

Adaptation Gap Report 2023 – Case Study

Ecosystem-based adaptation: Rice farming in Cambodia and Madagascar

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Rice production is under immense pressure from the increasing impacts of the climate crisis in Madagascar and Cambodia – two countries that are heavily reliant on rice cultivation for food security and economic stability.

Implementing ecosystem-based strategies in rice production requires a holistic and integrated approach that values the interconnectedness of ecosystems, services and agriculture. It can lead to more sustainable and resilient rice farming systems, while contributing to climate change mitigation and adaptation goals.

In Cambodia, home to 16 million people, rice production accounts for approximately half of its national agricultural output, while in Madagascar, the rice sector represents 41 per cent of household income, on average.

Climate impacts to rice production are compounded by economic and institutional constraints, which include poor irrigation infrastructure, a lack of appropriate technologies, a lack of clear understanding with regard to rice ecosystems and well-defined adaptation policies for rice production, poor road networks and marketing systems, and weak research and extension support.

To address the challenges of adapting to current and future climate impacts and implementing strategies to mitigate risks to rice production, the United Nations Environment Programme (UNEP) supported two ecosystem-based adaptation projects in Cambodia and Madagascar, both funded by the Adaptation Fund.

Both projects took a holistic strategy to implementing integrated adaptation measures that combine climate risk assessment with agricultural, environmental, economic and institutional factors of climate resilience.

The projects worked with local producers and partners to strengthen climate resilience through increased rice production that will withstand projected climate conditions,

while simultaneously increasing environmental sustainability and ecological services in the rice sector.

Measures were implemented to develop more resilient rice varieties, improve water management practices, enhance water storage and irrigation infrastructure and promote sustainable farming practices that reduce the impacts of the climate crisis on rice cultivation (figure 1).

Both projects also centred their approach around ecosystem restoration in the vicinity of the rice paddies by planting trees, rewetting watersheds and developing agroforestry systems to boost productivity and reduce soil erosion.

The two projects shared some common lessons for implementing ecosystem-based approaches in the agriculture sector (United Nations Environment Programme [UNEP] 2020; UNEP 2022):

Community engagement and education: Both projects involved local communities and farmers in the planning and implementation of adaptation measures. Community engagement, buy-in and project ownership were also influenced by the projects through the mobilization of local authorities (traditional chiefs, mayors), the use of social networks (farmers’ platforms, savings and loans groups), partnerships with governments and local non-governmental organizations, consultations, the demonstration of adaptation benefits, and training and capacity-building programmes.

Recognition of the value of restoring agroecosystems: The restoration of forests in and around rice fields helped enhance ecosystem resilience, support natural pest control, optimize water management, improve soil health and reduce erosion. The use of restoration techniques in combination with improved agricultural practices contribute to soil conservation, while diversifying income sources for agricultural households and mitigating economic risks if yields should fail during future extreme events.

Figure 1 Summary of adaptation strategies implemented for rice-based farming systems in Cambodia and Madagascar

	CAMBODIA	MADAGASCAR
Agronomic practices	Distribution of climate-resilient rice seed	Resilient rice model; improved rice seeds; climate-resilient rice varieties
Restoration	Restoration of degraded forest; conservation agriculture; eco-agriculture interventions	Watershed rehabilitation; management of productive landscapes and water services; agroforestry
Farming systems	Support to home gardens; livestock production; establishment of multi-use forests; cultivation of non-rice crops (fruits and vegetables)	Soil conservation and livestock management; agroforestry; integrated pest management; crop rotation and diversification
Marketing and economic	Livelihood diversification (e.g. cricket raising and beekeeping); economic assessment of microfinance and insurance products; set-up of community savings and loans groups	Post-harvest storage facilities with phytosanitary control, serving as trading points and markets; livelihood diversification
Knowledge and capacity	Information generated on climate change impacts and eco-agriculture options, awareness-raising on eco-agriculture	Integrated Resilient Rice Model for field preparation and fertilization; integrated pest management; seed-producer groups and training for water-user associations
Water infrastructure	Water supply installations—spring capture systems, wells, ponds and household rainwater harvesting.	Irrigation and drainage infrastructure improvement; dredging and clearing of canals; strengthening of dikes to prevent flooding; water quality assessments
Policy	Development of a national eco-agriculture upscaling strategy; integration of climate change risks and eco-agriculture into Cambodia's adaptation framework	Integrated Resilient Rice Model principles integrated in the National Strategy for Rice Development

Integration of approaches to strengthen the resilience of the rice subsector: Supporting policies at the local and national levels initiated concrete changes to rice production practices (e.g. Integrated Rice Resilience Model), from input to post-harvest management, including measures designed to restore and maintain ecological services surrounding rice ecosystems. When combined, this package of activities adapts agricultural inputs and practices, in addition to positioning rice production in the broader ecosystem, as well as human and economic contexts.

In view of extreme climate impacts in the future, such as prolonged dry spells or intense flooding, the efficacy of adaptation measures would depend on whether successful

measures could be scaled up across other vulnerable areas of the two countries to ensure that the entire rice production sector could be transformed successfully.

The adaptation measures found in Cambodia and Madagascar are often similar to those used in other rice-producing countries in Asia and Africa. Given the increasing climate risks, taking measures such as using climate-resilient rice varieties, eco-agriculture and forest landscape restoration offers greater resilience to erratic rainfall, drought, temperature conditions and other climate hazards, while transforming the rice production sector by enhancing ecosystem sustainability.

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Further resources

Cambodia:

Story: Locals lead adaptation efforts in drought-stricken Cambodian forests, <https://www.climatechangenews.com/2021/12/13/locals-lead-adaptation-efforts-drought-stricken-cambodian-forests/>.

Video: Climate Action in Cambodia, <https://youtu.be/SnotF8PPUVU>.

Story: "I'm proud to have brought the rain back": reforestation revives Cambodian mountains, <https://www.unenvironment.org/news-and-stories/story/im-proud-have-brought-rain-back-reforestation-revives-cambodian-mountains>.

Story: From rice to riches: adapting to climate change on Cambodia's coasts, <https://www.unenvironment.org/news-and-stories/story/rice-riches-adapting-climate-change-cambodias-coasts>.

Project factsheet, http://wedocs.unep.org/bitstream/handle/20.500.11822/28423/EBA_Cambodia.pdf?sequence=1&isAllowed=y.

Madagascar:

Lessons learned: Ecosystem-based Adaptation and an Integrated Resilient Rice Model in Madagascar, <https://wedocs.unep.org/handle/20.500.11822/40368>.

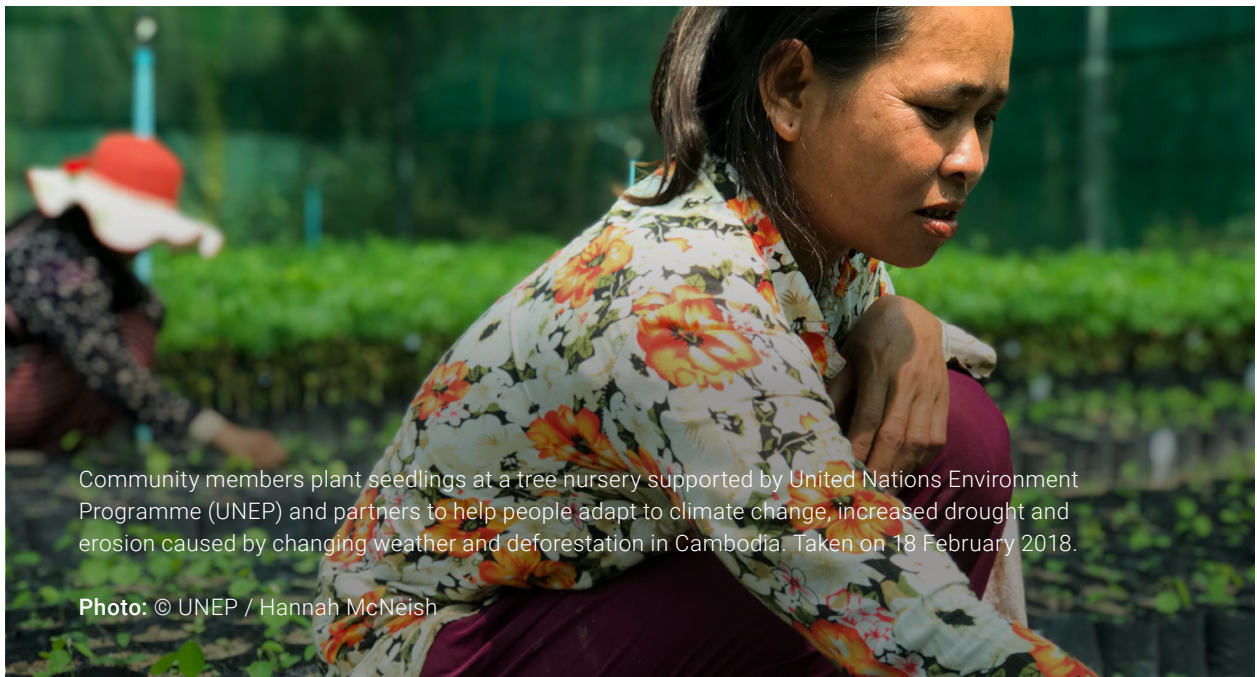
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Community members plant seedlings at a tree nursery supported by United Nations Environment Programme (UNEP) and partners to help people adapt to climate change, increased drought and erosion caused by changing weather and deforestation in Cambodia. Taken on 18 February 2018.

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