Managing Climatic Risks with Adaptation
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- In a world of climate change, adaptation is about managing risks to avoid probable costly post-disaster recovery and rehabilitation.

- There is no “off-the-shelf” approach to adapting to climate change; location and current conditions will influence how climate change impacts are assessed and what adaptation measures can be adopted.

- Deficiencies in land use management can exacerbate the adverse impacts of climate change.

Challenges

In 2006, the Asian Development Bank (ADB) and the governments of Australia, New Zealand, and Solomon Islands committed $19.4 million to improve the Solomon Islands’ road network. Years of conflict, neglect, and deferred maintenance had resulted in 80% of the roads being impassable or needing rehabilitation. Likewise, only about 25% of bridges were in good condition, 8% were closed to traffic, and the rest needed repairs. Under the Solomon Islands Road Improvement Project (SIRIP 1), 100 kilometers of the country’s rural roads and roughly 40 bridges and stream crossings will be rehabilitated and upgraded.

Challenges

In 2009, as rehabilitation was under way, strong winds and heavy rains buffeted the islands, causing floods that affected 7,000 people and extensively damaged infrastructure. Heavily affected was Guadalcanal, one of the areas covered by the project—29 kilometers of its roads and 11 of its bridges had been damaged by the floods.

Recognizing the need to protect its investments and fortify Solomon Islands against further damages and destruction brought about by the changing climate, ADB approved a $24 million grant for the Second Solomon Islands Road Improvement Project (SIRIP 2) to support the objectives of SIRIP 1, repair the infrastructure damaged by the floods, and provide increased attention to changing climate patterns and the damages these can cause to infrastructure.

A key component of SIRIP 2 is the conduct of climate change assessments to help develop adaptation measures for the subprojects of SIRIP 1.

Approach

Adaptation is about managing risks and preventing damages so that one can avoid engaging in potentially more expensive disaster response and recovery. ADB led the project team in assessing the potential impacts of climate change in Solomon Islands and designing adaptation measures for the project.

Scope. Assessments were done for two subprojects, which involved the

- rehabilitation of roughly 72.5 kilometers of coastal road and 25 wet crossings on the island of Makira. This road crosses 4 major rivers — which are prone to flash floods — and 21 small and medium stream crossings. It connects an agriculturally productive plain with the provincial capital.

- rehabilitation of the damages caused by the February 2009 flooding in the island of Guadalcanal, including 29 kilometers of road and 11 bridges. Extensive damage to the roads led to it being disconnected and impassable at 10 different locations. Also damaged by the floods were wet crossings, engineered fords, causeways, sealed and unsealed pavements, and road side drains. Heavy rains and floods occurred once more in January–March 2010, resulting in the damage and disconnection of yet another bridge.

Process. At the time the climate change assessments were conducted, the Makira and Guadalcanal subprojects were at different stages of design. As such, the nature and depth of climate change assessments carried out differed.

For Makira, contracts were about to go to tender so proposing changes to engineering structures were more difficult. ADB’s climate change consultant conducted a simple scoping exercise to verify the situation on the ground and hear the concerns of the residents.

For Guadalcanal, engineering designs were still at the draft stage so the range of adaptation measures that can be accommodated is wider. A team comprising a hydrologist, engineer, project team leader, and an adaptation specialist conducted a rapid assessment of the flood damages and the challenges leading to these, and agreed with the Ministry of Infrastructure on the steps to be undertaken.

In addition to the different approaches, the project team also had to deal with a lack of reliable climate data and knowledge of the hydrological and land systems. This meant that a number of reasonable assumptions had to be made to design the adaptation measures for each subproject.
Results

Findings. Assessments revealed that temperatures have been rising and will continue to do so. The sea level is also rising, with forecasts predicting an acceleration of sea-level rise. Changes in rainfall patterns are less clear but the floods experienced by Guadalcanal suggest increasing rainfall.

Impacts of these changes may include increases in water tables, extreme conditions such as floods and droughts, erosion and sediment accumulation in rivers, diseases and pests killing vegetation, and damage to coral reefs and mangroves, which serve to protect the shoreline.

A more significant finding pertained more to land use management than climate change. In Guadalcanal, the damaged bridges featured a series of 2-meter wide box culverts to allow water to flow through. Unfortunately, these culverts could not accommodate large debris from logging activities upstream, especially during heavy rains. The debris blocked the culverts, causing the river to flow over the bridge and the embankments. This, in turn, severely eroded the embankments, causing the bridges to be misaligned and disconnected from the road.

Adaptation Measures. In the same way that Makira and Guadalcanal were at different stages of project implementation, and varying approaches were utilized to assess climate change impacts, the adaptation measures proposed for the subprojects likewise varied.

For Makira, the project team recommended increasing the coastal reinforcement and mangrove plantations along low-lying coastal roads, elevating a segment of the road that appears to be permanently flooded due to a heightened water table, and increasing land cover and land rehabilitation upstream to reduce flood risk.

For Guadalcanal, the project team recommended increasing the heights or spans of the bridges to anticipate increased extreme rainfall events and sea-level rise. In particular, both ADB and the Ministry of Infrastructure Development agreed to assume a doubling in 10-year floods and to design the bridges accordingly. An estimated and reasonable 6% increase in total costs will be needed to implement such engineering measures. The team also recommended addressing the land use issues to prevent exacerbating floods.

Hopeful Outlook. The combined SIRIP 1 and 2 projects are not expected to be completed until 2012 but there are already signs of people awaiting positive outcomes. For instance, in Makira, new and extensive subsistence cocoa plantings are happening in anticipation of better access to markets. Access to markets is being further improved by constructing a new wharf in Kirakira, the capital of Makira.

Additional climate change assessment approaches are planned for Guadalcanal, including a ground-truthing or vulnerability assessment, which will include consultations with affected stakeholders to identify observations and coping mechanisms on the ground.

Once the SIRIP 2 climate change adaptation initiatives are completed, chances are that Solomon Islands will better understand and manage the serious threat to the livelihoods and development opportunities that climate change presents.