



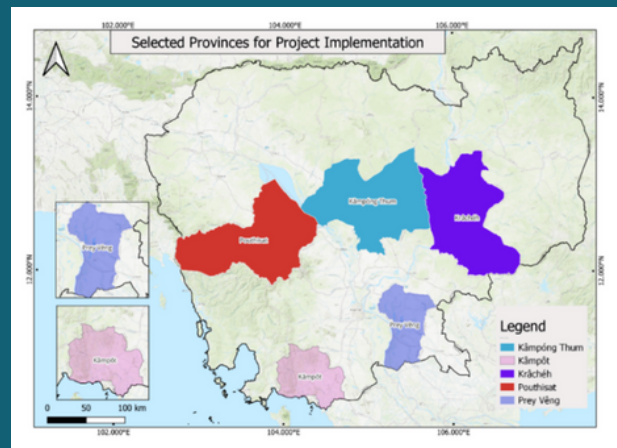
RESEARCH

Appropriate Costing Methods of Climate Change Adaptation in Infrastructure Development: Experimental Studies for Road and Related Infrastructure Projects in Cambodia (CAMI)

Cambodia is experiencing severe droughts and floods that cause significant loss of life and economic damage. Mainly due to poor design and lack of climate-resilient planning consideration, many road networks are severely damaged every year, and many sections are cut off during the heavy rainfalls mostly occurring in september and october. To address these challenges, it is urgent to enhance the climate resilience capacity of roads and other infrastructures in Cambodia.

OBJECTIVES

- Investigate methodologies for assessing damage and losses caused by climate change on roads and other infrastructure.
- Perform a Cost-Benefit Analysis (CBA) of these infrastructures under scenarios without and with climate change adaptation measures, incorporating climate projections.
- Develop practical tools and methods for Ministry of Public Works and Transport (MPWT) and Ministry of Rural Development (MRD) officials to assess the financial costs of adaptation in roads, small-scale irrigation, and related infrastructure.



RESEARCH METHODOLOGY



Climate projections using the MRC's global climate models and satellite images to identify flood-prone areas and inundation areas, estimate floodwater depth, and predict flood hazard for selected infrastructure (road).



Loss and damage assessment based on evaluation of climate risk and risk areas, inventory dataset for roads and infrastructures, damage-cost based on expert judgement and local cost and exposure.



CBA: climate risk analysis, scenario determination, cost-benefit identification for each adaptation option, decision analysis, and spreadsheet software like Microsoft Excel or Google Sheets.



CBA parameters include key parameters like Internal Rate of Return (IRR), Benefit Cost Ratio (BCR), and Net Present Value (NPV) as well as consultation with relevant MRD and MPWT Provincial Departments.



Capacity needs assessment for relevant officials of MPWT and MRD to assess the information gaps and training needed in the adaptation costing in road infrastructures.

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RESEARCH RESULTS

Loss and damage assessment for road network in Prey Veng and Kampot



Both Prey Veng and Kampot provinces are highly vulnerable to flooding, with **3,745 km² (2.45%)** in Prey Veng and **4,316 km² (2.07%)** in Kampot classified as flood-prone.



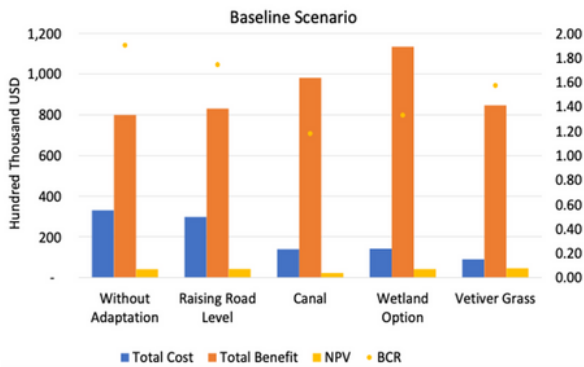
CBA: 3 nature-based solutions, namely the Canal Option, Wetland Option, and Greening Roadway Option, as the best suited for the local contexts.



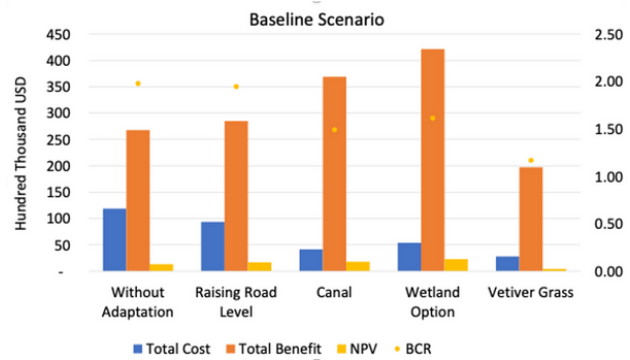
The estimated damage from the 2019 and 2020 floods amounted to **\$4,464,557** in Kampot and **\$3,645,618** in Prey Veng.



Based on capacity needs assessments with government officials from the MPWT and MRD, capacity and knowledge on “skills and technical methods” to losses and damages, and the adaptation costing model was evaluated and provided better understanding of building a national guideline on adaptation costing on road infrastructure development in Cambodia.



CBA results under the baseline scenario and adaptation options for the NR43 road project in Kampot province



CBA results under the baseline scenario and adaptation options for the PR382D road project in Prey Veng province



RECOMMENDATION

- Integrate developed methods and tools for assessing losses and damages, and CBA into ministry plans and design standards, with necessary technical and financial support.
- Use statistical and spatial analyses to understand how hazards impact infrastructures and guide policy adaptations at the provincial level.
- Continuous monitoring and updating of tools and methods for assessing climate change impacts on infrastructure.
- Incorporate assessment methods and tools into the university curriculum, particularly in climate change programs.
- Provide comprehensive training for government officials and contractors on these assessment methods.
- Support the approval of national adaptation guidelines and expand research into water and irrigation infrastructures based on the CAMI project’s experiences.

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