



Climate Change Adaptation through Small-Scale and Protective Infrastructure Interventions in Coastal Settlements of Cambodia (CCA4CS)

Report on Green-Grey Infrastructure Protection in Ou Oknha Heng Commune, Prey Nob District, Preah Sihanouk Province



JULY 2025
PHNOM PENH, CAMBODIA

BRIEF SUMMARY

Under Output 3.6 of Component 3, the project aimed to safeguard residents by rehabilitating one critical water gates and restoring mangroves for coastal protection in Ou Oknha Heng Commune, Prey Nob District.

OUTPUT 3.6

KEY ACHIEVEMENTS

- **Letter of Agreement (LoA)** signed between NCSD and Preah Sihanouk Provincial Hall in February 2025 to formalize the locally-led intervention.
- **Rehabilitation of One Water Gates:**
 - Engineering drawings finalized in March 2025 after stakeholder consultations.
 - Pre-inspection conducted for environmental and social safeguards.
 - Contract signed in April 2025 between PDOWRAM and Yin Sok Construction.
 - Construction completed and water gates handed over to the Provincial Department of Water Resource and Meteorology (PDOWRAM) in September 2025.
- **Mangrove Restoration – 53 hectares:**
 - Mangrove Planting and Management Plan approved in August 2023.
 - Site reassessed based on ESS consultant advice and environmental suitability.
 - Revised restoration plan targets 2 ha in Champu Khmao and 51 ha in Banteay Prey Commune.
 - 1,000 seedlings planted during the launch event on 25 June 2025 with participation from MoE, provincial leaders, youth, and community.
- **Conservation and Protection Measures:**
 - 100 concrete demarcation poles installed in Tuek Thla and Tuek L'ak communes, covering 975 ha of mangrove.
 - Enforcement and patrolling program launched using SMART tools:
 - 12 illegal logging attempts intercepted.
 - 8 warnings issued; 2 formal notices served.
 - Community education sessions held, resulting in reduced illegal activities.

GOOD PRACTICES

1. Robust Planning and Stakeholder Engagement

The project undertook detailed site assessments, surveys, and engineering designs before initiating infrastructure works. Active engagement with local authorities and community leaders ensured that the interventions were context-specific and well-received by the community. Environmental and social risks were addressed early on, fostering community ownership and ensuring a smooth implementation.

2. Adaptive Planning in Mangrove Restoration

Restoration plans were revised based on real-time conditions, including soil quality and tidal flow. Collaboration with environmental authorities ensured resource optimisation and targeted ecologically viable zones. Demarcation, boundary mapping, and degradation assessments supported effective site selection.

3. Integration of Law Enforcement and Community Monitoring

The SMART tool was introduced to improve environmental monitoring and law enforcement at the local level. Community members and local officials were trained in patrol techniques and documentation. Awareness campaigns strengthened legal compliance and promoted shared responsibility for conservation.

LESSONS LEARNED

1. Inclusive and Iterative Planning Is Key

Stakeholder consultations improved technical designs and enhanced project acceptance. Local involvement from the beginning ensured relevance, accountability, and long-term maintenance. Iterative planning avoided mismatches between designs and local hydrological or ecological realities.

2. Adaptive Implementation Is Essential

Revising restoration strategies in response to field challenges improved ecological outcomes. Flexibility in both technical and institutional processes was critical. Close collaboration with provincial departments enabled timely adjustments and built adaptive capacity.

RECOMMENDATIONS

1. Institutionalise Inclusive Planning and Risk Assessment

Projects should include community consultations and integrate local knowledge from the outset. Final designs should follow environmental and social assessments, supported by a standardised checklist. This approach minimises delays and enhances sustainability.

2. Promote Adaptive Management

Projects should allow adjustments during implementation based on performance data and community feedback. Regular stakeholder reviews and contingency plans in budgets are vital. Ecological baselines and monitoring should guide restoration efforts.

3. Strengthen Conservation through Enforcement and Community Empowerment

Law enforcement tools like SMART should be formally adopted and scaled up for effective implementation. Community education campaigns and stakeholder training will reinforce conservation values. Embedding these systems in local governance ensures long-term impact and institutional continuity.

PROJECT OVERVIEW

Since August 2021, the United Nations Human Settlements Programme (UN-Habitat) and the National Council for Sustainable Development (NCSD) have been implementing the Climate Change Adaptation through Protective Small-Scale Infrastructure Interventions in Coastal Settlements of Cambodia Project (CCA4CS), with financial support from the Adaptation Fund.

The project aims to strengthen climate resilience and adaptation in Cambodia's most vulnerable coastal settlements through targeted, on-the-ground interventions. By focusing on areas where ecotourism can support long-term sustainability, the initiative enhances communities' capacity to withstand climate-related challenges. The project is structured around three interconnected components to accomplish this in the highly vulnerable settlements in Kep Province and Prey Nob District of Preah Sihanouk Province:

Component 1: Community-scale knowledge and capacity enhanced to sustain the adaptation benefits of the project's investments.

Component 2: Government planning and technical capacity enhanced and knowledge captured and disseminated to sustain and enhance the project's adaptation benefits.

Component 3: Resilience built through investment in small-scale protective and basic service infrastructure and natural assets.

By integrating these components, the project addresses immediate climate risks and lays the foundation for long-term sustainability and resilience in Cambodia's coastal communities.

RATIONALE FOR THE INTERVENTION

The communities of Prey Nob District, situated west of the Kampong Smach estuary, have been shielded from sea flooding since 2001 by an earth embankment and roadway separating rice paddies from the mangrove forest. On the landward side lies a 30-meter-wide flood drainage canal, designed to convey freshwater overflow during the rainy season. This canal discharges through 36 manually operated vertical sluice gates beneath the embankment.

Several sluice gates along this protective embankment have been identified as damaged and require urgent repair. Furthermore, some locations along the embankment are overtopped by storm surges approximately once every 2–3 years, causing structural damage and saltwater intrusion into the rice fields. Compounding the threat, extensive mangrove deforestation has intensified the vulnerability of coastal settlements to flooding. These challenges pose a serious threat to local liveli-

hoods and infrastructure, underscoring the need for immediate intervention to strengthen coastal resilience and mitigate flood risks.

BRIEF DESCRIPTION OF THE INTERVENTION

Under Component 3, which focuses on enhancing climate resilience through infrastructure development, the project aimed to safeguard residents by rehabilitating two critical water gates and restoring mangroves for coastal protection in Ou Oknha Heng Commune, Prey Nob District (Output 3.6). This intervention was projected to benefit approximately 20,000 individuals, with an estimated 50 percent being women. This report summarises the project's key experiences, achievements, good practices, lessons learned, and recommendations arising from this targeted intervention.

KEY ACHIEVEMENTS

The project achieved its objectives through a series of well-coordinated activities involving local authorities, community members, and technical experts. A Letter of Agreement was signed in February 2025 between the NCSD and the Preah Sihanouk Provincial Hall to enable the locally led initiative.

1. Water Gate Rehabilitation

The final engineering drawings were completed in March 2025 after stakeholder consultations. The Adaptation Officer conducted a pre-construction site inspection to assess suitability and potential environmental and social risks. Following a competitive procurement process, the Provincial Department of Water Resources and Meteorology (PDOWRAM) signed a contract in April 2025 with Yin Sok Construction. Construction commenced within a week of the contract signing, and the completed water gates were handed over to the PDOWRAM in September 2025.

2. Mangrove Restoration – 257 Hectares

To support restoration efforts, the Preah Sihanouk Provincial Administration established a Provincial Working Group including the Fisheries Administration and other key stakeholders. A consultant conducted site assessments and consultations, culminating in a Mangrove Planting and Management Plan approved in August 2023. Informed by ESS consultant recommendations regarding land suitability, the project team collaborated with the Provincial Department of Environment to revise the restoration plan.

The availability of full 257 hectares, initially identified for planting and restoration, could not be confirmed for implementation. Accordingly, the PA-PSH submitted a formal request to the National Council for Sustainable Development (NCSD) and the Ministry of Environment (MoE) seeking approval for a revision to the original

plan. On 17 July 2025, the Project Management Committee (PMC) approved the proposed revision. The revised plan includes:

- replanting activities in 53 hectares, comprising 2 hectares in Champu Khmao and 51 hectares in Banteay Prey Commune, along with mangrove protection and conservation measures
- the installation of 100 demarcation poles to delineate mangrove boundaries and reduce land-use conflicts, as well as degradation assessments to monitor threats from illegal logging and encroachment.

The Mangrove Planting Launching event, held on 25 June 2025 in Samrong Krom village, was attended by the MoE's Under Secretary of State, the Provincial Deputy Governor, local leaders, youth groups, and community members. During the event, 1,000 seedlings were planted.

Additional Achievements:

1. A total of 53 hectares of mangroves were restored using 32,000 seedlings across 3 fishery communities in 2 communes of Prey Nob in 2025.
2. An enforcement and patrolling program were launched, with SMART guidelines adopted by Community Fisheries (CFIs), Community Protected Areas (CPAs), and local officers for law enforcement. Patrols were conducted 18 times between April and September 2025 across multiple communities, including Prey Nob II, Chrolong, Champu Khmao, Boeng Rang, and Kampong Smach Touch.
 - 12 illegal logging attempts intercepted
 - 8 verbal warnings and two formal notices issued
 - Awareness sessions conducted on legal penalties
 - Result: Noticeable reduction in illegal activities in target areas
3. One hundred concrete demarcation poles were installed in Tuek Thla and Tuek L'ak Communes (Chrolong and Prey Nob II Fishery Communities), safeguarding 975 hectares of mangrove forest within Chrolong and Prey Nob II fishery communities. The initiative was formalised by Provincial Ordinance No. 017/25 dated 19 June 2025.

GOOD PRACTICES

1. Robust Planning and Stakeholder Engagement in Infrastructure Projects

A notable good practice demonstrated by the project was its emphasis on detailed planning and comprehensive stakeholder engagement. The infrastructure activities were not initiated until after thorough site assessments, topographical surveys, and the preparation of engineering designs that incorporated feedback from multiple stakeholders, including local authorities and community leaders. This inclusive approach ensured that the rehabilitated water gates met local flood management needs and were technically suitable for the specific geomorphological and hydrological context of the area.

The project's insistence on pre-construction environmental and social risk assessments, conducted through field verification, ensured that potential adverse impacts were identified and mitigated in advance. By integrating the concerns of local stakeholders into the design and implementation phases, the project built trust, reduced resistance, and encouraged local ownership of the outcomes. This participatory approach strengthened the sustainability of the infrastructure, ensured smoother implementation, and increased the likelihood of long-term community maintenance.

2. Adaptive Planning and Technical Flexibility in Mangrove Restoration

Another exemplary practice was the project's ability to adapt its restoration approach in response to dynamic field conditions. Rather than proceeding solely with initial assumptions, the project team collaborated with the Environmental and Social Safeguards (ESS) consultant and the Provincial Department of Environment to reassess site suitability for mangrove restoration. Factors such as soil fertility, tidal flow, and existing mangrove survival rates were considered in real time, enabling course corrections and optimisation of resources.

This flexible, iterative process resulted in a revised restoration plan that targeted areas with higher ecological potential and fewer land-use conflicts. The planning also included detailed implementation measures such as the installation of demarcation poles, mapping of boundaries, and degradation assessments. These adaptive measures significantly enhanced the project's ability to achieve high survival rates and demonstrated a replicable model for other restoration projects.

3. Integration of Law Enforcement and Community-Based Monitoring

The incorporation of law enforcement tools, such as SMART (Spatial Monitoring and Reporting Tool), into community-level conservation activities represents a key innovation. By training local officers, CFIs, CPAs, and commune-level stakeholders in SMART patrolling techniques, the project institutionalised monitoring and enforcement. Regular patrols, documentation of infractions, and issuance of warnings helped build local capacity to protect restored mangroves and deter illegal logging.

Furthermore, community outreach efforts such as awareness campaigns on mangrove laws and penalties fostered broader support for conservation. The synergy between legal enforcement and community sensitisation created a culture of shared responsibility, helping to reduce environmental crime in the targeted zones.

LESSONS LEARNED

1. Inclusive and Iterative Planning Is Fundamental to Project Success

The project demonstrated that infrastructure development and ecological restoration are more successful when preceded by iterative planning cycles that include broad-based stakeholder engagement. Finalising tech-

nical designs only after consultations and feedback ensures community relevance and reduces implementation delays. Involving sub-national authorities and local community groups from the outset helped generate ownership and accountability, which are critical to long-term operation and maintenance. The experience also highlighted that a one-size-fits-all approach to planning is ineffective in coastal and estuarine zones where hydrological and ecological variables are highly context-specific. Iterative planning helped adjust to these realities, preventing misallocation of resources and enhancing resilience outcomes.

2. Adaptive Implementation Increases Ecological Success and Community Support

The restoration activities highlighted the importance of adapting project plans to the local ecological and socio-political conditions. When initial plans were found to be sub-optimal due to low survival rates and unsuitable soils, the project proactively revised its restoration strategy. This responsiveness to ground realities enabled the project to target more suitable areas, thereby increasing its effectiveness. Flexibility was not only technical but also institutional, as the project worked closely with provincial departments to realign planning and execution. This experience reinforces the importance of building adaptive capacity within project teams and their institutional partners.

While physical restoration of ecosystems is essential, long-term success requires complementary efforts in legal enforcement

RECOMMENDATIONS

1. Institutionalise Inclusive Planning and Pre-Implementation Risk Assessments

Future projects should incorporate robust participatory mechanisms into the planning cycle, ensuring that local knowledge, traditional practices, and site-specific risks are considered in both the design and implementation phases. Planning should not be viewed as a one-time activity, but rather as a continuous process of iteration, review, and validation with affected communities and sub-national authorities.

It is also recommended that technical drawings and implementation timelines be finalised only after conducting topographical and environmental assessments, complemented by social consultations. A mandatory pre-construction checklist that includes ESS compliance would help to standardise this process and mitigate unforeseen disruptions.

2. Promote Adaptive Management in Restoration and Infrastructure Projects

Donors and implementing partners should allow for flexibility in project execution to enable mid-course corrections based on environmental performance, community feedback, or field constraints. This could be institutionalised through regular joint review meetings with stakeholders and inclusion of contingency planning in budgets and log frames.

Specifically for ecological restoration, long-term monitoring frameworks and site-specific ecological baselines should guide planting strategies. This adaptive approach not only improves technical outcomes but also enhances transparency, community trust, and accountability.

3. Strengthen Conservation through Legal Enforcement, Monitoring Tools, and Community Empowerment

To sustain ecological gains, it is essential to integrate legal enforcement mechanisms and participatory monitoring tools such as SMART into restoration efforts. Provincial governments should be supported to formalise these tools through ordinances and capacity-building programs.

Additionally, community-based conservation education should be expanded to promote behavioural change and stewardship. Mobilising youth, schools, and civil society organisations around conservation values can help create long-term champions for the environment. Embedding these practices within local governance systems will increase resilience, reduce degradation pressures, and ensure institutional continuity beyond project lifecycles.

DOCUMENTATION

Name	Type	Produced Date	Location
Pre-inspection report	Report	April 2025	Link
Mangrove Planting Management Plan (MPMP)	Report	August 2023	Link
Weekly site report by the site manager	Report	August 2025	Link
Post-inspection report	Report	July 2025	Link





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