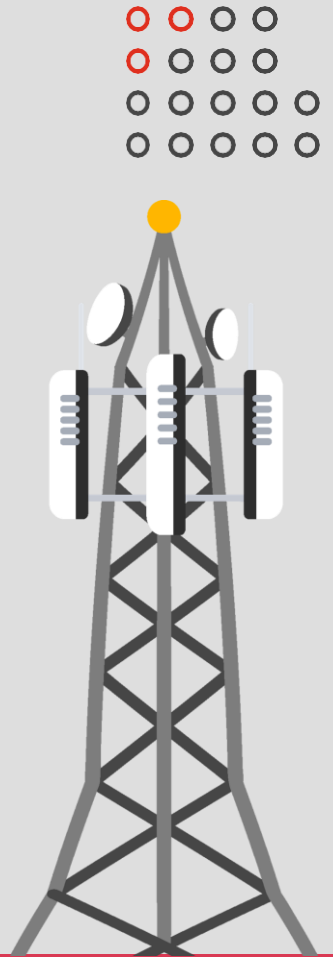
- Financing projects/intervention with dedicated **Resilience Fund**
- National/South-Asia level **Risk Insurance Facility** to absorb risks
- Indian states participating in National level **risk pool**





# Thank you

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