



Cabo Verde

Diagnosing Road Network Vulnerabilities to Guide Resilient Investment

CASE SNAPSHOT



SECTOR

Transport



COUNTRY

Cabo Verde



TIMELINE

2010s-present




COST

Undisclosed



RESULT

- Road sector investment, maintenance, and emergency response systematically informed and prioritized based on hazard risk and vulnerability diagnostics

The background image shows a coastal city, likely Praia, Cape Verde. It features a mix of modern and traditional architecture, a large bridge spanning a bay, and a prominent lighthouse on a cliff. The city is built on a hillside overlooking a deep blue ocean. The sky is clear and blue.

CASE STUDY SUMMARY: DIAGNOSING ROAD NETWORK VULNERABILITIES TO GUIDE RESILIENT INVESTMENT

THE OBJECTIVE

To strengthen resilience of Cabo Verde's national road network — a lifeline across its geographically dispersed islands — by systematically diagnosing hazard exposure and asset vulnerabilities. The aim was not only to quantify risks but also to translate them into clear priorities that could guide investment planning, resource allocation, and more resilient maintenance strategies.

THE CHALLENGE

Cabo Verde's road network is the backbone of its multi-island economy, linking ports, markets, schools, and hospitals. Yet it is acutely exposed: steep volcanic slopes, heavy seasonal rains, recurrent landslides, flash floods, hurricanes, and coastal storm surges cut off communities again and again. The country's small size, fiscal constraints, and reliance on tourism magnify the impacts of each disruption.

Until recently, decision-making relied largely on anecdotal reports or ad hoc local knowledge. There was no systematic diagnostic of which roads were most at risk, what types of hazards posed the greatest threats, or which investments would deliver the greatest return in avoided losses and connectivity maintained.

Key vulnerabilities included:

- Absence of systematic asset inventories and condition surveys, leaving authorities blind to where infrastructure was most exposed or at risk of failure.
- Recurrent traffic disruptions and community isolation due to landslides on steep slopes, storm damage, and extreme weather events.
- Limited institutional capacity and fragmented emergency preparedness and maintenance funding, handicapping proactive risk management.
- Critical supply chains—delivery of food, fuel, medicines, and emergency relief—dependent on a few non-redundant connections susceptible to climate and disaster shocks.

National authorities recognized the urgent need for a comprehensive diagnostic to identify, assess, and prioritize road network vulnerabilities and guide investment in resilience.



THE SOLUTION

The Cabo Verde program pioneered a rigorous diagnostic of road vulnerability as the first step toward climate-smart investment. The approach integrated spatial mapping of hazard exposure, asset condition surveys, and risk analysis to systematically identify and prioritize the most critical infrastructure vulnerabilities. Diagnostic results informed investment planning, strengthened asset management practices, and supported proactive maintenance and emergency response measures, with clear institutional responsibility and capacity-building at each phase.

Methodologies

The study pulled together national road inventories with new hazard data on floods, landslides, and coastal storms. Using GIS tools, each segment was mapped against exposure zones. Hydrological models were applied to simulate floods under different rainfall return periods. Slope stability analysis identified roads at risk of landslides.

Outputs

This produced the country's first comprehensive vulnerability overlays: road-by-road mapping of exposure to flood, landslide, and coastal hazard. The diagnostic identified specific "choke points" where even short interruptions would cut off entire communities. Economic assessments valued the costs of disruptions, enabling comparison of alternative interventions.

Insights

Several key insights emerged:

- A small number of segments carried disproportionate vulnerability weight — protecting them would secure access for thousands.
- Maintenance gaps were exacerbating risks: where drains and culverts had not been maintained, vulnerability was multiplied.
- Some existing protective works (e.g., hard embankments) offered poor cost-benefit compared to nature-based solutions such as slope revegetation or better surface drainage design.
- The cost of inaction was high: without adaptation, climate damages to the road system would be several times greater than preventive investment.

The diagnostic transformed abstract notions of "climate vulnerability" into actionable priorities that ministries and road authorities could directly use in budgeting and planning.



APPROACH TO RESILIENCE

Technical dimension

Resilience was strengthened through hazard-informed road design standards, slope stabilization, upgraded drainage, and targeted embankment works at the most exposed sites. The diagnostic also improved asset management, embedding regular inspection and predictive maintenance into the national program.

Nature-based dimension

Where possible, green solutions were emphasized: slope and watershed revegetation, reforestation to reduce runoff, and bioengineering for erosion control. These measures complemented gray infrastructure and offered co-benefits in biodiversity, soil stability, and reduced maintenance costs.



The diagnostic mapping emphasized that resilience and natural resource protection are interlinked. By integrating green infrastructure — such as vegetative slope stabilization — the project reduced sediment flows into rivers and coastal areas, protecting ecosystems while safeguarding roads. The program showed that environmental sustainability was not an add-on, but a cost-saving approach that directly reduced vulnerability.



THE ENABLERS

Several factors underpinned Cabo Verde's success:

- Policy Alignment: The diagnostic was embedded into national sector planning and supported by climate resilience goals.
- Institutional Support: Capacity development enabled local engineers to manage GIS overlays and feed diagnostics into budgets.
- Financing Strategy: With fiscal space limited, the diagnostic provided an evidence-based case for prioritizing scarce funds on high-impact interventions, enhancing financial sustainability.
- Donor Partnership: Technical and financial backing from the World Bank ensured global methodologies were localized.
- Stakeholder Recognition: Maps and diagnostics were shared across ministries, reinforcing awareness and sparking ownership.



THE RESULT

Cabo Verde now has its first-generation system-wide diagnostic of road and hazard interaction — an asset in itself, ensuring that investments are informed by high-quality planning. Road works are being designed and targeted using this evidence, cutting risk and maximizing resilience returns.

The diagnostic has already shaped national budget decisions and donor investments, steering resources to those few critical segments where disruption would otherwise cause disproportionate social and economic harm. By prioritizing efficiency, the case demonstrates how a small island state can finance resilience sustainably by targeting the right interventions. The use of hazard-informed overlays has made resilience part of everyday planning, creating a culture of evidence-based decision-making that will extend benefits well beyond the roads sector.

QII PRINCIPLES IN ACTION

Principle 4: Resilience— By systematically diagnosing asset and hazard vulnerabilities, Cabo Verde ensures that its investment in transport infrastructure maximizes resilience benefits, safeguards services and supply chains, and adapts dynamically to evolving climate and disaster hazards.

RELATED REFERENCES

Want to explore this case further? Access the detailed case study [here](#).

Related Materials

- World Bank (2017). “Climate and Disaster Resilient Transport in Small Island Developing States: A Call for Action.”
- GFDRR (2021). Annual Report FY21: In-Country Engagements—Africa, Cabo Verde section



