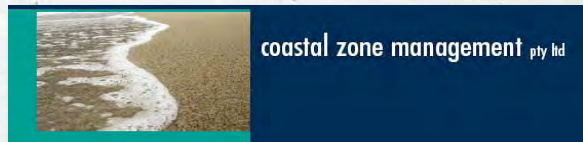


ADAPTATION HANDBOOK

Undertaking Risk Treatment for Coastal Climate Change Risks in the Republic of Kiribati



Kiribati Adaptation Project

KAP II: Component 1.3.2

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About This Document

This document provides guidance on an approach to the treatment of climate change risks in Kiribati, also referred to as climate change adaptation. The handbook follows directly from the *Risk Assessment Handbook: Version II*¹. It has been designed for use during training sessions conducted as part of Component 1.3.2 of the Kiribati Adaptation Program (KAP II). The approach outlined in this handbook has been tailored for the specific purpose of Coastal Hazard Risk Diagnosis and Planning (CHRDP) in Kiribati, is appropriate to country needs and recognises capacity constraints.

Document Outline

This handbook concentrates on the final phase of the Risk Assessment Framework, Phase V 'Risk Treatment'. There are five phases in the Risk Assessment Framework (see Figure 1):

1. Set the Context (Phase I)
2. Risk Identification (Phase II)
3. Risk Analysis (Phase III)
4. Risk Evaluation (Phase IV)
5. Risk Treatment (Phase V)

The methods outlined herein apply the results of the first 4 phases (Set the Context, Risk Identification, Risk Analysis, Risk Evaluation) to inform the final phase - Risk Treatment. It should be noted that **Risk Treatment** and **Adaptation** are used interchangeably here, but are taken to have the same meaning: 'an approach to treat the identified risk'. The term 'adaptation' is used throughout this handbook; however, we must keep in mind that this relates directly to the 'Risk Treatment' component of the Risk Assessment framework.

In addition, methods to undertake the two overarching phases of the risk assessment process are outlined in this Handbook (see Figure 1):

- Communicate and Consult; and
- Monitor and Evaluate.

It is important to note that these activities should be completed throughout the risk assessment process.

Two Excel Workbooks, entitled *First Level Adaptation Templates* and *Second Level Adaptation Templates*, accompany this Handbook. The Workbooks contain templates for completing the Risk Treatment activities. Review the Workbooks as you progress through the training program.

¹ A copy of this handbook was provided electronically to Workshop Participants in the 'CZM Participants Folder'

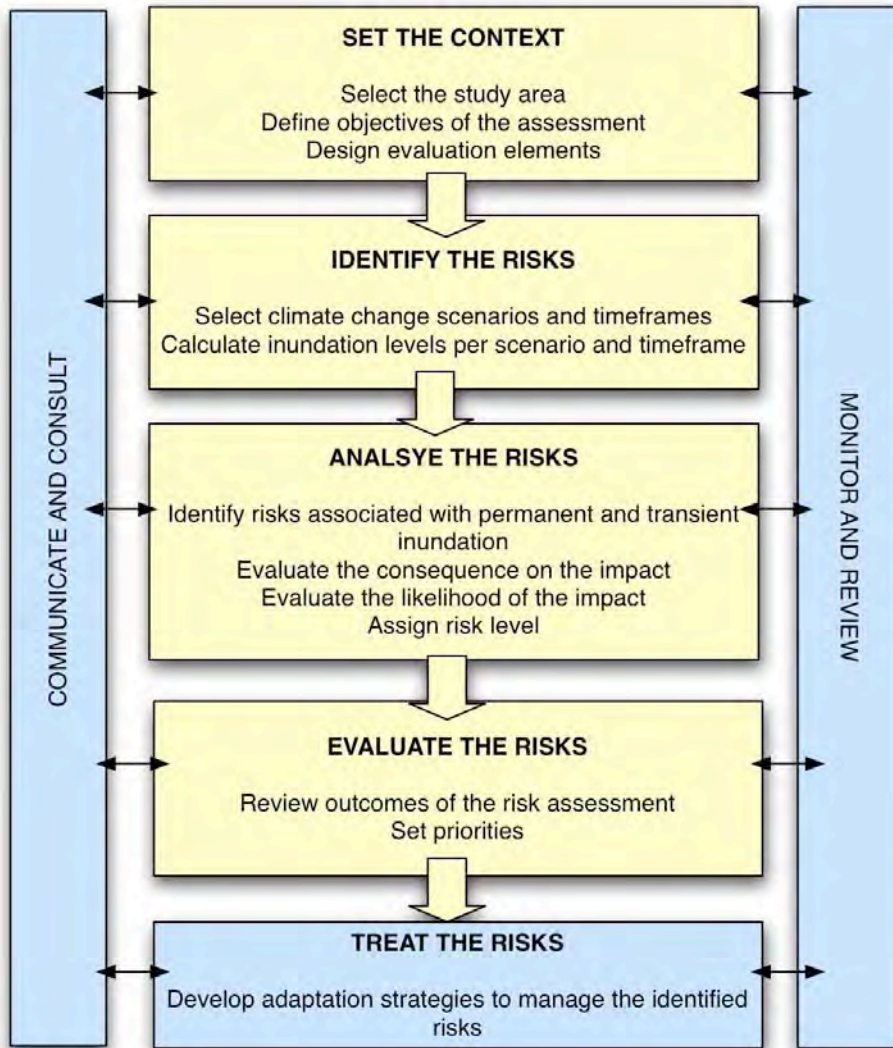


Figure 1: The Risk Assessment Framework

Note: Topics in the dark shading are covered in this manual. Topics in the light shading are covered in the *Risk Assessment Handbook*.

INTRODUCTION TO RISK TREATMENT

Key questions to be addressed within any approach to adaptation include:

- What is the risk?
- How can we treat it?
- How can we decide which treatment option is appropriate?
- Having decided on a treatment option, what specific measures are needed?
- Who is responsible for carrying out these measures and when should they be carried out?

The risk management framework adopted in this Project operates in a strategic 'top down' manner to address these questions.

The approach involves consideration of the outputs from Risk Analysis (Phase III of the risk assessment framework) to inform the selection of a broad range of adaptation options that could be implemented to treat the identified risks.

Subsequently, the applicability of each adaptation option is assessed to inform the decision making process. Finally, a relevant series of implementation measures are established in conjunction with an assignment of responsibility for discrete measures.

The steps involved in this process are:

- Step 1: Prioritise Treatment of Risks
- Step 2: Select Adaptation Options
- Step 3: Evaluate Adaptation Options.
- Step 4: Formulate an Adaptation Plan.

This handbook will explore the actions required in each of the four steps.

Two risk assessments have been completed during the training conducted in KAP Component 1.3.2. The scales of risk assessment are referred to herein as:

- First level risk assessment; and
- Second level risk assessment.

A description of these risk assessment types is provided in Table 1.

Table 1: Risk Assessment Types

Risk Assessment Type	Description
First level risk assessment	Risk assessment for South Tarawa. Involves the identification of climate change risks associated with permanent inundation from sea level rise and the assignment of a risk prioritisation value to the identified risks.
Second level risk assessment	Risk assessment for villages in South Tarawa. Involves the identification of climate change risks associated with permanent inundation from sea level rise per village. Risks are assigned a risk prioritisation value and these values are assessed to define an overall risk rating per village.

In this handbook the approach to risk treatment is covered for each of the two risk assessment types. We commence with the Risk Treatment for the First Level Risk Assessment. Refer to the *First Level Adaptation Templates* Excel file for this component of adaptation planning.

FIRST LEVEL RISK ASSESSMENT: RISK TREATMENT

STEP 1: Prioritise the Treatment of Risks

The first step in the risk treatment phase is to *prioritise the treatment of risks*. We must determine what risks should be treated as a priority. The priority of risk treatment is based on:

- The risk rating (as assigned in the risk analysis); and
- The current controls in place to manage the risk.

During the risk assessment we allocated a risk rating to each risk based on a consideration of the likelihood and the consequence of the risk occurring (for example, Low, Medium, High and Extreme) (see the adaptation templates in the [Excel Worksheet '1st Level RA Results_ Tawara'](#)).

We also allocated a rating to each of the risks that indicated the effectiveness of the current controls in place to manage the risk. The rating was a value from 1 to 3:

- 1 = No control.
- 2 = Control but no action.
- 3 = Control and action.

A 'control' is a guidance tool such as policy, strategy and/or guideline, while action relates to implementation of activities and management actions. In allocating a rating, effectiveness was implied. For example, if there was a measure and an action to control a risk but the action was not effective in managing the risk, a rating of 2 was assigned. The allocated current control rating for the identified risks for South Tarawa is provided in the [Excel Worksheet 'Step 1_Risk Priority Results'](#).

Once a current control rating has been assigned, the next step is to combine the risk rating and the current control rating to assign a *risk prioritisation rating*, following the **matrix** in Table 2.

There are four categories for the prioritisation of risk treatment:

1. No major concern (NMC)
2. Periodic monitoring (PM)
3. Active management (AM)
4. Control critical (CC)

These ratings indicate the priority of treating each of the risks.

If the control in place to manage a risk is ineffective and it is an extreme risk, the implementation rating is 'Control Critical', suggesting that immediate attention is required. Conversely, if a risk has a low or medium rating, and the current controls are very effective, then the implementation rating is 'No major concern', suggesting that the adaptation measures to address that risk are a lower priority.

The outcomes of the prioritisation are used to inform risk treatment.

STEP 2: Select Adaptation Options

Once we have additional information on what risks should be treated as a priority, we must consider how we will treat the risks. Therefore, the next step in the risk treatment phase is to consider what options are available to treat the identified risks. A number of adaptation options are shown in Table 3.

These adaptation options represent a preliminary list of available adaptation options for the Government of Kiribati. This list is not exhaustive and should be viewed as a starting point for the development of a list of adaptation actions applicable to treat climate change inundation risks in Kiribati². It is important to remember that these options are explicitly designed to treat risks

² The adaptation options presented in Table 3 have been generated based on the outcomes of an adaptation assessment conducted in 2008 under the KAP II program (Component 1.3.2). During the assessment GoK representatives reviewed a range of risk treatment measures and developed treatment actions aligned to each of the measures. The measures were designed to ensure that they were practical for application in Kiribati.

associated with sea-water flooding from the lagoon and ocean sides.

The final list of adaptation options applicable in Kiribati are presented in Table 3 (also refer to [Excel Worksheet 'Step 2_Adaptation Options'](#)).

The treatment types are presented across a number of themed areas based on adaptation category. There are 5 categories of adaptation:

- Education/behaviour;
- Research;
- Regulatory and Institutional;
- Structural and technological; and
- Spread the Risk.

Table 2: Risk Prioritisation Matrix

Risk Level	Current Control Rating		
	1 No Control	2 Control but no action	3 Control and action
Low	Periodic Monitoring	No Major Concern	No Major Concern
Medium	Active Management	Periodic Monitoring	No Major Concern
High	Control Critical	Active Management	Active Management
Extreme	Control Critical	Control Critical	Active Management

Table 3: Adaptation Measures to treat risks associated with inundation in Kiribati

Adaptation Category	Adaptation Measure	Adaptation Actions
Education/behaviour	Disseminate information on implications of identified risks of climate change within South Tarawa to relevant Ministries and strengthen the profile of climate change within key Ministries	1. Present outcomes of the risk assessment to key stakeholders (as identified in Stakeholder analysis)
		2. Initiate Regular Meetings with key Ministries to foster the creation of expertise in risk assessment and to build relationships with other Ministries to share information.
		3. Establish communication channels between scientists and Ministerial staff
		4. Decrease the ‘silo’ nature of climate change management within the GoK through the implementation of planning strategies that mainstream climate change adaptation across Ministries (see outcomes of the Institutional Strengthening work completed through KAP II in 2008)
Education/behaviour	Establish/strengthen relationships with the local community to facilitate monitoring activities, raise awareness and participate in adaptation strengthening activities	1. Communicate with EYC (Environment Youth Club) regarding the need to establish a committee of Community Leaders
		2. Establish a committee of Community Leaders to lead awareness program at the community level
		3. Hold a Workshop to initiate two-way dialogue between Community Leaders & experts
		4. Integrate workshop outcomes with the Communication Strategy (see adaptation measure below)
Education/behaviour	Communicate with/educate the community on climate change risks and adaptation activities	1. Review options to disseminate results of the risk assessment to the community
		2. Create a Climate Change Communication Strategy – envisioned as a 5 year plan. Information and awareness raising for: the outcomes of the current research; the importance of monitoring aiming for volunteer support; adaptation actions that can be taken by individuals to increase their resilience to the potential impacts of climate change
		3. Monitor outcomes of the KAP Curriculum Development Resource project for climate change modules
Research	Ensure quality and validity of information sources for decision making	1. Review most recent climate change information at a regional and local scale as it becomes available
		2. Communicate state-of-knowledge regarding climate change and climate related risks across all Ministries
		3. Ensure that there is regular review of existing and potential technology that may increase information and aid decision-making.
		4. Maintain open dialogue with regional organisations (i.e. SOPAC) to ensure transferability/continuity of all

Adaptation Category	Adaptation Measure	Adaptation Actions
		pertinent information to be used in decision making process as it relates to climate change adaptation
Research	Develop a coastal monitoring program, which includes mainstreaming of adaptation measures across all Ministries (applies to existing and planned monitoring activities)	1. Establish extent of current monitoring regimes – what are the existing beach/wetland/ecological monitoring programs:
		· Where is monitoring undertaken?
		· How often?
		· What format are results in?
		· Who is custodian?
		· What is information currently used for?
		· How can this information be mainstreamed into coordinated adaptation planning?
		2. Ensure that all existing information is collated to inform gap analysis identifying target areas to focus future monitoring works, based on outcomes of the Risk Assessment.
Research	Analyse tools to enhance enforcement activities undertaken by Ministries. The aim is to ensure an integrated and transparent approach to enforcement of coastal protection	3. Communicate with funding agencies and development partners to ensure that local monitoring conducted by Ministries compliments work being undertaken under different agencies/organisations/projects and may be used in a 'nested' fashion (use same benchmarks/standards/methodologies)
		4. Develop partnership with research institutions (i.e. University of South Pacific) to encourage research in Kiribati – e.g. research projects focused on key issues identified in the risk assessment.
		5. Design a comprehensive coastal monitoring program based on evaluation of all above points
		1. Review progress of KAP consultant undertaking enforcement assessment
Research	Analyse tools to enhance enforcement activities undertaken by Ministries. The aim is to ensure an integrated and transparent approach to enforcement of coastal protection	2. Communicate with the public to determine appropriate enforcement tools that would increase voluntary compliance
		3. Investigate the needs and constraints on enforcement officers based on their experiences. This could be undertaken in a workshop or by a TA. Also, investigate and document the user friendly or appropriate tools for enforcement that favour voluntary compliance and cooperation of community, increased community service
		4. Seek funding for implementation of identified tools

Adaptation Category	Adaptation Measure	Adaptation Actions
Research	Complete research into the social and cultural aspects of climate change	1. Propose CCST/NASC initiate discussion on the need for further assessment on the social and cultural impacts of climate change (& need for TA) through agenda item
		2. On approval by CCST/NASC seek funding for TA to develop strategy (lead agency approved by NASC). Upon receipt of funding recruit TA
		3. Following review of study outcomes, implement recommendations
Research	Review the structural integrity of existing defence structures*	1. Monitor outcomes of KAP II Component 2.2.1 (currently underway) - This information will inform adaptation planning along the coast
		2. Review existing defence works for valuable infrastructure (not currently being considered by Component 2.2.1)
		3. Develop programme of works to upgrade existing defence structures, as identified from review
Research	Monitor changes in condition of structures so that any modifications/retrofitting occurs on time and prior to failure	1. Conduct monitoring of condition of structures in high and extreme risk areas
		2. ID areas requiring immediate attention/Ongoing monitoring (align to Coastal monitoring program)
		3. Identify alternative options should the existing building and infrastructure be impacted upon in order to maintain services and connections
Regulatory and Institutional	Review and amend development codes (retrofitting existing developments and provisions for new developments)	1. Investigate standards to reduce sensitivity of inflexible infrastructure (existing infrastructure)
		2. Where location of infrastructure is not flexible investigate standards of construction that reduce their sensitivity (planned infrastructure)
Regulatory/ Institutional	Incorporate climate change scenarios into policy and decision making processes	Review outcomes of the Institutional Reform project completed as part of KAP II and;
		1. Initiate dialogue with relevant Ministries to garner support for implementation of the recommendations outlined in CZM KAP II report
		2. Continue dialogue with Ministries to review progress towards mainstreaming climate change adaptation.
		3. Lengthen strategic planning horizons

Adaptation Category	Adaptation Measure	Adaptation Actions
		4. Establish program to investigate potential internal resettlement
Regulatory/ Institutional	Modification of Ministerial planning approval process	1. Review recent recommendations for regulatory change and develop plans for regulatory change as required.
		2. Submit agenda item to CCST and NASC to review previous reports and outline recommendations for implementation
		3. Promote inundation sensitive urban design at the plan making and development assessment stages of the planning process: update planning schemes to give greater weight to inundation risk.
		4. Request technical support from regional organisations to develop guidelines for EIA enforcement officers
		5. Progressively incorporate higher design standards into asset management plans and rolling capital works programs. i.e. update planning guidelines for habitable floor levels to better protect future development
		6. Increase training of EIA enforcement officers - develop set guidelines for EIA officers to ensuring climate change is incorporated into all planning requests
Regulatory/ Institutional	Review and update disaster planning and management	1. Request information on the step-by-step actions that would be required in a disaster situation. For example, evacuation measures, informing businesses of risk etc
		2. Ensure that the disaster response plan is adaptively managed. Review plan regularly to ensure response options incorporate current climate change information
		3. Identify alternative options should the existing building and infrastructure be impacted upon in order to maintain services and connections
Regulatory/ Institutional	Develop a foreshore management plan	1. Request KAP Component 2.2.1/2.2.2 (Coastal Engineer) work with FMC to initiate development of FMP
		2. Liaise with relevant agencies to ensure uptake and implementation of FMP, following approval of plan by the FMC
Structural and technological	Better drainage and storm water capture*	1. Investigate drainage improvements at all known flash flood points
		2. Upgrade stormwater infrastructure using water sensitive urban design methods and ensuring that modelling caters for climate change
Structural and technological	Protect species/ecosystems through active management controls, as	1. Investigate active management controls to reduce climate change impact on priority ecosystems
		2. If thresholds are breached (See Coastal Monitoring Program), implement selected active management controls.

Adaptation Category	Adaptation Measure	Adaptation Actions
	appropriate*	
Structural and technological	Scale up coastal protection measures*	<ol style="list-style-type: none"> 1. Monitor thresholds for change. 2. Once approaching limits of acceptable change select and implement coastal protection measures, as appropriate.
Structural and technological	Investigate design and costing of protection measures including guidelines established for review and approval of hard structural options	<ol style="list-style-type: none"> 1. Request KAP Component 2.2.1/2.2.2 (Coastal Engineer) work with FMC to review existing draft seawall guidelines & work with key GoK agencies (MELAD, PWU, MFMRD) to review existing protection measures
		<ol style="list-style-type: none"> 2. KAP Coastal Engineer & FMC & key GoK agencies develop guidelines
Spread the Risk	Review household and government insurance mechanisms	<ol style="list-style-type: none"> 1. Contact Kiribati Insurance Commission (KIC) to request initiation of the review
		<ol style="list-style-type: none"> 2. Conduct awareness campaigns for at risk businesses and households
Avoidance	Migration of People Away from High Risk Areas*	<ol style="list-style-type: none"> 1. Monitor thresholds for change. 2. Investigate opportunities for re-settlement 3. Once approaching limits of acceptable change select and implement settlement relocation measures, as appropriate.

STEP 3: Evaluate Options for Risk Treatment

Following identification of adaptation options, an assessment must be undertaken to determine which adaptation options are suitable to treat the risks identified in South Tarawa, and to define what order adaptation options should be implemented³. This is completed through a number of actions:

- A. Action 1: Determine what adaptation options will treat your risks.
- B. Action 2: Determine what risks should be treated first (draws on the outputs from Step 1).
- C. Action 3: Examine the constraints and opportunities to implementation.
- D. Action 4: Combine outputs from Step 2 and Step 3 to develop a list of adaptation options that are presented in order of the priority in which they should be implemented.

Completion of these steps facilitates development of a first level adaptation plan. The methods to complete each of these Actions are presented below.

Action 1: Determine What Adaptation Options Will Treat Your Risks

To determine what adaptation options are applicable for treating each of your identified risks we must analyse each risk in turn.

To do this, use the Excel template to record whether or not an adaptation option (as identified in Step 2) has the ability to treat each of our risks (as identified in the Risk Analysis Phase).

***Go to the Excel workbook to view the template for analysing Adaptation Options against each risk (Worksheet 'Step 3_Action 1 and Action 2).**

³ We cannot implement all adaptation options in unison. Therefore, we must prioritise our adaptation options to ensure that we implement those that will have the greatest impact in reducing the likelihood of risks occurring.

To complete this activity, select a risk and progress through each adaptation option noting whether the option has the ability to contribute to treating the selected risk. A number 1 is allocated against each adaptation option that will treat the selected risk. The results of such an assessment are shown in [Worksheet 'Step 3_A1 and A2_EXAMPLE](#).

In many cases, one adaptation measure will treat a number of different risks. Further, each risk may be treated through implementation of several adaptation options.

In the next Action, we analyse our results to determine which adaptation options should be implemented first.

Action 2: What Adaptation Options Should be Implemented First

The adaptation options that treat the high priority risks should be implemented first.

Therefore, the outputs from the Risk Prioritisation (Step 1) are used to determine which adaptation options treat the highest priority risks. For each risk, insert the risk priority rating as calculated in Step 1, into the green cell underneath the risk, applying the ratings shown in Table 4.

Table 4: Risk Priority Ratings

Risk Priority	Rating
Control Critical	4
Active Management	3
Periodic Monitoring	2
No Major Concern	1

The *adaptation implementation prioritisation rating (AIP)* for each adaptation option will be automatically calculated in the Excel file. The AIP is the sum of the number of priority risks treated, times the level of risk prioritisation.

This is calculated in the spreadsheet by:

Adaptation Implementation Prioritisation rating (AIP) = [number of Control Critical (CC) risks X 4]+ [number of Active management (AM) risks X 3]+ [number of Periodic monitoring (PM) risks X 2]+ [number of No major concern (NMC) risks X 1]

Action 3: Examining Constraints and Opportunities to Implementing Adaptation Options

The actions completed so far provide us with a range of adaptation options to treat risks and guidance on what adaptation options should be implemented first, based on a consideration of the current controls in place to manage the risk and the risk rating.

In addition to this information, we must also determine what the GoK can do in practice. For example, some of the adaptation options may face a number of constraints to implementation, such as lack of financial resources, which will require external support. Conversely, some adaptation options may provide significant social benefit. Therefore, in the development of the adaptation plan it is important to prioritise the adaptation options based on a consideration of the barriers and opportunities framing the realities of adaptation implementation.

To complete this, we must assess each of our adaptation options against criteria for evaluating the barriers and opportunities that will be faced when implementing the option.

GoK stakeholders previously developed a list of criteria for application in a constraints and opportunities analysis during a Risk Treatment Workshop held in 2008 (see Table 5). These criteria can be used to prioritise adaptation options for implementation.

To complete the assessment, we will review each adaptation option and assign a rating of 0 to 2 under each of the evaluation criteria. Zero indicates a barrier to implementation, while 2 indicates an opportunity for implementation of the adaptation option. Table 6 should be used to allocating ratings.

Once a rating has been assigned for each barrier and opportunity criterion, a rating

representing the ease of implementation of the adaptation option is automatically generated in the Excel file. A high rating indicates an option that faces limited constraints to implementation. An adaptation option with a low rating indicates an option that may face barriers to implementation (see [Excel Worksheet Step 3_Action 3](#), for the template for completing the Barrier and Opportunity Analysis).

In addition, some of the evaluation criteria (Table 6) may have a greater influence on implementation of adaptation options than others. For example, budget may be seen as the overriding factor influencing the implementation of the adaptation options.

Therefore, we must review the criteria and determine if any have a greater influence on implementation than others. If so, the criteria should be weighted by inserting a value greater than 1 in the green cells in [Excel Worksheet Step 3_Action 3](#).

The final output is a rating that indicates the ease of implementation of each adaptation option based on an understanding of the variable impact of different barriers to implementation. As stated, a high rating is indicative of an option that faces limited barriers to implementation, whilst a low value indicates an adaptation option that faces significant barriers to implementation.

Table 5: Criteria for analysis of the potential barriers to implementing adaptation options

Criteria	Description
No regrets	The option is beneficial in the absence of climate change. The option not only contributes to addressing climate change but also contributes to other development objectives, for example enhancing access to food and increasing human health.
Statutory requirements	The option can be implemented without any policy or legislative change.
Community acceptability	The option will be amenable to community members.
Environmental Impact	The option is not likely to have any adverse environmental impacts. Environmental impact will be minimised.
Budget	The option can be implemented within current GoK ministerial budgets. No external funding will be sought.
Cost benefit	The benefits of adaptation clearly exceed its costs. While costs may be high, the benefit derived through implementation exceeds these costs. This is a strategic estimate only. We do not need to know the exact costs to rank this criterion.
Resource security	The option will enhance access to food, clean water and the ocean.
Adaptive capacity	The option will increase the adaptive capacity of the community by increasing their ability to manage the potential impacts of climate change.

Table 6: Guide to allocating ratings in the barrier and opportunities analysis

Criteria	0	1	2
No regrets	Option only contributes to climate change adaptation	Contributes in part to development as well as climate change	Will greatly contribute to development in addition to climate change adaptation
Statutory requirements	Significant changes to statutory requirements are needed	Minimal changes to statutory requirements are needed	No changes to statutory requirements are needed
Community acceptability	The option will not be amenable to community members	The option should be amenable to community members	The option will be amenable to community members
Environmental Impact	Potential for major impact on the environment	Minor impact to the environment	No environmental impact
Budget	Would require major inclusion to budget: > 1 year to receive funding	May be covered by next financial year budget – upon written request.	Can be covered under existing financial budgets
Cost benefit	The costs will exceed the benefits	The costs are equal to the benefits	The benefits far exceed the costs
Resource security	The option will not enhance access to food, clean water and the ocean	The option may enhance access to food, clean water and the ocean	The option will enhance access to food, clean water and the ocean
Adaptive capacity	The option will not increase the adaptive capacity of the community	The option may increase the adaptive capacity of the community	The option will increase the adaptive capacity of the community

Action 4: Prioritising Adaptation Options for Implementation

We now have two sources of information that will provide guidance on the implementation of adaptation options.

1. Information that demonstrates the extent to which each adaptation option treats risks that are assigned as a high priority (Action 1 and 2); and
2. An understanding of the constraints and opportunities facing implementation of each adaptation option (Action 3).

The final step is to combine these sources of information to gain an understanding of the priority and ease of implementation.

Creating an adaptation matrix will combine this information. An adaptation matrix categorises the adaptation options into four distinct groups (Figure 4):

1. Important and easy
2. Important but tricky
3. Not so important but easy
4. Too hard for now

The category that an adaptation option is assigned provides guidance on the steps for implementation, as outlined in Figure 5.

To complete this Action, the results from Action 1 and 2 (the Adaptation Implementation Prioritisation rating) and the results from Action 3 (the Barriers and Opportunities Rating) are combined in a scatter graph to align the two information sources.

A template has been developed to align these two sources of information – see [Excel Worksheet Step 3_Action 4](#). If the barrier and opportunity criteria have been weighted, these values should be selected for inclusion in the adaptation matrix (Figure 2). If not, the unweighted criteria should be selected for inclusion in the matrix (Figure 3).

- Barriers and Opportunities: unweighted
- Barriers and Opportunities: weighted

Figure 2: Selection if the barrier and opportunity criteria have not been weighted

- Barriers and Opportunities: unweighted
- Barriers and Opportunities: weighted

Figure 3: Selection if the barrier and opportunity criteria have been weighted

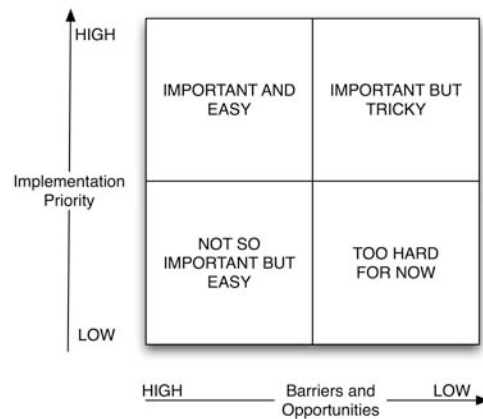


Figure 4: Adaptation Matrix

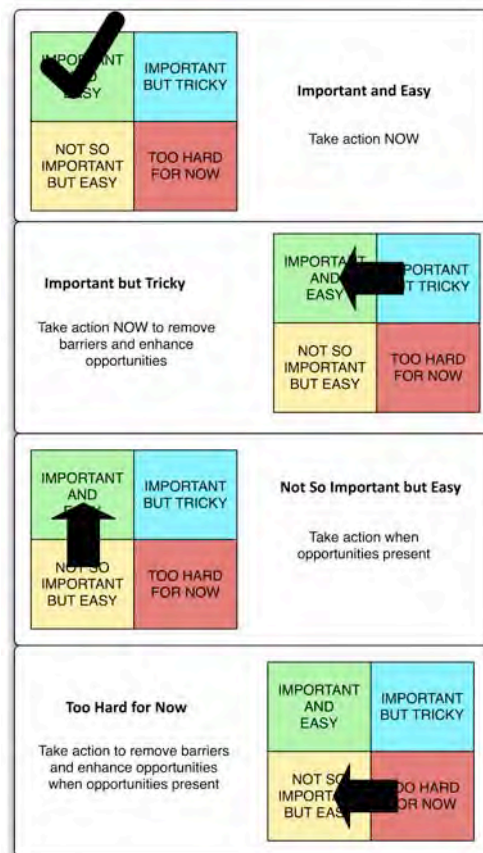


Figure 5: Strategies for Implementation

The separation between the adaptation categories (i.e. 'important and easy' versus 'not so important but easy') are set at the half way point of the range of values in the x (barriers and opportunities) and y (implementation priority) axes (see Figure 6 for example). However, you should review where the adaptation options fall within the matrix to ensure that it accurately represents the case for implementation of adaptation options in South Tarawa.

This will entail reviewing the adaptation options and discussing the merit of moving the separation point (note that each adaptation option is coded as a 'letter'). Table 7 provides details on each adaptation option, the actions associated with the option and the responsibility for implementation.

Step 4: Formulate Adaptation Plan

At the end of the assessment, the adaptation options have been assigned to a category that reflects the importance of implementation and the potential barriers or opportunities to implementation (i.e. Important and Easy; Important but Tricky; Not so Important but Easy; Too Hard). The categorisation provides guidance on the actions for implementation:

1. **Important and Easy:** These are adaptation actions that we should be able to take action on immediately. They have limited barriers to implementation and will treat a number of high priority risks.
2. **Important but Tricky:** We want to ensure that the actions assigned to

this category can move across to the 'Take Action Now' category. To do this we must try to remove the barriers and/or increase the opportunities for implementing the option. We should start addressing barriers or enhancing opportunities immediately.

3. **Not So Important But Easy:** We may not start taking action on the adaptation options that fall within this category immediately (our efforts will be focused on the Important but Easy adaptation options). However, when opportunities to support implementation of these options are apparent, we must take advantage of them.
4. **Too Hard for Now:** We want to remove the barriers to implementation; however, our efforts will be focused on removing the barriers in the 'Important but Tricky' adaptation actions. Therefore, when opportunities to remove barriers present themselves, we will take advantage of them.

The outputs of the adaptation matrix guide the structure of an adaptation action plan. The adaptation action plan is presented in Table 7. You will note that the column indicating the Ministry responsible for implementation of the adaptation option is left blank. Responsibility will be assigned during the Training Workshop.

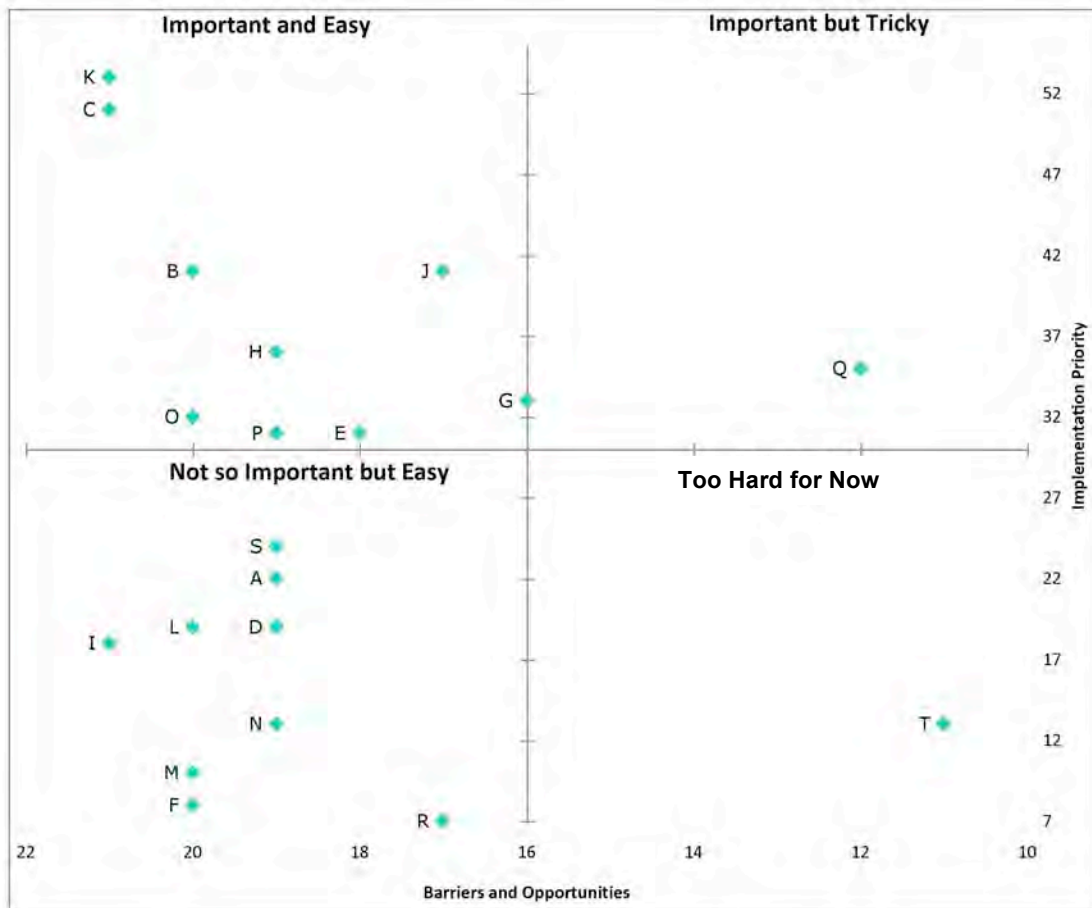


Figure 6: Example Adaptation Matrix

Summary

By following the steps outlined herein you have produced an adaptation plan to treat climate change risks associated with flooding (due to rising sea levels) in Tarawa. Implementation of this plan will be discussed during the training workshop.

Table 7: Strategic Adaptation Plan for South Tarawa

Prioritisation ID	Adaptation Option	Adaptation Actions	Risks Treated Through Implementation of the Adaptation Option ⁴	Ministerial Responsibility
A	Disseminate information on implications of identified risks of climate change within South Tarawa to relevant Ministries and strengthen the profile of climate change within key Ministries	<ol style="list-style-type: none"> 1. Present outcomes of the risk assessment to key stakeholders (as identified in Stakeholder analysis) 2. Initiate Regular Meetings with key Ministries to foster the creation of expertise in risk assessment and to build relationships with other Ministries to share information. 3. Establish communication channels between scientists and Ministerial staff 4. Decrease the 'silo' nature of climate change management within the GoK through the implementation of planning strategies that mainstream climate change adaptation across Ministries (see outcomes of the Institutional Strengthening work completed through KAP II in 2008) 		
B	Establish/strengthen relationships with the local community to facilitate monitoring activities, raise awareness and participate in adaptation strengthening activities	<ol style="list-style-type: none"> 1. Communicate with EYC (Environment Youth Club) regarding the need to establish a committee of Community Leaders 2. Establish a committee of Community Leaders to lead awareness program at the community level 3. Hold a Workshop to initiate two-way dialogue between Community Leaders & experts 4. Integrate workshop outcomes with the Communication Strategy (see adaptation measure below) 		
C	Communicate with/educate the community on climate change risks and adaptation activities	<ol style="list-style-type: none"> 1. Review options to disseminate results of the risk assessment to the community 2. Create a Climate Change Communication Strategy – envisioned as a 5-year plan. Information and awareness raising for: the outcomes of the current research; the importance of monitoring aiming for volunteer support; adaptation actions that can be taken by individuals to increase their resilience to the potential impacts of climate change 		

⁴ Risks to be inserted within the table following completion of the adaptation assessment for South Tarawa (this work will be undertaken by the Working Group during December 2009).

Prioritisation ID	Adaptation Option		Risks Treated Through Implementation of the Adaptation Option
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Prioritisation ID	Adaptation Option	Adaptation Actions	Risks Treated Through Implementation of the Adaptation Option ⁴	Ministerial Responsibility
		5. Design a comprehensive coastal monitoring program based on evaluation of all above points		
F	Analyse tools to enhance enforcement activities undertaken by Ministries. The aim is to ensure an integrated and transparent approach to enforcement of coastal protection	<ol style="list-style-type: none"> 1. Review progress of KAP consultant undertaking enforcement assessment 2. Communicate with the public to determine appropriate enforcement tools that would increase voluntary compliance 3. Investigate the needs and constraints on enforcement officers based on their experiences. This could be undertaken in a workshop or by a TA. Also, investigate and document the user friendly or appropriate tools for enforcement that favour voluntary compliance and cooperation of community, increased community service 4. Seek funding for implementation of identified tools 		
G	Complete research into the social and cultural aspects of climate change	<ol style="list-style-type: none"> 1. Propose CCST/NASC initiate discussion on the need for further assessment on the social and cultural impacts of climate change (& need for TA) through agenda item 2. On approval by CCST/NASC seek funding for TA to develop strategy (lead agency approved by NASC). Upon receipt of funding recruit TA 3. Following review of study outcomes, implement recommendations 		
H	Review the structural integrity of existing defence structures*	<ol style="list-style-type: none"> 1. Monitor outcomes of KAP II Component 2.2.1 (currently underway) - This information will inform adaptation planning along the coast 2. Review existing defence works for valuable infrastructure (not currently being considered by Component 2.2.1) 3. Develop programme of works to upgrade existing defence structures, as identified from review 		
I	Monitor changes in condition of structures so that any modifications/retrofitting occurs on time and prior to failure	<ol style="list-style-type: none"> 1. Conduct monitoring of condition of structures in high and extreme risk areas 2. ID areas requiring immediate attention/Ongoing monitoring (align to Coastal monitoring program) 3. Identify alternative options should the existing building and 		

Prioritisation ID	Adaptation Option	Adaptation Actions	Risks Treated Through Implementation of the Adaptation Option ⁴	Ministerial Responsibility
		infrastructure be impacted upon in order to maintain services and connections		
J	Review and amend development codes (retrofitting existing developments and provisions for new developments)	<ol style="list-style-type: none"> 1. Investigate standards to reduce sensitivity of inflexible infrastructure (existing infrastructure) 2. Where location of infrastructure is not flexible investigate standards of construction that reduce their sensitivity (planned infrastructure) 		
K	Incorporate climate change scenarios into policy and decision making processes	<p>Review outcomes of the Institutional Reform project completed as part of KAP II; and</p> <ol style="list-style-type: none"> 1. Initiate dialogue with relevant Ministries to garner support for implementation of the recommendations outlined in the report 2. Continue dialogue with Ministries to review progress towards mainstreaming climate change adaptation. 3. Lengthen strategic planning horizons 4. Establish program to investigate potential internal resettlement 		
L	Modify Ministerial planning approval processes	<ol style="list-style-type: none"> 1. Review recent recommendations for regulatory change and develop plans for regulatory change as required. 2. Submit agenda item to CCST and NASC to review previous reports and outline recommendations for implementation 3. Promote inundation sensitive urban design at the plan making and development assessment stages of the planning process: update planning schemes to give greater weight to inundation risk. 4. Request technical support from regional organisations to develop guidelines for EIA enforcement officers 5. Progressively incorporate higher design standards into asset management plans and rolling capital works programs. i.e. update planning guidelines for habitable floor levels to better protect future development 6. Increase training of EIA enforcement officers - develop set guidelines for EIA officers to ensuring climate change is incorporated into all planning requests 		

Prioritisation ID	Adaptation Option	Adaptation Actions	Risks Treated Through Implementation of the Adaptation Option ⁴	Ministerial Responsibility
M	Review and update disaster planning and management	<ol style="list-style-type: none"> 1. Request information on the step-by-step actions that would be required in a disaster situation. For example, evacuation measures, informing businesses of risk etc 2. Ensure that the disaster response plan is adaptively managed. Review plan regularly to ensure response options incorporate current climate change information 3. Identify alternative options should the existing building and infrastructure be impacted upon in order to maintain services and connections 		
N	Develop a foreshore management plan	<ol style="list-style-type: none"> 1. Request KAP Component 2.2.1/2.2.2 (Coastal Engineer) work with FMC to initiate development of FMP 2. Liaise with relevant agencies to ensure uptake and implementation of FMP, following approval of plan by the FMC 		
O	Better drainage and storm water capture*	<ol style="list-style-type: none"> 1. Investigate drainage improvements at all known flash flood points 2. Upgrade stormwater infrastructure using water sensitive urban design methods and ensuring that modelling caters for climate change 		
P	Investigate design and costing of protection measures including guidelines established for review and approval of hard structural options	<ol style="list-style-type: none"> 1. Request KAP Component 2.2.1/2.2.2 (Coastal Engineer) work with FMC to review existing draft seawall guidelines & work with key GoK agencies (MELAD, PWU, MFMRD) to review existing protection measures 2. KAP Coastal Engineer & FMC & key GoK agencies develop guidelines 		
Q	Scale up coastal protection measures*	<ol style="list-style-type: none"> 1. Monitor thresholds for change. 2. Once approaching limits of acceptable change select and implement coastal protection measures, as appropriate. 		
R	Protect species/ecosystems through active management controls, as appropriate*	<ol style="list-style-type: none"> 1. Investigate active management controls to reduce climate change impact on priority ecosystems 2. If thresholds are breached (See Coastal Monitoring Program), implement selected active management controls. 		

Prioritisation ID	Adaptation Option	Adaptation Actions	Risks Treated Through Implementation of the Adaptation Option ⁴	Ministerial Responsibility
S	Review household and government insurance mechanisms	<ol style="list-style-type: none"> 1. Contact Kiribati Insurance Commission (KIC) to request initiation of the review 2. Conduct awareness campaigns for at risk businesses and households 		
T	Migration of People away from High Risk areas*	<ol style="list-style-type: none"> 1. Monitor thresholds for change. 2. Investigate opportunities for re-settlement 3. Once approaching limits of acceptable change select and implement settlement relocation measures, as appropriate. 		

SECOND LEVEL RISK ASSESSMENT: RISK TREATMENT

This section of the Handbook outlines the approach to undertaking the second level adaptation planning. Refer to the [Second Level Adaptation Templates](#) Excel file as you progress through this section of the Handbook.

A Government of Kiribati (GoK) Working Group was established to complete a second level risk assessment for each village within South Tarawa (see the Excel Worksheet entitled [2nd Level RA Results](#)). The group applied the risk assessment framework to identify, analyse and evaluate risks associated within inundation due to sea level rise. The assessment provided information on:

- The relative risk prioritisation of each village in South Tarawa. This is a rating assigned to each village that demonstrates the level of risk a village is exposed to, comparative to other villages in South Tarawa. A rating of Low, Medium, High or Extreme was assigned to each village.
- The highest risks per village. This is a list of all the risks that the village is exposed to, and the level of risk as a function of the consequence of the risk occurring and the likelihood that it will occur.

This information will be used to develop an adaptation matrix for each village, which will help direct implementation of adaptation actions throughout South Tarawa. Therefore, we follow the steps that were undertaken in the First Level Risk Treatment to prioritise the treatment of risks per village and develop a risk matrix.

IMPORTANT:

Before we begin, it is important to recognise that the outputs of the second level risk treatment are two fold:

1. Helps inform national prioritisation for implementing adaptation options; and
2. Helps inform village level prioritisation of adaptation options.

This training is focused on conducting the second level risk treatment to help prioritise the implementation of national level adaptation options – i.e. increasing the detail in the first level adaptation plan to help focus the delivery of national level adaptation actions. The development of a risk treatment plan that would help inform village level prioritisation of adaptation options would require extensive consultation at the village level to:

- Validate the risk ratings assigned in the national assessment;
- Identify and rank barriers and opportunities to adaptation in the village itself; and
- Use this information to prioritise adaptation options and assign responsibilities for implementation.

Village specific prioritisation is beyond the scope of the current project and could be considered under future assessments. However, the risk treatment work undertaken here applies a ‘train-the-trainer’ approach, therefore the Working Group members involved in the training will be able to guide and facilitate the village level assessments, thus ensuring increased ownership over the outcomes.

Step 1: Prioritise the Treatment of Risks

The treatment of risks should be conducted based on an appreciation of:

- The risk rating (as assigned in the risk analysis); and
- The current controls in place to manage the risk.

Step 1 is completed as follows:

1. Insert the risks and risk prioritisation rating for the selected village in the Excel worksheet '**Step 1_Risk Priority**' (this can be copied and pasted from the Worksheet '**Second level RA Results**').
2. Identify the current control rating for each risk by referring to the current control rating assigned to the risk in the South Tarawa results: presented at the end of the worksheet (see Note).
3. Use the risk priority matrix (Table 2) to assign a risk prioritisation rating to each risk based on the risk rating and the control rating

Note: The current controls in place to manage the risk are considered to be universal across South Tarawa and therefore ratings are based on the outcomes of the first level assessment. In village-based assessments, the current controls may be reviewed in conjunction with local people to gain location specific information to inform the allocation of a 'current control' rating. This is beyond the scope of the current project. Therefore, the current control ratings allocated in the first level assessment are applied here.

Step 2: Select Adaptation Options

Once we have information on what risks should be treated as a priority, we must consider how we will treat the risks. Therefore, we need to know what options are available to treat the identified risks. We will refer to the adaptation options shown in Table 3.

Step 3: Evaluate Adaptation Options

Following the identification of adaptation options, an assessment must be undertaken to determine which adaptation options are suitable to treat the risks identified in the selected village, and to define what order adaptation options will be implemented. This is completed through a number of steps:

1. Action 1: Determine what adaptation options will treat your risks.
2. Action 2: Determine what risks should be treated first (draws on the outputs from Step 1).
3. Action 3: Examine the barriers and opportunities to implementation.
4. Action 4: Combine outputs from Step 2 and Step 3 to develop a list of adaptation options that are presented in order of the priority in which they should be implemented.

Action 1: Determine what adaptation options will treat your risks

The alignment of adaptation options to treating specific risks was completed in the first level assessment, so we apply these outputs and analyse them based on the risks specific to the selected village.

Therefore, the first step is to ensure that we are only considering risks relevant to the selected village. So, go to the Excel Worksheet entitled '**Step 3_Action 1&2**', which contains the outputs of the adaptation option assessment for South Tarawa.

Highlight the risks relevant to the selected village. Then clear the contents of the cells under the risks that are not applicable to the selected village. NOTE: make sure that you **clear** the cells. DO NOT delete the content of the cells because this will affect the calculations. To clear cells, highlight the cells, right click and select 'clear contents'.

Action 2: Determine what risks should be treated first

The next step is to determine the priority of the risks that each adaptation option treats, for the selected village.

So we must add the Risk Prioritisation rating (as calculated in Step 1, for the selected village). The rating will be inserted in the green cells under each risk, following the ratings in Table 4.

To do this, select a risk specific to the village under consideration and then refer back to worksheet 'Step 1 Risk Priority' and see what risk priority rating this risk was assigned. If it was assigned 'Control Critical', insert the number '4' in the green cell below the selected risk, in the 'Step 3_Action 1&2' worksheet.

Complete this task for each of the risks relevant to the selected village.

Once complete, the Adaptation Implementation Prioritisation (AIP) rating will be automatically calculated.

This rating provides guidance on the importance of implementing each adaptation option based on consideration of the number of high priority risks that the option treats.

Action 3: Examine the constraints and opportunities to implementation

The barriers and opportunities to implementing each adaptation option were evaluated in the First Level adaptation assessment. The results of this analysis are applied in the Second Level adaptation assessment.

The barriers and opportunities to implementing adaptation options are considered to be consistent across each village. Therefore, there is no action required in the barrier and opportunity assessment for the Second Level adaptation plan. Rather, the outputs from the First Level assessment are applied (see Note below).

Note: The outcomes of the barrier and opportunity analysis from the first level assessment will be applied here. In village-based assessments, the barriers and opportunities would be reviewed in conjunction with local residents to gain location specific information to inform the assessment of barriers and opportunities.

Action 4: Develop an adaptation implementation matrix

The final step is to combine the results of the adaptation prioritisation with the outcomes of the barriers and opportunities analysis to generate the adaptation matrix.

This is automated in Excel Worksheet 'Step 3_Action 4'.

Finally, we need to ensure that the axis of the adaptation matrix covers the range of values in our assessment. Also, 'Value X crosses at' should be set at the mid point between the range of values.

Step 4: Formulate Adaptation Plan

At the completion of Step 3 we will have an adaptation matrix specific to the village under consideration. The aim is to develop an adaptation matrix for each of the high and extreme risk villages.

The adaptation matrixes can be used to prioritise implementation of national level adaptation options.

Information to Prioritise Implementation of National Level Adaptation Options

The adaptation matrixes (final output from Step 3_Action 4) provide information to guide implementation of the adaptation actions. By reviewing the adaptation matrixes for each village we will be able to prioritise implementation of adaptation actions in the areas where there is the highest net benefit (i.e. treats the highest number of high risks and faces the least barriers to implementation).

Therefore, once adaptation matrixes have been developed for each of the high and extreme risk villages, the outcomes of the matrixes should be

summarised to provide direction on implementation of the First Level adaptation plan.

For example, '*communicate and educate the community on climate change risks*' is an adaptation option that should be implemented immediately according to the outputs of the First level adaptation planning. If resources are limited and we need to define locations in which this adaptation option would be implemented first. We can refer to the village adaptation matrixes and see where this adaptation option provides the highest net benefit (i.e. treats the highest number of high risks and faces the least barriers to implementation). This would be the village in which this adaptation option is situated closest to the top left hand corner of the adaptation matrix.

Other Considerations

Through completion of the steps outlined in this handbook a guide to implementing adaptation options has been developed. This information guides how we will treat our identified risks.

A concept that can be used in future risk assessments to enhance adaptation planning that has not yet been discussed is the notion of **'thresholds for implementation'**. When developing an adaptation plan or, more specifically, when determining when to implement an adaptation option, thresholds for implementation are important as they provide guidance on when an option must be implemented to avoid **unacceptable risk**.

Adaptation options can be separated into two categories, resilience building and active

management options. Resilience building adaptation options are commonly 'no/minimal regrets' adaptation options that increase resilience to the effects of climate change. These options can be implemented immediately. Conversely, active management actions are management controls that may face significant financial or human resource investment, and therefore may not be implemented until other management controls (such as resilience building measures) no longer sufficiently manage the risk. Active management options are commonly structural or technological management options. The difference between resilience building and active management tools to treat climate change risk is demonstrated in Figure 7.

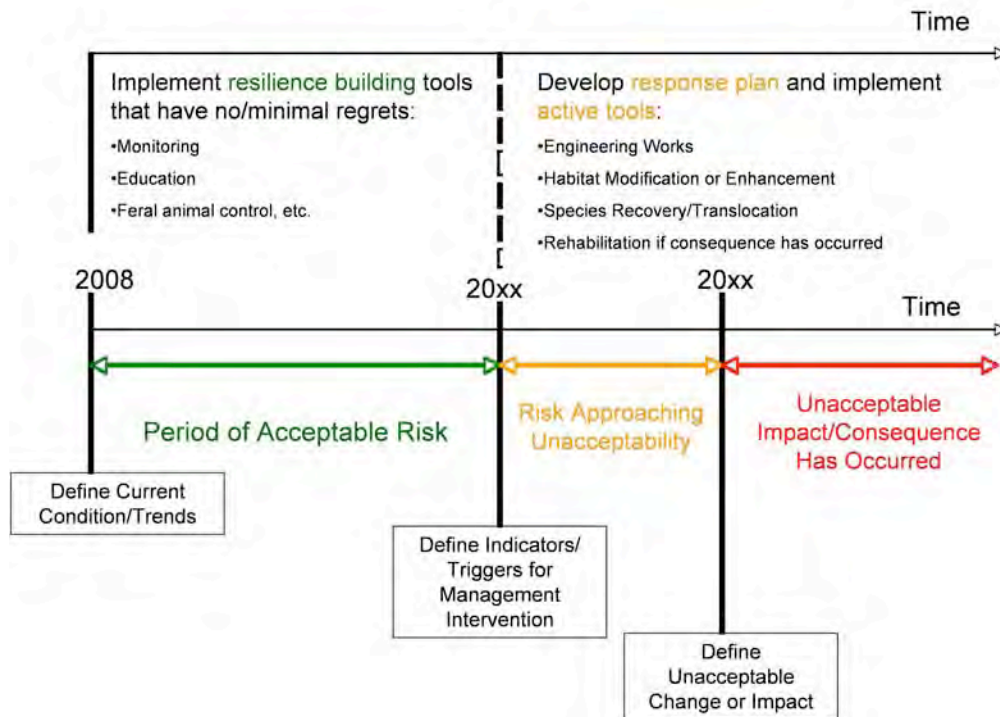


Figure 7: Conceptual model for risk treatment (BMT WBM and CZM, 2009)

The adaptation options shown in Table 3 have been classified as resilience building adaptation or active management options (*indicates an Active Management option).

To advance the adaptation plan developed in this training, thresholds for implementation could be established for the active management actions that treat our identified risks.

To do this, we would identify each of the risks that are treated by an active management adaptation option and record them in a Thresholds Table – see Table 8 for example. Then thresholds for acceptable change and triggers for management intervention could be established for each of these risks. In this way, the risks could be monitored to ensure action is taken prior to the breach of thresholds.

Thresholds may include: percent decline in GDP; defining the type of services affected and level of affect that can be tolerated. Thresholds should be defined through extensive stakeholder consultation to ensure all stakeholders agree with the assigned thresholds.

The development of thresholds is beyond the scope of the current training. However, it is an important aspect in responding to climate change risks and also ties into monitoring and evaluation of an adaptation plan. Therefore, it is an important issue that may be considered during future assessments.

Monitoring and Evaluation

The development of the adaptation plan is not the final stage of the risk assessment process. The Adaptation Action Plan must be regularly reviewed and updated.

Monitoring and evaluation is essential to ensure:

- Review of the effectiveness of adaptation options in treating risks;
- Risk levels do not increase; and
- New risks are identified and treated.

Things will change. The likelihood of a risk occurring may increase in one location and decrease in another. In addition, communities and the natural environment will change over time, therefore, so too will climate change risks. Consequently, it is important, that the risk assessment process is continued. Re-evaluation of risks should be conducted at regular intervals. Regular update of the risk assessment process will ensure that the effectiveness of adaptation options in treating the risk is evaluated and new approaches to treatment are identified. Further, new risks can be identified and included within the risk assessment treatment plan.

Communication and Consultation

Communication and consultation is an iterative process of exchanging information and opinions. Communication is important to ensure that those involved in the risk assessment process and those with a stake in the outcomes of the risk assessment process, understand the basis on

which decisions are made and why particular actions are taken.

Government of Kiribati officials have worked collaboratively throughout the Risk Assessment process to establish agreed ratings for climate change risks in South Tarawa. In addition, these representatives have sought initial input from local community members to validate the outcomes of the second level risk assessment work.

The work has sought to provide Government officials with the skills and capabilities to undertake risk assessment and adaptation planning. In future assessments, there may be increased stakeholder involvement in the risk assessment process to ensure ownership and buy-in in the outputs. This is particularly important in the development of second level adaptation plans for individual villages.

Table 8: Thresholds for Change

Risk	Active Management Controls	Threshold for Acceptable Change	Trigger for Management Intervention	Responsibility for Action
Reduction in freshwater/drinking water availability	Better Drainage and Storm Water Capture	% Population without access to fresh drinking water		
Cost of switching to more expensive sources	Better Drainage and Storm Water Capture	\$ Government spending allocated to water source		
Increased coastal erosion	Review the structural integrity of existing defence structures	<10m buffer		
	Scale up coastal protection measures	No buffer		
Loss of Biodiversity	Protect species through active management controls, as appropriate	% loss, or number of species		
Loss of habitat for crabs/marine species - reduction in food availability	Protect species/ecosystems through active management controls, as appropriate	Catch rate drops to XX		

Conclusion

This handbook has outlined an approach to adaptation planning in Kiribati. The approach has been tailored to:

- Align to the risk assessment framework adopted in KAP Component 1.3.2; and
- The information and resources available to GoK participants.

The handbook is a resource for GoK representatives to undertake adaptation planning in Kiribati. The handbook should be used in conjunction with the Excel Workbooks, *First Level Adaptation Templates* and *Second Level Adaptation Templates*.

Importantly, the Handbook is the final stage in the Risk Assessment process. Therefore, it should be viewed as a supporting handbook to the Risk Assessment Handbook. The alignment between the stages of the risk assessment framework and the supporting handbooks is demonstrated in Figure 8.

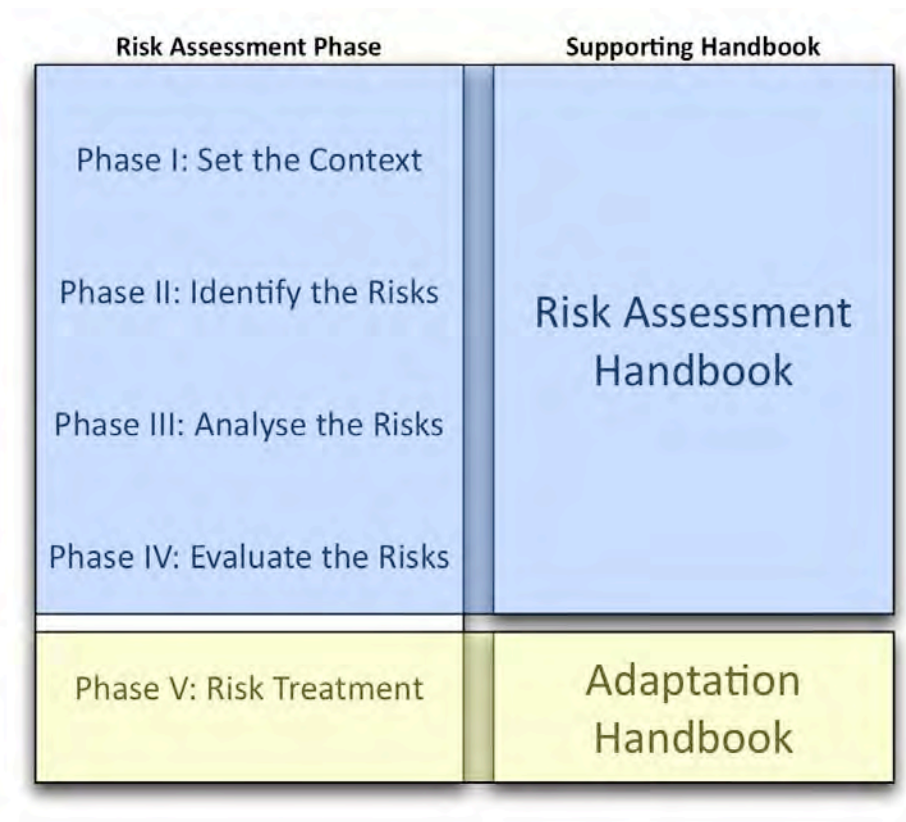


Figure 8: Supporting handbooks for Phases of the Risk Assessment process

Note: Topics in the light shading are covered in this manual. Topics in the dark shading are covered in the *Risk Assessment Handbook*.

The risk assessment training and mentoring has aimed to provide GoK staff with skills and knowledge to continue to apply the Risk Assessment framework in Kiribati. This will be vital to ensure that the critical challenge of climate change is addressed in a structured, transparent and consultative manner.