

ISSUE BRIEF: TRANSFORMATIVE ADAPTATION TO CLIMATE CHANGE IN FOOD SYSTEMS

RICE REVOLUTION: FOSTERING TRANSFORMATIVE ADAPTATION IN BANGLADESH'S RICE SECTOR

USAID Climate Adaptation Support Activity

INTRODUCTION

Climate change is already disrupting the production and distribution of food, contributing to shortages while many food systems are widely recognized as failing to provide sufficient nutritious food equitably. In some cases, minor, gradual adjustments to these production systems will be enough to adapt existing food systems to climate-related impacts in ways that allow people to thrive. In other cases, large-scale transformative change will be needed to prepare for a future significantly different from the present as the climate continues to change.

This issue brief explores these approaches, focusing on how USAID can support transformative adaptation in Bangladesh's rice sector, while building on current efforts to prepare the country for the challenges brought about by a changing climate. The brief is designed to complement **Promoting Transformative Adaptation to Climate Change in Food Systems**, a framework that USAID staff can use as they make programming decisions to support the large-scale improvements in climate resilience needed to transform food systems in the face of a changing climate.

As such, the brief works through a four-prong framework that includes four steps (see Box I).

BOX I: Steps to Transformative Adaptation

1. Understanding the **long-term risks** to the food system
2. Co-creating a truly **transformational vision** of the future
3. Collaboratively **sequencing and implementing** interventions
4. **Adaptively managing progress** toward the vision

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I. LONG-TERM RISKS TO BANGLADESH'S RICE SECTOR

Bangladesh's agricultural sector has undergone profound changes in recent decades, with a nearly three-fold increase in rice production between the early 1970s and 2018. Rice production now accounts for 60 percent of the country's crop value and 80 percent of its cropped area. The rice sector contributes significantly to the country's economy, employing millions in cultivation, processing, and distribution. At the same time, rice is a critically important staple food in Bangladesh, with much of the population dependent on it as their primary source of nutrition. As a result, rice is a cornerstone of both the lives and livelihoods of many Bangladeshis – providing food security, income, and cultural identity.

Bangladesh's rice sector nevertheless faces profound challenges. The efficiency of rice production in Bangladesh is limited by weak infrastructure, a lack of mechanization, land degradation, and limited market access. As the country works to expand food production and generate a higher standard of living for its rapidly growing population, these challenges are exacerbated by climate impacts – particularly those related to **sea level rise, salinity, and drought**.

Experts predict that by 2050, **rising sea levels** may submerge about 17 percent of the country's territory, including 30 percent of its agricultural land.¹ This territorial contraction is expected to displace up to 20 million people, further reducing agricultural output in a country already struggling with food insecurity.²

In the face of increased erosion, farmland that remains will face higher levels of **salinity** – reducing rice yields by an estimated 15-20 percent as available land shrinks.³ Indeed, salinity is already a major challenge in much of Bangladesh – it affects 1 million hectares of the country's agricultural land, representing about a 25 percent increase since 1970.⁴ The country is expected to experience a further 25 percent median increase in soil salinity by 2050, with more than 50 percent increases in the most affected areas.⁵

Drought is also a critical challenge. Particularly in the northern districts (e.g., Rajshahi, Chapai Nawabganj, Naogaon, Sylhet, Moulvibazar, etc.), droughts have led to yield losses of 10 to 30 percent or even higher.⁶ These impacts are likely to grow – as changes to the monsoon, changes in runoff associated with melting glaciers, and rising temperatures exacerbate drought conditions in Bangladesh.⁷

¹ Dasgupta et al 2018. Climate Change Salinization and High-Yield Rice Production in Coastal Bangladesh. *Agricultural and resource economics review*, 47(1):66.

² Davis et al 2018. A universal model for predicting human migration under climate change: examining future sea level rise in Bangladesh. *Environ. Res. Lett.* 13: (2018).

³ Jamal et al. 2023. Challenges and adaptations for resilient rice production under changing environments in Bangladesh. *Land* 12(6): 1217

⁴ SDRI 2010. Coastal saline soils of Bangladesh. Soil Resource Development Institute Dhaka

⁵ World Bank Group. 2015. Salinity Intrusion In A Changing Climate Scenario Will Hit Coastal Bangladesh Hard.

⁶ Rahman et al 2020. Enhancing Rice Productivity in the Unfavourable Ecosystems of Bangladesh. *Bangladesh Rice Journal* 24 (2): 83-102.

⁷ Climate Risk Profile: Bangladesh (2024): The World Bank Group.

II. A VISION FOR A TRANSFORMED FUTURE

Given the profound challenges facing Bangladesh’s rice sector, large-scale changes are needed to safeguard food security for the country’s population. Indeed, despite the many challenges facing Bangladesh’s rice sector, it is possible to envision a future where rice production is significantly more productive, profitable, and resilient than it is today.

Because of climate change, this future will likely include significant **shifts in the locations where rice is cultivated**. Indeed, projections show rice becoming less viable in low-lying coastal areas susceptible to flooding, erosion, and/or saltwater intrusion. In northern Bangladesh, heat stress may eventually challenge the productivity of certain rice varieties. In this context, investments in **infrastructure** – including irrigation, drainage, and flood protection – could bolster the resilience of vulnerable regions and even open new areas for rice cultivation.

A transformed rice sector would also rely heavily on **improved agricultural practices**. In this future, Bangladeshi rice farmers would have access to climate-resilient rice varieties tolerant to heat, drought, floods, and salinity. They would **diversify farming systems**, spreading risk, enhancing soil health, and providing alternative income. It would also increase the focus on sustainability, employing practices including conservation agriculture, agroforestry, and integrated water management.

In this transformed future, Bangladeshi rice farmers would have access to timely, tailored **weather and climate services** and improved **agronomic advice**. Access to affordable **credit, input subsidies**, and market support would help farmers invest in ways that bolster climate resilience. At the same time, appropriate insurance products would safeguard farmers against loss in a more variable climate. All approaches would take place in the context of **enabling policy frameworks**, where the government collaborates with research institutes, NGOs, and the private sector to ensure that a range of climate change considerations are integrated into agricultural policy.

To varying degrees, a vision for this kind of future has been articulated in a range of documents shown in **Box 2**.

BOX 2: Resources for Bangladesh Transformed Agriculture Sector

- ▶ [Bangladesh Climate Change Strategy and Action Plan](#) (updated 2022)
- ▶ [Bangladesh Delta Plan 2100](#)
- ▶ [Bangladesh’s National Pathway Document for the UN Food Systems Summit: Towards Sustainable Food Systems in Bangladesh](#)
- ▶ [Eighth Five-Year Plan 2021-2025](#)
- ▶ [Mujib Climate Prosperity Plan 2021-21](#)
- ▶ [National Adaptation Plan \(NAP\) 2023-2050](#)
- ▶ [National Agriculture Policy](#)
- ▶ [Perspective Plan of Bangladesh 2021-2041](#)
- ▶ [Strategic Plan for the Rice Sector in Bangladesh: 2050 and Beyond](#)

III. USAID’S ROLE IN SUPPORTING TRANSFORMATIVE ADAPTATION

Making progress toward this kind of transformation would require many actors to take many, often coordinated, steps to foment change. It will also involve tradeoffs – for instance, regarding land use planning, water management, investment in climate-resilient infrastructure, and the balance between traditional practices and modernization. Importantly, transforming the rice sector will also have significant social implications – both positive and negative – particularly for smallholder farmers who rely on rice cultivation for their livelihoods.

Some steps in this transformation will diverge more from the status quo than others. In all cases, however, it will be important that different interventions support and complement each other, with each step and each actor contributing along a pathway to transformative adaptation.

INCREMENTAL STEPS TOWARD TRANSFORMATIVE ADAPTATION

USAID has focused its current efforts on supporting the transformation of Bangladesh's rice sector to advance climate-smart agriculture, support crop diversification, and improve the quality and accessibility of information for rice-related decision-making.

- ▶ **Climate smart agriculture (CSA).** Several USAID activities are designed to promote CSA techniques in Bangladesh's rice sector. This includes Feed the Future (FtF)'s **Public-Private Partnership Activity**, which works to enhance the rice-breeding capacities of the private sector through a partnership with the International Rice Research Institute, private sector companies, and farmers. FtF's **Bangladesh Rice and Diversified Crops Activity** has also expanded the adoption of improved rice. In addition, FtF's **Bangladesh Climate-Smart Agriculture Activity** teaches smallholder farmers to adopt climate-smart cultivation techniques like using improved seeds and fertilizer.
- ▶ **Crop diversification.** The **Bangladesh Rice and Diversified Crops Activity** supports crop rotation and diversification by promoting technologies that contribute to the production of sesame, maize, mung beans, sunflowers, and groundnuts and by strengthening the economic competitiveness of alternative crops by improving value chain efficiencies, access to finance, and post-harvest services. In line with SO2 of USAID's Climate Strategy, this work package aims to improve food security through systemic changes that increase rural incomes.⁸
- ▶ **Access to improved information.** USAID has made several investments in data and information to improve rice-related decision-making. This includes participation in the **Climate Services for Resilient Development (CSR)** initiative,⁹ through which USAID has helped train representatives from the Ministry of Agriculture and the Bangladesh Meteorological Department in the

production and use of agricultural climate services¹⁰ and identifying new priorities to best use climate information in this context.¹¹ Through the **Cereal Systems Initiative for South Asia (CSISA)**,¹² USAID has also supported an analysis of groundwater challenges and opportunities in Bangladesh.

BOLDER STEPS TO TRANSFORMATIVE CHANGE

To date, USAID has focused on supporting incremental steps toward transforming Bangladesh's rice sector. Looking forward, however, it can assist Bangladesh on the path to bolder change by promoting broader system changes. Systems change takes a holistic view of a problem or issue, recognizing the interconnectedness of several factors within a system and considering the relationships and feedback loops among different elements and stakeholders. USAID can focus on a range of activities to promote transformative systems change in Bangladesh's rice sector. This could involve:

- ▶ **Supporting the development of a comprehensive Integrated Water Resources Management (IWRM) program.** A nationwide IWRM program could promote water-related system changes in Bangladesh's rice sector. While this kind of program could take many forms, USAID can support the local and national governments as they work to modernize and expand irrigation infrastructure, provide large-scale training programs to build the capacity of farmers and extension workers, and enact policy reforms that can support the creation of financial instruments and insurance schemes for farmers in managing risks associated with both drought and sea level rise.
- ▶ **Fostering the creation of one or several climate-resilient livelihood programs.** Many farmers will likely need to transition out of rice production and find new ways of earning their livelihood. To support this, USAID can assist the Government of Bangladesh as it develops programs that promote alternative livelihoods less vulnerable to climate change. This might include

⁸ USAID 2021. Feed The Future Bangladesh Rice and Diversified Crops Activity Final Performance Report: Sharing Evidence and Insights.

⁹ These partners are the United States Government, the American Red Cross, the Asian Development Bank, the Inter-American Development Bank, Esri, Google, the Skoll Global Threats Fund, and the U.K. Government.

¹⁰ Gawthrop E. 2019. IRI Training to support Climate Services for Resilient Development (CSR) in South Asia. CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS).

¹¹ Mason et al. 2022. Re-prioritizing climate services for agriculture: insights from Bangladesh. *Climate Services*. 27.

¹² Cereal Systems Initiative for South Asia. <https://csisa.org/>

encouraging the integration of trees and shrubs into farming systems to provide additional income and environmental benefits, promoting aquaculture and fisheries as alternative livelihoods, and/or supporting the development of livestock farming as an alternative income source.

- ▶ **Nurturing additional leverage points for transformation.** USAID staff can nurture a number of other leverage points for transformation – including, for instance, by supporting localization, equity, and inclusion; contributing to policy dialogues and advocacy efforts to raise awareness among key stakeholders about the need for transformation; and/or supporting the development of public-private partnerships with agribusinesses, input suppliers, exporters, and other relevant stakeholders to develop and implement transformative adaptation in the rice sector jointly.

IV. ADAPTIVELY MANAGING PROGRESS TOWARD TRANSFORMATION

Because neither Bangladesh’s society nor its climate will remain static, the vision for transformative adaptation and our sense of how to get there will need to be adjusted over time. Establishing a robust system to measure progress, understand barriers and opportunities, and adapt to changing circumstances will be extremely important. USAID programming can prioritize this kind of adaptive management in several ways.

First, in the context of a pathways approach, USAID can use results frameworks to link near-term activities, projects, and programs to a long-term vision. USAID also has a number of resources on systems change, including a [How-To Note on Establishing and Reporting Systemic Change Targets](#), that can be useful in prioritizing and planning activities. USAID may like to work collaboratively with other actors – including through a collective action approach – to show how disparate activities lead to common goals.

In developing this type of framework, USAID may pursue goals and indicators articulated in the visionary documents listed above. In other cases, USAID may need to develop its

own goals and indicators to measure progress. In both cases, however, they will need to engage a wide range of stakeholders, including government agencies, local communities, NGOs, and the private sector, in the planning and M&E processes. To advance this work, USAID may also create and/or support platforms for regular dialogue and knowledge exchange among stakeholders to share experiences and lessons learned.

V. CONCLUSIONS

While USAID has promoted climate change adaptation for decades, the concept of “transformative adaptation” is still new, representing an evolving approach that calls on society to reframe whole systems to fundamentally reduce vulnerability to climate variability and change. This means there is no established recipe for transformative adaptation, which will necessarily take place differently in various places and be based on the unique risks, vulnerabilities, and priorities of specific communities. Though there is no single approach to transformative adaptation, USAID has already begun supporting Bangladesh as it takes incremental steps in this direction through climate-smart agriculture, crop diversification, and access to information.

Moving forward, USAID can support Bangladesh as it takes bolder steps to transform its rice sector. Though USAID will not be able to drive this change on its own, it can help create a context where bold steps are more likely and feasible.

For instance, because transformation must be an inclusive, locally driven process that addresses the needs and perspectives of a range of stakeholders, USAID can support Bangladesh as it moves along a transformative pathway by promoting localization of climate-resilient development efforts, facilitating policy dialogues, and fostering private sector engagement.

Whether USAID is promoting incremental or bolder steps toward transformation, it is critical that the Agency takes a long-term, holistic view and considers how near-term changes can build on each other, eventually creating important leverage points for change. Improvements to USAID’s monitoring and evaluation processes may also help document the catalytic effects of the Agency’s adaptation efforts on long-term outcomes and systems-level change.