KIRIBATI TECHNOLOGY ACTION PLAN

Adaptation

July 2025

TNA TECHNOLOGY NEEDS ASSESSMENT

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REPORT

Technology Action Plan

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FOREWORD

In the context of unprecedented climate change and its far-reaching effects, the urgency for adaptive strategies has never been greater, particularly for vulnerable nations such as Kiribati. This stunning archipelago, whose coastlines are both central to its cultural identity and vital to the livelihoods of its communities, continues to face significant threats from rising sea levels and increasingly frequent extreme weather events.

In recognition of this critical situation, the Technology Needs Assessment (TNA) project was initiated to systematically identify and promote technologies essential for coastal protection. The TNA process has been successfully led by the Climate Change and Disaster Management Division (CCDRM) of the Office of Te Beretitenti (OB), in collaboration with the UNEP Copenhagen Climate Centre (UNEP CCC) and the University of the South Pacific (USP). The national coordinator played a pivotal role in guiding the efforts of two local consultants, whose technical contributions have been instrumental in bringing this report to completion.

From the outset, the TNA's mission was clear: to identify and prioritize adaptive and mitigative technologies tailored to the specific needs of Kiribati's unique environment. Stakeholder engagement was a cornerstone of this process, ensuring that a wide range of perspectives were considered and that barriers to technology adoption were properly analysed. The insights gathered informed the development of the Barrier Analysis and Enabling Framework (BA&EF), a critical component that deepens our understanding of implementation challenges and strengthens the feasibility of our technological roadmap.

The Technology Action Plan (TAP) further translates this strategic vision into practical, actionable steps, offering a clear path forward for the deployment of priority technologies.

This report represents the culmination of a collaborative and inclusive effort. It serves as a valuable resource for stakeholders, policymakers, and practitioners committed to protecting Kiribati's coastlines and enhancing the resilience of its communities. Through the development of the TAP, we have brought together extensive research and local knowledge into a comprehensive framework that is both ambitious and achievable.

Mr. Tebwaatoki Taawetia
Secretary
Office of Te Beretitenti

Executive Summary

Coastal protection was a key focus for adaptation in the Kiribati Technology Needs Assessment (TNA) project. This report marks the final phase of the TNA process, culminating in the creation of a Technology Action Plan (TAP), which serves as a strategic guide for implementing technology within the country. The sector-specific TAPs detailed in this report were developed based on findings from the earlier phases and input from stakeholders. In the initial phase, a range of adaptation and mitigation technologies were identified, prioritized, and outlined in the TNA Report. Research and stakeholder feedback helped to pinpoint barriers to the wider adoption of these prioritized technologies, which were then addressed in the Barrier Analysis and Enabling Framework (BA&EF). The following technologies were deemed priority areas within the TAP for the coastal protection sector:

1. Coastal rehabilitation through land reclamation
2. Green-grey infrastructure
3. Mass concrete seawalls

The Barrier Analysis and Enabling Framework (BA&EF) employed a consultative process with stakeholders to identify, screen, decompose, and analyse the root causes of barriers through a national workshop. The BA&EF report revealed that barriers across different sectors were interconnected, with notable similarities, including economic and financial challenges, policy and regulatory issues, technical obstacles, and gaps in information and awareness. Additionally, the report outlined the necessary measures and the supportive environment required for the effective deployment of prioritized technologies.

Following a similar stakeholder consultation approach as in the previous phases, the Technology Action Plan (TAP) engaged multiple stakeholders, including representatives from both the public and private sectors, as well as members of the TNA Steering Committee. Together, they assessed the enabling measures and prioritized those from the BA&EF report that were essential for technology deployment. These prioritized measures were then converted into actionable and viable steps for the TAP. For each step, a series of activities was defined to promote the successful implementation of these technologies within the country.

Below, a table summarizes the objectives, planned actions, timelines for implementation, and total costs associated with the prioritized technologies outlined in the action plan.

Table 1: Summary of objectives, planned actions, timelines for implementation and the total cost

Ambition	Actions	Timeframe for implementation	Total cost for implementation
Technology 1: Coastal rehabilitation by land reclamation			
Coastal rehabilitation by land reclamation will be implemented in the targeted areas by 2030 supported by improved engineering technologies, strengthened national coastal policy and a strong community engagement	Improve access to climate finance	2026 - 2030	AUD$700,000
	Integrate vegetation with engineered solution		AUD$1,000,000
	Policy review, formulation and alignment		$1,000,500
	Development of a standardized seawall design that effectively withstand environmental challenges and ensures long term security	2026 - 2030	
	Sharing knowledge and information		AUD7,000
Technology 2: Green-grey infrastructure			
As technology has not yet been utilized in Kiribati, we will focus on implementing it in South Tarawa, specifically integrating it with government	Strengthening partnership	2026 - 2030	$800.00
	Capacity building		$800.00
	Establish a dedicated fund		$800.00
	Improved institutional capacity		$800.00
	Improved institutional capacity		$1,500.00

buildings. This initiative aims to address and mitigate coastal erosion, enhancing the resilience of the infrastructure in this vulnerable region.	Improved research development		$40,000.00
	Effective government policies		$2,800.00
Technology 3: Mass concrete seawall			
To effectively respond to the urgent challenges posed by coastal erosion, our immediate intervention will focus specifically on areas most at risk. These targeted regions are susceptible to significant erosion threats and will be prioritized for our protective measures.	1.0 Source funding support	2026 - 2030	$300,000.00
	2.0 Establish coastal management authority		$115,000.00
	3.0 Improve staff technical capacity, skills and knowledge		$16,000.00
	4.0 Improve community awareness		$17,000.00

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Acronyms

ADB	Asian Development Bank
AUD	Australian Dollary
CFD	Climate Finance Division
DFAT	Australian Department of Foreign Affairs and Trade
INDC	Intended Nationally Determined Contributions
KIT	Kiribati Institute of Technology
KJIP	Kiribati Joint Implementation Plan
MELAD	Ministry of Environment, Lands and Agriculture Development
MCIA	Ministry of Culture, Internal Affairs
MFAT	New Zealand Ministry of Foreign Affairs and Trade
MISE	Ministry of Infrastructure and Sustainable Energy
MOE	Ministry of Education
GCF	Global Climate Fund
GDP	Gross Domestic Product
GEF	Global Environmental Fund
GoK	Government of Kiribati
GGGI	Global, Green
TAP	Technology Action Plan
OB	Office of Te Beretitenti
US	United States

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Chapter 1.0: Technology Action Plan and Project Ideas for Coastal Protection Sector

Coastal protection plays a vital role in safeguarding the livelihoods of communities residing primarily along coastlines. However, challenges such as insecure land tenure and the scarcity of available land make it difficult for residents to relocate to safer areas away from the threat of severe inundation and the impacts of strong wave overtopping. This limited choice reinforces the vulnerability of these communities, underscoring the need for comprehensive strategies that address both coastal protection and housing security.

Recognizing the vulnerabilities of both the people and the islands to the ongoing threat of climate change, the national climate change policy, Kiribati Joint Implementation Plan (KJIP), Intended Nationally Determined Contributions, strategically addresses the severity and anticipated impacts of this crisis. It prioritizes coastal protection as a critical issue, emphasizing the need for comprehensive adaptation action to safeguard the entire population and ensure a sustainable future for the islands.

The estimated value of the damage climate change has inflicted on Kiribati is significant and multifaceted. By the 2040s, the cost of managing sea-level rise alone is projected to be between US$17 million and US$54 million, which corresponds to about 4 to 17 percent of Kiribati's GDP[1]. Annual damages specifically on Tarawa, the main island, due to coastal impacts and water resource changes are estimated at US$8 to US$16 million, with extreme storm surge events potentially causing capital losses up to US$430 million[2]. These figures reflect only part of the total damage, as losses related to agriculture, health, and other sectors are likely substantial but harder to quantify[2].

Overall, climate change threatens Kiribati's land through erosion, inundation, and saltwater intrusion, affecting freshwater supplies, crops, infrastructure, and livelihoods, with some islands already disappearing[3]. The country's vulnerability is so severe that climate adaptation

[1] **Climate Adaptation and Resilience Costs in the Pacific Islands and Atolls – available online at** Climate Adaptation and Resilience Costs in the Pacific Islands and Atolls - Climate Adaptation Platform

[2] Impact of Climate Change on Low Islands The Tarawa Atoll, Kiribati – available online at WB Report on Climate Change in Kiribati.pdf

[3] Meet the President Trying to Save His Island Nation From Climate Change – available online at Climate Change Kiribati: Islands at Risk of Disappearance | TIME

costs could reach up to 35% of its GDP when considering coastal zone impacts alone[4]. Without effective adaptation, these damages could be catastrophic for Kiribati's economy and population[2].

[5]The three technologies prioritized in the initial stage of the TNA process which was reflected in the TNA report, followed by the BA&EF report whereby actions and activities were identified for the implementation of each of the technologies are as follows;

1. Coastal rehabilitation by land reclamation
2. Green – grey infrastructure
3. Mass concrete seawall

Table 2: Technologies prioritized in the coastal protection sector, level of current uptake and preliminary target.

Technology Prioritized	Level of Current Uptake	Preliminary targets
Coastal rehabilitation by land reclamation	Successful small-scale implementations of this technology have yielded promising results that support its broader adoption. The creation of new land presents a valuable opportunity to alleviate the strain caused by land shortages in South Tarawa. Similarly, in Tuvalu, a major project involving seven hectares of coastal rehabilitation through land reclamation has been completed successfully which will be replicated in Kiribati.	The focus for implementing this technology will be in a vulnerable region of South Tarawa that is frequently affected by flooding and wave overtopping. This area faces significant risks to residents due to its constant exposure to inundation.

[4] REPUBLIC OF KIRIBATI INTENDED NATIONALLY DETERMINED CONTRIBUTION – available online at STRUCTURE OF THE INDC
[5] TNA Report

Green-grey infrastructure	While this technology has not yet been implemented in Kiribati, a scaled-down version could be specifically designed to effectively tackle the climate change challenges that Kiribati is encountering.	As technology has not yet been utilized in Kiribati, we will focus on implementing it in South Tarawa, specifically integrating it with government buildings. This initiative aims to address and mitigate coastal erosion, enhancing the resilience of the infrastructure in this vulnerable region.
Mass concrete seawall	Mass concrete seawalls have gained widespread recognition as an effective solution to combat coastal erosion in Kiribati. This technology has been employed as an immediate intervention to address pressing coastal erosion challenges.	To effectively respond to the urgent challenges posed by coastal erosion, our immediate intervention will focus specifically on areas most at risk. These targeted regions are susceptible to significant erosion threats and will be prioritized for our protective measures.

Chapter 2: Action Plan for Coastal rehabilitation by land reclamation

2.1. Technology overview

Anecdotal evidence from integrated vulnerability assessments and national consultations suggest that communities in Kiribati are experiencing increasing temperatures, stormier weather, more frequent coastal inundation and declining coastal fishery stocks.[6] The mean sea level is projected to rise by 5–15 cm by 2030 and 20–60 cm by 2090 under the higher emissions scenario. In addition, climate induced sea-level rise will exacerbate the impact of storm surges[7]

Coastal rehabilitation by land reclamation is a crucial strategy employed by Kiribati to enhance community resilience in the face of ongoing climate change threats. This approach to coastal rehabilitation is tailored to meet specific local needs and conditions. Some reclamation projects are designed to extend land boundaries into the sea, providing additional space for habitation and infrastructure. In contrast, other initiatives focus on reclaiming land to mitigate the impacts of wave overtopping and rising sea levels, thereby safeguarding communities from environmental hazards. By adapting reclamation techniques to their unique circumstances, this technology has been adopted at different versions to meet the circumstances.

2.2 Action Plan for Coastal rehabilitation by land reclamation

2.2.1 Ambition for TAP

Kiribati coastline has different physical features as compared to Tuvalu and the Marshall islands[8]. Kiribati coastlines tends to have a larger lagoons and more extensive reef-enclosed areas as compared to the neighbouring atoll islands such as Tuvalu and Marshall Islands[9]. Population pressure in Kiribati has led to several problems prompting the use of coastal rehabilitation through land reclamation. Consequently, population pressure drives land scarcity

[6] Kiribati National Climate Change policy
[7] ibid
[8] **Terrain and Topography of Kiribati: mountains, valleys, and plains** *available online at* Terrain and Topography of Kiribati: mountains, valleys, and plains. - Earth Site Education
[9] The study for assessment of ecosystem, coastal erosion and protection / rehabilitation Final Report of damaged area in Tuvalu available online at https://openjicareport.jica.go.jp/pdf/12020657_02.pdf

and vulnerability in coastal zones, prompting land reclamation as a solution to expand land availability and protect against flooding, despite associated environmental and flood risk challenges[10, 11].

Recognizing that the successful adoption of this technology necessitates significant funding, particularly from external sources, this phase of the TAP report will concentrate on a specific area in South Tarawa. This location is consistently affected by seawater inundation and frequently experiences severe wave overtopping. As a result, families in this community are confronted with substantial challenges and have no viable alternatives but to remain and adapt to their increasingly difficult circumstances. The size of the area is 0.3 ha with the population of approximately 1,132 people (2020 census report). It was anticipated that the work would target 2026 to commence and complete 2030.

2.3 Actions and Activities selected for inclusion in the TAP for coastal rehabilitation by land reclamation

2.3.1 Summary of barriers and measures to overcome barriers

This exercise reflects on the findings presented in the BA&EF report. During the TAP stakeholder consultation retreat held from May 12 to May 14, 2025, participants (refer annex 1) highlighted several critical barriers identified through the BA&EF exercise that hinder the effective implementation and dissemination of this technology. These barriers include economic and financial constraints, regulatory and policy challenges, technical limitations, and issues related to human capacity and awareness. Table 2 outlines these identified challenges along with strategies to achieve the outlined goals for the deployment, transfer, and diffusion of this technology.

Table 3: Identified barriers and measures

Categories of Barriers	Measures to overcome barriers
Economic and Financial	Enhancing access to climate finance is crucial for advancing coastal rehabilitation initiatives in Kiribati. To support this effort,

[10] Xu, Lilai; Ding, Shengping; Nitivattananon, Vilas; Tang, Jianxiong. **Land; Basel** Vol. 10, Iss. 8, (2021): 866. DOI:10.3390/land1008086

[11] **New land creation on waterfronts is increasing, study finds** ***available online at*** *New land creation on waterfronts is increasing, study finds*

	the Climate Finance Division of the Ministry of Finance and Economic Development has been established to streamline access to climate finance resources. Strengthening the institutional capacity of this division is key to improving proposal development and fund management, which, in turn, will build donor confidence and ensure the successful implementation of vital coastal rehabilitation technologies. By focusing on capacity-building within the division, Kiribati can unlock greater funding opportunities and foster resilience against climate change impacts.
Strengthened regulations and policies	The enforcement of coastal protection regulations and policies is currently insufficient, highlighting the need for a comprehensive review and update to align them with the present national context. To enhance the effectiveness of these measures, it is essential for implementing partners involved in coastal protection projects and national initiatives to collaborate closely. By working together, they can establish robust standards that should be integrated into updated regulations and policies, ensuring more effective protection of our coastal environments.
Technical and Human capacity Barrier	The challenges associated with inadequate coastal protection designs have highlighted the urgent need for capacity building in this area. To address these issues effectively,

	local institutions like the Kiribati Institute of Technology must enhance their curriculum to align with current technological advancements in coastal protection. This alignment will ensure that local professionals are well-equipped with the necessary skills and knowledge to develop and implement effective coastal management strategies.
Awareness and Information	To enhance the effectiveness of coastal protection initiatives, it is imperative to prioritize information sharing and raise awareness about the environmental, social, and economic benefits associated with these efforts. Government services, NGOs, and local churches must actively engage with community members to foster understanding and support for coastal protection. Developing comprehensive manuals can serve as valuable resources for implementing partners, ensuring that best practices are effectively communicated. It is crucial to educate the community about the standards required to enhance coastal protection, as well as the potential dangers and challenges that can arise from inadequate compliance. Ultimately, by promoting informed involvement and collaboration, we can improve the resilience of our coastal areas and safeguard them for future generations.

2.3.2 Actions selected for inclusion in the TAP

This section provides a list of narrative descriptions and reasonable arguments for each of the measures selected as actions to be included in the TAP for coastal rehabilitation by land

reclamation. The measures considered as actions are based on economic and non-economic measures particularly relating to development and approval of national coastal policy and mainstreaming policy in other national and sectoral policies. The noneconomic measures provides a pathway for generating and sharing knowledge, land use planning and developing pilot projects in communities.

Table 4: list of actions and its narrative descriptions

Barriers	Actions	Descriptions
Economic and Financial	Increase access to climate finance	Coastal protection initiatives demand substantial financial backing. Typically, larger projects receive support from international donors, while government budgets often only cover urgent needs to safeguard specific regions and communities from the severe effects of coastal erosion. Securing external funding usually necessitates well-structured project proposals. Unfortunately, Kiribati has faced challenges in effectively accessing major global climate finance and adaptation funds due to shortcomings in project documentation and design.
	Secure funding for coastal protection	The government's annual fiscal budget often falls short in providing adequate funding for projects aimed at protecting the country from

		the severe impacts of climate change. This insufficiency hampers efforts to establish a standardized approach to mitigate the adverse effects of climate change. To secure sustainable funding for coastal protection, it is essential for the government of Kiribati to foster collaboration and cooperation with its development partners.
Regulation and policies	Develop a strong and conducive policies and regulations	Regulations and policies should be tailored to the specific context of the country, ensuring that activities and actions can be developed in full compliance with these standards.
Technical and human capacity barriers	Development of a standardized seawall design that effectively withstands environmental challenges and ensures long-term security.	Harnessing the expertise and capacity of local staff to develop a standardized coastal protection system is essential for addressing the unintended consequences of sea level rise and wave overtopping. This approach is crucial for safeguarding both coastal resources and the communities that inhabit these vulnerable areas. Relying heavily on international consultants for

		leadership in this area has proven to be an increasingly expensive and unsustainable strategy. By empowering local teams in Kiribati, we can foster innovative solutions that are not only more cost-effective but also better tailored to the unique challenges faced by our coastal environments.
Awareness and information (Social barriers)	Community consultation	It is essential to raise awareness about the consequences of inadequate compliance with established standards. Adhering to these standards not only promotes accountability but also facilitates the integration of traditional skills and knowledge into a standardized framework, ultimately yielding long-term benefits for individuals and organizations alike. By embracing standardized practices, we can ensure a more sustainable and effective approach to our work.

2.3.3 Activities identified for implementation of selected actions

Table 5: Activities identified for implementation of selected actions

Actions	Activities
1.0 Improve access to Climate Fund	Activity 1.1: Institutional and technical capacity building of sectoral staff to acquire skills to be able to gain access to climate funds.
	Activity 1.2: Strengthening coordination mechanism to improve donor coordination to enhance cooperation and commitment
	Activity 1.3: Set up a climate finance tracking systems within the sector's financial system frameworks. This would enable tracking how the system is being adopted
	Activity 1.4: Technical assistance to improve financial management systems, ensuring alignment with international standards for transparency and accountability
2.0 Capacity building	Activity 2.1: Training programs for government agencies to improve project and meet accreditation requirements for multilateral funds
3.0 Policy review, formulation and alignment	Activity 3.1: Engage local consultant with all fees(inclusive of travel expenses, consultant fee)
	Activity 3.2: Policy formulation and alignment with the national development initiatives, policies and frameworks
	3.3: Stakeholder engagement and inclusive dialogue. This draws experiences and views from a diverse social groups.
	3.4: Capacity building and institutional strengthening to align to the policy requirement
4.0 Development of a standardized technology design that effectively withstands environmental	4.1: Engage International Consultant (inclusive of fees, travel, transportation, accommodation)

challenges and ensures long-term security.	
	4.2: Site assessment and data collection
	4.3: Environmental Impact Assessment
	4.4: Regulatory compliance and permitting
	4.5: Design development
	4.6: Material testing and selection
	4.7: Monitoring and maintenance planning
	4.8 Integrate green vegetation with engineered solutions for a demonstration
5.0 Sharing knowledge and information	5.1: Organize workshops and seminars that bring together engineers, scientists, local communities and policy makers to share best practices, present case studies and introduce new technologies for coastal protection
	5.2: Information and data sharing platforms to enable sharing of information
	5.3: Community engagement and local knowledge integration

2.3.4 Actions to be implemented as Project Ideas

The actions above were transformed into project concepts and ideas aimed at implementing the Technology Action Program (TAP). These concepts were meticulously evaluated by the coastal working group with a focus on technical feasibility. The following project ideas have been identified to foster a conducive environment for the diffusion and dissemination of technology:

- Design a project with many benefits that will attract funding Review and develop a strong and conducive coastal protection policy
- Development of a demonstration seawall design that integrated with vegetation that would effectively withstands environmental challenges and ensures long-term security.
- Sharing knowledge and information

2.4 Stakeholders and Timelines for the Implementation of TAP for coastal rehabilitation by land reclamation

2.4.1 Overview of Stakeholders and Timeline for implementation of TAP

The main implementing agency is Ministry of Infrastructure and Sustainable Energy (MISE) who will coordinate the overall coastal rehabilitation technology diffusion in the country. MISE will be responsible for coordinating all the meetings and will be driving the submission and acceptance of the national coastal protection policy. The other main partner will be Office of Te Beretitenti (OB) who will work along MISE in providing technical support and communications to project's recipient. The TNA could provide technical input in terms of providing guidance on landscape designing and land use plans. The Office of Te Betretitenti and the Ministry of Environment, Lands and Agriculture Development (MELAD) could provide assistance in formalizing the National Coastal Protection Policy and seeking consultations from the climate change steering committee which is the Kiribati National Expert Group so that the policy is well aligned to other sectoral policies. The Ministry of Culture and Internal Affairs (MCIA) and Ministry of Fisheries and Ocean Resources could assist. The tertiary institutions such as Kiribati Institute of Technology (KIT) could assist in developing curriculum that would support building and the designing of strong coastal protection technology that would serve a long term benefit. The Ministry of Finance and Economic Development could look into budget submissions from MISE to accelerate the diffusion of the technology.

2.4.2 Scheduling and sequencing of specific activities

Table 6: Scheduling and sequencing of specific activities in coastal rehabilitation by land reclamation.

Activity						Responsible body
	2026	2027	2028	2029	2030	
1.1						MFED, OB
1.2						MFED, OB
1.3						MISE, OB
1.4						MISE, OB,
2.1						MISE, OB, KIT
3.1						MISE, OB

3.2						MISE, OB
3.3						MISE, OB
3.4						MISE, OB
4.1						MISE, MCIA, MELAD
4.2						MISE, OB, MELAD, MCIA
4.3						MISE, OB, MELAD, MCIA
4.4						MISE, OB, MELAD, MCIA
4,5						MISE, OB, MELAD, MCIA
4.6						MISE, OB, MELAD, MCIA
4.7						MISE, OB, MELAD, MCIA
4.8						MISE, OB, MELAD, MCIA
5.1						MISE, OB, MFED(CFD)
5.2						MISE, OB, MFED(CFD)
5.3						MISE, OB, MFED(CFD)

2.5 Estimation of Resources needed for action and activities

The table below offers an estimate of the funding needed for implementing the technology in Kiribati. This estimate considers various factors essential for the development and construction of the technology within the local context.

Table 7: Estimations of costs of actions and activities for coastal rehabilitation by land reclamation

Actions	Activity	Cost (AUD)	Sub-total for action (AUD)	Source of Funding
Action 1	1.1	$ 700,000	$3,400,500	GCF, GGGI, Multilateral banks, bilateral partnerships, GEF
	1.2	$ 1,000,000		
	1.3	$700,000		
	1.4	$1,000,500		
Action 2	2.1	$700,000	$700,000	Multilateral banks, bilateral partnerships, GCF, Adaptation fund GGGI, GEF
Action 3	3.1	$700,000	$1,600,000	GGGI, bilateral partnerships. GoK, GEF
	3.2	$200,000		
	3.3	$200,000		
	3.4	$700,000		
Action 4	4.1	$100,000	$1,254,000	GGGI, bilateral partnerships, GEF
	4.2	$15,000		
	4.3	$12,500		
	4.4	$100,000		
	4.5	$12,000		
	4.6	$12,000		
	4.7	$15,000		
	4.8	$1,000,000		
Action 5	5.1	$12,000	$49,000	GGGI, bilateral partnerships, GoK, multilateral banks, GEF
	5.2	$2,000		
	5.3	$15,000		
TOTAL			**$8,542,500**	

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2.6 Management Planning

2.6.1 Risks and Contingency Planning

There is a chance that the TAP may face challenges in its effective execution in Kiribati due to certain risks. Therefore, it is advisable to consider some contingency plans to support its implementation:

- Insufficient government fiscal budgeting: Additionally, insufficient funding can pose significant challenges throughout the process. This financial constraint may disrupt workflows and lead to potential delays, putting the project on hold until adequate resources are secured.
- Addressing the persistent challenge of insufficient government funding to bridge critical financial gaps is essential, particularly in contexts where reliance on donor support is unreliable. Government intervention to maintain steady funding is not only uncertain but often a slow-moving process.
    - To mitigate this issue, a comprehensive contingency plan must be developed to advocate for increased government budgetary allocations dedicated to the advancement of project. In addition, the government, should actively pursue enhanced funding support from development partners like the Ministry of Foreign Affairs and Trade (MFAT) and the Department of Foreign Affairs and Trade (DFAT)alongside key stakeholders such as the Global Green Growth Institute (GGGI), the World Bank, and the Asian Development Bank (ADB),). By fostering these collaborative relationships and strategically leveraging available resources, we can fortify our efforts toward sustainable coastal protection initiatives in the face of climate change.
- The sector's focus may shift, potentially redirecting attention away from critical development areas, such as coastal communities at risk of displacement. It is essential for the MISE and OB to highlight the significance of land reclamation technology in protecting these vulnerable coastal communities from the challenges posed by climate change.
- Land Tenure System in Kiribati: In Kiribati, particularly within the Gilbert group of islands, land ownership extends right down to the water's edge. This unique land tenure system necessitates that any development initiative—such as the construction of seawalls—must first obtain consent and, where applicable, agreement from the landowners whose properties may be affected or partially utilized. This requirement for prior consultation is

critical because it respects the rights of the landowners and ensures their participation in decisions that impact their land. However, this process can often be slow, as it requires careful negotiation and consensus-building within the community.

2.6.2 Next Steps

- To accelerate the adoption of coastal rehabilitation by land reclamation, the following critical and immediate steps need to be implemented:
    - Form a coastal rehabilitation stakeholder consultation group to help coordinate activities, such as developing Terms of Reference for consultants and identifying and addressing institutional gaps, as well as identifying funding opportunities to expedite the implementation of the technology (a critical requirement).
    - A consultant should be hired to develop the National Coastal Rehabilitation Policy by the end of 2026 (a critical requirement).

(i) Create an effective land-use plan to identify sites for coastal rehabilitation by land reclamation.

Table 8: TAP overview table for Coastal rehabilitation by land reclamation.

Sector	Coastal Protection							
Subsector	Integrated Coastal Zone Management							
Technology	Coastal rehabilitation by land reclamation							
Ambition	To reclaim 1.3 ha through the adoption of coastal rehabilitation in one vulnerable location on South Tarawa							
Benefit	To save communities living in this area from the continuing threat of sea level rise and wave overtoppings							
Actions	Activities to be implemented	Sources of funding	Responsible body and focal point	Time frame	Risks	Success Criteria	Indicators for monitoring of implementation	Budget per activity
1.0 Increase access to climate finance	Activity 1.1: Institutional and technical capacity building	GCF, GGGI, WB, ADB, bilateral partnerships, GEF	MFED, KIT, OB	2026 - 2027	Dependency on external funding which can undermine local ownership and sustainability	Project documents are developed and gained access to funding support	Capacity of staff within the CFD of the MFED gained access to donor fundings	$700,000
	Activity 1.2: Strengthening coordination mechanism	GGGI, WB, ADB, GEF	OB, MFED, OB	2026 – 2027	- Duplication and overlap - Lack of clarity and accountability	Coordination mechanism developed	All projects are well coordinated	$1,000,000

	Activity 1.3: Climate finance tracking systems	GGGI, GEF, WB, ADB, bilateral partnerships	OB, MFED	2026 – 2028	- Data inconsistencies and lack of standardization - Capacity constraints in recipient countries	Tracking system for financial management was developed and used by climate finance division within the project life	Application and adoption of the system to fast track the progress of project	$700,000
	Activity 1.4: Technical assistance to improve financial management systems, ensuring alignment with international standards for transparency and accountability	GGGI, GEF, WB, ADB, bilateral partnerships	MFED, MISE, OB	2026 – 2028	- Capacity constraints	Management systems are improved and aligned to international standards	All projects are aligned to international standards	$1,000,500
Integrate vegetation	Activity 2.1: Infrastructure	WB, ADB, bilateral	MISE, OB	2025 - 2030	Regulatory and compliance risks	Infrastructure was developed	Project on green-grey	$1,000,000

with engineered solutions	development and rehabilitation	partnerships, GCF, Adaptation fund GGGI, GEF				and rehabilitated	infrastructure is developed and up and running	
	Activity 2.2: Training programs for government agencies is improved project and meet accreditation requirements for multilateral funds	WB, ADB, bilateral partnerships, GCF, Adaptation fund GGGI, GEF	MISE, MFED (CFD), OB	2026 - 2028	Opportunity cost – training pulls employees away from their regular duties	Programs for government agencies is improved and meet accreditation requirements for multilateral funds	Accreditation requirement for multilateral funds are met and programs for government agencies is improved and applied	$700,000
Policy review , formulation and alignment	Activity 3.1: Engage local consultant with all fees(inclusive of travel expenses, consultant fee)	GGGI, bilateral partnerships. GoK, GEF	MISE, OB.	2027 - 2030	Exclusion from benefits	International consultant is fully engaged	Policy is developed and well aligned to government priorities	$700,000

	3.2 Policy formulation, and alignment	GGGI, bilateral partnerships. GoK, GEF		2027- 2030	Policy is poorly designed	Policy is successfully adopted	Policy is implemented	$200,000
	3.3: Stakeholder engagement and inclusive dialogue	GGGI, GEF,WB, ADB, bilateral partnerships	MISE, OB	2029-2030	Conflict and opposition	Stakeholders engaged in dialogues and proactively participated in decision making process	Stakeholders engaged in dialogues at different levels	$200,000
	3.4: Capacity building and institutional strengthening	GGGI, GEF, WB, ADB, bilateral partnerships	MISE, OB	2029 - 2030	Curriculums are poorly aligned to institutional capacity need	Staff capacity increased	Number of staff trained	$700,000
Development of a standardized seawall design that effectively withstand	4.1 Engage international consultant (inclusive of fees, travel, transportation)	GGGI, bilateral partnerships, GEF	MISE, OB	2026 - 2027	Unavailability of a consultant	An international consultant was successfully recruited	An international consultant take	$100,000

environmental challenges and ensures long term security								
	4.2: Site Assessment and data collection	GGGI, GEF, WB, ADB, bilateral partnerships	MISE, OB, MELAD	2026 - 2026	Bias or incomplete scoping	An Environmental Impact Assessment (EIA) is a crucial requirement for the approval of project implementation.	Environmental assessment guidelines are strictly followed	$15,000
	4.3: Environmental impact assessment	GGGI, GEF, WB, ADB, bilateral partnerships	MISE, OB	2029-2030	Result of the assessment conflict with the project intended goals	A timely completion of the assessment	EIA is completed and the result was approved	$12,500
	4.4: Regulatory compliance and permitting	GGGI, GEF, WB, ADB,	MISE, OB	2026 - 2030	Operational inefficiency	Designing of infrastructure is	Design is successfully adopted	$100,000

		bilateral partnerships				completed and used by MISE		
	4.5: Design development	GGGI, GEF, WB, ADB, bilateral partnerships	MISE, OB	2027-2030	Insufficient number of personnel capable to make the design	The design is successfully adopted	Number of designs being made	$12,000
	4.6: Material testing and selection	GGGI, GEF, WB, ADB, bilateral partnerships	MISE, OB	2028 - 2030	Incorrect testing methods	Appropriate testing methods was successfully used	Materials are successfully tested	$12,000
	4.7 Monitoring and maintenance planning	GGGI, GEF, WB, ADB, bilateral partnerships	MISE, OB	2026-2030	Poor data collection and analysis	Monitoring and maintenance are well planned	Monitoring plan was developed and applied	$15,000
Sharing knowledge and information	5.1: Organize workshops and seminars that bring together engineers, scientists, local communities and	GGGI, bilateral partnerships, GoK, multilateral banks, GEF	MISE, OB	2029-2030	Misinformation and validation issues	Workshops and seminars were successfully conducted that brought together engineers, scientist, local	Number of workshops and seminars conducted	$12,000

	policy makers to share best practices, present case studies and introduce new technologies for coastal protection					communities and policy makers		
	5.2: Information and data sharing platforms	GGGI, GEF, WB, ADB, bilateral partnerships	MISE, OB	2026 - 2028	Poor access to platforms	Information and data are readily available for sharing	Number of people use the platform	$2,000.00
	5.3 Community engagement and local knowledge integration	GGGI, GEF, WB, ADB, bilateral partnerships	MISE, MCIA	2026 - 2030	Communities are not properly consulted	Targeted communities engaged in consultations	Number of communities engaged in community consultations	$15,000.00

Chapter 3: Technology Action Plan and Project Ideas for Green-grey infrastructure

3.1: Technology overview

Green-grey infrastructure refers to the integration of traditional engineered solutions ("grey" infrastructure, such as seawalls, drainage systems, and roads) with nature-based approaches ("green" infrastructure, such as bioswales, rain gardens, and mangrove restoration) to address climate resilience, disaster risk reduction, and sustainable development[12].

Kiribati is highly vulnerable to climate change impacts, especially sea level rise, coastal flooding, and water scarcity[13]. Recent projects have focused on rehabilitating and constructing climate-resilient infrastructure that combines both green and grey elements. Examples include:

- Climate-resilient drainage systems using bioswales, rain gardens, and detention ponds for flood management[14, 15].
- Raising ground levels and upgrading public buildings (schools, health centers) to withstand extreme weather and flooding[16].
- New water supply infrastructure powered by renewable energy, designed to ensure water security for vulnerable communities[17]
- Integrating green-grey infrastructure aligns with Kiribati's national adaptation plans and international climate commitments, supporting:
- Enhanced resilience to natural disasters and climate change.
- Protection of groundwater and water supplies.
- Improved access to basic services and infrastructure, especially in outer islands[15,].

[12] CLIMATE CHANGE IN KIRIBATI: THE WAY FORWARD available online at Kiribati: Selected Issues in: IMF Staff Country Reports Volume 2023 Issue 226 (2023)
[13] **CORVI Risk Assessment: Tarawa, KiribatiFindings from a CORVI Rapid Assessment** available online at CORVI Risk Assessment: Tarawa, Kiribati • Stimson Center
[14] **Green-Gray Infrastructure Accelerator available online at Green-Gray Infrastructure Accelerator | World Resources Institute**
[15] KIRIBATI OUTER ISLANDS RESILIENCE AND ADAPTATION PROJECT April 22, 2022 available online at World Bank Document
[16] ibid
[17] ibid

- *Challenges*: Limited technical capacity, need for institutional strengthening, and funding gaps remain significant barriers to scaling up green-grey solutions[18].
- *Opportunities*: Ongoing projects and international support are building local capacity and demonstrating the effectiveness of integrated approaches, paving the way for broader adoption and replication across the islands[15].

Green-grey infrastructure is emerging as a critical sector for Kiribati's sustainable development and climate adaptation, offering cost-effective, resilient solutions that blend engineering with ecosystem services to safeguard communities against escalating climate risks[15].

3.2 Action plan for Green- grey infrastructure

3.2.1 Introduction

Kiribati faces acute climate challenges, particularly in the areas of coastal erosion, freshwater scarcity, and ecosystem vulnerability, which threaten both livelihoods and long-term sustainability[19]. Responding to these challenges, Kiribati's national adaptation strategies emphasize the need for resilient infrastructure that blends engineered (grey) solutions with nature-based (green) approaches[20]. This integrated "green-grey" infrastructure model leverages the strengths of both traditional hard infrastructure and ecosystem-based solutions to deliver robust, adaptive outcomes for communities and the environment.

Recent initiatives, such as the Kiribati Joint Implementation Plan for Climate Change and Disaster Risk Management (KJIP), underscore the importance of promoting sound, reliable infrastructure development and land management while enhancing ecosystem resilience[20]. Complementary efforts, including the mainstreaming of Nature-based Solutions (NbS) through technical assistance and capacity building, have further highlighted the value of combining community-driven, ecosystem-focused measures with conventional engineering to address coastal risks and water security[19].

[18]PROPOSALFORKIRIBATI, Adaptation Fund Board Project and Programme Review Committee Thirty-fifth Meeting Bonn, Germany, 8-9 April 2025 available online at AFB.PPRC_.35.Inf_.12.-Proposal-for-Kiribati.pdf

[19] **Coastal Nature-based solutions in Kiribati draws on lessons from the past** available online at **Coastal Nature-based solutions in Kiribati draws on lessons from the past | Pacific Environment**

[20] KIRIBATI JOINT IMPLEMENTATION PLAN for Climate Change and Disaster Risk Management (KJIP) 2014-2023 available online at KIRIBATI_JOINT_IMPLEMENTATION_PLAN.pdf

3.3 Ambition for TAP

Kiribati aims to launch a comprehensive action plan for green-grey infrastructure as part of the Technology Action Plan (TAP). This initiative will combine institutional strengthening, technological advancements, and funding access ensuring alignment with national objectives and international commitments. Furthermore, it seeks to foster inclusive and sustainable development pathways that cater to local needs while preparing for future climate-related challenges.

As the technology has not yet been utilized in Kiribati, we will focus on implementing it in South Tarawa, specifically integrating it with government buildings. This initiative aims to address and mitigate coastal erosion, enhancing the resilience of the infrastructure in this vulnerable region.

3.4 Actions and Activities selected for inclusion in the TAP for Green-grey infrastructure

3.4.1 Summary of Barriers and measures to overcome barriers

This exercise reflected on the BA&EF report findings. During the TAP stakeholder consultation retreat held from May 12 to May 14, 2025, participants (refer annex 1) highlighted several critical barriers that hinder the effective implementation and dissemination of this technology. These barriers include (finance and economic perspective); high cost associated with technology, limited access to the climate finance, budget limitations. The non-financial barriers include; workforce gaps, insufficient research development, and inadequate/weak government policies. The table below identified challenges along with strategies to achieve the outlined goals for the deployment, transfer, and diffusion of this technology.

Table 9: Identified barriers and measures

Barriers	Measures
1. High cost – Financial and economic barriers	Strengthening Partnerships: Foster collaboration among governmental agencies, non-governmental organizations, and international bodies to pool resources and share expertise in climate finance.

2. Limited access to climate finance – Financial and economic barriers	Capacity Building: Invest in training and educational programs for local stakeholders to enhance their skills in project design, proposal writing, and financial management, enabling them to effectively navigate and utilize climate finance opportunities.
3. Budget limitations – Financial and economic barriers	Given Kiribati's constrained financial resources, Kiribati must rely on external funding to tackle its urgent challenges. To effectively address the critical issue of coastal protection, it is imperative to establish a dedicated seed capital fund tailored specifically for this purpose. Such a fund would not only support sustainable development in vulnerable coastal areas but also significantly strengthen the resilience of these communities against the adverse impacts of climate change. By investing in proactive coastal protection initiatives, Kiribati can safeguard its environment and the livelihoods of its people for generations to come.
4. Workforce skill gaps/lack of local expertise – Institutional barrier	More local staff gained and had access to training programs tailored to meet the local demand. Local training institutions developed curriculum that support the workforce skill gaps
5. Insufficient research development – Technical barrier	Improved research development enhances the implementation of green-grey infrastructure by providing rigorous, integrated approach to design, assess and optimize the systems, it creates spatially explicit models and analytical tools that assess urbanization impacts on both green and grey infrastructures helping planners to optimize land use to expand green infrastructure alongside urban growth, its promotes combining traditional engineering with ecological principles. Research informs policy guidance and institutional capacity building. Its support developing business cases and

	innovative financing mechanisms and promotes knowledge sharing and capacity building.
6. Inadequate/weak government policies - Regulatory and Policy barrier	Effective government policies – Effective government policies enhance the implementation of green-grey infrastructure by creating enabling frameworks that support planning, funding, and integration of green infrastructure with traditional grey infrastructure.

3.4.2 Actions selected for inclusion in the TAP for Green – grey infrastructure

This section provides a list of narrative descriptions and reasonable arguments for each of the measures selected as actions to be included in the TAP for the green-grey technology. The measures considered as actions are based on the economic and non-economic measures particularly relating to acceleration of technology adoption in the country.

Table 10: Actions selected for inclusion in the TAP for Green-grey infrastructure.

Barriers	Actions	Descriptions
Financial and economic barriers	Strengthening Partnerships	Foster collaboration among governmental agencies, non-governmental organizations, and international bodies to pool resources and share expertise in climate finance.
	Capacity Building	Invest in training and educational programs for local stakeholders to enhance their skills in project design, proposal writing, and financial management, enabling them to effectively navigate and utilize climate finance opportunities.

	Establishing a dedicated fund	Establishing a dedicated fund for coastal projects that can provide seed capital and attract further investment.
	Promoting awareness and understanding of climate finance options available to local communities and organizations.	Promoting awareness and understanding of climate finance options available to local communities and organizations.
Institutional barriers	Improved institutional capacity	Building local staff and institutional capacity in terms of providing local institutions with appropriate capacity to deliver this training could enhance capacity building both at the individual and institutional level.
	Improved research development	Improved research development enhances the implementation of green-grey infrastructure by providing rigorous, integrated approach to design, assess and optimize the systems, it creates spatially explicit models and analytical tools that assess urbanization impacts on both green and grey infrastructures helping planners to optimize land use to expand green infrastructure alongside urban growth, its promotes

		combining traditional engineering with ecological principles. Research informs policy guidance and institutional capacity building. Its support developing business cases and innovative financing mechanisms and promotes knowledge sharing and capacity building.
	Effective government policies	Effective government policies enhance the implementation of green-grey infrastructure by creating enabling frameworks that support planning, funding, and integration of green infrastructure with traditional grey infrastructure.

3.5 Activities identified for the implementation of selected actions

This section aims to expand the identified actions into more specific activities. Table 10 presents a list of activities which need to be implemented to achieve each identified action.

Table 11: Activities identified for implementations of Green-grey infrastructure.

Action	**Activity**
1.0 Strengthening Partnerships	1.1 Identify partners to collaborate with on the project
	1.2 Setting clear goals and expectations for partnership to align all parties

	1.3 Jointly creating and implementing strategic plans with shared priorities and timelines
	1.4 Develop formal partnership agreements that defines roles, responsibilities, and decision-makings
2.0 Capacity building	2.1 Training face-to-face or online to increase knowledge and skills
	2.2 Develop curriculum, approved and adopted
3.0 Establishing a dedicated fund	3.1 Developing a prototype for demonstration
	3.2 Conducting financial planning to determine funding needs and usage
	3.3 Ensuring legal and regulatory compliance, including business and intellectual property protection
4.0 Improved institutional capacity	4.1 Improve governance and strategic planning
	4.2 Strengthening infrastructure and operational systems
	4.3 Enhancing collaboration and networking
	4.4 Financial and quality management
5.0 Improved research development	5.1 Local staff are trained to leverage their capacity to run research activities
	5.2 Research unit within the Ministry is established and equipped with necessary tools and equipment
	5.3 Specialized personnel hired to develop and run research need for the Ministry
6.0 Effective government policies	6.1 Review national coastal protection policy
	6.2 Stakeholder consultation on coastal protection policy
	6.3 Endorsement of the revised policy by cabinet

3.5.1 Actions to be implemented as project ideas.

The above actions were turned into Project ideas that mostly deals with strengthening partnerships, capacity building, promoting awareness and understanding of climate finance options, improved institutional capacity, improved research development and effective government policy. Projects Ideas were identified to create an enabling environment for technology diffusion:

(i) Identify multifaceted research projects : Foster collaboration among governmental agencies, non-governmental organizations, and international bodies to pool resources and share expertise in financial management, and research activities. Develop a platform for dialogue through which partners engage and share information.

(ii) Improved technical capacity: Invest in training and educational programs for local stakeholders to enhance their skills in the designing of Green-Grey Infrastructure that meet and suitable to the local condition in Kiribati

(iii) Establishing a dedicated fund: Establishing a dedicated fund for coastal projects that can provide seed capital and attract further investment.

3.6 Stakeholders and timelines for the implementation of TAP for Green-Grey Infrastructure

3.6.1 Scheduling and sequencing of specific activities

The table below outlines the timeline and organization of key activities necessary to implement the actions related to the development of Green-Grey Infrastructure. The planning and execution phase of the TAP is projected for 2026, allowing sufficient time to fulfill the goal of technology dissemination in Kiribati.

Table 12: Scheduling and sequencing and responsible stakeholders of specific activities in construction of Green-grey seawall.

Activity						Responsible body
	2026	2027	2028	2029	2030	
1.1 Setting clear goals and expectations for partnership to align all parties						MISE, OB
1.2 Jointly creating and implementing strategic plans with shared priorities and timelines						
1.3 Develop formal partnership agreements that defines roles, responsibilities, decision-making						MISE, OB
2.1 Training face-to-face or online to increase knowledge and skills						MISE, OB, MOE
2.2 Develop curriculum, approved and adopted						MOE, MISE, OB
3.1 Develop a prototype to						MISE, OB

demonstrate the technology						
3.2 Conduct financial planning to determine funding needs and usage						MFED, (CFD), MISE, OB
4.1 Improve governance and strategic planning						MISE, OB
4.2 Strengthening infrastructure and operational systems						
4.3 Enhancing collaboration and networking						MISE, OB,
4.4 Enhanced Financial and quality management (hire local expert)ok						MISE, OB, MFED (CFD)
5.1 Local staff are trained to leverage their capacity to run research activities						MISE, MOE(KIT)
5.2 Research unit within the						MISE

Ministry is established and equipped with necessary tools and equipment						
5.3 Specialized personnel hired to develop and run research need for the Ministry						MISE, OB
6.1 Review national coastal protection policy						MISE
6.2 Stakeholder consultation on coastal protection policy						MISE, MCIA, OB
6.3 Endorsement of the revised policy by cabinet						MISE, OB

3.7 Estimation of Resources needed for action and activities

3.7.1 Estimation of capacity building needs

Green-grey infrastructure (GGI) construction will only provide solutions to coastal inundation and prevent coastal erosion if effective designs are in place. This will certainly require human capacity or expertise such as coastal engineers to implement the project. A dedicated unit within the implementing agency is required to process and evaluate requests and will also need some capacity building in terms of using more modern tools for assessment. In addition to this, there must be also additional capacity development for local communities in terms of maintenance and sustainability of the infrastructure into the future.

3.7.2 Estimations of costs of actions and activities

In the small island nation of Kiribati, nestled in the heart of the Pacific Ocean, the challenges posed by climate change are ever-looming. Rising sea levels threaten its very existence, while the unpredictable nature of storms leaves the landscape vulnerable. In response to these challenges, the government of Kiribati has turned its attention to a progressive approach: the implementation of green-grey infrastructure, a hybrid model that combines natural and engineered systems to enhance resilience.

However, embarking on this ambitious project involves extensive estimations and multifaceted considerations. Firstly, the financial commitments required for green-grey infrastructure, which integrates natural coastal defences—like mangrove restoration and living shorelines—with engineered solutions such as seawalls and drainage systems, are substantial. Budget estimates reflect not just the immediate construction costs but also the long-term maintenance and ecological management that will be necessary to ensure sustainability and efficacy.

Realistically, Kiribati faces significant limitations in its capacity to fund these essential development projects. The nation is characterized by its scant financial resources, often heavily reliant on international aid and external support. Efforts to secure funding from international organizations have become a priority, forming partnerships that could provide both financial backing and technical expertise. These partnerships are critical; they enable Kiribati to tap into a broader pool of resources, accessing grants, loans, and innovative funding mechanisms that would not be available otherwise.

The process of estimating costs also encompasses the need for comprehensive environmental assessments, stakeholder consultations, and engagement with local communities. Kiribati's leaders understand that successful implementation hinges not solely on financial resources but also on an inclusive approach that considers the voices and needs of those who stand to be most affected by climate change. These deliberations are intricately woven into the estimated timelines and project scopes, creating a dynamic network of collaboration among government agencies, local populations, and international partners.

Ultimately, the narrative of Kiribati's journey towards adopting green-grey infrastructure paints a picture of resilience and innovation in the face of financial constraints. It embodies the struggles of a nation that, while limited in resources, is determined to forge a path that not only protects its shores but also fosters a sustainable future. Each step in the estimation process becomes a crucial building block, paving the way for a comprehensive strategy that harmonizes

the ingenuity of nature with human engineering, ensuring that Kiribati can withstand the tempests of tomorrow.

Table 13: Estimations of costs of actions and activities for Green-grey infrastructure seawall construction.

Action	Activity	Cost	Sub-total for action (AUD$)	Source of funding
1.0 Strengthening Partnerships	1.1 Setting clear goals and expectations for partnership to align all parties	$800.00	$24,000.00	Government of Kiribati (GOK), DFAT, MFAT,
	1.2 Jointly creating and implementing strategic plans with shared priorities and timelines	$800.00		
	1.3 Develop formal partnership agreements that defines roles, responsibilities, decision-making, and dispute resolution	$800.00		
2.0 Capacity building	2.1 Training face-to-face or online to increase knowledge and skills	$1500.00	$21,000.00	MFAT, DFAT,
	2.2 Develop curriculum, approved and adopted	$6,000.00		
3.0 Establishing a dedicated fund	3.1 Develop a prototype for demonstration	$3,000,000	$3,120,000	GOK, GEF, GGGI, DFAT, MFAT
	3.2 Conduct financial planning to determine funding needs and usage	$120,000		
4.0 Improved institutional capacity	4.1 Improve governance and strategic planning	$200,000	$242,000.00	GOK, GEF, MFAT, DFAT, GGGI,
	4.2 Strengthening infrastructure and operational systems (hire local expert)	$20,000.00		
	4.3 Enhancing collaboration and networking	$12,500.00		
	4.4 Enhanced Financial and quality management (hire local expert)	$10,000.00		
5.0 Improved research development	5.1 Local staff are trained to leverage their capacity to run research activities (hire local expert to run in-house training)	$10,000.00	$35,000.0	GOK, GEF, MFAT, DFAT, GGGI,

	5.2 Research unit within the Ministry is established and equipped with necessary tools and equipment (no extra recruitment)	$20,000.00		
	5.3 Specialized personnel hired to develop and run research need for the Ministry	$10,000.00		
6.0 Effective government policies	6.1 Review national coastal protection policy.	$6,000.00	$9,500.00	GOK, GEF, MFAT, DFAT, GGGI,
	6.2 Stakeholder consultation on coastal protection policy	$2,000.00		
	6.3 Endorsement of the revised policy by cabinet	$1,500.00		

3.7 Management Planning

a) Risks and Contingency Planning

There is a chance that the TAP may face challenges of ineffective implementation due to certain risks. As a result, we propose several contingency plans to support the successful execution of the TAP:

- Securing consistent funding: Local communities are facing a shortage of government support for seawall construction requests. The proposed solution is to boost government budget allocations and seek financial assistance from donor agencies to enable the development of sustainable seawalls. The significant expenses associated with adopting this technology necessitate a joint effort among government agencies, and non-governmental organizations.
- Lack of technical expertise: In Kiribati, there is a shortage of coastal engineers, highlighting the urgent need for upskilling and training individuals in this field. This could be achieved through short-term training opportunities abroad or by developing relevant curricula in local tertiary institutions. Additionally, there is currently no construction company specializing in seawall construction. To encourage investment in this critical area, the government could consider offering incentives such as tax concessions or reduced import duties on machinery necessary for seawall building.

b) Next Steps

Members of the technical working group emphasized that, due to the potential and distinctive features of the technology, careful planning is essential. This will ensure the development of the most suitable version of the technology, tailored to meet local circumstances and specific needs.

Table 14: TAP overview table for construction of green-grey infrastructure

Sector	Coastal Protection							
Subsector	Integrated Coastal Zone Management							
Technology	Green-Grey Infrastructure							
Ambition	To build a prototype to demonstrate the effectiveness of the technology							
Benefit	To save communities living in this area from the continuing threat of sea level rise and wave overtopping							
Actions	**Activities to be implemented**	**Sources of funding**	**Responsible body and focal point**	**Time frame**	**Risks**	**Success Criteria**	**Indicators for monitoring of implementation**	**Budget per activity**
1.0 Strengthening Partnerships	1.1 Setting clear goals and expectations for partnership to align all parties	Government of Kiribati (GOK), DFAT, MFAT,	MISE, OB	2026	Competing priorities $24.000	Expectations regarding roles, responsibilities, communications protocols and deliverables are clearly outlined accordingly	Number of interactions and completion of training or enablement sessions	$800.00

	1.2 Jointly creating and implementing strategic plans with shared priorities and timelines		MISE, OB	2026		All strategic plans, priorities and timelines are shared jointly by partners	Number of plans, priorities and timelines shared jointly by partners	$800.00
	1.3 Develop formal partnership agreements that defines roles, responsibilities, and decision-making	GGGI, DFAT, MFAT, World Bank, ADB	MISE, OB	2026 - 2030	Lack of partner's interest in the project	Partnership agreements were formally developed	Number of partnership agreements that were developed	$800.00
2.0 Capacity building	2.1 Training face-to-face or online to increase knowledge and skills	GGGI, MFAT, DFAT,	MISE, MOE, OB	2028-2030	Curriculum is poorly designed Lack of participation of relevant stakeholders in the training	Training program is deployed as anticipated	Number of trainings implemented	$1,500.00

	2.2 Develop curriculum, approved and adopted	MFAT, GGGI, DFAT,	MOE, MISE, OB	2028-2030	Curriculum is poorly designed	Curriculum is approved	The curriculum is successfully implemented	$6,000.00
3.0 Establish a dedicated fund	3.1 Develop a prototype for demonstration	MFAT, DFAT, GGGI, WB, ADB	MFED (CFD), MISE, OB	2027-2030	Unavailability of funding	A prototype seawall was built for a demonstration	Number of prototype seawall built	$3,120,000
	3.2 Conduct financial planning to determine funding needs and usage	DFAT, MFAT,	MFED (CFD), MISE, OB	2026 - 2030	Lack of internal controls which leads into improper fund and inaccurate financial data	Financial planning is successfully used to determine funding needs and usage	Financial plannings are properly implemented which leads into successful determine of funding needs and usage	$8,000.00
4.0 Improved institutional capacity	4.1 Improve governance and		MISE, MFED(CFD),	2026-2030	Duplication of responsibilities and weak	Governance and strategic planning is	Institution function is improved as	$200,000

	strategic planning				institutional structure	strongly improved	compared to previous arrangement	
	3.3 Strengthening infrastructure and operational systems (hire local expert)		MISE, OB,	2026 - 2027		Institutional infrastructure and operational systems operate successfully	Operational systems successfully meet operational objectives such as process efficiency, quality, and customer satisfaction	$20,000.00
	4.3 Enhancing collaboration and networking		MISE, OB, MELAD, MFED (CFD)	2027 - 2030	Lack of interest in collaboration and networking	Collaboration and networking is strongly enhanced	A strong engagement in networking and collaboration	$2,500.00
	4.4 Enhanced financial and quality management (hire local expert)		MISE, OB, MFED (CFD)	2026 - 2030	Poor financial and quality management $25,000.00	Financial and quality management system is improved	Local consultant is hired to develop a financial and quality management system	$10,000.00

5.0 Improved research development	5.1 Local staff are trained to leverage their capacity to run research activities (hire local expert to run in-house training)		MISE, OB	2027 - 2030	Poor local staff capacity to handle research activities	Improved data collection and analysis system	The application of improved data collection and analysis is successfully adopted	$10,000.00
	5.2 Research unit within the Ministry is established and equipped with necessary tools and equipment (no extra recruitment)	GOK, GEF, UNDP, MFAT, DFAT, GGGI,	MISE, OB	2026 - 2030	Research unit is not equipped with necessary equipment	Research unit is successfully established and functional as intended	Research unit conducted research and data analysis.	$20,000.00
	5.3 Specialized personnel hired to develop and run research programs for the Ministry		MISE, OB	2026 - 2030	Research expert is not available	Specialised research personnel was hired and successfully develop	Research programs for the Ministry is developed	$10,000.00

						research program for the Ministry		
6.0 Effective government policies	6.1 Review national coastal protection policy.	GOK, GEF, UNDP, MFAT, DFAT, GGGI,	MISE, OB	2027 - 2030	Developing national coastal policy is not the Ministry's policy	The national coastal protection policy was reviewed	A new national costal protection was developed	$6,000.00
	6.2 Stakeholder consultation on coastal protection policy		MISE, OB, MELAD	2027 - 2029	Stakeholder consultation on coastal protection policy failed to achieve stakeholder's interest	Stakeholder consultation went as planned	Number of consultations conducted	$2,000.00
	6.3 Endorsement of the revised policy by cabinet		MISE	2026	New policy failed to achieve cabinet approval	Policy is successfully adopted and endorsed	Policy endorsed and approved by cabinet	$1,500.00

Chapter 4.0: Technology Action Plan for Mass concrete seawall

4.1 Technology overview

Kiribati, a nation of low-lying coral atolls in the Pacific, faces acute threats from climate change, with rising sea levels and increased storm surges placing its coastal communities and infrastructure at significant risk[21]. As most of the population and critical assets are concentrated along narrow coastal strips, the need for effective shoreline protection is urgent to safeguard livelihoods, homes, and national security[21]. Mass concrete seawalls have traditionally been a key engineering response to these challenges, aiming to absorb wave energy, prevent erosion, and reduce flooding[22]

However, the deployment of concrete seawalls in Kiribati presents unique technical, environmental, and social challenges. The harsh marine environment accelerates material degradation, especially corrosion of steel reinforcement, while the ecological impacts—such as increased erosion in adjacent areas and disruption of natural sediment flows—have led to community concerns and, in some cases, local bans on hard seawall construction in favor of nature-based solutions[23, 24]. Recent innovations in concrete technology, including the use of non-corrosive reinforcements and modified mix designs, offer opportunities to enhance the durability and sustainability of seawalls, but must be carefully adapted to the local context[25, 22].

This chapter outlines a Technology Action Plan (TAP) for the design, construction, and maintenance of mass concrete seawalls in Kiribati. It draws on global best practices, recent material innovations, and the lessons learned from both engineered and ecosystem-based approaches. The climate change policy emphasizes the integration of resilient infrastructure

[21] Forging coastal resilience in Kiribati, 28 November 2023 available online at Forging coastal resilience in Kiribati | UNOPS

[22] Hosseinzadeh,N et al,.2022. Concrete seawalls: A review of load considerations, ecological performance, durability, and recent innovations, Ecological Engineering, Volume 178, id.106573 available online at Concrete seawalls: A review of load considerations, ecological performance, durability, and recent innovations - Astrophysics Data System

[23] The Village that Banned Seawalls, 7 Jul 2015, SPREP available online at The Village that Banned Seawalls | Pacific Environment

[25]Researchers Developing a Concrete Mix with Seawater for Seawall Construction, April 18, 2022, OPCA available online at Researchers Developing a Concrete Mix with Seawater for Seawall Construction

with community engagement and environmental stewardship, aiming to deliver coastal protection solutions that are robust, inclusive, and sustainable for the future of Kiribati[21, 22].

4.2 Ambition of the TAP

The coastal regions face the effects of severe rising sea level leading to tidal surges and coastal flooding, along with wave overtopping that cause damage to infrastructure, loss of livelihoods, and necessitate community relocations. The goals for deploying and spreading mass concrete seawall technology in Kiribati are aimed at enhancing the resilience of coastal and high-risk communities by implementing mass concrete seawall technologies. This initiative involves pinpointing high-risk communities and suggesting effective designs that offer sustainable, long-term coastal protection against the impacts of climate change.

4.3 Actions and Activities selected for inclusion in the TAP for Mass concrete seawall

4.3.1 Summary of Barriers and measures to overcome barriers

This exercise reflected on the BA&EF report. During the TAP stakeholder consultation workshop held from March 12 to 14, 2025, participants (refer annext 1) emphasized the significance of barriers related to economic and financial factors, technical challenges, and social behaviours, as these hinder the effective implementation and dissemination of this technology. Table below outlines barriers, and the strategies proposed to achieve the set goals for the deployment and diffusion of this technology.

Table 15: Summary of barriers and measures for seawall construction.

Categories of barriers	**Measure to overcome barriers**
Financial and economic barriers	Kiribati faces significant financial and economic barriers in deploying mass concrete seawalls, primarily due to structural constraints in its economy and challenges in sustaining large-scale infrastructure projects. These barriers are rooted in the country's fiscal limitations, reliance on external resources, and institutional capacity gaps. To overcome this barrier, strengthen partnerships and access to climate change funds will ease the problem.
Institutional barriers	Inadequate regulatory and policy enforcement has significantly impeded the Ministry's capacity to manage

	compliance effectively. To address this challenge, it is essential to thoroughly review and update existing policies that may be weak or outdated. Aligning these policies with the current context will enable the Ministry to enhance its compliance management and respond more effectively to evolving requirements.
Technical barriers	The challenge arises from the lack of skilled or specialized contractors and personnel in Kiribati who possess a strong understanding of effective seawall designs. To address this issue, it has been recommended to strengthen the technical expertise within the local community by providing capacity-building initiatives. Additionally, it was observed that scientific data or risk assessment tools are essential to prioritize and guide decisions regarding effective designs for sustainable coastal protection in Kiribati.
Social barriers	Increasing community awareness and promoting behavioral changes are vital for improving the implementation of the technology. The obstacles primarily stem from a lack of awareness and the engagement of local communities in the upkeep and preservation of the mass concrete seawall. At present, local communities are not included in the decision-making process, leading to a lack of ownership. To address these social challenges, it is essential to inform local communities about the importance of seawalls and the roles they can play in ensuring the long-term sustainability of these structures for ongoing protection.

4.4 Actions selected for inclusion in the TAP for seawall construction

This section presents a compilation of narrative explanations and justifications for each measure proposed as actions in the TAP for mass concrete seawall construction. The selected measures are informed by both economic and non-economic factors, specifically addressing economic and technical obstacles. Table below outlines the actions along with their corresponding narrative descriptions.

Table 16: Actions selected for seawall construction for inclusion in the TAP.

Barriers	Actions	Descriptions
Economic and financial barriers	Source funding support	Concrete seawalls can cost up to A$5,000 per meter with capital investment reaching several million dollars. Maintenance cost are also significant, exceeding A$100,000 per project annually. Projects often rely on unsustainable financing donor funding, making long-term planning difficult
Institutional barriers	Establish coastal management authority	Weak institutional capacity in Kiribati is a significant barrier to implementing seawall technologies because the country lacks a dedicated coastal management authority and sufficient technical expertise to plan, design, and enforce effective coastal protection measures. Currently, coastal management responsibilities are fragmented across several government ministries that are overwhelming and under

		resourced, resulting in ad hoc, poorly designed seawall construction that often fail or cause further problems.[19]
Technical barriers	Improve staff technical capacity, skills and knowledge	Data gaps create uncertainty and risk in seawall implementation in Kiribati, environmental harm, and increased vulnerability of communities to climate change impacts.
Social barriers	Improve community awareness	Lack of awareness is a significant barrier affecting the implementation of seawall technologies in Kiribati for several reasons: a) Limited local understanding of seawall impacts b) Insufficient data and technical capacity c) Short term project focus and donor dependency d) Social and cultural factors

4.5 Activities identified for implementation of selected actions

This section aims to expand the identified actions into more specific activities. Table 17 presents a list of activities which need to be implemented to achieve each identified actions.

Table 17: Activities identified for implementation of selected actions in mass concrete seawall construction.

Actions	**Activities**
1.0 Source funding support	1.1 Formulating funding proposals and submissions to targeted funds or donors

	1.2Capacity building - educate local government officials and community leaders on accessing climate adaptation fund
2.0 Establish coastal management authority	2.1 Coastal management policy
	2.2 Resource allocation for the authority
3.0 Improve staff technical capacity, skills and knowledge	3.1 Staff training
4.0 Improve community awareness	4.1 Community consultation
	4.2 Develop platform for sharing information

4.6 Actions to be implemented as Project Ideas (PIs)

The highest priority project from the list would likely be Coastal Resilience Fund Creation. This proposition came up in the discussion in the retreat with the adaptation technical working group (12-14th March, 2025).

Rationale:

1. Essential Funding: Establishing a dedicated fund is critical as it provides the financial resources necessary for all subsequent projects and initiatives related to seawall construction and coastal resilience.

2. Attracting Partners: A well-structured fund can attract international organizations and donors, ensuring long-term sustainability and support for coastal management efforts.

3. Local Empowerment: This initiative empowers the local government and communities by creating a mechanism for funding that can be tapped into for various projects, thereby fostering responsibility and ownership.

4. Foundation for Other Projects: Without adequate funding, the implementation of other projects, such as training programs, pilot seawall construction, and community awareness campaigns, would be significantly hindered.

By prioritizing the creation of a Coastal Resilience Fund, Kiribati would lay the groundwork for effective and sustainable coastal management that addresses the impending challenges posed by climate change.

Second priority from the list would be establishment of a coastal management authority.

Rationale:

(a) Integrated Coastal Zone Management (ICZM):

- To promote holistic management of coastal areas that considers the interactions between land, water, and marine ecosystems.
- To harmonize different sectoral policies (e.g., tourism, agriculture, fisheries) and ensure sustainable use of coastal resources.

(b) Environmental Protection:

- To safeguard coastal ecosystems, including wetlands, mangroves, coral reefs, and marine biodiversity, which are critical for ecological health.
- To mitigate the impacts of climate change, such as sea level rise and increased frequency of storms, through adaptive management practices.

© Sustainable Development:

- To support and promote sustainable economic activities, such as responsible tourism, fisheries management, and aquaculture, that do not degrade coastal environments.
- To balance development needs with environmental protection to ensure long-term benefits for local communities.

(d) Disaster Risk Reduction:

- To establish frameworks for disaster preparedness and response, particularly in areas prone to sea level rise and wave overtopping

4.7 Stakeholders and Timelines for the Implementation of TAP for Mass Concrete Seawall Construction

4.7,1 Overview of Stakeholders and Timeline for implementation of TAP

The successful implementation of a Technology Action Plan (TAP) for a mass concrete seawall in Kiribati requires the involvement of various stakeholders. Each stakeholder plays a crucial role in ensuring the project aligns with community needs, environmental standards, and technical requirements. Here's a summary of key stakeholders:

(a) Government Agencies

- Ministry of Infrastructure and Sustainable Energy (MISE): Responsible for overseeing construction projects and infrastructure development.

- Ministry of Environment, Lands and Agricultural Development (MELAD): Ensures that environmental assessments and sustainability measures are integrated into the project.

- Local Government Bodies: Engage with local communities and provide insights into local needs and logistics.

(b) Community Stakeholders

- Local Communities: Residents living in coastal areas who will be directly affected by the seawall. Their input on design and construction is vital.

© Office of the Beretitenti (President): The Kiribati National Expert Group plays a pivotal role in setting the strategic direction for national climate change and disaster-related projects. This group not only provides crucial political guidance but also approves the implementation of these initiatives. By aligning with national priorities and engaging with local communities, the Expert Group ensures that projects are not only technically sound but also culturally appropriate and sustainable. Their work is essential in fostering resilience against climate change impacts, while promoting collaborative efforts among government agencies, non-governmental organizations, and international partners. This collaborative approach enhances the effectiveness of implementation, ensuring that the initiatives reflect the needs and aspirations of the people of Kiribati.

(d) Climate Finance Division (CFD) of the Ministry of Finance and Economic Development: The Government of Kiribati established the Climate Finance Division (CFD) to strategically mobilize and enhance access to climate finance resources. This initiative aims to support the country's commitment to addressing climate change impacts and fostering sustainable development. Through the CFD, the government seeks to attract diverse funding sources and effectively channel resources towards initiatives that bolster resilience, adaptation, and mitigation efforts within the community.

4.8 Scheduling and sequencing of specific activities

By following this sequence, the implementation plan for the mass concrete seawall will proceed efficiently and effectively.

Table 18: Timeline for the implementation of activities

Activity	2026	2027	2028	2029	2030	Responsible body
1.1						MISE, OB,
1.2						MISE, OB
2.1						MISE, OB
2.2						MISE, OB
3.1						MISE, MOE
4.1						MISE, MCIA,
4.2						MISE, MCA

4.9 Estimation of Resources needed for Actions and Activities

4.9.1 Estimation of capacity building needs

The construction of seawalls in Kiribati can effectively address coastal flooding and erosion, but this relies on the use of well-thought-out designs. It is crucial to have skilled professionals, such as coastal engineers, involved in the execution of these projects. A specialized team within the relevant agency should be established to handle and assess project proposals, and this team will need training to utilize modern assessment tools effectively. Furthermore, it is essential to enhance the capabilities of local communities to ensure that they can maintain these infrastructures and sustain them for the long term.

4.10 Estimations of costs of actions and activities

Table 19: Estimations of costs of actions and activities

Actions	**Activity**	**Activity Cost (AUD$)**	**Sub-total for Action (FJD)**	**Sources of Funding**
1.0 Source funding support	1.1 Strengthen partnership with international organizations to establish a dedicated fund	$150,000		DFAT, MFAT, GEF, GCF

	to support coastal resilience initiatives including mass concrete seawall		$300,000.00	
	1.2 Improve access to climate funds by educate local government officials and community leaders on accessing climate adaptation fund	$150,000.00		GCF,
2.0 Establish coastal management authority	2.1 Coastal management policy	$15,000.00	$115,000.000	GCF, DFAT, MFAT
	2.2 Resource allocation for the authority	$100,000.00		DFAT, , GCF, DFAT, MFAT
3.0 Improve staff technical capacity, skills and knowledge	3.1 Staff training	$10,000.00	$16,000.00	DFAT, MFA
	3.2 Development of a curriculum	$6,000.00		

4.0 Improve community awareness	4.1 Community consultation	$15,000.00	$17,000.00	DFAT, MFAT,
	4.2 Develop platform for sharing information	$2,000.00		MFAT, DFAT

4.11 Management Planning

4.11.1 Risks and Contingency Planning

The effectiveness of the TAP has suffered significantly due to several factors, necessitating the development of contingency plans to address the resulting challenges:

(a) Securing Sustainable Funding: The government currently faces significant challenges in providing adequate funding for seawall construction requested by local communities. To address this issue, our contingency plan involves increasing government budget allocations and actively seeking financial support from donor agencies to facilitate the implementation of sustainable mass concrete seawall projects.

(b) Establishment coastal management authority: Creating a new unit within the Ministry will necessitate additional operational funding. To ensure its success, cabinet approval is essential. This approval will depend on the unit's defined role, ensuring it does not duplicate existing work within the Ministry, as well as the value it brings to the Ministry's operations and the benefits it will provide.

© Lack of technical expertise: In Kiribati, the shortage of coastal engineers is a pressing concern that directly impacts our ability to effectively manage and protect our coastlines. To address this gap, it is essential to focus on two key strategies: enhancing local capacity through targeted training programs and incentivizing the establishment of specialized construction firms.

Firstly, we can prioritize upskilling our workforce by providing short-term training opportunities abroad for aspiring coastal engineers. Additionally, developing a specialized curriculum in our tertiary institutions will equip local students with the necessary skills and knowledge to address coastal engineering challenges.

Collaborating with educational institutions and international organizations can facilitate this process, ensuring that our workforce is well-prepared for future demands.

Secondly, to encourage the establishment of construction companies specializing in seawall construction, the government should consider offering incentives. Providing tax concessions or reduced import duties on machinery essential for seawall construction can attract local and foreign investment. This approach not only brings in expertise and resources but also creates job opportunities, ultimately strengthening our capacity to implement effective coastal protection measures.

By aligning our training efforts with strategic government incentives, we can build a robust framework for coastal resilience in Kiribati, safeguarding our islands against the impacts of climate change and rising sea levels.

4.12 Next Steps

During the consultation with stakeholders (retreat), stakeholders emphasized the need to streamline efforts by focusing on activities related to risk assessment and contingency planning. Given that mass concrete seawalls provide an urgent solution to protect the most vulnerable areas facing severe climate change effects in Kiribati, it is crucial to establish clear guidelines that ensure understanding and compliance among all parties involved.

Table 20: TAP overview table for construction of Mass concrete seawall

Sector	Coastal Protection							
Sub-sector	Please state the sub-sector Integrated Coastal Zone management							
Technology	Mass Concrete Seawall							
Ambition	This is an immediate response to protect eroded areas and to protect land from the persisting climate change impact							
Benefits	Building mass concrete seawalls offers significant benefits for coastal protection in addressing erosion and flooding threats exacerbated by sea-level rise.							
Action	Activities to be implemented	Sources of funding	Responsible body and focal point (s)	Time frame	Risks	Success criteria	Indicators for Monitoring of implementation	Budget per activity
1.0 Source funding support	1.1 Strengthen partnership with international organizations to establish a dedicated fund to support coastal resilience initiatives including mass	DFAT, MFAT, GEF, GCF	MISE, OB,	2025	Poor partner engagement leading to delays or failure to meet project gaols	Partners are fully engaged and their support receives in a timely manner	Number of partners engage in the project	$150,000.00

	concrete seawall							
	1.2 Improve access to climate funds by educate local government officials and community leaders on accessing climate adaptation fund	GCF,	MISE, OB	2026	Project proposal does not meet the climate funds criteria	Project proposal was accepted and funding is ready to be utilized	Availability of funding support through climate funds	$150,000.00
2.0 Establish coastal management authority	2.1 Coastal management policy	, GCF, DFAT, MFAT	MISE, OB	2027	Delay in the completion of the policy	Policy is successfully completed and is ready for use	Policy is in use	$15,000.00

	2.2 Resource allocation for the authority	DFAT, , GCF, DFAT, MFAT	MISE	2027	Limited budget to allocate resources to the authority	Authority is fully established and functional	Number and type of resources allocated to authority	$100,000.00
3.0 Improve staff technical capacity, skills and knowledge	3.1 Staff training	DFAT, MFAT,	MISE, MOE (KIT)	2027 - 2030	Insufficient resources	Allocation of resources is adequate enough to allow training of local staff	Number of staff trained	$10,000.00
	3.1 Development of a curriculum	DFAT, MFAT,	MISE, MOE	2027 - 2030	Insufficient budget Lack of expertise for curriculum development.	Curriculum was developed and used	Curriculum is approved and ready to be used in teachings	$6,000.00
4.0 Improve community awareness	4.1 Community consultation	, MFAT, DFAT	MISE, OB	2027 - 2030	Insufficient number of staff to carry out community consultation	Community consultation progressing well	Number of consultation programs being implemented	$15,000.00

						according to the plan		
	4.2 Develop platform for sharing information	, MFAT, DFAT	MISE, OB	2027 - 2030	Lack of proper communication equipment	Platforms are successfully being in use	Number of platforms currently used	$2,000.00

Chapter 5: Project Ideas

The Adaptation Technical Working Group evaluated the proposed actions and selected an initiative that demonstrates significant potential for scaling and disseminating technology across the country. Notably, among the three prioritized technologies advanced from Phase 1 to this final phase, coastal rehabilitation through land reclamation emerged as the preferred choice over green-grey infrastructure and mass concrete seawalls. This approach will be further refined into a project proposal in line with the guidelines outlined in the TAP report. It will emphasize its alignment with the specific needs articulated by the Office of Te Beretitenti in Kiribati since the inception of this initiative. Prior discussions have centered on the construction of seawalls designed to reclaim land and facilitate the relocation of affected populations. This initiative directly addresses the pressing challenge of rising sea levels and coastal erosion, particularly in vulnerable regions.

Recognizing that the successful adoption of this technology necessitates significant funding, particularly from external sources, this phase of the TAP report will concentrate on a specific area in South Tarawa. This location is consistently affected by seawater inundation and frequently experiences severe wave overtopping. As a result, families in this community are confronted with substantial challenges and have no viable alternatives but to remain and adapt to their increasingly difficult circumstances. The size of the area is 0.3 ha with the population of approximately 1,132 people (2020 census report). It was anticipated that the work would target 2026 to commence and complete 2030.

By creating robust barriers, we aim to protect communities while simultaneously providing a safer environment for those impacted by climate change. The need for such interventions has been clearly articulated by the Office of Te Beretitenti, highlighting the urgency and importance of tailored solutions for Kiribati's unique context.

While explicit technical hydrological parameters for land reclamation are not detailed in the publicly available documents, the approach must ensure:

- Continuity of sediment supply from reefs
- Minimising disruption to natural hydrologydynamics and sediment transport

- Protection against wave action and storm surge through both engineered and natural buffers
- Consideration of tidal ranges and extreme water levels to prevent flooding
- Monitoring and maintenance plans for coastal infrastructure

5.1 Project Idea

Table 21: Project idea – Developing a coastal rehabilitation by land reclamation

Proposed Project Title: Developing a coastal rehabilitation by land reclamation prototype project	
Introduction/background	Kiribati, a picturesque island nation located in the central Pacific Ocean, is grappling with the acute challenges posed by climate change, including rising sea levels, increasing storm intensity, and coastal erosion. As one of the world's most vulnerable nations to climate change, Kiribati faces an existential threat that imperils its environment, infrastructure, and livelihoods. The nation's unique geography—comprising 33 atolls and reef islands, many of which are merely a few meters above sea level—makes it especially susceptible to the impacts of climate change, prompting urgent action to protect its coastal zones. In response to these challenges, the Adaptation Technical Working Group has prioritized innovative solutions that address coastal vulnerabilities while considering environmental sustainability and social equity. Among the proposed actions evaluated, coastal rehabilitation through land reclamation has emerged as a promising strategy. This approach stands out for its ability to restore degraded coastal ecosystems while creating new land for sustainable development. The successful implementation of a land reclamation prototype project can serve as a model for adaptive practices not only within Kiribati but

	also across other Pacific island nations facing similar challenges. The importance of this initiative is underscored by the consistent emphasis from the Office of Te Beretitenti, demonstrating a clear alignment with national development priorities and the need for sustainable solutions to enhance resilience against climate change. The proposed project will harness advanced technologies and community involvement to ensure that reclaimed areas are not only functional but also ecologically stable and socially beneficial. By focusing on coastal rehabilitation through land reclamation, this project aims to restore natural habitats, protect existing shorelines, and provide new opportunities for agriculture, tourism, and community development in Kiribati. As we consider the future of Kiribati in the face of climate change, this project represents a significant step towards not just safeguarding the nation's coastal environments, but also empowering its communities to thrive in an increasingly uncertain world. Through this prototype project, Kiribati aims to set a precedent in innovative coastal protection, striving for an adaptive future that embraces the challenges of a changing climate.
Objectives	In alignment with the overarching goals outlined in the TAP report, the project involving coastal rehabilitation through land reclamation in Kiribati aims to achieve the following objectives: 1. Enhance Coastal Resilience: Implement land reclamation strategies that strengthen the natural coastal defences against climate change impacts such as rising

	sea levels, storm surges, and erosion, thereby protecting both human settlements and vital ecosystems. 2. Restore Ecosystems and Biodiversity: Rehabilitate degraded coastal areas to restore essential habitats that support local biodiversity, including mangroves, seagrasses, and coral reefs, contributing to the overall health of marine and terrestrial ecosystems. 3. Create Sustainable Land for Community Use: Develop new land suitable for agriculture, residential, and recreational purposes, fostering economic opportunities and enhancing the quality of life for communities impacted by climate change. 4. Promote Community Engagement and Capacity Building: Involve local communities in the design, implementation, and management of land reclamation
What are the inputs and are they measurable?	To effectively implement the coastal rehabilitation and land reclamation project in Kiribati, several inputs will be necessary. These inputs can be categorized into different areas: 1. Human Resources - Skilled Labor: Engineers, environmental scientists, ecologists, and project managers to design, execute, and manage the reclamation project. - Community Engagement Specialists: Individuals experienced in participatory approaches to facilitate community involvement and local capacity building. - Training Facilitators: Experts to conduct training sessions for local stakeholders on sustainable practices and environmental management. 2. Financial Resources

	- Funding: Secured finances from government bodies, international aid, NGOs, and partnerships to cover project costs including planning, implementation, and maintenance. - Budgeting for Maintenance: Allocated funds for the ongoing maintenance of newly reclaimed land and restored ecosystems. 3. Technical Inputs - Engineering Plans: Detailed blueprints incorporating innovative and sustainable engineering practices for land reclamation. - Environmental Impact Assessments: Comprehensive analysis reports to evaluate potential ecological effects of the project 4. Construction Materials - Fill Materials: - Sand (sourced locally, potentially from dredging or beach nourishment) - Gravel and crushed rocks 5. Geotextiles: Fabric materials to reinforce soil, prevent erosion, and separate different soil layers. - Concrete and Cement: For any structural components like retaining walls, walkways, or piers. 6. Vegetation and Landscaping - Native Plants and Seeds: - Mangrove seedlings (e.g., Rhizophora spp., Avicennia spp.) - Salt-tolerant grasses and shrubs for soil stabilization (e.g., Spartina spp., S. alterniflora) - Other native flora that helps restore local ecosystems. - Soil Amendments: Organic matter or fertilizers to enhance soil quality for plant growth.

	7. Erosion Control Materials - Silt Fencing: To control sediment runoff during construction. - Coconut Fiber Mats: For erosion control and soil stabilization on slopes and newly vegetated areas. - Boulders/Riprap: For absorbing can absorb and deflect the energy of incoming waves, reducing the impact on the shoreline and the potential for erosion. - Barrier to Overwash: They can help prevent sediment and debris from being washed away during high tides or storm events, maintaining the integrity of the beach and adjacent habitats. 8. Erosion Control - Stabilization of Slopes: When placed along vulnerable areas of coastline, boulders can stabilize the soil and prevent landslides or slumping, especially on steep coastal banks. - Reduction of Sediment Loss: They help trap sediments, reducing the rate of erosion and allowing for natural vegetation to establish and thrive. 9. Habitat Enhancement - Wildlife Support: Boulders create habitats for marine life, including fish, invertebrates, and other organisms, thereby enhancing biodiversity in coastal environments. 10. Visual and Aesthetic Appeal - Well-placed riprap can also enhance the visual appeal of coastal areas while providing a durable and natural solution to erosion concerns.

Relationship to the country's sustainable development priorities	It is directly related to coastal protection in Kiribati and addresses one of the important issues emanating from climate change impacts. The key strategy is to mitigate the climate change impacts through coastal rehabilitation by land reclamation. This is a new development project.
Project deliverables e.g. value/benefits/messages	The project deliverables for the proposed "Developing a Coastal Rehabilitation by Land Reclamation Prototype Project" in Kiribati can be categorized into several value propositions, benefits, and key messages that will effectively communicate the project's goals and outcomes. Here are the primary deliverables: 1. Value/Benefits: a. Enhanced Coastal Resilience - Benefits: Strengthened natural defenses against climate change impacts, protection of human settlements, and safeguarding vital ecosystems. - Value: Increased safety and security for communities living in coastal areas vulnerable to erosion and extreme weather events. b. Ecosystem Restoration - Benefits: Improved health of marine and terrestrial ecosystems, restoration of essential habitats for local biodiversity, and better water quality. - Value: Restoration of mangroves, coral reefs, and seagrass beds, which are important for fisheries and provide ecological services such as carbon sequestration and water filtration.

	c. Sustainable Land Development - Benefits: Creation of new land for agriculture, housing, and recreation that can support local economies and enhance residents' quality of life. - Value: Developed infrastructure that opens up new economic opportunities and reduces reliance on imports.
Project scope and possible implementation	This project is nationally significant as it addresses crucial challenges related to coastal rehabilitation impacted by climate change. By focusing on restoring and maintaining healthy coastal ecosystems, it aims to enhance environmental resilience, thereby supporting the livelihoods of communities in Kiribati. It is connected to ongoing initiatives in the region.
Project Activities	Coastal rehabilitation through land reclamation typically involves a range of project activities. Though specific activities may vary based on the project's location, goals, and environmental considerations, here is a general list of activities that may be included: 1. Site Assessment and Surveys: - Environmental impact assessments (EIA) - Topographical and bathymetric surveys 2. Planning and Design: - Development of project plans and designs - Community consultation and stakeholder engagement - Regulatory compliance and permitting 3. Material Sourcing and Preparation:

	- Identification and sourcing of fill materials (e.g., soil, sand, and rock) - Processing of materials for appropriate use 4. Construction Activities: - Formation of protective structures (e.g., seawalls, breakwaters) - Dredging and excavation of existing land or water bodies - Filling and leveling the reclaimed area 5. Ecosystem Restoration: - Planting of native vegetation to stabilize soil and provide habitat - Reintroduction of marine life in surrounding areas
Timelines	Five years
Budget/resources requirements	$8,542,500.00 • Funding from the Government of Australia (DFAT), Government of New Zealand (MFAT), World Bank, ADB, Global Climate Fund (GCF) of UNEP. • Resource Needed: Engaging Project Management Team (consisting of Project Manager, Technical Officers and support staffs) and Consultants.
Measurement/evaluation	Measuring and evaluating project progress and success is crucial for ensuring that project objectives are met and that improvements can be made in future projects. Here are key methods and metrics to consider: 1. Define Clear Objectives and Key Performance Indicators - SMART Goals: Ensure that project goals are Specific, Measurable, Achievable, Relevant, and Time-bound.

	- Key Performance Indicators (KPIs): Identify specific KPIs aligned with project objectives, such as: - Scope: Deliverables completed vs. planned. - Time: Actual vs. planned timelines (schedule variance). - Cost: Actual vs. planned budget (cost variance). - Quality: Quality assessments and compliance with standards. 2. Regular Progress Monitoring - Status Reports: Provide regular updates on project progress. This can include completed tasks, issues, and risks. - Milestones: Break the project into key milestones and track their completion. This helps in assessing progress at key phases. - Gantt Charts: Visualize project timelines to see scheduled tasks against actual progress.
Possible complications / challenges	Project implementation can encounter various challenges at different stages, each requiring unique strategies to address them. Below are common challenges categorized by project phases: 1. Initiation Phase - Unclear Objectives: Difficulty in defining project goals and objectives can lead to misalignment among stakeholders. - Stakeholder Engagement: Identifying and engaging all relevant stakeholders can be challenging, leading to inadequate support.

	- Resource Availability: Assessing and securing the necessary resources (financial, human, material) for project initiation. 2. Planning Phase - Scope Creep: Difficulty in managing project scope leading to uncontrolled changes or expansions. - Risk Assessment: Inadequate identification and assessment of potential risks can result in surprises later. - Budgeting Issues: Estimating costs accurately can be challenging, leading to potential funding shortfalls. - Timeline Development: Creating a realistic timeline can be difficult due to dependencies and uncertainty. 3. Execution Phase - Communication Breakdown: Ineffective communication among team members or stakeholders can hinder progress. - Quality Control: Ensuring that deliverables meet the required quality
Responsibilities and Coordination	MISE – Primarily responsible for overseeing the technical aspects of the project. MELAD – Tasked with ensuring the safeguarding of ecosystems and the environment. OB – Provides coordination and approval for project activities. MFED (CFD) – Manages all financial-related matters.

	MCIA – Responsible for managing consultations with island authorities in the outer islands. MOE – Oversees the development and management of training programs.

Chapter 6.0: Conclusion

In conclusion, the initial phase of the Technology Needs Assessment (TNA) report has identified three key technologies that hold promise for advancing sustainable development in Kiribati. After careful consideration, coastal rehabilitation emerged as the top priority due to its multifaceted advantages and potential benefits for the country, its ecosystems, and the well-being of its people. This technology promises to enhance coastal resilience, restore vital ecosystems, and protect livelihoods that depend on these natural resources[26].

In alignment with the decision made by the Office of Te Beretitenti, which prioritizes technology adoption as outlined in the TNA, BA&EF report and the TAP report, land reclamation has been selected as the primary method for coastal protection within the coastal rehabilitation sector. This decisiohas was communicated to UNEP Copenhagen Climate Centre through the Office of Te Beretitenti where it was agreed and thus allows the work to proceed accordingly.

While Kiribati is committed to funding this vital project to the best of its ability, we recognize the valuable role that development partners can play in providing essential support and resources[27]. We believe that collaboration will be pivotal in overcoming the challenges we face. Therefore, we respectfully request assistance to facilitate the implementation of coastal rehabilitation initiatives, particularly within a timeline of the next three to five years. Together, with the right support, we can ensure a healthier, more resilient coastal environment that benefits both our communities and nature for generations to come.

To effectively implement the coastal rehabilitation project in Kiribati, we estimate a total funding requirement of approximately $8,542.500 million. This budget will be allocated across several key activities essential for the successful execution of the project. This funding breakdown allows for a structured approach to achieving successful outcomes

[26] Waltkin et,al,. 2019. Australian Coasts & Ports 2019 Conference- Hobart, 10-13 September 2019. Temaiku Land and Urban Development- Building Sustainable Climate Change Resilience for Kiribati
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in the coastal rehabilitation project, ensuring that resources are utilized efficiently and effectively across different activities.

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Annex 1:Retreat – Participant list (May 12-14th, 2025)

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