BUILDING RESILIENCE IN CAMBODIA

Delivering complex multi-sector projects for sustainable and advanced development to promote extreme weather preparedness

// June 2025

CLIMATE DELIVERY INITIATIVE SERIES //

Case Study

CIF Program: PPCR

TOPICS

- Multi-sector projects
- Resilience-building
- Adaptation to extreme weather events

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PROJECT DATA

PROJECT TITLE	Promoting Climate-Resilient Agriculture in Koh Kong and Mondulkiri Provinces as part of the Greater Mekong Subregion Biodiversity Conservation Corridors Project.
PARTNER ORGANIZATION/S	Asian Development Bank (ADB)
COUNTRY	Cambodia
SECTOR/S	Multisector resilient development: agriculture, energy, forests, local financing development, and environment.
TOTAL PROJECT COST	$7.4 million
PROJECT DURATION	2018-2021 (*additional financing only, parent project started in 2014)
DELIVERY CHALLENGES	The project addresses resilience to extreme weather events in Koh Kong and Modulkiri provinces through multisector project and multi ministry execution.
CASE AUTHORS	Ziza Machado and Devi Prasad Ayyannamahanty
PROJECT EXPERTS	Alvin Lopez, Asian Development Bank (ADB)

KEY MESSAGES

Multisectoral Approaches Enhance Climate Resilience
The case-study demonstrates the viability of successfully integrating climate-smart agriculture, adaptive infrastructure, and biodiversity conservation into one project to build resilience in vulnerable communities.

A Blueprint for Future Climate Adaptation Efforts
The project offers valuable insights for designing community-centered, climate-resilient development models, particularly in regions facing similar climate threats.

Five Strategic Lessons for Future Projects

1. Focus multisector projects in one geographic area
2. Adapt procurement and safeguard guidelines
3. Provide prequalification training
4. Align with both national and local planning
5. Use digital tools for monitoring and real-time adjustments

EXECUTIVE SUMMARY

Cambodia faces profound and growing challenges from shifting weather conditions. Over half of its population relies on agriculture for their livelihoods and deforestation rates continue to rise at alarming rates, making Cambodia particularly vulnerable to the impacts of extreme weather events, including rising temperatures, unpredictable rainfall, drought, and saltwater intrusion.

In response, the Royal Government of Cambodia and Asian Development Bank (ADB) launched the "Promoting Climate-Resilient Agriculture in Koh Kong and Mondulkiri Provinces" project as part of the "Greater Mekong Subregion Biodiversity Conservation Corridors Project." The project sought to bolster local resilience using a comprehensive approach that included sustainable agricultural practices, including climate-smart agriculture and agroforestry, climate-adaptive infrastructure improvements, and biodiversity conservation efforts. The project targeted two provinces: Koh Kong, where coastal communities face the dual threats of rising sea levels and saltwater intrusion and Koh Kong's upland communities and Mondulkiri, where shifting rainfall patterns and deforestation are driving agricultural insecurity. Key activities included the construction of rainwater harvesting ponds and tanks, the introduction of future-proofing irrigation systems, and the establishment of bioengineered sea barriers to protect agricultural land from saltwater intrusion.

The project achieved many of its targets, highlighting the potential for multisectoral climate projects to effectively enhance the livelihoods of local populations and drive ahead development. Over 2,000 households gained reliable access to water for agriculture and livestock through 40 rainwater harvesting ponds and small-scale irrigation systems. Farmers adopted climate-smart agricultural practices, including System of Rice Intensification (SRI) and drought-resistant crops. In Koh Kong, bioengineered sea barriers protected approximately 400 hectares of farmland from saltwater intrusion. The project empowered communities to manage and maintain vital infrastructure through the formation of farmer water user groups and sea barrier management groups.

The project faced several challenges during implementation, highlighting the complexities inherent in multisector initiatives. The absence of centralized coordination to manage the multiple subprojects, consultants, and contractors; compounded by the need to balance two executing agencies and frequent changes in ADB's project managers, significantly hindered implementation effectiveness. Additionally, stringent ADB requirements proved difficult to adapt to small-scale, locally based infrastructure projects, which delayed infrastructure development. Moreover, the decision to consult the Ministry of Water Resources and Meteorology, but without decision-making power, left the infrastructure and the community groups without the legal recognition, technical expertise, or financial support necessary for maintaining the infrastructure after project completion.

Key Messages:

1. **Concentrate Resources in Single-Region:** Focus on one region for multisector interventions, with a designated project manager, allowing for concentrated resources, simplified management, and better oversight.

2. **Adapt Procurement Guidelines to Project Scale and Local Context:** Build flexibility into safeguard guidelines without compromising core environmental and social standards. This can help ensure the efficient and timely delivery of smaller infrastructure components.

3. **Conduct Prequalification Training for Local Contractors:** Training on a multilateral development bank's standards and requirements could help bridge the gap between international procurement standards and local practices, not only for better projects but also for country development.

4. **Align Projects Not Only with National Priorities but Also with Local Planning:** This alignment increases government ownership, facilitates resource allocation, and promotes smoother implementation.

5. **Leverage Digital Tools for Monitoring and Reporting:** Explore the use of technology for efficient and effective design, real-time monitoring, and meeting requirements as digital tools can enable more efficient management of resources. Consider regular evaluations (at least every two to three years) to identify issues early and adjust strategies accordingly.

The legacy of the project lies in its demonstrated potential to positively affect local communities through multisectoral, community-driven solutions. By integrating agricultural innovation, infrastructure improvements, and biodiversity conservation, the project helped high-risk communities adapt to the impacts of shifting weather conditions, protect their livelihoods, and strengthen their resilience. The lessons learned from this project are crucial for informing the next generation of adaptation and resilience initiatives in Cambodia and similar regions. As extreme weather events continue to pose significant risks, this initiative serves as a valuable blueprint for designing, implementing, and sustaining future projects that not only mitigate environmental impacts but also promote sustainable development, natural resource conservation, and improved livelihoods.

LIST OF ABBREVIATIONS

ADB	Asian Development Bank
BCCP	Biodiversity Conservation Corridors Project
CIF	Climate Investment Funds
ELC	Economic Land Concession
FA	Forestry Administration
FWUG	Farmer Water User Group
GIC	Grant Implementation Consultant
IO	International Organization
MAFF	Ministry of Agriculture, Forestry, and Fisheries
MDB	Multilateral Development Bank
MOE	Ministry of Environment
MOWRAM	Ministry of Water Resources and Meteorology
NAPA	National Adaptation Program of Action
NGO	Nongovernmental Organization
PDoWRAM	Provincial Department of Water Resources and Meteorology
PPCR	Pilot Program for Climate Resilience
RGC	Royal Government of Cambodia
SBMG	Sea Barriers Management Group
SCF	Strategic Climate Fund
SPCR	Strategic Program for Climate Resilience
SRI	System of Rice Intensification
VDFSG	Village Development Fund Saving Group
WUG	Water User Group

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1. INTRODUCTION

Cambodia, like many developing countries, is increasingly vulnerable to the impacts of variable changes in weather patterns. The country faces major weather hazards, including increasingly severe floods, prolonged droughts, and rising temperatures—threatening agriculture, water resources, and vulnerable communities. In 2022, agriculture accounted for 36 percent of national employment and 22 percent of GDP, denoting its importance to the livelihood of the population.[1] Cambodia's high deforestation rate further exacerbates these risks, as forests play a vital role in regulating water cycles, protecting biodiversity, and supporting sustainable agriculture. Meanwhile, the country's emissions are rising rapidly, driven primarily by land-use changes, such as the expansion of agriculture and uncontrolled urban development (i.e., infrastructure) into forested areas.

The Royal Government of Cambodia (RGC) has taken a proactive stance on enhancing the country's resilience to extreme weather and supporting sustainable development. As part of these efforts, in 2010, the RGC partnered with the Asian Development Bank to launch the "Greater Mekong Subregion Biodiversity Conservation Corridors Project (BCCP)." The main objective of the project was to address the conservation and management of biodiversity-rich forest landscapes across Cambodia, Viet Nam, and Lao Peoples Democratic Republic. In Cambodia, the BCCP targeted Koh Kong and Mondulkiri provinces—regions known for their unique biodiversity but also particularly vulnerable to extreme weather impacts.

In 2014, the BCCP introduced the "Promoting Climate-Resilient Agriculture in Koh Kong and Mondulkiri Provinces" project aimed at enhancing the resilience of ecosystems and communities' livelihoods in these provinces. The project encompassed a range of strategic interventions to improve water management, promote sustainable agricultural practices, and enhance biodiversity conservation. This new project was supported by CIF's Pilot Program for Climate Resilience (PPCR).

The project demonstrated the potential for multisectoral environmental resilience initiatives to deliver tangible benefits for communities while promoting sustainable development and achieved the construction of eight large irrigation systems and two sea barriers. In terms of livelihood, the project introduced the System of Rice Intensification (SRI) method to 1,100 households and saline-tolerant crop varieties in Koh Kong. Additionally, the construction of sea barriers allowed for the reclamation of 400 hectares of arable land by displacing sea-salt water, benefiting 900 households. Local community empowerment included training sessions for sustainable farming, with over 2,163 participants (70 percent of them women); the establishment of Farmer Water User Groups (FWUGs) to manage the newly installed irrigation schemes; and the establishment of Sea Barriers Management Groups (SBMGs) to oversee the maintenance of the sea barriers. The project also established a bamboo-based community enterprise, trained 65 provincial and district officials in integrating resilient principles into development planning and budgeting, and ensured that women held 30 percent of management positions in water and forest conservation groups.

The multisectoral nature of the project presented significant challenges. Compliance with Asian Development Bank (ADB) standards and safeguard requirements caused delays in infrastructure construction, as individual assessments were required for each subproject rather than being conducted as part of an integrated, multi-sector project. Overlapping mandates and evolving responsibilities of the executing agencies, coupled with the absence of a designated project manager to coordinate stakeholders, caused further confusion. Frequent turnover of project leads from ADB and consultants added to the lack of direction. Additionally, integrating the PPCR project into a larger parent initiative without assigning technically capable executing agencies with proper jurisdiction led to the project being sidelined in government planning. As a result, neither the infrastructure nor community groups were fully integrated, leading to weak government ownership and challenges to long-term project sustainability.

This case study explores the challenges faced by the project in delivering the multisectoral components and distills the lessons learned to inform future climate resilience efforts. The analysis focuses on three key areas: coordination among government agencies, human resources and organizational capacity, and integration challenges. It also offers recommendations on how future projects can overcome these challenges and maximize their potential for long-term success. By learning from both the achievements and the obstacles encountered in this initiative, future adaptation and resilience projects in Cambodia and beyond can build on a solid foundation for sustainable development.

2. CONTEXT

The objective of CIF's Pilot Program for Climate Resilience (PPCR) is to pilot and demonstrate ways to integrate weather-related risk and resilience into core development planning. It aims to contribute to achieving the objectives of the Strategic Climate Fund (SCF) by providing incentives for scaled-up action and transformational change. It seeks to integrate resilience to extreme weather events in national development planning consistent with poverty reduction and sustainable development goals.[2]

The Cambodia Strategic Program for Climate Resilience (SPCR) was initially endorsed by the PPCR Sub-Committee on June 29, 2011, and revised on January 13, 2014. The SPCR indicates that agriculture and water resources are the most important sectors for the Cambodian economy, with 57.6 percent of the population relying on agriculture for their livelihood. Recognizing the climate vulnerabilities determined in the National Adaptation Program of Action (NAPA)—including increased rainfall variability affecting water availability, potable water supply, flood protection, and irrigation—the Royal Government of Cambodia (RGC) requested additional support from CIF under the PPCR.

The country's annual rainfall ranges from 1,100 mm to 4,000 mm, depending on the region, with a pronounced dry season from November to April.[3] This erratic rainfall exacerbates water scarcity, especially in the dry season, impacting both agricultural production and water access for communities. In addition to rainfall variability, Cambodia is increasingly vulnerable to floods, which affect over 1.7 million people annually, primarily in low-lying areas near the Mekong River and Tonle Sap. Furthermore, rising temperatures, which have increased by 0.8°C over the past 50 years,[4] contribute to longer drought periods and heat stress, further exacerbating food and water insecurity, particularly in rural areas where agriculture is heavily reliant on seasonal rainfall patterns. These climate risks are compounded by sea-level rise, which threatens coastal agricultural zones and increases the risk of saltwater intrusion into freshwater sources.[5] A grant of US$7.4 million was allocated to fund the "Promoting Climate-Resilient Agriculture in Koh Kong and Mondulkiri Provinces" subproject. The project's main interventions are consistent with PPCR's core indicators:

1 | Strengthened climate-responsive development planning;

2 | Improved institutional framework in place;

3 | Climate-responsive investment approaches identified and implemented;

4 | Strengthened adaptive capacities;

5 | Increased resilience of households, communities, businesses, sectors, and society to climate variability and environmental changes.[6]

2.1. Project Development Challenge

The main project development challenge was to build the resilience of agricultural communities in the targeted provinces. Both Koh Kong and Mondulkiri are under increasing threat from extreme weather events. By 2025, these areas are projected to experience temperature increases between 0.7°C and 1.0°C, with Koh Kong expecting longer droughts, reduced rainfall, and a sea rise of up to ten centimeters, intensifying saltwater intrusion. This would likely affect both agriculture and freshwater availability. Mondulkiri faces different threats, including increased rainfall and flood risks, leading to soil erosion and flooding challenges. Both provinces are predicted to face more extreme hot days and longer heatwaves, further stressing local ecosystems and reducing agricultural productivity. These impacts can potentially compound existing vulnerabilities,[7] especially for smallholder

farmers who rely on consistent water availability and stable ecosystems for their livelihoods.

2.2. The Intervention: The Subproject and its Strategic Focus

The Koh Kong and Mondulkiri provinces subproject was designed to build resilience to extreme weather events and support 4,300 households in the target areas. It aimed to enhance local adaptive capacity while fostering diversified livelihoods and income-generating opportunities.[8] The project activities included improving water management systems, introducing sustainable agricultural practices, and enhancing the capacity of local communities to adapt to environmental changes.

Four core interventions addressed both immediate climate risks and long-term sustainability:

1 **Rainwater Harvesting Ponds and Drip Irrigation Systems:** The construction of rainwater harvesting ponds in both provinces was designed to increase access to water during the dry season. In tandem, drip irrigation systems aimed to boost high-value crop production in areas where water resources were becoming increasingly scarce due to droughts and erratic rainfall patterns.

The project established Farmer Water User Groups (FWUGs) to manage the newly installed irrigation schemes. FWUGs typically are a governance institution of the Cambodia government. Their legal establishment was not explicitly listed as part of the interventions, but they were included for capacity building, operations and maintenance, training and mobilization. These groups, composed of local community members, were given training in system operation and maintenance, with an emphasis on community-led management. This approach not only improved the efficiency of water use but also empowered local communities to take ownership of the infrastructure, ensuring its continued use and maintenance after the project ended.

2 **Climate-Resilient Irrigation and System of Rice Intensification (SRI):** In Mondulkiri, the project delivered a climate-resilient irrigation system through rainwater catchment ponds to ensure consistent water supply for rice fields. This was accompanied by SRI, a method that uses less water while enhancing yields, ensuring resilience during both droughts and floods.[9] The introduction of saline-tolerant rice varieties, such as Chul'sa and Riang Chey rice, was another important intervention. These varieties were specifically selected to cope with the saltwater intrusion that increasingly threatens coastal agricultural land in Koh Kong. Farmers were trained in selecting and cultivating these stress-tolerant varieties, which offered higher yields even in challenging growing conditions.

3 **Bioengineered Sea Barriers:** In Koh Kong, sea barriers were constructed to mitigate saltwater intrusion caused by rising sea levels. This intervention was crucial for preserving arable land and enabling farmers to adopt salinity-resistant crops, protecting their livelihoods from soil degradation. Sea Barriers Management Groups (SBMGs) were established to manage the maintenance of these barriers, with local community members taking responsibility for their upkeep. Like FWUGs, SBMGs are a standard governance of community projects in Cambodia, mirroring other government-led development projects.

4 **Ecosystem-Based Adaptation:** Efforts in Mondulkiri included enhancing forest cover and improving soil and water management through catchment development planning, including protection of the watershed, protection against landslides, erosion and land degradation, protection of habitats of aquatic and terrestrial animals, and sustainable use of forest resources to buffer the impacts of extreme weather events on water users and provide safety nets for local communities when agricultural crops fail. This intervention focused on promoting long-term ecosystem health, crucial for sustaining agriculture and forest-dependent livelihoods in the face of changing climatic conditions.

The two main executing agencies were the Ministry of Environment (MOE) and Ministry of Agriculture, Forestry, and Fisheries (MAFF), reflecting their respective historical roles in managing Cambodia's biodiversity, forestry, and agriculture sectors. The Ministry of Water Resources and Meteorology (MOWRAM), which is responsible for the irrigation and water sector, was informed of the project during the initial consultations, but its involvement during implementation was limited to participation in information sessions. The subproject also worked with several other stakeholders, including non-governmental organizations and international organizations, local communities, and the local private sector.

3. DELIVERY CHALLENGES

The project faced multiple delivery challenges that have been consolidated into three primary categories: **coordination among government agencies, human resources and organizational capacity,** and **integration challenges.** These challenges, and the lessons derived from them, provide a foundation for improving future project design and execution, ensuring that climate resilience initiatives can more readily achieve their objectives.

3.1. Challenge 1: Coordination Among Government Agencies

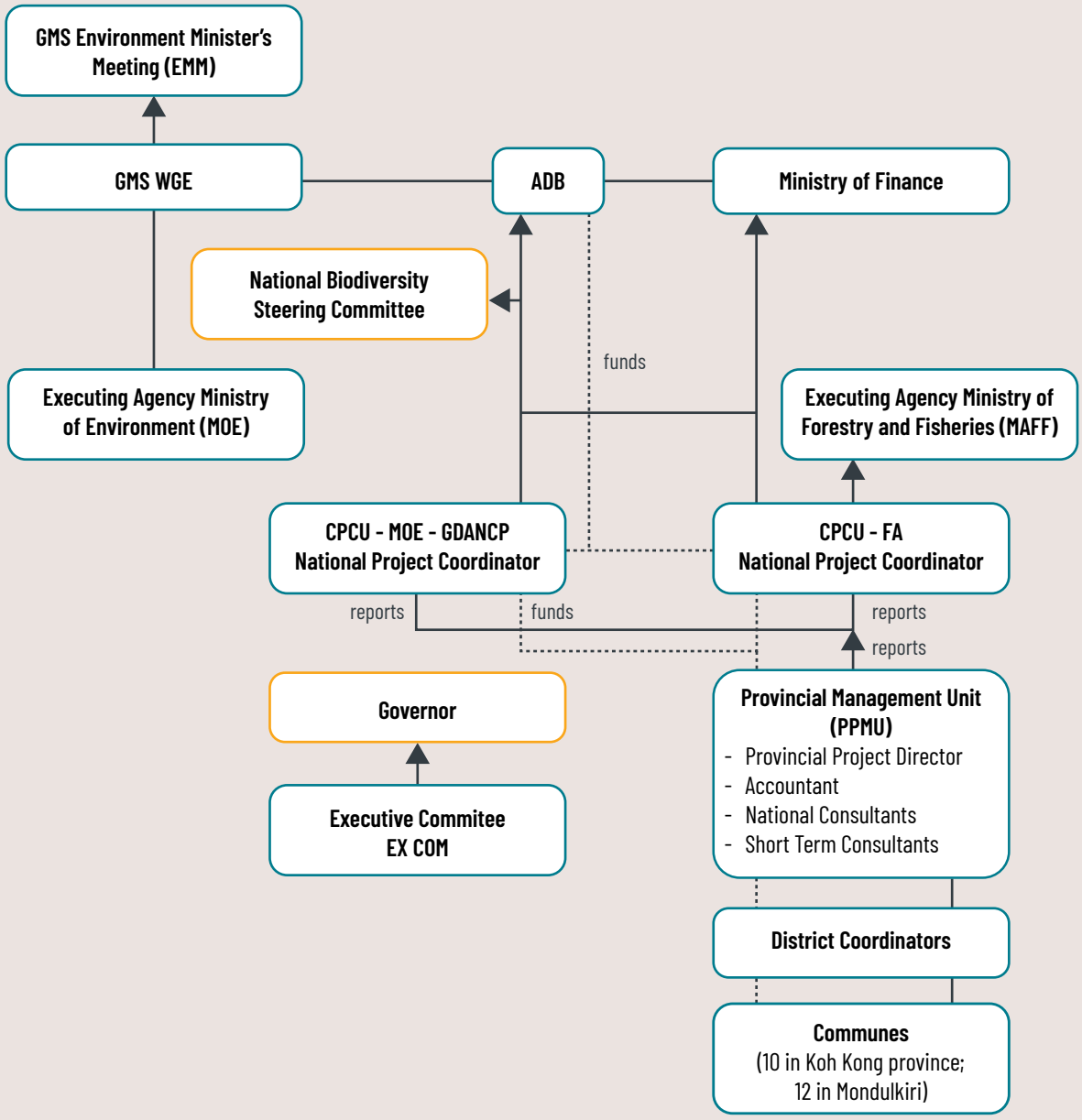
The Ministry of Environment (MOE) and Ministry of Agriculture, Forestry, and Fisheries (MAFF), tasked with the project's execution, faced coordination issues, each with overlapping mandates and evolving responsibilities. The lack of dedicated project managers, many of whom held dual roles within their ministries, also strained the focus on the project's needs, hampering overall coordination. Figure 2 presents the complex relationship between the different implementing actors.

Interviews revealed that frequent turnover of project managers, both at the national and multilateral development bank (MDB) levels, disrupted project continuity, resulting in communication delays and inconsistent oversight. In several instances, the new MDB project managers requested revision of the studies for procurement processes and safeguards, causing further delays in implementation.

Further complicating coordination was the passive involvement of provincial governments and the exclusion of the Ministry of Water Resources and Meteorology (MOWRAM) as an executing agency. While they were eventually tasked with implementing certain aspects of the project, such as managing water systems and maintaining infrastructure, their initial exclusion from key decisions led to misalignments in local priorities and diminished project ownership at the provincial level.

Additionally, jurisdictional shifts, particularly the transfer of Economic Land Concessions (ELCs) from MOE to MAFF during the life of the project, led to confusion over roles and responsibilities. This lack of clarity caused delays in decision-making, particularly in areas like forest management and the integration of water management systems.

FIGURE 1. Project Organization Structure



3.2. Challenge 2: Human Resources and Organizational Capacity

The procurement requirements set by the Asian Development Bank (ADB) presented significant challenges, causing repeated project delays in the project implementation. Contractors bidding on the infrastructure projects struggled to meet ADB's high documentation standards, competitive bidding processes, and stringent environmental safeguards. The ADB mandate for individual documentation for each subproject led to duplication of efforts, with submitted documents frequently returned for multiple revisions, further delaying the construction of critical infrastructure such as rainwater harvesting systems and irrigation schemes. Farmers were eager to adopt new techniques, but the slow delivery of drip irrigation systems caused them to miss vital planting seasons, severely limiting the initial impact of the project. Also, the lack of flexibility of the procurement process sidelined local contractors, who could have provided equipment more quickly, in favor of international firms unfamiliar with local agricultural conditions. Furthermore, the involvement of international contractors unfamiliar with Cambodia's local context introduced additional challenges to the implementation process. Infrastructure—particularly water canals and sea barriers—designed by international contractors proved ineffective for flood management and water drainage. The improper placement of water gates, combined with a limited understanding of local hydrology, led to ineffectiveness of the canals and sea barriers in protecting the land and crops from saltwater intrusion.

3.3. Challenge 3: Integration Challenge

The sustainability and long-term maintenance of the project's infrastructure faced significant challenges, largely due to the limited ownership by government institutions, as the project was perceived as an ADB-led initiative. While key infrastructure—such as rainwater harvesting ponds, irrigation systems, and bioengineered sea barriers—was successfully delivered, post-implementation maintenance was overlooked. Upon completion, the infrastructure and the local Water User Groups (WUGs) and Farmer Water User Groups (FWUGs) were transferred to MOWRAM. The interviews highlighted that MOWRAM's exclusion as an executing agency led to two critical issues for project sustainability: suboptimal technical design suited to the local context and the absence of legal recognition for the WUGs and FWUGs.[10] According to the local Provincial Department of Water Resources Management and Meteorology (PDoWRAM), the project infrastructure did not fully comply with local technical standards or those featured in local government's planning, which, compounded with delays in execution, left the WUGs and FWUGs without formal registration, limiting their access to the technical support and financial resources typically provided to government-led projects.

4. TRACING THE IMPLEMENTATION PROCESS

The project began implementation in August 2015.[11] The major delivery challenges soon became evident as the project moved forward.

4.1. Confronting Challenge 1: Institutional Coordination

The project faced institutional coordination challenges due to the fragmented responsibilities between the Ministry of Environment (MOE) and the Ministry of Agriculture, Forestry, and Fisheries (MAFF). The ministries were tasked with implementing the project but, without a dedicated leading ministry, the project's direction was uncertain. The dedicated focal points in the ministries held dual roles, which weakened focus and hindered coordination efforts. While roles and responsibilities were outlined during the project design phase, the absence of a centralized coordination point led to significant disruptions in project continuity.

Moreover, jurisdictional shifts led to confusion over roles and responsibilities. This was particularly the case for the transfer of Economic Land Concessions (ELCs)[12] from MOE to MAFF in 2016. The transfer of ELCs added over four million hectares of land under the jurisdiction of MAFF, which increased the ministry's role in project execution, particularly in production

forest management, but led to jurisdictional confusion with MOE over the conservation-focused components of the PPCR project. The following table shows the responsibilities to implement the four interventions in the two provinces, by MOE and/or MAFF as the executing agencies, and their relevant implementing agencies, as per the project's design documents before the ELCs.

INTERVENTION	MOE	MAFF
Rainwater harvesting ponds for increased resilience high-value crop productivity	In community-protected areas in both Koh Kong and Mondulkiri provinces	In community forests in both Koh Kong and Mondulkiri provinces
Resilient irrigation for extreme weather events and SRI		In Mondulkiri province only
Bioengineered sea barriers and coastal adaptation to changing weather conditions to reduce saltwater intrusion	In Koh Kong province only	
Ecosystem-based adaptation in two pilot catchments	In Mondulkiri province only	In Mondulkiri province only

Following the jurisdictional reforms in 2016, all protected forest areas, designated as biodiversity conservation corridors, were transferred from MAFF/FA to MOE. Concurrently, the ELCs, previously the responsibility of MOE, were assigned to MAFF, giving MAFF full responsibility for all ELCs. This reform fundamentally altered the roles and responsibilities of both ministries. MOE assumed the primary mandate for protection and conservation, while MAFF shifted its focus to the development of production forests. Consequently, components originally managed by MAFF had to be transferred to MOE. Moreover, the MOWRAM was only included as a relevant agency (not as an executing agency) in the project design, which limited its participation to consultation. MOWRAM's expertise in water management became critical as the PPCR introduced water-related infrastructure like irrigation systems and rainwater harvesting ponds. Because MOWRAM was not involved in the initial planning of the PPCR project, its late entry and limited role led to delays and gaps in infrastructure design and management, and hindered proper alignment among the water management components, impacting long-term sustainability.

SOLUTION:

The project had two executing agencies, which presented significant implementation challenges. The separation between the two agencies was largely maintained, leading to clearly divided implementation responsibilities for identical activities across the respective provincial project implementation units. The parent project had established a Grant Implementation Consultant (GIC) team to advise on the project implementation, but it had no direct role. The GIC and other service providers had to coordinate with both executing agencies. Similarly, the project monitoring and reporting system was divided until 2018, when a more integrated system was introduced. With the support of the GIC team, the project began producing integrated quarterly progress reports and, by the end of the year, successfully produced its first integrated annual work plan and budget.

To address the poor coordination between the two executing agencies, a regular series of national and provincial-level coordination meetings was introduced in 2018. These meetings included participation from service providers and were organized alternately by the two agencies. However, at the provincial level, there was still a tendency for each agency to conduct meetings separately.

To meet the requirements of the two executing agencies, the GIC team had to divide their working time between each agency. The rigid compartmentalization of working time proved to be a constraint, and greater flexibility would have been more productive. Agreed monthly work plans, developed in consultation with the two agencies, would have been beneficial.

4.2. Confronting Challenge 2: Human Resources and Organizational Capacity

To implement the project, local contractors would need to construct a variety of small-scale infrastructure works. However, procurement processes posed a major challenge in this case, stemming from the difficulties that local contractors faced in meeting the Asian Development Bank's (ADB) procurement standards and guidelines.

The project faced four key procurement challenges:

1. **Documentation and Compliance:** ADB required comprehensive and individual safeguard studies for each of the subprojects. Given the multisectoral nature of the project, the studies were often repeating themselves as there were several subprojects in the same location.

2. **Competitive Bidding Process:** ADB's strict international competitive bidding standards added complexity to procurement. Many local contractors lacked the capacity to meet these stringent requirements, resulting in overreliance on international firms. The hiring of international contractors unfamiliar with Cambodia's specific climate and agricultural challenges further complicated project delivery, as these firms required time to adapt to local conditions.

3 **Material Quality and Design Issues:** Procurement delays not only slowed the delivery of key materials, such as irrigation systems, but also led to quality issues. For example, inadequate designs of infrastructure, including the sea barriers, resulted in inefficiencies that affected the surrounding agricultural land.

4 **Staff Turnover Challenges:** The short tenure of ADB's project staff was reflected as a change in direction of the project each time a new staff person was put in charge of the project. The new person had to get up to speed with the progress and often brought a different vision (requesting amendments on previous cleared documents), which led to delays in implementation.

In several instances, the delays in procurement and infrastructure rollout meant that farmers missed crucial planting seasons, which reduced the immediate impact of the agricultural interventions. For example, the introduction of the System of Rice Intensification (SRI) was hindered by the delayed availability of water management infrastructure, leaving farmers unable to benefit from the intended improvements.

In addition to the documentation challenges, material quality issues emerged due to the delayed and misaligned procurement process. Infrastructure such as water gates and sea barriers, designed to manage floods and prevent saltwater intrusion, faced problems due to inappropriate designs and materials. The sea barriers in Koh Kong, for instance, were found inadequate for retaining water and managing nearby agricultural flooding, which required further revisions and interventions.

SOLUTION:

The review mission in August 2018 decided to engage the GIC team in reviewing and revising all safeguard reports. In the following months, the GIC team, including social and environmental safeguard specialists and the team leader, provided more extensive peer reviews than initially anticipated. They conducted numerous site visits and facilitated multiple community consultations. This led to several revisions of the safeguard reports, in response to an iterative cycle of review and comment by ADB specialists. This prolonged process resulted in significant delays in awarding construction contracts and the inevitable need for a project extension to complete the civil works. Consequently, all agricultural support activities planned for each subproject were also put on hold, resulting in missed cropping seasons. Eventually, ADB agreed to an overarching safeguard report that included all the subprojects.

Between February 2014 and April 2019, 11 contract variations were approved. These changes included adjustments in team composition, input duration, consultant replacement, and extension of the work timeline until September 2019. The firm declined an additional extension to cover the prolonged project implementation. After the GIC contract concluded, the executing agencies recruited numerous individual consultants and appointed a Project Management Adviser to coordinate their activities.

4.3. Confronting Challenge 3: Integration Challenges

The sustainability of the project's infrastructure and the long-term maintenance of key systems presented a significant challenge throughout the project's life. While the project successfully constructed critical infrastructure, such as rainwater harvesting ponds, irrigation systems, and bioengineered sea barriers, ensuring the ongoing operation and maintenance of these systems proved difficult. MOWRAM, despite its jurisdiction and technical expertise in water resources management, was not included as an executing agency. MOWRAM's lack of involvement posed a burden on the executing agencies, which lacked the relevant expertise; it also meant that the ministry's internal policies and regulations were not followed, and, therefore, the ministry could not add the project as part of its overall planning.

The exclusion of MOWRAM as an executing agency led to very limited participation in the establishment of the Water User Groups (WUGs) and Farmer Water User Groups (FWUGs). Normally, the local Provincial

Department of Water Resources Management and Meteorology (PDoWRAM) legally recognizes these groups when the projects are developed in-house, but because the project was seen as external, the groups now lack the formal recognition and financial resources necessary to maintain critical infrastructure, such as irrigation systems and sea barriers. MOWRAM's absence also resulted in the lack of assigned long-term maintenance budget further jeopardizing the sustainability of the projects. Without a clear financial or institutional framework, many communities were left without the resources to maintain these systems after project completion. Formalizing these groups with legal backing and integrating them into local government frameworks will be essential for sustaining infrastructure in future projects.

SOLUTION:

The involvement of community groups was critical to the construction and maintenance of sea barriers. Although there were initial challenges with their design and maintenance, the involvement of the Sea Barriers Management Groups (SBMGs) ensured that communities were directly engaged in protecting their land from future weather-related impacts.

The absence of long-term maintenance budgets or formal provisions for continued financial support created maintenance issues, as local communities were not fully equipped to manage the new systems when they became operational. Many infrastructure systems required ongoing technical oversight and repairs that local groups could not afford. Although water ponds, irrigation scheme, and sea barrier projects were eventually handed over to MOWRAM, they were not embedded into the ministry's overall planning process. Without a clear strategy for post-project sustainability, the communities expressed concerns about the durability of these interventions beyond the end of the project.

WUGs are the standard form of governance for infrastructure community-owned projects in Cambodia. Though the project envisioned their formation, it focused on organizing the communities but overlooked the procedures required for these groups to be legally recognized by the government institutions, particularly MoWRAM. Without MOWRAM's proper involvement and its government line departments, the WUGs and the infrastructure were not embedded in the overall structure of the PDoWRAM. Though at project completion the executing agencies handed over the infrastructure and groups to MOWRAM, the ministry did not allocate any resources to the added assets. At the time of data collection for this report, PDoWRAM had not yet incorporated the assets into their planning. Meanwhile, the WUGs used their personal resources to address small, urgent issues.

5. RESULTS

By the time the project closed in 2021, the PPCR subproject had achieved several key successes, particularly in enhancing agricultural resilience through the introduction of climate-smart practices. The project achieved the promotion of sustainable agricultural practices that are both resilient to climate variability and productive enough to support community livelihoods. By introducing the System of Rice Intensification (SRI) and salinity-resistant crop varieties, the project helped farmers maintain or increase crop yields in areas affected by erratic rainfall and saltwater intrusion. Additionally, the construction of rainwater harvesting ponds, an irrigation scheme, and bioengineered sea barriers ensured reliable water access and protected arable land, directly addressing the water security challenges. These interventions mitigate the impacts of a changing environment, while providing long-term infrastructure to support continued agricultural productivity.

Water Management Improvements: One of the most tangible outcomes of the project was the significant improvement in local water management systems. While the original plan envisioned constructing 40 rainwater harvesting ponds, project adjustments and logistical challenges—mostly related to feasible projects located on private land—meant that eight larger ponds were built alongside boreholes, stream water extraction subprojects, and rainwater harvesting tanks. A management group was established to oversee and manage the rainwater ponds and ensure rational use of the resource and maintenance of the infrastructure.

Climate-Smart Agriculture and Livelihood Diversification: The project introduced the System of Rice Intensification (SRI), a method that uses less water and fewer inputs while significantly increasing rice yields. SRI was particularly impactful in Mondulkiri, where farmers faced challenges with erratic rainfall and limited water resources. By implementing SRI, farmers were able to reduce their dependence on water and improve crop productivity, helping them adapt to the changing environment. In total, 1,100 households adopted SRI, benefiting from increased rice yields and reduced vulnerability to droughts.

In addition to rice production, a pilot project in Mondulkiri encouraged the use of drought-resistant crops, including vegetables and fruits, and promoted the adoption of climate-resilient home gardening techniques. Training sessions for farmers, which involved over 2,163 participants (70 percent of them women), emphasized best practices in soil preparation, crop rotation, and water-saving irrigation techniques. Demonstration farmers received drip irrigation systems and seedlings for home gardens, allowing them to experiment with sustainable, high-value crop production that required less water.

The project also ventured into the sustainable management of non-timber forest products, particularly bamboo in Mondulkiri. The bamboo-based community enterprise provided an environmentally friendly livelihood option, reducing the pressure on forest resources and offering an income stream that was less vulnerable to climate variability.

Infrastructure for Climate Resilience: A key component of the project was the construction of two sea barriers—one in Ta Meakh village and another in Ta Ok village—using bioengineered methods that allowed for the natural re-vegetation of pond walls, which enhanced both the structural integrity of the barriers and their environmental benefits. The construction of these barriers helped reclaim approximately 400 hectares of arable land, enabling 900 households to continue rice farming in areas that would have otherwise been rendered unusable by saltwater intrusion.

Capacity Building and Community Empowerment: In addition to the creation of the Farmer Water User Groups (FWUGs) and the Sea Barriers Management

Groups (SBMGs), the project trained 65 provincial and district officials in integrating climate change into development planning and budgeting. Training programs for provincial officials in catchment planning and the integration of climate resilience standards into infrastructure projects were particularly successful, leading to the improved design and implementation of water management systems in both provinces.

The emphasis on broad-based participation and women's empowerment was a standout success of the project. Women, who are often disproportionately affected by extreme weather events, played a leading role in the implementation of climate-smart agriculture and water management systems. The project ensured that 70 percent of the participants in agricultural training were women, and 30 percent of management positions in water and forest conservation groups were held by women.

TABLE 1. Project Achievements

INDICATORS	CUMULATIVE ACHIEVEMENT	OVERALL TARGET	% OF ACHIEVEMENT OF TARGET
Number of rainwater harvesting ponds under construction	17	30	75%
Number of households with access to rainwater harvesting ponds for irrigation of home gardens	1,502	2,000	75%
Number of households adopting drought-resistant crops	1,435	2,000	72%
Number of households with access to a climate-proofed irrigation system	90	1,000	9%
Number of households adopting SRI technologies	402	1,000	40%
Number of households protected by 15 km of sea barriers	250	400	62%

6. CONCLUSIONS AND LESSONS

The "Promoting Climate-Resilient Agriculture in Koh Kong and Mondulkiri Provinces" subproject provided important lessons that can shape the design and implementation of future adaptation and resilience initiatives. Drawing from the challenges and successes encountered, the following recommendations aim to improve multisectoral environmental resilience projects by addressing coordination, procurement, infrastructure maintenance, and sustainability issues, while incorporating many of the solutions originally outlined in the project. These recommendations offer detailed and logical guidance for future project designs, ensuring stronger outcomes, more effective use of resources, and long-term resilience for communities facing extreme weather–related risks.

6.1. Coordination Framework

6.1.1. Establish a Clear Lead Agency and Defined Roles

Designating a lead implementing agency with clear authority over decision-making can streamline processes and reduce delays caused by jurisdictional confusion. Having a dedicated project manager responsible for overseeing coordination and communication between agencies would also ensure the efficient flow of information and decision-making.

6.1.2. Involve Provincial Governments Early in the Planning Process

Provincial and local governments must be engaged from the outset to ensure that project plans align with local needs and priorities. Their early involvement can improve ownership, foster better collaboration, and avoid the misalignments that occur when local authorities are brought in too late. This approach will ensure that decision-making is localized, adaptive, and better suited to the context.

6.1.3. Advance Capacity Building for Multisector Projects

Building institutional capacity across both national and subnational levels is essential for ensuring long-term project success. Projects working on resilience and biodiversity should invest in continuous capacity-building efforts to help government institutions and local implementers understand climate resilience, complex procurement procedures, and sustainable infrastructure management. A structured capacity-building framework, introduced at the project's inception, can reduce reliance on external consultants and develop in-house expertise within local agencies, ensuring that skills remain in the institutions after the project ends.

6.2. Adapting Procurement Processes to Local Context

6.2.1. Tailor Procurement Guidelines to Project Scale and Local Context

Procurement guidelines should be adapted to the project's scale and local context. Small-scale infrastructure projects, such as rainwater harvesting ponds or community irrigation systems, are not fit for standards of large-scale international projects. Building flexibility into safeguard guidelines—without compromising core environmental and social standards—can help ensure that smaller infrastructure components are delivered efficiently without undue delays.

6.2.2. Conduct Prequalification Workshops for Local Contractors

Future projects should consider conducting prequalification training for local contractors to help familiarize them with multilateral development banks' (MDBs) procurement standards and safeguards. This would reduce delays during the implementation phase, as local contractors would have a better understanding of the expectations for documentation,

compliance, and quality control. Such training could help bridge the gap between international procurement standards and local practices, allowing greater participation by local firms and reducing reliance on international contractors who may be unfamiliar with local conditions.

6.3. Ensuring Long-Term Sustainability and Infrastructure Maintenance

6.3.1. Integrate Sustainability Planning into Project Design

A major challenge in the Cambodia project was the difficulty in maintaining the infrastructure after the project ended. Future projects must ensure that sustainability planning is embedded into the project from the outset. As part of the project, budgetary arrangement should be made to cover long-term maintenance and operational costs, whether by ensuring that the government allocates funds for maintenance of the asset or by having the project itself provide funds to be managed locally post-implementation. Alternatively, creating partnerships with local governments or private sector entities to assume responsibility for infrastructure maintenance post-project can help ensure that infrastructure continues to serve communities long after the project has officially concluded.

The project's experience with institutional changes, such as the transfer of land management responsibilities between ministries, underscores the importance of anticipating jurisdictional shifts. Ensuring that flexible coordination frameworks are established early will enable projects to adapt more easily to evolving institutional landscapes. Additionally, reducing turnover among project managers and appointing dedicated leadership with clear roles will help maintain continuity, improve coordination, and avoid disruptions in project delivery.

6.3.2. Revisit Executing Agencies When Adding a Subproject to an Already Established Project

It is essential to reassess the assignment of roles to executing agencies and other relevant agencies when adding a subproject to an ongoing project. This ensures the investment receives formal recognition, legal authority, and proper management for the long-term sustainability of infrastructure. Providing comprehensive training in technical management, financial planning, and maintenance will enable these groups to operate independently and ensure the long-term functionality of key infrastructure, such as irrigation systems and rainwater harvesting ponds.

6.4. Developing Strategic Frameworks for Multisector Projects

6.4.1. Focus Multisector Projects on a Single Geographical Area at a Time

Multisector project interventions are inherently complex. Implementing them across multiple, geographically distant locations adds further challenges and can stretch resources thin. Focusing project delivery on one area at a time can help reduce management burdens, improve coordination, and ensure that efforts and resources are more effectively concentrated. This approach also allows for better oversight and increases the impact of interventions within each targeted area.

6.4.2. Align Projects with National Priorities and Local Regulations

Projects should be aligned not only with national weather-related resilience priorities, but also with local regulations and agency requirements. This alignment increases government ownership, facilitates better resource allocation, and promotes smoother implementation. By designing projects that are complementary to national and regional development goals, MDBs can ensure that governments remain invested in maintaining and scaling up successful project components after the end of the formal project.

6.5. Incorporating Monitoring, Evaluation, and Adaptive Management

6.5.1. Leverage Digital Tools for Monitoring and Reporting

Comprehensive monitoring and evaluation frameworks should be established, supported by digital platforms, to enable ongoing assessment of project progress, outcomes, and challenges. Future projects should explore the use of technology for efficient and effective design, real-time monitoring of infrastructure performance, compliance with safeguard requirements, and overall project progress. These tools can provide project managers with up-to-date information, enabling faster problem-solving and more efficient management of resources. Regular evaluations (at least every two to three years) should be conducted to identify issues early and adjust strategies accordingly.

The "Promoting Climate-Resilient Agriculture in Koh Kong and Mondulkiri Provinces" project is a compelling example of how environmental resilience initiatives can directly enhance the livelihoods of rural communities while safeguarding fragile ecosystems. Through the introduction of climate-smart agricultural systems, improved water management infrastructure, and community-driven conservation efforts, the project demonstrated that targeted interventions could reduce vulnerability to extreme weather events and deliver tangible benefits to local populations. The positive outcomes achieved during the project underscore the importance of integrating environmental sustainability with livelihood support in the context of climate adaptation.

Project implementation faced significant challenges, particularly regarding coordination, procurement, and long-term sustainability. The complexity of coordinating multiple ministries with overlapping responsibilities slowed decision-making and contributed to delays in project implementation. The rigidity of procurement processes and the reliance on international contractors unfamiliar with local conditions caused further delays, particularly in the construction of key infrastructure. The project highlighted the need for more robust sustainability planning and better integration of MDB projects with local government planning for managing operations and maintenance costs after project completion.

The lessons learned from these challenges are invaluable for future environmental resilience initiatives. Clear and early coordination between all relevant stakeholders, tailored procurement processes that better suit local contexts, and well-planned sustainability mechanisms are critical to ensuring the long-term success of similar projects. By addressing these areas and incorporating the recommendations outlined in this report, future projects will be better positioned to overcome potential barriers and achieve more effective, scalable, and sustainable outcomes.

Moreover, this project emphasizes the importance of engaging local communities and building their capacity to manage resilient infrastructure and agricultural systems. The empowerment of Water User Groups (WUGs), the promotion of gender equity through inclusive training programs, and the creation of community-led management systems are all essential components of climate adaptation efforts. These initiatives foster local ownership and ensure that climate resilience interventions are maintained and scaled up after project completion. By ensuring that local actors are central to the process, future projects can create more sustainable, resilient communities that are better prepared to face the challenges of shifting weather conditions.

ENDNOTES

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→ 1 CEIC Data. (2023). *Cambodia Employment in Agriculture (% of total employment).* https://www.ceicdata.com and FAO. (2023). *Hand-in-Hand Initiative*: Cambodia. https://www.fao.org.

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→ 4 The Phnom Penh Post. (2021). *Fuelling dirty energy for economic growth.* https://www.phnompenhpost.com/special-reports/fuelling-dirty-energy-economic-growth.

→ 5 VOA News. (2021). *In Coastal Cambodia, Climate Change Kills Rice Crops With Salt Water.* Retrieved from https://www.voanews.com/a/in-coastal-cambodia-climate-change-kills-rice-crops-with-salt-water-/6297948.html.

→ 6 "Promoting Climate-Resilient Agriculture in Koh Kong and Mondulkiri Provinces" as part of the "Greater Mekong Subregion Biodiversity Conservation Corridors Project" (Supplementary). Appendix N – Summary Project/Programme Approval Request — "Greater Mekong Subregion Biodiversity Conservation Corridors Project" (Additional Financing) (Project No. 40253-023 CAM). ADB. 2014.

→ 7 From the Climate Change Impact Modelling and Vulnerability Assessment prepared at the time of project design. Using simulations driven by Representative Concentration Pathways (RCPs), which describe a wide range of potential future scenarios for the main drivers of shifting weather conditions (greenhouse gas emissions, air pollutant emissions, and land use) two emissions scenarios were considered: RCP 4.5 (lower greenhouse gas concentrations) and RCP 8.5 (higher greenhouse gas concentrations).

→ 8 "Promoting Climate-Resilient Agriculture in Koh Kong and Mondulkiri Provinces" as part of the "Greater Mekong Subregion Biodiversity Conservation Corridors Project" (Supplementary). Appendix N – Summary Project/Programme Approval Request — "Greater Mekong Subregion Biodiversity Conservation Corridors Project" (Additional Financing) (Project No. 40253-023 CAM). ADB. 2014.

→ 9 Improving Rice Production and Commercialization in Cambodia Findings from a Farm InvestmentClimate Assessment. ADB. 2014. https://www.adb.org/sites/default/files/publication/77825/improving-rice-production-cambodia_3.pdf.

→ 10 The WUGs and FWUGs have developed their internal regulations with the support from PDoWRAM, which endorsed by local authorities, but require further support from PDoWRAM.

→ 11 This is when the grants became effective. "GMS Biodiversity Conservation Corridors Project" (BCCP & BCCP-AF/PPCR). Project Completion Report. MAFF/MOE. 2021.

→ 12 ELCs are long-term leases that allow the beneficiary to clear land to develop industrial agriculture.

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