

Climate and Disaster Resilient Transport Partnership Program

Why is resilient transport important?

Transportation infrastructure is fundamental to the development and progress of societies and nations. This is because transportation networks act as primary channels of access and connectivity to economic centers, health services, as well as emergency situations. Therefore, nations channel significant public and private resources toward functioning transport networks. Ever since 2002, the World Bank has worked with partner countries to build and rehabilitate more than 260,000 kilometers of transport network. For these investments, and future World Bank transport investments to fully realize their intended impact, and support the World Bank's twin goals, it is critical that they are resilient to disaster and climate change risks. Transportation assets, such as roads, are often long-lived and, if regularly maintained, are designed to deliver specified and predictable services over their entire lifetime.

How do natural hazards affect transport infrastructure?

Natural hazards often have a destructive effect on transport infrastructure, particularly on road networks. For example, heavy rainfall may cause erosion and scouring of roads and bridges, flooding may result in road closures and limited use of roadways, and strong winds may bring debris that obstructs traffic flows. In addition, in the case of earthquakes, damage is caused not only by the initial earth tremor but by aftershocks as well.¹

These events translate to economic and social impacts as they reduce the usability of the roadways, cut off access to communities and services in cases with limited redundancy, and increase travel times. Economic impacts may include increased time and costs to move people and goods to commercial areas and increased costs of road and vehicular maintenance.²

Particularly problematic is that not all damage is evident immediately after the disaster. This is usually the case after long-term flooding when, road surfaces appear undamaged after water subsides, however water has seeped through porosities in the pavement surface and eroded the base and sub-base of the road, a condition that is further aggravated by continued use of the road. This leads to surface damage and subsidence that leads to increased vehicle operating costs, as well as being a road safety hazard.

To manage and reduce the risks these hazards may pose, developing countries are seeking new approaches to plan, design, construct, operate, and maintain their transportation systems. In addition, it is critical to urge a shift away from traditional and reactive approaches towards a multi-dimensional disaster risk management approach that incorporates people, the environment, hydrology, geology, as well as transportation infrastructure so that such proactive methodology can result in 60-70% life-cycle cost savings.

¹http://www.recoveryplatform.org/assets/publication/PD/NA/PDNA_VolumeB/PDNA%20GUIDELINES%20VOLUME%20B%20-%20Transport.pdf

²https://www.gfdrr.org/sites/default/files/publication/Practitioners_Guide_to_Prioritizing_Climate_Resilient_Transport_Investments.pdf

What should countries do?

Strategic Approach

It is important that countries identify their “lifeline critical” infrastructure assets, to increase the likelihood of continuity of services during and after a crisis. The life cycle approach is applied to highlight the fact that pieces of infrastructure undergo processes of growth, reorganization/development, deterioration/conservation, and destruction, ultimately creating opportunities for iteration that supports a reflective, stable, and systems oriented resilience capacity (socio-ecological resilience). Infrastructure approached in this manner is able to respond and evolve rather than stay static and, ultimately, vulnerable to threats of climate hazard-induced structural or systemic failure. Disaster risk financing techniques can help price the risk faced by lifeline-critical infrastructure (beyond normal maintenance) and allows for better financial planning that contributes to increasing the resilience of infrastructure.



There are significant and varied disaster related resilient transport challenges that can occur across the project cycle. A majority of these are related to vulnerability and adaptive capacity. Upstream planning of transport systems can reduce the hazard exposure of the infrastructure that results in greater disaster risk. The life-cycle approach was applied to highlight how climate and disaster risk management can be integrated in the different phases of infrastructure life-span:

- ***Institutional and Regulatory Capacity Building:*** Centralizing disaster risk information and data comprehensively by enhancing strong coordination among central governments, line ministries and agencies, and local municipalities; upstream planning of transport systems to reduce the hazard exposure of the infrastructure that results in greater disaster risk; mitigation of institutional and regulatory challenges, which are cross-cutting in nature, to utilize the life cycle approach effectively
- ***Systems planning:*** Shifting deployment of long-lived infrastructure away from disaster-prone areas to avoid development lock-in; consideration of integration and redundancy on critical infrastructure to offer alternatives
- ***Engineering and design:*** Using transport infrastructure both for connectivity and for disaster risk management purposes, particularly from hydrometeorological-related hazards; use of innovative materials and design specifications that enhance robustness and flexibility of infrastructure
- ***Asset management:*** Inventory and mapping of transport infrastructure using open and interoperable technologies and improving institutional and financial arrangements for infrastructure maintenance; integration of climate and disaster risk considerations in the prioritization of investments in new infrastructure, rehabilitation, and restoration

- **Contingency programming:** Developing policy and institutional frameworks, communication protocols, and investments in emergency preparedness and response; alignment of transport systems and flows with local and regional evacuation, response, and recovery needs

The World Bank recognizes infrastructure as a driving force for development and an invaluable asset for cities. This Resilient Transport Partnership Program will leverage the information, tools, and technical expertise that exist in many countries to inform current and future World Bank transport investments by ensuring that the wealth of knowledge and experience within each country or institution can be shared widely to benefit as many countries and people as possible.

What does the Resilient Transport Partnership Program do?

This Resilient Transport program endeavors to consolidate and scale-up efforts to build safe and reliable transport systems. The program grounds future, relevant World Bank Group projects to the appropriate sectors by establishing a base set of tools, solutions, and priorities on which to build. This helps keep the World Bank's moving parts in accordance with one another, integrating related projects throughout the institution in a way that allows them to actively inform one another. The program also acknowledges that different partner countries will have diverse starting points, values, and approaches. Thus, it is offered as a flexible suite of engagements that can be applied in a modular way.

This partnership program will seek to accomplish the following objectives that should enable scaling up and systematization of global engagements:

1. Define key areas where technical assistance interventions can mainstream resilience across the lifecycle of infrastructure from systems and planning to engineering and design to asset management to contingency and response.
2. Build an informal community of practice to deepen technical knowledge and establish the best practices based on inputs from Transport and DRM experts.
3. Support an external effort to convene and engage donors, bi-laterals and other partners that could provide support to deliver technical assistance.
4. Define operational approaches to identify new projects and investments that have material impact beyond technical assistance for more transformative operations.

It is a priority that the program encourages the creation of partnerships at the country level and that people are at the center of the World Bank Group's Resilient Transport efforts moving forward. The engagement is designed to go beyond roads and cover many different components of transport systems including rail, ports, bridges, and tunnel.



Figure 1. Resilient Transport Dashboard from [Resilient Transport CoP website](#)

The Program is built around three components:

This Program is intended to support the Transport and ICT GP (T&I GP) and the GP Social, Urban, Rural and Resilience (GP SURR) as a multi-year, multi-country program to replicate best practices and scale up efforts in enhancing climate and disaster resilient transport globally. There are three components of the program:

Component 1: Operational Engagement

The program will include provision of coordinated Technical Assistance between the Disaster Risk Management and Transport Practices of the World Bank Group (WBG), with support from the Global Facility for Disaster Reduction and Recovery (GFDRR). Influencing in-country engagements will be a focus along the following infrastructure life cycle components:

- a. Institutional and regulatory capacity building
- b. Systems planning
- c. Engineering and design
- d. Asset management
- e. Contingency programming

Phase 1: US\$1 million is being invested in Bangladesh, India, Nepal, and Sri Lanka through Phase 1 South Asia: Promotion of Resilient Infrastructure Technical Assistance Program. Furthermore, under Global: Resilient Transport Infrastructure Program, US\$1 million is being invested in Paraguay, Serbia, Sri Lanka, Kenya, and Laos. 2-pager country strategy notes, guidance notes, and final reports were created through these technical assistances.

Phase 2: Additional US\$1 million is being invested in Bangladesh, India, and Nepal through Phase 2 South Asia: Promotion of Resilient Infrastructure Technical Assistance Program. Under this new partnership program, US\$ 2 million is awarded for Vietnam, Kyrgyzstan, Brazil, Haiti, Argentina,

Philippines, and Mongolia. Support is targeting challenges in countries, as outlined as part of the life-cycle approach above.

Vietnam: Geospatial Medium Term Expenditure Framework for Resilient Roads	Phuong Thi Minh Tran, Kai Kaiser, Chi Kien Nguyen
Vietnam: Piloting and Scaling up building climate resilient bridges in poor rural areas	Phuong Thi Minh Tran, Kien Chi Nguyen
Kyrgyz Republic: Site hazard assessment and resilience-informed designs to ensure sustainability of road projects	Aidai Bayalieva
Brazil: Improving Climate Resilience of Federal Road Network	Satoshi Ogita, Frederico Pedroso
Haiti: Enhancing Climate Resilience of Transport Infrastructure	Pierre Bonneau
Argentina: Informing Climate Resilient Infrastructure Development	Veronica Ines Raffo, Yohannes Yemane Kesete
Philippines: Mainstreaming Disaster Risk Management to Sustain Local Infrastructure- A Case Study on Resilient Roads Planning	Victor Dato
Mongolia: Municipal Transport Asset Management for Climate Resilience in Ulaanbaatar City	Yang Chen

Phase 3: Additional funding opportunities will be assessed.

Component 2. Knowledge Management

The program will create a knowledge sharing environment and community of practice (CoP) for DRM and Transport sector specialists to better develop a comprehensive menu of services to offer potential clients of both sectors.

This involves the development of a Knowledge Exchange program that will integrate workshops, site visits, peer-peer knowledge sharing and action planning to support World Bank clients on specific topics. Its features will include the following:

- 1.Objective-focused structure: Demand-driven and problem-solving orientation, with possible technical assistance, including consultation and expert visits to client nations through the World Bank's City Resilience Program and other programs

2. Knowledge exchange to foster operations: Knowledge exchange, just-in-time assistance, and potential technical assistance for clients and World Bank task teams

3. Structured learning: Delivery of structured learning for clients and partners such as e-learning courses and a package of selected knowledge exchange instruments before, during, and after the Technical Knowledge Exchange

4. Application to knowledge networks: Contribution of relevant inputs to CoPs to support development of their knowledge assets (such as case studies and best-practice lessons) and to disseminate them to the broader community

The program acts as a knowledge platform and creates a space for exchange of knowledge and best practice, allowing for an opportunity to better serve partner needs in the transport and DRM nexus. Currently, the program has three concrete ways in which it acts as a knowledge platform:

i) Online portal: An online repository has been created on the DRM portal, which houses the DRM transport page. This is regularly updated from relevant resources such as project documents existing in the Bank operations portal. This portal also has first-hand information project leads working in resilient transport projects.

ii) Community of Practice (CoP): Through this program, the World Bank now has a Resilient Transport CoP, which brings together people from global practices to share knowledge and experience of working in this area. The CoP also provides an avenue for writing and sharing blogs and other materials for those that are part of the CoP.

iii) Technical knowledge exchange events: These are biannual events that bring together government officials from partner countries, World Bank project leads, as well as other experts working in the transport sector. The first technical knowledge exchange event took place in Tokyo in May 2017 and the conference summary report was produced to capture the best practices shared by the participants. The second knowledge exchange event is planned for Belgrade in December 2017.

Component 3: Flagship initiatives

The program will also provide support to launch certain flagship initiatives every year, where the focus will be to consolidate existing engagements and scale-up support for integrating resilience measures in transportation systems. Currently, the program is supporting an initiative on “Climate and disaster resilient asset management systems in Small Island Developing States”. The main objective of this initiative is to develop resilient transport asset management systems in targeted SIDS through risk informed lifecycle asset management including operations and maintenance considering community based approaches. The proposed initiative builds on the experience and lessons learned from implemented transport projects in countries such as Nepal, Bhutan, Belize, Samoa, and Tonga, and looks to scale up the approach to benefit other SIDS. This approach will involve the development of a geospatial platform to map road asset quality and risk to natural hazards, identification of solutions to build resilient transport asset management systems, and support knowledge exchange between the countries.

Role of GFDRR and the Tokyo DRM Hub

Working with over 400 local, national, regional, and international partners, GFDRR provides grant financing, technical assistance, training, and knowledge sharing activities to mainstream disaster and climate risk management in policies and strategies. GFDRR has a decade of experience convening partners and bringing together a wealth of knowledge and expertise to share information and develop innovative solutions. GFDRR continues to play this role for the Resilient Transport program.

The Tokyo DRM Hub, launched under the Japan-World Bank Program managed by GFDRR, is a center of DRM excellence. The Hub develops knowledge products to meet developing country demand for expertise, best practices, and solutions in DRM and conducts knowledge exchanges, for example the TKX for the Resilient Transport program.

The World Bank is committed to scale-up its engagement on resilient transport

There is currently increasing awareness and demand for strengthening disaster risk management through infrastructure, especially transport. One of the main messages emerging from Forward Look – A Vision for the World Bank Group in 2030 is commitment to meet global and client needs for “crisis preparedness, prevention, and response,” in part by “contributing to global efforts to bridge the infrastructure funding gap, critical to achieving the [Sustainable Development Goals] SDGs”. By tackling DRM and Transport in tandem, integrating the priorities and needs of both sectors, robust resilient transport systems can be established to reduce lost returns on investments and make strides to lessen poverty in the long term.

Program Results

of global products and tools developed

	Value, Number	Date
Baseline	0.00	30-Sep-2017
End Target	15.00	30-Sep-2020

of global and regional knowledge sharing events

	Value, Number	Date
Baseline	0.00	30-Sep-2017
End Target	10.00	30-Sep-2020

of knowledge materials on resilient transport made available to the Resilient Transport CoP

	Value, Number	Date
Baseline	0.00	30-Sep-2017
End Target	35.00	30-Sep-2020

of people trained through workshops and capacity building exercises

	Value, Number	Date
Baseline	0.00	30-Sep-2017
End Target	300.00	30-Sep-2020

\$ billion leveraged for targeting resilient transport

	Value, Amount(USD)	Date
Baseline	9.50	30-Sep-2017
End Target	12.00	30-Sep-2020

of new Flagship products

	Value, Number	Date
Baseline	0.00	30-Sep-2017
End Target	3.00	30-Sep-2020