Build Back Better Sector Guides

IRRIGATED AGRICULTURE

Disaster Impacts

- Agriculture sector highly impacted by natural hazards
  - Agricultural infrastructure (irrigation and drainage systems)
  - High vulnerability of rural communities
  - Major economic losses

Event	Disaster Effects (Damage and Loss) ($ million)		Recovery Needs ($ million)	
	Total	Agriculture	Total	Agriculture
Typhoon Damrey (Viet Nam), 2005	700,000	365,000 (52%)	76,470	6,440 (8%)
Cyclone Sidr and floods (Bangladesh), 2007	3,000,000	1,000,000 (33%)	234,200	64,000 (27%)
Floods (Northern Afghanistan), 2014	240,000	72,000 (30%)	56,660	19,586 (35%)
Earthquake (Palu, Sulawesi Province, Indonesia), 2018	1,700,000	464,739 (27%)	360,000	80,860 (22%)

ADB placed its regular assistance on holder in Afghanistan effective 15 August 2021.

Source: Asian Development Bank.

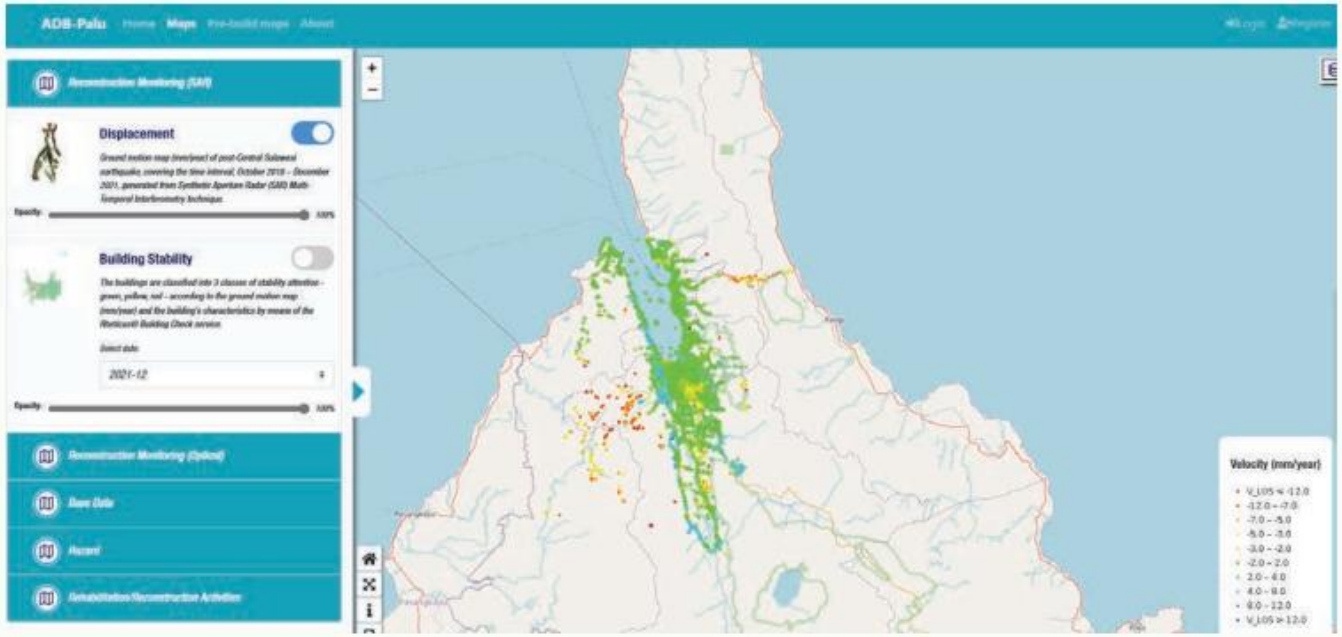
Post-Disaster Recovery Objectives

- Building climate and disaster resilience
- Additionally:
  - Enhanced productivity and efficiency of water use
  - Strengthening system management
  - Improved livelihoods and economic development

Agricultural System Assessment

- Disaster and climate risk assessment – agriculture and irrigation assets
- Classification and prioritization of reconstruction and recovery needs
- RAP categorize system constraints and potential improvements (infrastructure and management)
- Identification of improvements to infrastructure resilience (existing and new)

Box 2: Project Example—Assessment Tools



Ground motion map (mm/year) of post-Central Sulawesi earthquake, covering the time interval, October 2018–December 2021. Source: ADB.

Satellite remote sensing is a powerful tool for assessing disaster damages and losses and to support resilient reconstruction. The 2019 **Indonesia: Emergency Assistance for Rehabilitation and Reconstruction Project** (52316-001) leveraged partnerships with the European Space Agency and the Indonesian Space Agency to assess the impacts of a 7.4 magnitude earthquake in Central Sulawesi Province and to monitor the reconstruction and recovery exercise.

Resilient Structures

- Improve agricultural system resilience through better design
- Adopt specifications and standards commensurate with revised risk assessment
- Climate and disaster proofing of infrastructure

The Asian Development Bank (ADB) 2009 **Nepal Emergency Flood Damage Rehabilitation Project** (43001-012) rehabilitated surface irrigation canals following severe floods that affected western Nepal. Flood-resistant design standards were adopted to rehabilitate farmland and the construction of infrastructure to reduce impacts from future flooding.

ADB's 2012 **Cambodia: Flood Damage Emergency Reconstruction Project** (46009-001) built back better by restoring livelihoods by increasing agriculture productivity and providing short-term income for the community who were employed in the construction of the canals, and by providing emergency access to communities in the event of future flooding. Upgrades in engineering design and stronger standards were paramount in restoring structures with climate-resilient features.

Sources: ADB. Nepal Emergency Flood Damage Rehabilitation Project; and ADB. Cambodia: Flood Damage Emergency Reconstruction Project.

Resilient Materials and Construction

- Adoption of more resilient and durable materials
- Adoption of high quality construction methods and workmanship

ADB Indonesia: Emergency Assistance for Rehabilitation and Reconstruction Project (52316-001). The project supported the resilient reconstruction of the Gumbasa irrigation system in Central Sulawesi following the 2018 earthquake and tsunami.

The Asian Development Bank 2019 **Indonesia: Emergency Assistance for Rehabilitation and Reconstruction** project (52316-001) provided an evaluation of potential materials and construction methods to better withstand future earthquakes and liquefaction. Stone masonry structures of the Gumbasa irrigation system were restored and strengthened with reinforced concrete, and an impermeable membrane was applied to main and secondary canals to reduce percolation. High-risk areas of the PASIGALA pipeline crossing ground fault lines that traverse liquefaction areas were restructured with a high grade of polyethylene pipe (HDPE PE 100 PN 16 type), which is encased in sand and joins galvanized iron pipes to provide flexibility and full rotation.

Modernisation

- Improved climate and disaster resilience
- Improved water productivity, efficiency and financial sustainability

- Irrigation systems
  - Piped distribution
  - Canal lining
  - Flow measurement
  - Real-time monitoring
  - Upgrading control and safety systems

ADB Viet Nam: Water Efficiency Improvement in Drought-Affected Provinces Project (49404-002).
Construction of cutting-edge, irrigation pressure pipelines aims to fortify drought resilience in Binh Thuan, a province severely impacted by drought.

The Southern Central Coast and Central Highlands of Viet Nam are particularly vulnerable to climate change. The 2014–2016 El Niño Southern Oscillation (ENSO)-induced drought was the most severe in 40 years, while rainfall during the 2015 monsoon period was 40%–70% below the long-term average. Approximately 60,000 hectares of agricultural land in the central highlands was affected to varying degrees. The impact was most severe on the smallholder farmers who rely on rain-fed surface water sources for irrigation.

Nature-Based Solutions

- Use of natural processes to build on land restoration and water-land operations management to improve vegetation, water availability and quality, and raise agricultural productivity
- Improve water availability and recharge through small storage structures and water harvesting measures

The Kyrgyz Republic, particularly the southern *oblasts* (provinces) of Jalal-Abad and Osh, is highly prone to landslides because of its rainfall patterns, geology, land cover, and high seismic activity. There are more than 4,500 landslide sites in the country, of which about 1,200 are active. Approximately 550 settlements, housing 30,000 people and representing approximately 30% of settlements and 0.5% of total population, face immediate landslide risk.

The Asian Development Bank **Kyrgyz Republic: Landslide Risk Management Sector Project** (53022-001) aims to reduce exposure of at-risk communities (involving 15–20 subprojects) to landslides through mitigation engineering measures. Where appropriate, nature-based solutions, such as regreening and timber retaining and drainage structures, will be carried out.

Early Warning Systems

- Integrated monitoring and communication systems
- Monitoring
- Data acquisition
- Forecasting and warning methods
- Communication
- Response

The Asian Development Bank 2005 **Bangladesh: Emergency Flood Damage Rehabilitation Project** (38625-013) provided analytical input and capacity building to enhance existing early warning systems, including the flood forecasting system operated by the Flood Forecasting and Warning Centre under the Bangladesh Water Development Board.

The project included improving reliability of the existing forecasting system, improving accuracy of weather predictions, and providing longer forecasting periods. It also determined cost-effective options to update the 40-year-old topographic and elevation data, and linked the existing flood forecasting system to major infrastructure and agricultural land to improve its usefulness.

Strengthening Resilient Management

- Irrigation stakeholders
  - Government (Irrigation Ministry)
  - Scheme management
  - Water User Groups
  - Farmers

- Strengthening management for:
  - Resilience
  - Supply continuity
  - Adequacy repairs and maintenance
  - Financial sustainability

ADB Viet Nam: Water Efficiency Improvement in Drought-Affected Provinces Project (49404-002). Construction of cutting-edge, irrigation pressure pipelines aims to fortify drought resilience in Binh Thuan, a province severely impacted by drought.

The Asian Development Bank 2018 **Viet Nam: Water Efficiency Improvement in Drought-Affected Provinces Project** (49404-002) exemplifies the complementarity between the modernization of irrigation systems and their management in order to build resilience.

The project aims to strengthen management practices by improving water allocation and delivery services by way of a real-time decision support system for farmers, so that they are able to optimize crop water applications. Maintenance of systems will be upgraded by applying asset inventory and management databases, as well as a systematic asset maintenance schedule and funding approach that is based on asset condition assessments. A water pricing framework and options to engage third parties in the operation and maintenance areas also will be established.

Risk-Informed Governance

- Developing preparedness plans
- Protocols for system operation
- Procedures for emergency events

- Requires:
  - Multi-hazard risk assessment
  - Asset inventories
  - Developing disaster response strategies
  - Defining institutional roles and responsibilities
  - Effective communication approach