

BOOSTING THE RESILIENCE OF RURAL ELECTRIFICATION IN BANGLADESH

Addressing climate vulnerabilities in Bangladesh's rural power system

AT A GLANCE

Country: Bangladesh

Risks: Multi-Hazard

Area of Engagement: Promoting resilient infrastructure

GFDRR is assisting Bangladesh to enhance the climate resilience of its rural power system through a combination of risk mapping, knowledge transfer, and innovative solutions.



Small town on the waterways of the Ganges Delta in southern Bangladesh.
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RURAL ELECTRICITY ACCESS UNDERMINED BY DISASTER RISKS

Highly vulnerable to the impacts of climate change, Bangladesh experiences frequent tropical cyclones, river and coastal flooding, and high winds. The country faces the additional threat of sea-level rise as the climate changes, exacerbating the impact of extreme weather and natural hazards. The escalating frequency of disasters is impacting power generation, transmission, and distribution, which, in turn, is jeopardizing the reliability and affordability of electricity services. Over the past decade, the Bangladesh Rural Electrification Board (BREB) has achieved remarkable success in implementing one of the largest rural electrification initiatives worldwide, extending electricity access to over 90 million people. But BREB's prioritization of achieving 100 percent electricity access came at the expense of investments to strengthen the network against extreme weather and modernize its management. Improving network resilience and flexibility — with the support of the World Bank and development partners — has become a central goal of the government.

GOING BEYOND POWER GENERATION TO ENHANCE INFRASTRUCTURE RESILIENCE

Enabled by financing and technical support from GFDRR, the World Bank has supported BREB to integrate weather-related hazard and climate risk data into the design of Bangladesh's rural power system. Despite the challenges, such as limited data availability on specific attributes of the distribution network, the technical assistance provided by GFDRR through two grants yielded valuable insights and knowledge on mainstreaming climate resilience into Bangladesh's rural electrical distribution networks. It also directly informed World Bank-financed energy operations, particularly the \$500 million Bangladesh Electricity Distribution Modernization Program (EDMP), which is helping BREB to prepare a climate-resilient Rural Distribution Master Plan. This master plan will be the backbone of a modern, reliable, and resilient power system, and constitutes a central part of the Integrated Energy and Power Master Plan, due for release by the Bangladesh government in 2023.

100,000

people are expected
to benefit from the
engagement



Srisaillam Dam Reservoir, India. ©Fouzia Begum | iStock.com

Electrical lines in rural Bangladesh. © Md Golam Mortuza Ali

GFDRR's initial support entailed mapping vulnerable power infrastructure exposed to climate and disaster risks — particularly the impacts of cyclones — and identifying areas for improvement in the rural distribution network. The study provided a framework for analyzing risks, conducting a cost-benefit analysis, and guiding climate-resilient power system distribution network planning. It also conveyed the importance of integrating risk information and resilience objectives into Bangladesh's investment prioritization, as reflected in a 2022 World Bank report on the economic analysis of power projects around the world.

Through GFDRR assistance, the government of Bangladesh was also informed about policy frameworks and operational practices that could mitigate disaster risks in distribution and transmission, generation, and fuel supply. This knowledge enhanced capacity building efforts to ensure that operations and policies align with international best practices in power system resilience. This work has also influenced the government's campaign to digitize capabilities for monitoring

and controlling electricity network infrastructure, ultimately improving customer service and safety, reducing costs of operations and maintenance, and leading to faster responses during outages.

GFDRR enabled collaboration with international partners, such as the European Space Agency, to leverage the expertise of a consortium of Earth observation companies that conducted asset-level climate risk characterization of the high-voltage network in Bangladesh. This has enabled the World Bank team in Bangladesh to advance discussions with the government on cost-effective remote monitoring of flood and landslide risks as well as preventative measures for the vulnerable sections of the power grid. This marks an inaugural use case in the broader application of satellite data for improving resilience in Bangladesh.

The World Bank Tokyo Disaster Risk Management Hub, with GFDRR support, is supporting potential collaborations between Bangladesh and Japanese expert counterparts. The World Bank aims to facilitate Bangladesh and its development partners in



harnessing top-tier international expertise, including from the Tokyo Electric Power Company, to gain insights into their distribution system resilience and disaster preparedness policies as well as their mechanisms for division of responsibilities and risk sharing. GFDRR's support will enable the World Bank to engage with Japan's Central Research Institute of Electric Power Industry to share knowledge on good practices for disaster preparedness and enhance capacity building in rapid disaster response and recovery.

GFDRR has successfully supported Bangladesh in integrating climate resilience to the rural power system, with a specific focus on power system planning and post-disaster recovery. Through collaboration with local and international partners, knowledge exchange, and innovative solutions, it is assisting the country to bolster the rural energy infrastructure by making it more resilient against disaster risks that are increasingly being exacerbated by climate change.

HIGHLIGHTED RESULTS

Improved integration of weather-related hazards and climate risk data into the planning and design of Bangladesh's rural power system

By identifying areas for improvement in the rural distribution network and informing the Bangladesh government about policy frameworks and operational practices that could mitigate disaster risks, GFDRR supported BREB in enhancing the disaster and climate resilience of its power infrastructure.

Greater awareness among stakeholders about the importance of resilience and long-term durability

GFDRR's support is proving instrumental in identifying areas for improvement in Bangladesh's rural distribution network. Availability of high resolution and forward-looking risk data will be critical for making infrastructure investment decisions that are resilient over the lifetime of the assets.

Knowledge exchange and collaboration between local and international partners can revolutionize resilience-building approaches

Strategic partnerships improved BREB's resilience measures and disaster response capabilities. By leveraging expertise and innovative approaches, GFDRR has helped BREB develop robust strategies for managing climate risks and building a more resilient power distribution network.

LESSONS LEARNED

➤ Adequate data availability underlies accurate analysis and decision making

Better data provision, through geospatial data collection investments or innovative solutions like satellite imaging and artificial intelligence, can strengthen the ability to identify vulnerable assets, model resilient systems, and plan strengthening efforts.

➤ Building resilience into power system expansion from the start can save costs and improve reliability

BREB's success in expanding electricity access to millions is commendable for its speed and efficiency. Had the data on climate and hazard risks been available sooner, universal rural electrification could have been accompanied by a higher degree of reliability.