Coalition for Disaster Resilient Infrastructure

Turning Resilience into Project-Level Investment Decisions

Paris InfraWeeek 2026 | Beyond Risk Diagnosis: Making Adaptation Investable

Amit Prothi, Director General, CDRI - 3 November 2026 - Cité internationale des arts, Paris



© CDRI - Coalition for Disaster Resilient Infrastructure

Membership: 59 Countries and 13 Organizations

CDRI
Coalition for Disaster Resilient Infrastructure

Africa
- CHAD
- GHANA
- GUINEA
- KENYA
- LIBERIA
- MADAGASCAR
- MAURITANIA
- MAURITIUS
- NAMIBIA
- SEYCHELLES
- SOUTH SUDAN
- THE GAMBIA

Asia
- AFGHANISTAN
- BANGLADESH
- BHUTAN
- INDIA
- JAPAN
- JORDAN
- MALDIVES
- MONGOLIA
- NEPAL
- PHILIPPINES
- SRI LANKA
- TAJIKISTAN
- VIETNAM

Europe
- ARMENIA
- FRANCE
- GERMANY
- ITALY
- NETHERLANDS
- TÜRKIYE
- UK

North & Central America
- CANADA
- COSTA RICA
- GUATEMALA
- HONDURAS
- USA

Oceania & Pacific
- AUSTRALIA
- FIJI
- NAURU
- NEW ZEALAND
- PAPUA NEW GUINEA
- SAMOA
- TONGA

South America
- ARGENTINA
- BRAZIL
- CHILE
- COLOMBIA
- ECUADOR
- PARAGUAY
- PERU

The Caribbean
- ANTIGUA & BARBUDA
- CUBA
- DOMINICAN REPUBLIC
- GRENADA
- GUYANA
- HAITI
- JAMAICA
- TRINIDAD AND TOBAGO

Year	Membership
2019-20	24
2021	11
2022	3
2023	6
2024	3
2025	17
2026	8
TOTAL	**72**

16 SIDS

42 LMICs

14 G20 Members

ACMAD | African Union | arise | ADB Asian Development Bank | CAF Development Bank of Latin America and the Caribbean | CEPREDENAC | SICA Sistema de la Integración Centroamericana | CDEMA Caribbean Disaster Emergency Management Agency | European Investment Bank | ECOWAS | European Union | The World Bank | UNDP | UNDRR United Nations Office for Disaster Risk Reduction

CDRI Programmes and Engagements

Global Advocacy, Capacity Building, Technical Assistance

CDRI
Coalition for Disaster Resilient Infrastructure

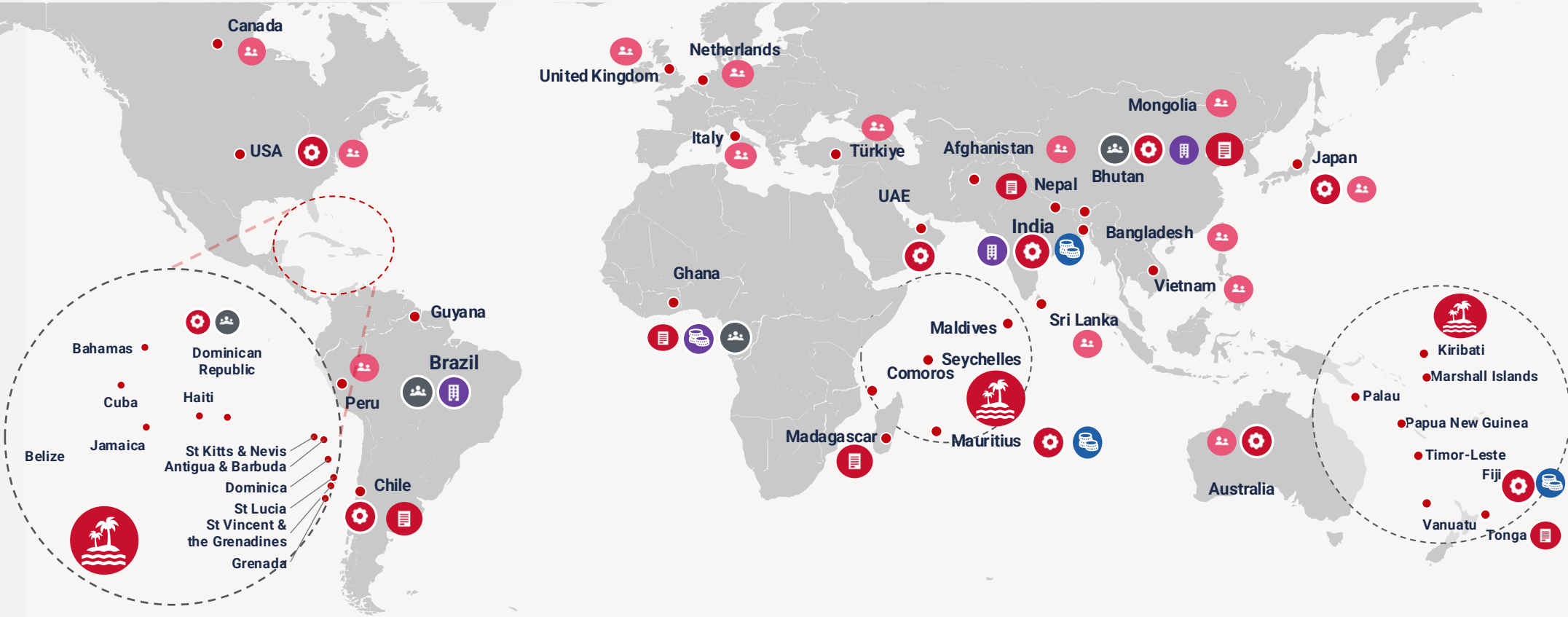
OUR WORK

48
Countries
With CDRI engagements (programmes, studies or fellowships)

183
Projects
Technical Assistance, Capacity building and Fellowships

5430
Professionals Trained
Through workshops, webinars and e-learning

80
Sessions on DRI
Orientation, sensitisation, and capacity building



25
Island nations supported under IRIS

5
Countries with urban infrastructure programmes

5
Countries Covered under disaster risk financing

7
Countries Supported with sectoral technical assistance

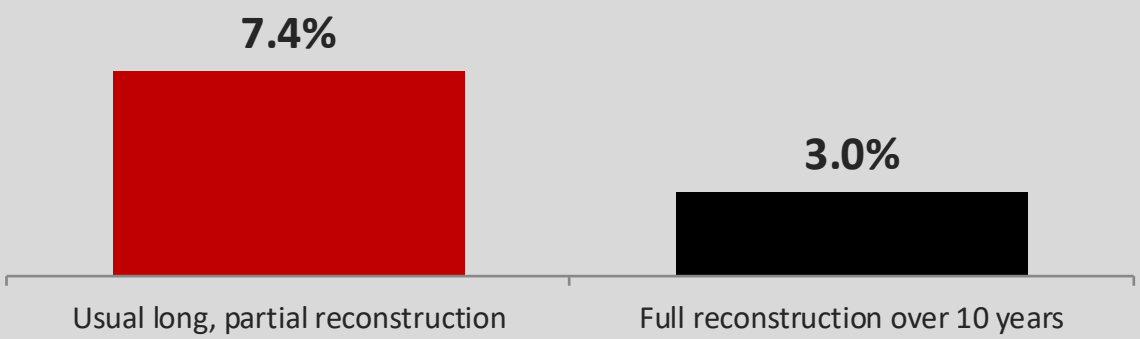
5
Countries Covered under Infrastructure Governance Study

23
Countries with CDRI Fellows (endorsing institutions)

© CDRI – Coalition for Disaster Resilient Infrastructure

Context: Economic Costs of Disasters (Macro-economic perspective)

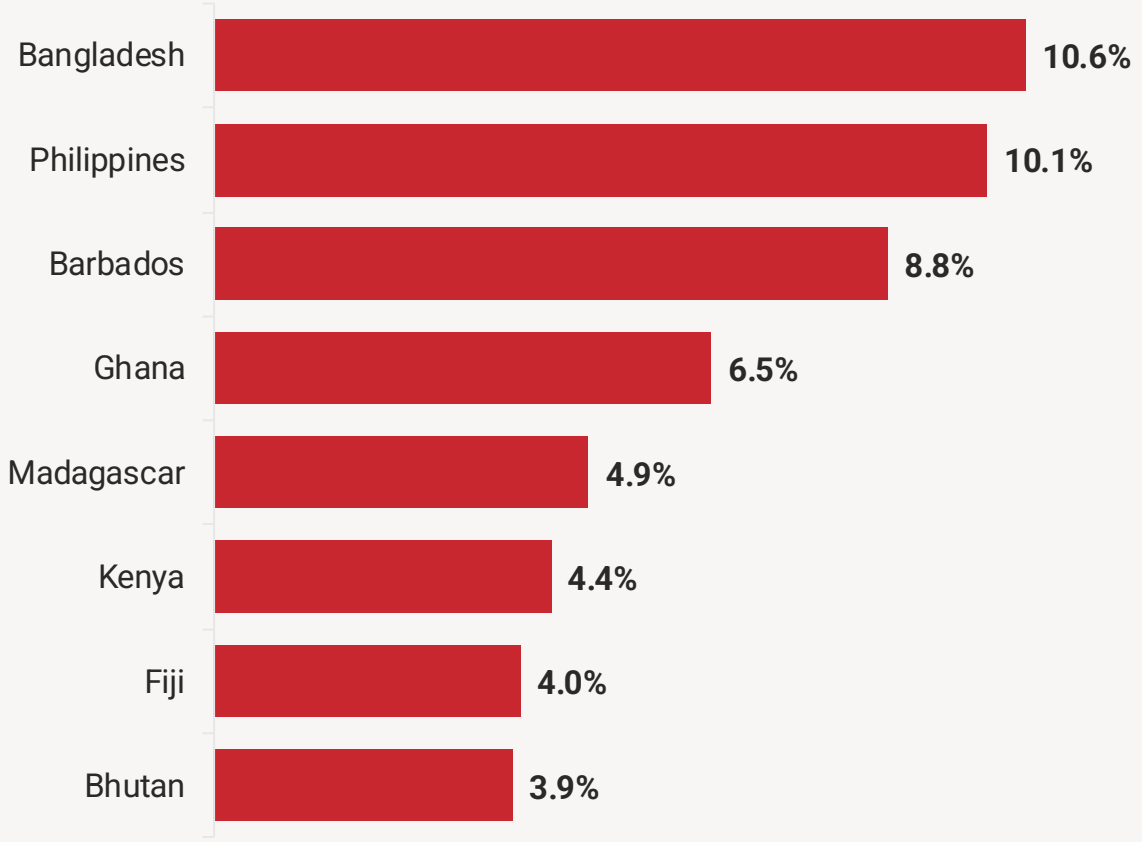
7.4 × CDRI's economic impact modelling in eight diverse countries shows that the economic costs of infrastructure failures due to disasters are, on average, 7.4 times the cost of direct damage to infrastructure assets.



If a country can execute a full reconstruction over 10 years, instead of the usual long, partial reconstruction, the average GDP impact in 2050 may fall by more than half, from 7.4 percent to 3 percent.

Faster and comprehensive reconstruction after disasters, significantly reduces the economic losses

Projected average annual GDP loss from disasters, 2025–2050 (eight climate-vulnerable countries; average 6.6%)



© CDRI – Coalition for Disaster Resilient Infrastructure

Building constituency: Businesses rely on infrastructure (Private sector perspective)

Businesses that build end-to-end resilience capabilities can better absorb, respond to, and recover from disasters, with shorter downtime and faster market share recovery.

1. **Business continuity Planning**
   Business continuity depends on both internal preparedness and timely restoration of critical infrastructure services.

2. **Addressing Value-Chain Risks**
   Business resilience depends on the resilience of suppliers, logistics networks and customers, not just company facilities.

3. **Closing Business Resilience Gaps**
   Strengthen business continuity plans through regular testing, clear SOPs, reliable supplier agreements and insurance.



Buckled railway tracks in UK during heatwaves in July 2022

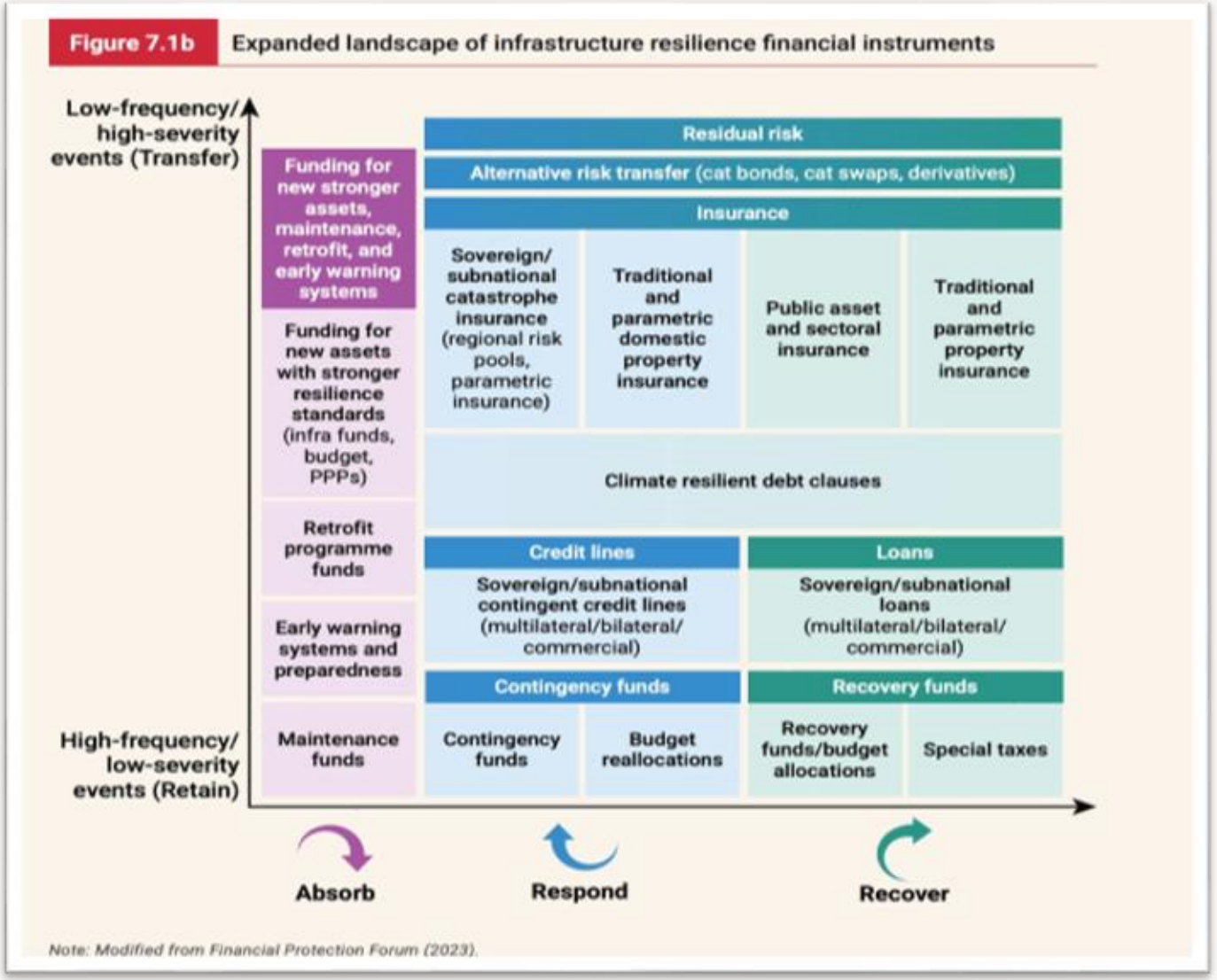
© CDRI – Coalition for Disaster Resilient Infrastructure

Resilient Infrastructure: Financing Requires a Layered Approach

CDRI
Coalition for Disaster Resilient Infrastructure

No single instrument is enough

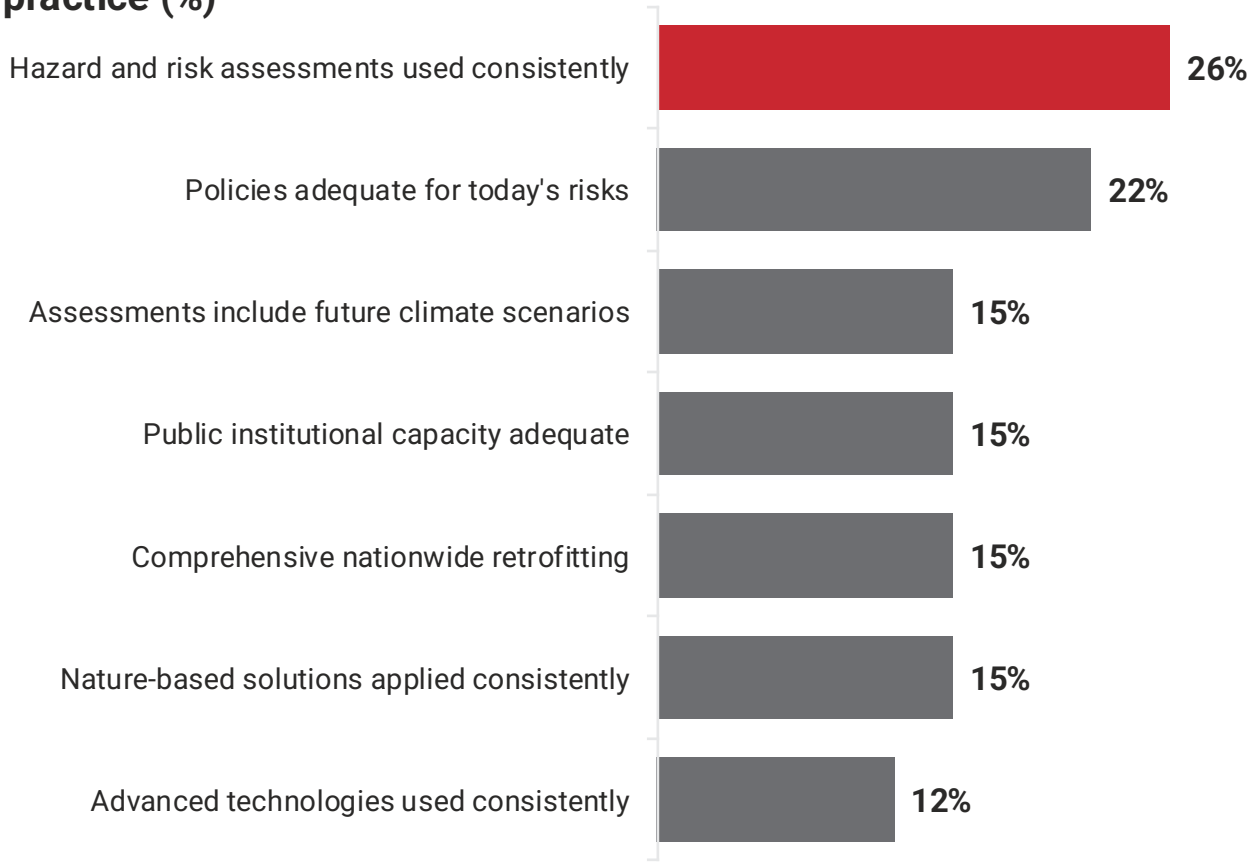
A combination is needed, and each can be used at different times before, during, and after a disaster.



© CDRI – Coalition for Disaster Resilient Infrastructure

Professionals: Risk is being diagnosed, but rarely drives decisions

Infrastructure professionals reporting comprehensive or consistent practice (%)



Source: CDRI, GIR 2025 Global Infrastructure Resilience Survey (3,000+ respondents, 100+ countries, 70+ expert interviews).

60%

say available funding meets less than a quarter of resilience needs

61%

of infrastructure companies allocate less than 10% of budgets to resilience; a quarter allocate nothing

"Invisible" measures — maintenance, retrofitting, data and capacity — are systematically underfunded at every income level.

© CDRI – Coalition for Disaster Resilient Infrastructure

Project Focus: Embedding resilience across the infrastructure lifecycle

Appraisal	Design	Procurement	Construction	Operation & maintenance	Renewal & refinancing
Does resilience pay here?	***Which measures, to what standard?***	***Who carries which risk?***	***Is it built as designed?***	***Is resilience maintained?***	***Where should the next dollar go?***
Resilience CBA at feasibility / DPR; mandatory hazard risk & vulnerability assessment; appraisal checklist	Sector catalogues of structural, operational and nature-based measures; design beyond codal minimums	Resilience clauses in EPC, PPP and concession agreements; hazard thresholds in force majeure	Independent resilience expert; real-time compliance monitoring	Resilience obligations in O&M contracts; longer, whole-asset defect liability; decision support	Network-wide retrofit prioritisation; evidence for lenders, insurers and concession reviews

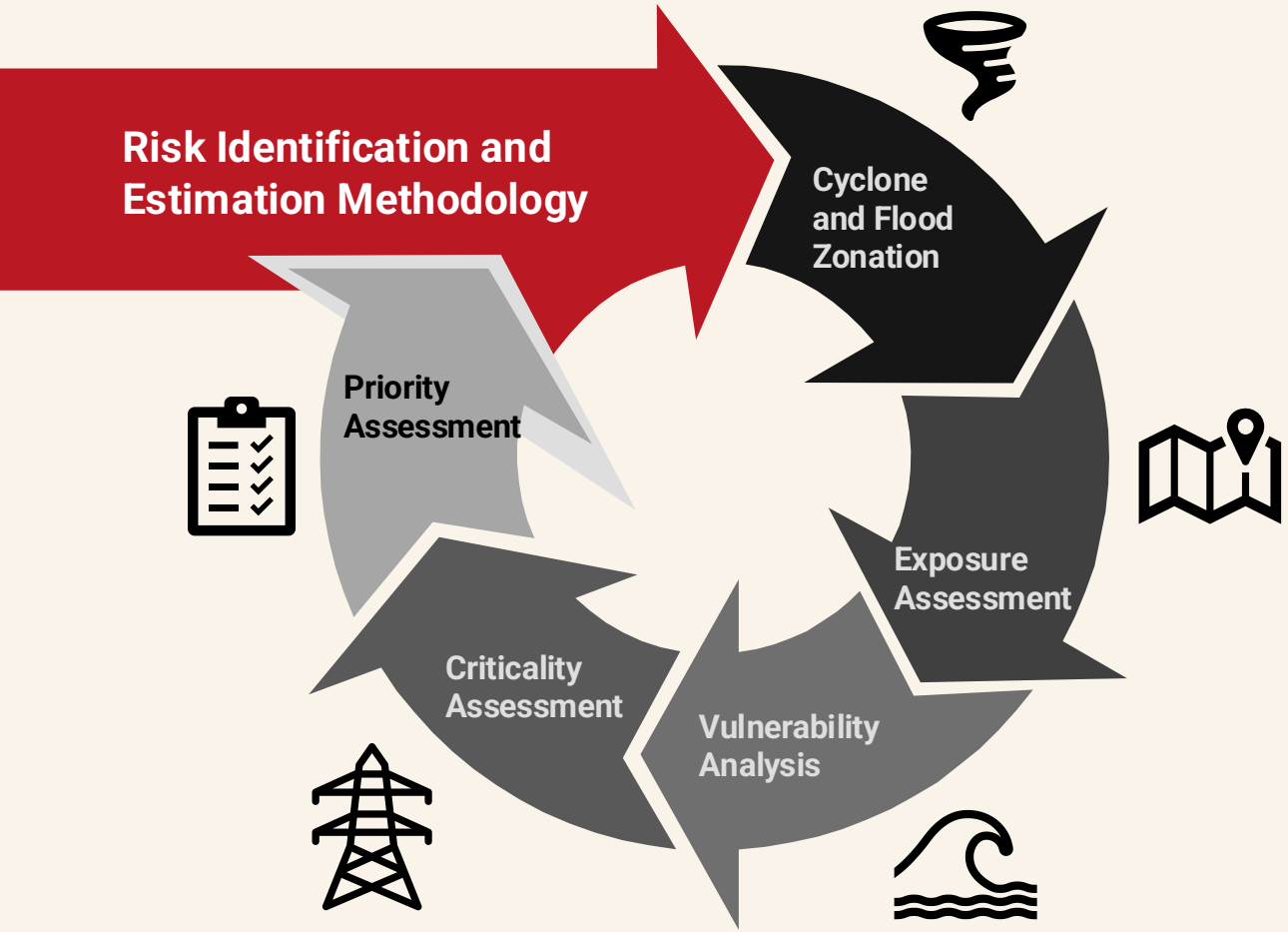
Why the lifecycle matters: many resilience choices cannot be retrofitted mid-cycle. Decisions on alignment, drainage capacity or materials have to be made, priced and contracted early, then protected through O&M.

Source: CDRI, Mainstreaming Disaster Resilience into Infrastructure Projects (2026); CDRI and BCG, Transport Infrastructure Reimagined (2024).

© CDRI – Coalition for Disaster Resilient Infrastructure

Odisha Power Study, CDRI

Methodology: Risk Identification and Estimation of Exposure, Vulnerability, and Prioritization of Assets



Step 1: Cyclone Zonation and Flood Zonation

Cyclone Micro Zonation and 2D Flood Modelling → Cyclone and Flood Hazard Map

Step II: Exposure Assessment

Asset Map → Cyclone and Flood Exposure Maps

Step III: Vulnerability Analysis

Cyclone, Flood, and Multi-Hazard Vulnerability → Cyclone and Flood Hazard Maps

Step IV: Criticality Assessment

Importance Based and Risk Based → Critical Assets Map

Step V: Priority Assessment

Prioritisation Matrix → Prioritisation Assets List

© CDRI – Coalition for Disaster Resilient Infrastructure

Appraising the opportunity at the national level

Objective: Mainstreaming disaster resilience into infrastructure projects in India



Cost-Benefit Analysis

Making a case for resilience through Cost-Benefit Analysis (CBA) for 3 sectoral projects under NIP

01



Appraisal of standard agreements

Appraisal of standard agreements (MCAs), bidding documents / contractual documents, and policy documents related to PPP & EPC for 3-line Ministries

02



Disaster resilience toolkit

Development of a toolkit for infrastructure resilience

03

Key outcomes envisaged	Applicability
Strengthening of sectoral infrastructure resiliency Reduction in physical damage and financial losses Disaster resilient investment decision-making tool Defined procurement process including disaster resiliency components	Line Ministries Implementing agencies Potential bidders Financial Institutions

© CDRI – Coalition for Disaster Resilient Infrastructure

RCBA tool: Making case for resilience in a project

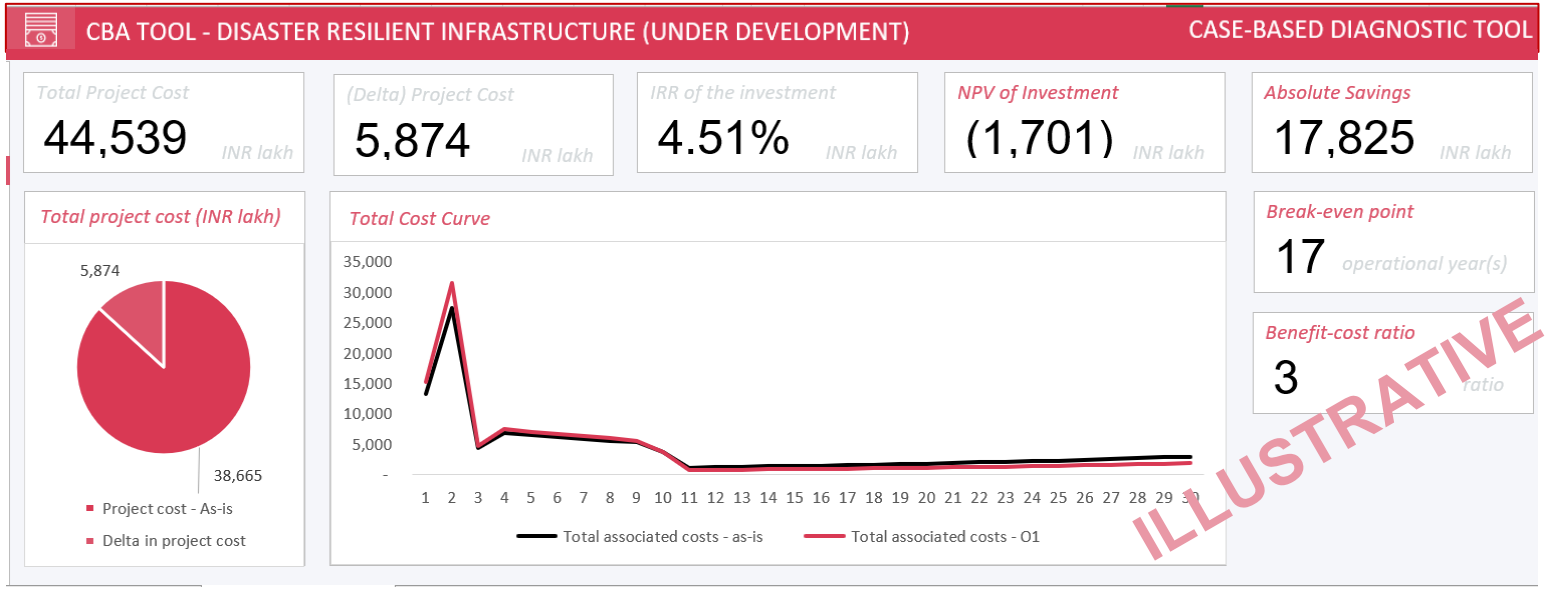
Method

- Determine vulnerability based on Location and disaster catalogue/HVRA in DPR
- Attributing cost of resilience measures

Comparison of cashflow over project lifecycle
- O&M costs
- Recovery costs in cases of disasters

Details of Selected Project	Disaster resilience options	Cost of alternative scenarios	Discounted cashflow comparison	NPV, Break-Even, Cost Benefit Ratio
Details from DPR of project • Location • Exposure to hazards • Cost • Design life		Comparing cost of scenarios • with resilience measures • without resilience measures		Key financial indicators for decision making

Illustrative Dashboards – Highway project in vulnerable area



CBA tool – Dashboard 3

Key financial indicators to decide incorporation of resilience measures

- NPV of all future cashflows
- Absolute savings on Recovery/reconstruction needs for incorporation of resilience measure
- Break-even point for the additional investment
- Benefit-cost ratio

Measures incorporated to 1% of the total alignment

© CDRI – Coalition for Disaster Resilient Infrastructure

Project example: 270 km power transmission line in flood prone hills

+8.0%
Added CapEx ($8.7 M on $108.9 M)

−20%
Average annual disaster loss (From $11.0 M goes down to $8.8 M)

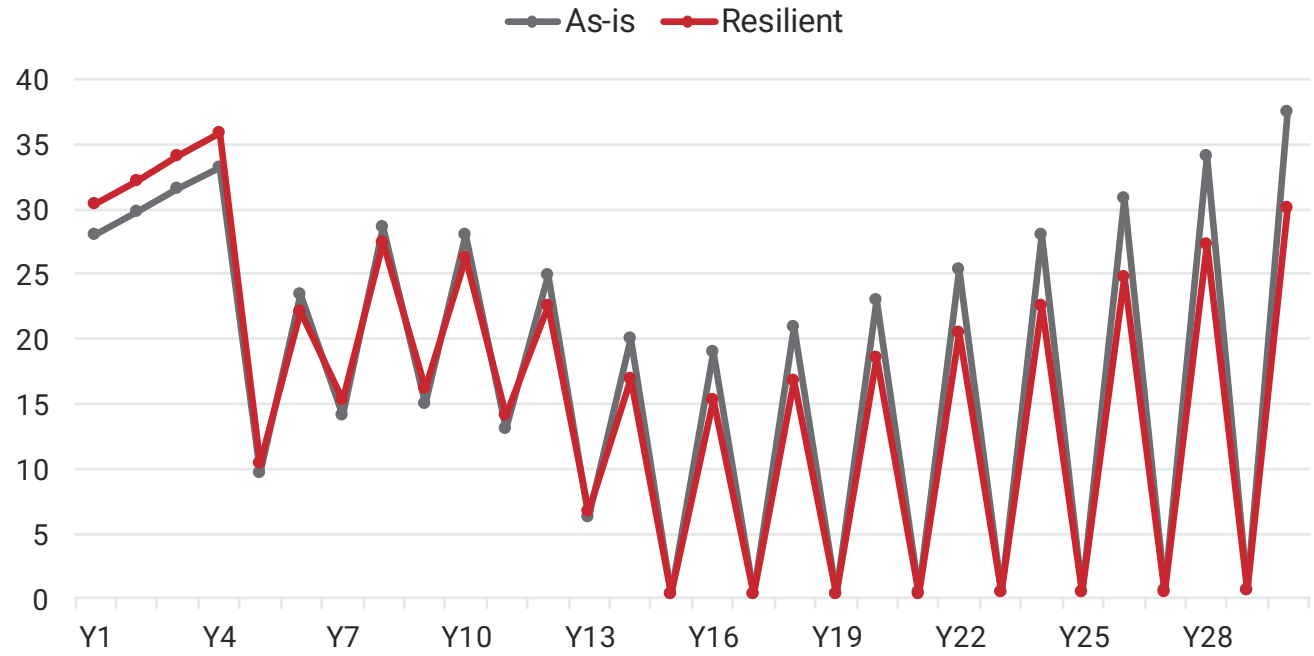
6.6 : 1
benefit-cost ratio

22.3%
IRR on the resilience spend, above a 13.9% WACC

Year 3
Operational break-even

$57.5 M
Lifecycle cost saving over 26 years

Total associated costs, US$ million per year (CapEx, O&M, debt service and disaster recovery)



Measures: high-tension low-sag (HTLS) conductors and an underground transmission corridor on exposed sections. **Higher spend in years 1–4; savings recur in every flood year (every two years).**

NIP pilot run in the CDRI RCBA tool (Ladakh, J&K; flood, 25–30° hill terrain). 70:30 debt-equity, 9% senior debt, 4-year build, 26-year operation. US$ at INR 94.86 = US$1 (interbank close, 2 Nov 2026).

© CDRI – Coalition for Disaster Resilient Infrastructure

Project example: 1,810 km power transmission line in cyclone-prone coast

+12.6%
added CapEx ($60.4 M on $479.2 M)

−20%
average annual disaster loss (From $137.2 M goes down to $109.8 M)

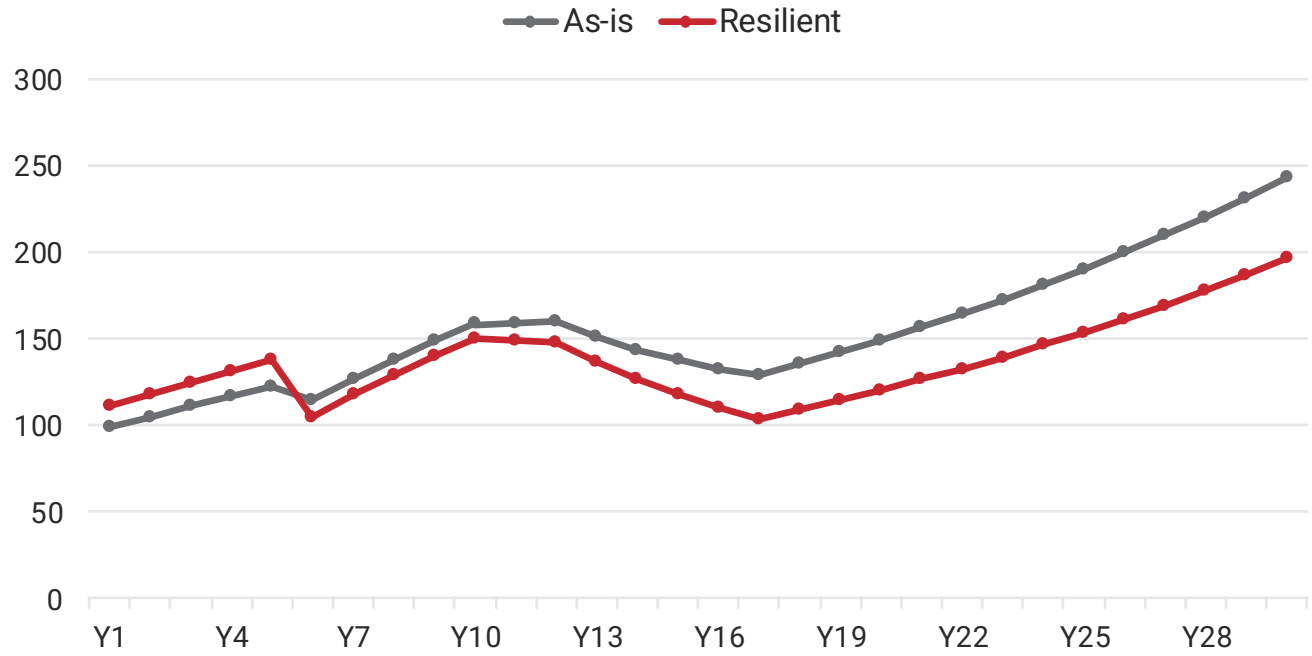
11.51 : 1
benefit-cost ratio

18.5%
IRR on the resilience spend, above a 13.9% WACC

Year 3
operational break-even

$694.6 M
lifecycle cost saving over 25 years

Total associated costs, US$ million per year (CapEx, O&M, debt service and disaster recovery)



Measures: underground cabling along the route, removing overhead spans from cyclone wind exposure. **Higher spend in years 1–5, then a permanently lower cost path.**

NIP pilot run in the CDRI RCBA tool (Kutch district, Gujarat; cyclone, within 5 km of coast). 70:30 debt-equity, 9% senior debt, 5-year build, 25-year operation. US$ at INR 94.86 = US$1 (interbank close, 2 Nov 2026).

© CDRI – Coalition for Disaster Resilient Infrastructure

Project example: 55 km national highway in flood-prone plains

+4.5%
added CapEx ($2.9 M on $65.1 M)

−48%
average annual disaster loss (From $1.4 M goes down to $0.7 M)

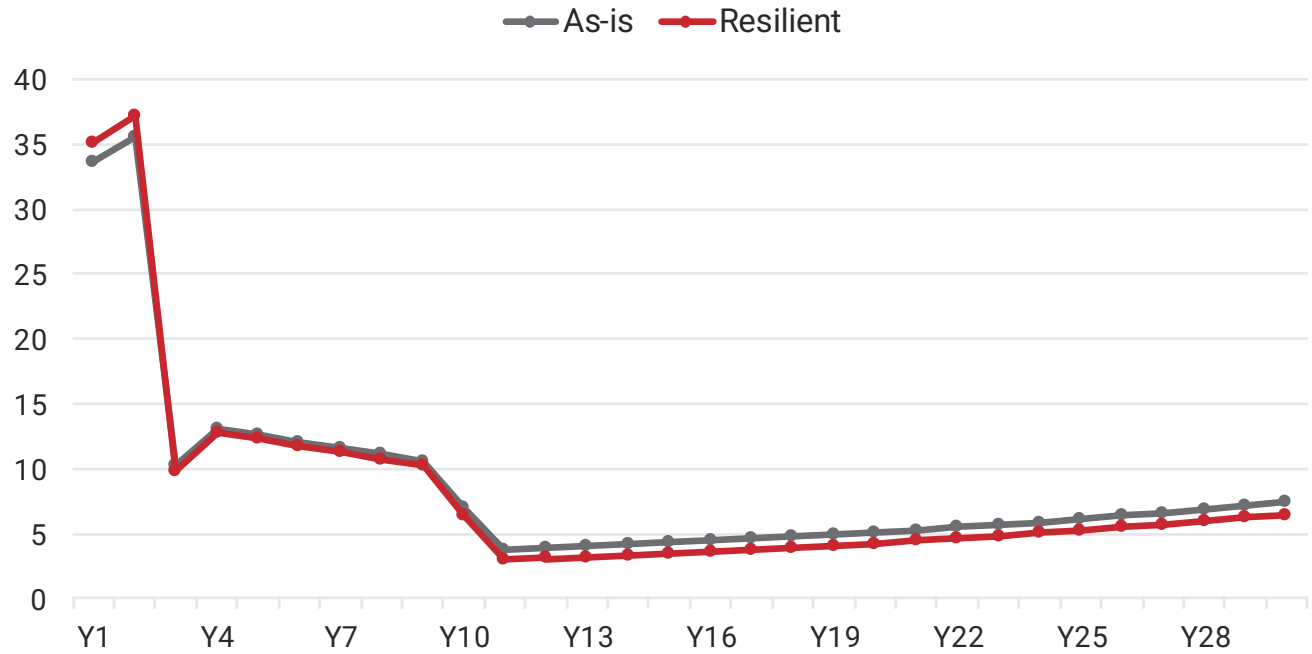
7.83 : 1
benefit-cost ratio

15.0%
IRR on the resilience spend, above a 13.9% WACC

Year 8
operational break-even

$23.0M
lifecycle cost saving over 28 years

Total associated costs, US$ million per year (CapEx, O&M, debt service and disaster recovery)



Measures: breast and retaining walls, drainage and protection works, slope protection.
Higher spend in years 1–2, then a permanently lower cost path.

NIP pilot run in the CDRI RCBA tool, updated model v42 (Cachar district, Assam; flood). 70:30 debt-equity, 9% senior debt, 2-year build, 28-year operation. US$ at INR 94.86 = US$1 (interbank close, 2 Nov 2026).

© CDRI – Coalition for Disaster Resilient Infrastructure

Worked example: 18 km national highway in landslide-prone hills

+8.1%
added CapEx ($3.3 M on $40.8 M)

−20%
average annual disaster loss (From $4.3 M goes down to $3.4 M)

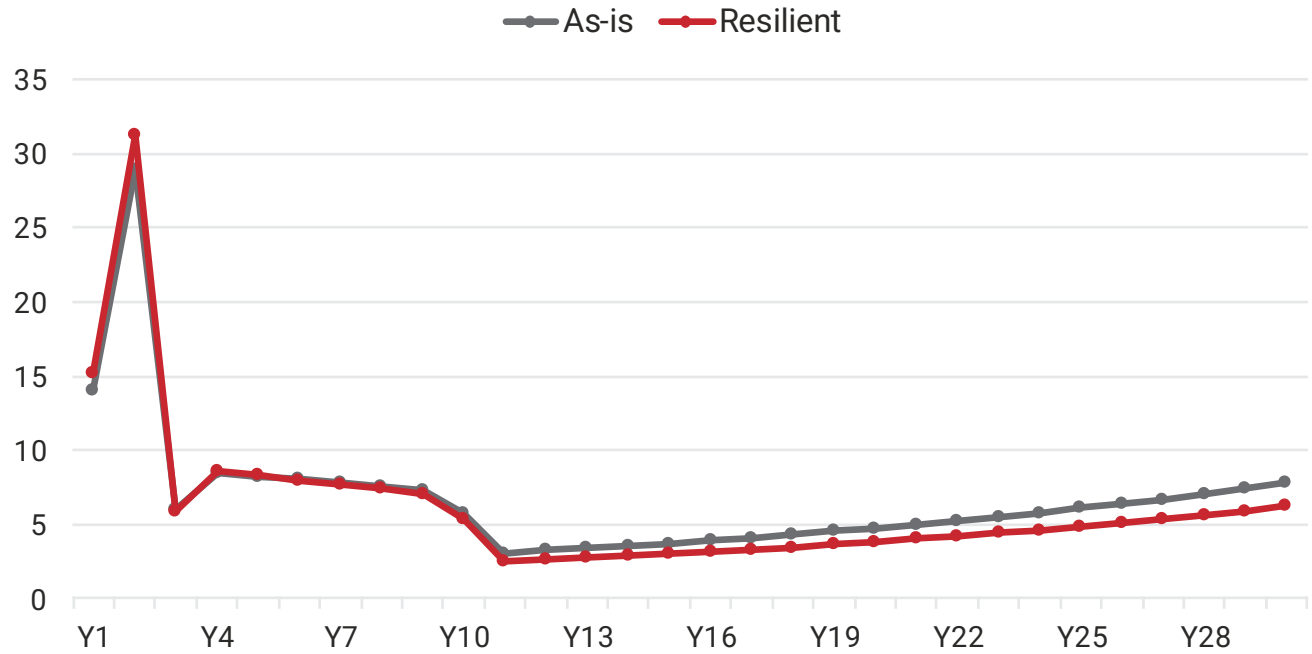
7.23 : 1
benefit-cost ratio

14.8%
IRR on the resilience spend, above a 13.9% WACC

Year 8
operational break-even

$23.9 M
lifecycle cost saving over 28 years

Total associated costs, US$ million per year (CapEx, O&M, debt service and disaster recovery)



Measures: breast and retaining walls, slope protection, RE walls, bridge, flyover and underpass upgrades, landslide-zone treatment. **Higher spend in years 1–2, then a permanently lower cost path.**

NIP pilot run in the CDRI RCBA tool (Chamoli district, Uttarakhand; landslide). 70:30 debt-equity, 9% senior debt, 2-year build, 28-year operation. US$ at INR 94.86 = US$1 (interbank close, 2 Nov 2026).

© CDRI – Coalition for Disaster Resilient Infrastructure

Writing resilience into contracts and concessions

What we found in India's standard documents

Roads (EPC): no disaster-resilience provisions; safety risk sits with the authority

Railways (EPC tender): scope omits resilient features; no resilience tests prescribed

Power (transmission bids): resilience obligations of the transmission provider undefined; nothing for the independent engineer to check

Force majeure: natural hazards treated as "Acts of God", though assets are designed for specific intensities

What we recommend

1. **Hazard thresholds in force majeure:** above the threshold, the authority bears the loss; below it, the concessionaire (e.g. Japan's Aichi Toll Road: ≥80 mm rain in 24 h, ≥15 m/s wind)
2. **Enforceable resilience clauses:** omitting agreed measures becomes an event of default
3. **Site-specific risk assessment:** mandatory for priority projects, with thresholds written into RFPs and final contracts
4. **Independent resilience expert:** from design through construction and O&M
5. **Longer, whole-asset defect liability:** India's roads ministry has extended it to up to **15 years for EPC roads**

Source: CDRI, Mainstreaming Disaster Resilience into Infrastructure Projects (2026); CDRI GIR 2025 finance working paper.

© CDRI – Coalition for Disaster Resilient Infrastructure







CDRI
Coalition for Disaster Resilient Infrastructure

For private sector investors, infrastructure resilience is an opportunity to protect assets and sustain value. Integrating preparedness into investment decisions can reduce disaster damage, minimize service disruptions and accelerate recovery. As nations build and retrofit infrastructure, investing in resilience supports business continuity, stronger communities and development over the long term.

Thank You

Resources