



# Guidance Note for the Vanuatu Rapid Climate Risk Assessment Framework

Prepared for Secretariat of the Pacific Regional Environment Programme | May 2024



**make  
everyday  
better.**



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## Revision History

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## Document Acceptance

Action	Name	Signed	Date
Prepared by	Nola Smart		02.05.24
Reviewed by	James Scoggins Cushla Loomb Kristin Renoux		06.05.24
Approved by	Cushla Loomb		06.05.24
on behalf of	Beca International Consultants Limited		

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## Rapid Climate Risk Assessment Framework Process

### Framework and Guidance Note Introduction

#### Getting Prepared

*Objective setting*

*Informing stakeholders*

*Role identification*

#### Gathering Information

*Information identification*

*Research*

#### Using the Excel Assessment Tool

Step 1: Understanding Industry

Step 2: Hazard & Exposure

Step 3: Vulnerability

Step 4: Risk Assessment

Step 5: Existing Climate Risk Management

Step 6: Adaptation

Step 7: Hazard Forecasting Awareness

*User inputs for assessment*

*Internal Excel tool risk calculation*

*Further information collection*

#### Analysing & Interpreting Results from Excel Tool Report

*This structure is repeated at the top of each page in the Guidance Note as a roadmap for easy navigation throughout the document.*

## Framework and Guidance Note Introduction

### This Guidance Note

This step-by-step guide builds capacity across Vanuatu government sectors to use and deploy the Rapid Climate Risk Assessment Framework ('Framework') and Excel tool. It is intended for use by industry bodies, associations, organisations, and government departments under the five sectors set out below. It provides a first high-level screening of climate risks.

#### Sector Applicability



*This guidance should be read alongside the Microsoft Excel tool for a full understanding of the process. We recommend reading through the Guidance Note in its entirety before starting an assessment so that you understand the end-to-end process.*

By following this guidance, users can conduct a rapid climate risk assessment and receive a report showing priority climate risks for their industry in a 'worst-case scenario'. This provides a foundation for targeting further in-depth assessment, developing strategies to enhance resilience and adapt to the changing climate.

Keep an eye out for these boxes throughout this Guidance Note. They set out **key tips** and **examples**.

### Introducing the Rapid Climate Risk Assessment Framework

Beca International Consultants Limited was commissioned by the Secretariat of the Pacific Regional Environment Programme (SPREP) to create a Rapid Climate Risk Assessment Framework (Framework) for application across the five key sectors in Vanuatu.

Vanuatu is subject to multiple natural hazards that have historically caused devastating damage. The damages, severity, and intensity of many of these natural hazards will be exacerbated by climate change in the future.

It is important that key industries within these sectors understand the risk climate change poses to their operations and how this risk may change over time. The Framework helps industries consistently identify areas that are most at risk from climate change. The Framework and Excel tool were completed in late 2023.

This Framework continues work from the Climate Information Services for Resilient Development in Vanuatu (Van-KIRAP) project (with Vanuatu Meteorology and Geo-hazards Department, Secretariat of the Pacific Regional Environment Programme (SPREP) and Commonwealth Scientific and Industrial Research Organisation (CSIRO)) and complements existing research and tools in Vanuatu, including:

- [Vanuatu National Adaptation Plan of Action](#) (2019-2030) developed by the National Advisory Committee on Climate Change.
- [Vanuatu Climate Futures Portal](#) (Van-KIRAP Climate Information Services portal).
- [Climate Change and Disaster Risk Reduction Assessment for Greater Port Vila](#) developed by SPREP.
- [Sarakata Flood Mitigation and Early Warning System Gap Analysis](#) developed by SPREP.
- [ClimateWatch mobile app and National Traditional Knowledge Indicators booklet](#) developed by Van-KIRAP.

## Why use the Rapid Climate Risk Assessment Framework?

Bespoke to Vanuatu with foundations in globally accepted good practice, the Framework provides the user with a report detailing the top risks across your industry's activities and relevant climate hazards. This has several benefits as set out below.



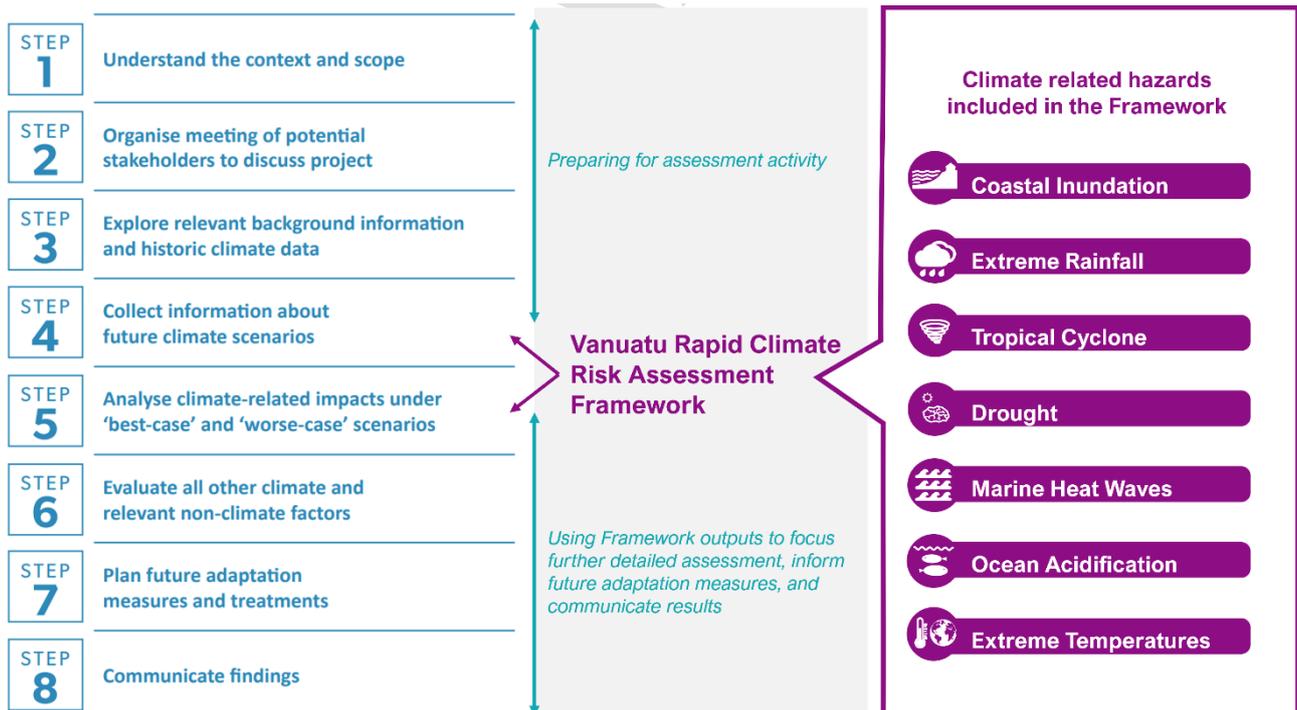
## What do we mean by climate risks and a rapid climate risk assessment?

**CLIMATE HAZARD X EXPOSURE X VULNERABILITY = CLIMATE RISK**

The Framework considers climate risks as a result from the interaction between climate-related hazards with the exposure and vulnerability of elements within the natural environment, built infrastructure or operations.

A rapid climate risk assessment uses readily available data and descriptive information on hazard, exposure and vulnerability to quickly screen for key climate risks now and in the future. The Van-KIRAP project outlines steps for conducting impact assessments related to climate change. These steps are shown in the diagram, which also highlights the role of the Framework and the hazards it considers.

### STEPS FOR CONDUCTING CLIMATE HAZARD-BASED IMPACT ASSESSMENTS



## Getting Prepared

### Scope and objective of rapid climate risk assessment

- ✓ Have you identified the scope and objective of the climate risk assessment you are conducting?

*This will be entered into the Excel tool and results report. We recommend including a description of what the results will be used for.*

### Informing key government and your industry stakeholders

- ✓ Have you considered informing the following people that you are going to do a rapid climate risk assessment and asked if they would like to input:

- Department of Tourism
- Vanuatu Tourism Office
- Public Works Department
- Department of Geology and Mines
- Department of Ports and Harbor
- Vanuatu Chamber of Commerce and Industry
- Reserve Bank of Vanuatu
- Department of Finance and Treasury
- Department of Environment Protection and Conservation
- National Disaster Management Office
- Meteorology & Geo-Hazards Department
- Department of Climate Change

### Identifying climate risk assessment roles

- ✓ Have you assigned the following roles:
  - **Lead agency / individual:** To confirm what answers / information should be entered where there is uncertainty or discussion on approach.
  - **Stakeholders:** Individuals / organisations who are needed for inputs into a climate risk assessment. Further tips are provided below.
  - **Technical Excel-user:** Someone with experience using Excel who can enter the information into the Excel-based framework tool. This may be the same as the lead agency.

#### Who are our stakeholders?

It is important to involve all key stakeholders that hold relevant knowledge to contribute to the rapid climate risk assessment. This will improve the reliability and representativeness of the assessment results as well as support communication/ownership of results across relevant parties.

When considering who might be a stakeholder think through the following questions:

- Who has working knowledge of the sector and/or industry?
- Who has knowledge of relevant climate data?
- Who provides infrastructure or goods and services that your sector and/or industry relies on?
- Who relies on the goods and services that your sector and/or industry provides?

## Gathering Information

- ✓ **Organise a meeting with core stakeholders** to discuss the information available to do the assessment. The types of information needed are set out below.
- ✓ **Identify:**
  - Where your industry operates in Vanuatu
  - The activities your industry does
  - How your industry interacts with the natural and built environment
  - What your industry depends on to operate
- ✓ **Research whether there is any historical climate data** relevant to your industry
  - Has your industry been impacted by coastal inundation, extreme rainfall, tropical cyclones, droughts, marine heat waves, ocean acidification or extreme temperature in the past?
  - The Van-KIRAP website includes [explainers of climate hazards](#) as well as observations, trends and projections for Vanuatu.
- ✓ **Explore tools / websites for specific information** relevant to your industry and/or industry locations. Relevant tools / websites are noted in the introduction.

DRAFT

## Using the Assessment Excel Tool

### Opening the Excel tool

1. Open the clean Excel template.
2. Save a copy of the template Excel tool with a unique title. We recommend the following structure: “owning org – date of assessment – your name”.  
**You must do this every time you want to complete an assessment.**
3. Familiarise yourself with the tabs structure of the Excel tool as shown on the following page.
4. We recommend having a printout of this guidance note open alongside the Excel tool.

#### Things to be aware of:

- If you are unsure about how to answer a question in the Excel tool, choose the most likely from the dropdown menu and make a note of it in the ‘Blank for any user notes’ tab of the Excel tool.
  - Use the ‘Blank for any user notes’ tab of the Excel tool to record any discussion points that have informed your answers. This helps you understand your reasoning later.
- Refer to the Framework development methodology report and case study in the Van-KIRAP Portal for more detailed context on the Rapid Climate Risk Assessment Framework.
- The default exposure and vulnerability scoring in the Framework relies on data from 2023.
- Information about future climate change scenarios is constantly evolving. The results of your assessment will be valid at a point in time and we advise reviewing your assessment if new climate projections become available for Vanuatu. We also recommend reassessment if activities or vulnerability change.
- Van-KIRAP provides guidance on climate hazard-based impact assessments for Vanuatu. It can be found on the [VanClimateFutures.gov.vu](https://VanClimateFutures.gov.vu) website here.

# Excel Tool Tab Structure

## Introduction

## Glossary

## Response Form

## View Results Report

## Blank for any user notes

**Rapid Climate Risk Assessment Framework** **BECA**

**FOR INTERNAL USE ONLY**

**Purpose and Introduction**

The Rapid Climate Risk Assessment Framework (RCRAF) is designed to enable users from the infrastructure, water, fisheries, tourism and agriculture sectors in Vanuatu to identify and highlight key climate risks to inform decision making for adaptation and future development.

**Instructions**

This tool for internal use only. It has been developed specifically for the Government of Vanuatu, Department of Tourism. Please contact BeCA if others want to understand the Rapid Climate Risk Assessment Framework purpose/purpose.

**Overall Structure of RCRAF**

**Glossary**

**Terms**

**Adaptation**

**Adaptability**

**Climate Driver**

**Climate Projection**

**Climate Variability**

**Coastal Inundation**

**Coastal Resilience**

**Consequence**

**Construction Activities**

**Direct Risk**

**Drought**

**El Niño Southern Oscillation (ENSO)**

**Element of Risk**

**Exposure**

**Extreme rainfall**

**Extreme Temperature**

**Freight/air Exemptions**

**Goods Supply Activities**

**Hazard**

**Impacts**

**Insured/Uninsured**

**Land Transport Activities**

**Rapid Climate Risk Assessment Framework (RCRAF) - Question Response Form**

**FOR INTERNAL USE ONLY**

**Contents**

**1. Understanding Industry**

**2. Exposure**

**3. Risk Assessment**

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**Rapid Climate Risk Assessment Framework (RCRAF) - View Results Report**

**FOR INTERNAL USE ONLY**

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**Rapid Climate Risk Assessment Framework (RCRAF) - User Notes**

**FOR INTERNAL USE ONLY**

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Instructions and Excel tool structure.

Refer to this tab for any definitions as you complete your assessment.

Entry of climate risk assessment information.

Final report with assessment outcomes.

Excel tab to record information you have relied on for your assessment e.g. screengrabs, photographs, articles.

## Completing the Framework Assessment

Go to the **'response form'** tab.

There are 7 steps to complete the form as shown on the right.



### Tip!

Before you start, make sure you are working on your saved copy of the Rapid Climate Risk Assessment Framework Microsoft Excel tool.

When you have entered the objective for completing the assessment, then use the information you have gathered about your industry's activities to inform your answers in the following steps.

## Step 1: Understanding your industry's activities and interactions



**The purpose of this step is:** to understand the types of activities or elements of your industry that may be at risk from a changing climate.

Answer 'yes' to all relevant elements and provide brief commentary explaining why each element is relevant.

Leave blank the elements that are not applicable.

### Excel tool subheading: "Does your industry rely on the following natural features?"

Examples of **natural features** to help identify what is relevant to your industry.

	Infrastructure	Fisheries	Water	Agriculture	Tourism
Coastal / Marine Ecosystems	Coastal/marine infrastructure e.g. jetties, and wharfs may impact coastal/marine ecosystems	Ocean fisheries rely on Coastal / Marine ecosystems	Any discharges to sea may have coastal/marine ecosystem interactions	Coastal / marine ecosystems relevant for aquaculture, e.g., fish, pearl, seaweed	Any eco or adventure tourism, e.g., cruising, beach, diving, snorkelling, relying on coastal / marine ecosystems
Terrestrial Ecosystems	Terrestrial ecosystems likely to be relevant for land-based infrastructure	Terrestrial ecosystems not relevant unless includes land-based activities	Discharges to land interact with terrestrial ecosystems	Terrestrial ecosystems relevant for land-based agriculture	Any land-based tourism that interacts with the natural environment relies on terrestrial ecosystems
Freshwater Ecosystems	Infrastructure which is built over or through bodies of water, or causes discharges to freshwater	Freshwater ecosystems are relevant if you do freshwater fishing (e.g. from rivers, inland water bodies)	Water has clear interactions with freshwater ecosystems	Freshwater ecosystems relevant for land-based agriculture due to water requirements	Any tourism that interacts with rivers or lakes relies on freshwater ecosystems

**Excel tool subheading: “Do you rely on any of the following built features?”**

For each listed **built feature**, ask yourself these questions:

- If something happened to this built feature, could our industry still operate normally? For example, for *water supply* could you continue operating if there was a disruption or contamination to your water supply?
- Do we invest money in this built feature, either by paying for services (e.g., electricity, telecommunications) or by maintaining it (e.g., inhabited building maintenance)?

If the answer is ‘yes’ to either question, mark it as ‘yes’ in the Excel tool.

The Excel tool includes broad elements that should cover most features. If your industry relies on other built features not listed, make sure that they do not fit into any existing categories. If they do not fit, answer ‘yes’ to the ‘other/user-defined’ category and provide details. Please note that this will not be assessed by the Excel tool and may require a separate risk assessment process outside of the Framework Excel tool.

**Excel tool subheading: “Which of the following operations and activities are involved in your industry?”**

For activities and operations, consider all relevant aspects of your industry, not just the main activity. This should include additional activities that contribute to your industry’s function. For example, consider dependencies on land transportation activities for goods delivery or office-based activities supporting operations.

**Important Tips!**

After finishing this section, make sure to check and confirm your answers.

If you confirm your answers to this question, and then decide to change them, you will need to first remove the answers in the Exposure and Vulnerability matrix tables.

**Save your work before continuing.**

## Step 2: Exposure



This step assesses your industry’s hazards and exposure to these hazards.

**Excel tool subheading: “What climate hazards have impacted your industry in the past”**

We recommend consulting industry stakeholders to understand how various climate hazards have previously affected your industry. Examples of impacts can include operational interruptions, decreased agricultural yields, infrastructure damage, or a decline in clients, customers, or tourists. The ‘Blank for any user notes’ tab in the Excel tool can be helpful for listing resources that you have used to understand these impacts.

**Excel tool subheading: “Exposure of elements”**

Features	Industry relevant element	Coastal Inundation	Extreme Rainfall	Tropical Cyclone	Drought	Marine Heat Waves	Ocean Acidification	Extreme Temperature
Natural Features	Coastal / Marine Ecosystems	E	H					H
Natural Features	Terrestrial Ecosystems							H
Natural Features	Freshwater Ecosystems							
Built Features	Inhabited Buildings					N/A		
Built Features	Ports / Wharves							
Built Features	Airports / Airfields			H				
Built Features	Telecommunications					N/A		
Built Features	Electricity							
Built Features	Wastewater Infrastructure			E	L			
Built Features	Transportation Assets							
Built Features	Water Supply		M	H				
Built Features	Stormwater / Flood Management							
Built Features	Uninhabited Buildings					N/A	N/A	
Built Features	Evacuation Structures						N/A	
Operations	Outdoor Land Activities							
Operations	Outdoor Marine Activities							
Operations	Outdoor Freshwater Activities		E					
Operations	Outdoor Coastal Activities							
Operations	Land Transportation Activities							
Operations	Water Transportation Activities		H					
Operations	Office / Shop / Admin Activities							
Operations	Goods Supply Activities							
Operations	Construction Activities							

The Excel tool explains exposure and gives examples, describing how to rate different levels of exposure. Based on your responses, the Excel tool highlights relevant hazards for your industry, which might shade grey certain columns. The Excel tool uses a matrix in both the exposure and vulnerability sections, taking into account industry-specific factors and the impact of climate hazards.

The [Van-KIRAP Climate Futures Portal](#) is a valuable resource. It lets you explore exposure maps showing locations where your industry may operate and climate hazard information. Keep in mind that certain information about exposure may be available from other sectors or government organizations, like electricity or telecommunications assets that you rely on. It is worth involving these organizations as stakeholders in your assessment to gather relevant information.

The following table and examples show how to enter each element’s exposure rating to the relevant hazards. The Excel tool has been auto populated with default high-level exposure scores for where the user doesn’t have information to update it with. See above example of a matrix being completed where the users have entered available information and left other cells blank for default scores to be used.

Situation:	Action:
If you have information available:	Enter a rating by choosing from the pre-defined rating levels ranging from Not Applicable to Extreme.
If you do not have information available:	Leave the cell blank and the Excel tool will apply default scores.
If you do not think that the element and climate hazard combination are applicable to your industry:	Enter 'NA' for Not Applicable.

Example: if you are a tourism business assessing coastal inundation for inhabited buildings, you may have five buildings, three of which are currently prone to flooding during storm surges while the other two are inland and not exposed. In this case, you can use dropdown options to rate this as 'H' for 'High' as 60% of your buildings are exposed.

Features	Industry relevant element	Coastal Inundation	Extreme Rainfall	Tropical Cyclone	Drought	Marine Heat Waves	Ocean Acidification	Extreme Temperature
Natural Features	Coastal / Marine Ecosystems							
Natural Features	Terrestrial Ecosystems							
Built Features	Inhabited Buildings	H						
Built Features	Electricity	E H M L N/A						
Built Features	Water Supply							
Built Features	Evacuation Structures							

To indicate that a hazard is not relevant for an element, e.g. if coastal inundation is not relevant for your inhabited buildings because they are all located significantly inland and have no interaction with the coast, insert an 'N/A' score.

Features	Industry relevant element	Coastal Inundation	Extreme Rainfall	Tropical Cyclone	Drought	Marine Heat Waves	Ocean Acidification	Extreme Temperature
Natural Features	Coastal / Marine Ecosystems							
Natural Features	Terrestrial Ecosystems							
Built Features	Inhabited Buildings	N/A						
Built Features	Electricity	E H M L N/A						
Built Features	Water Supply							
Built Features	Evacuation Structures							

### Step 3: Vulnerability



This step assesses your industry’s vulnerability to climate hazards.

Vulnerability is a crucial component of climate risk. The Excel tool provides definitions and examples to understand vulnerability. Understanding the distinction between vulnerability and exposure is important to complete your rapid climate risk assessment. An example showing the difference is included on the following page.

The Excel tool provides initial ratings for vulnerability, which you can choose to update with industry-specific information. If no rating is entered, the Excel tool will use the initial score. There are three tasks required to complete this Step:

1. Review the matrix table to confirm if you agree with the initial vulnerability ratings and answer ‘yes’/‘no’ to this question above the matrix in the Excel tool
2. Provide commentary on any changes you would like to make to the ratings, and
3. Update the matrix with any new ratings.

Features	Industry relevant element	Coastal Inundation		Extreme Rainfall		Tropical Cyclone		Drought		Marine Heat Waves		Ocean Acidification		Extreme Temperature	
		Initial	Update?	Initial	Update?	Initial	Update?	Initial	Update?	Initial	Update?	Initial	Update?	Initial	Update?
Natural Features	Coastal / Marine Ecosystems	E		H		E		L		E		E		H	
Natural Features	Terrestrial Ecosystems	L		E		E		E		N/A		N/A		H	
Natural Features	Freshwater Ecosystems	H		E		E		H		N/A		N/A		H	
Built Features	Inhabited Buildings	H		M		H		M		N/A		N/A		M	
Built Features	Ports / Wharves	H		M		H		M		N/A		N/A		L	
Built Features	Airports / Airfields	H		H		H		H		N/A		N/A		L	
Built Features	Telecommunications	M		M		H		L		N/A		N/A		L	
Built Features	Electricity	M		M		H		L		N/A		N/A		L	
Built Features	Wastewater Infrastructure	H		H		H		M		N/A		N/A		L	
Built Features	Transportation Assets	H		H		H		M		N/A		N/A		M	
Built Features	Water Supply	L		M		H		H		N/A		N/A		H	
Built Features	Stormwater / Flood Management	M		H		H		M		N/A		N/A		L	
Built Features	Uninhabited Buildings	H		M		H		M		N/A		N/A		L	
Built Features	Evacuation Structures	M		H		H		N/A		N/A		N/A		M	
Operations	Outdoor Land Activities	M		E		E		H		N/A		N/A		H	
Operations	Outdoor Marine Activities	L		E		E		L		M		M		H	
Operations	Outdoor Freshwater Activities	H		E		E		H		N/A		N/A		H	
Operations	Outdoor Coastal Activities	H		E		E		L		M		M		H	
Operations	Land Transportation Activities	H		E		E		L		N/A		N/A		L	
Operations	Water Transportation Activities	L		E		E		M		L		L		L	
Operations	Office / Shop / Admin Activities	M		M		H		M		N/A		N/A		M	
Operations	Goods Supply Activities	M		H		H		M		M		L		M	
Operations	Construction Activities	M		M		H		M		N/A		N/A		H	

Situation:	Action:
If you have information available:	Refer to the Excel tool’s defined rating levels (ranging from Not Applicable to Extreme) to check the ‘initial’ rating. If you would like to change the rating enter this in the ‘Update?’ column and provide justification for the change in the text box provided above the matrix table in the Excel tool.
If you do not have information available or agree with the initial rating:	Leave the cell blank and the ‘initial’ rating will be applied.
If you do not think that vulnerability to the element and climate hazard combination are applicable to your industry.	Enter ‘NA’ for Not Applicable.

**Example:** Consider an infrastructure provider assessing the vulnerability of their telecommunication activities to tropical cyclones. Initially, the excel tool assigns a 'H' rating for high vulnerability. However, you know that your staff are well-equipped with radios for communication when landline and mobile phones are unavailable. As a result, you update the vulnerability score to 'L' for low in the 'Update' column for tropical cyclone and telecommunication.

Features	Industry relevant element	Coastal Inundation		Extreme Rainfall		Tropical Cyclone		Drought		Marine Heat Waves		Ocean Acidification		Extreme Temperature	
		Initial	Update?	Initial	Update?	Initial	Update?	Initial	Update?	Initial	Update?	Initial	Update?	Initial	Update?
Natural Features	Terrestrial Ecosystems	L		E		E		E		N/A		N/A		H	
Built Features	Inhabited Buildings	H		M		H		M		N/A		N/A		M	
Built Features	Telecommunications	M		M		H	L	L		N/A		N/A		L	
Built Features	Electricity	M		M		H	L	L		N/A		N/A		L	
Built Features	Water Supply	L		M		H	M	H		N/A		N/A		H	
Built Features	Evacuation Structures	M		H		H	M	N/A		N/A		N/A		M	

What is the difference between **exposure** and **vulnerability**?

An example of a sector assessing extreme rainfall and water supply.

*Exposure* assesses whether there are elements located in areas exposed to the climate hazard. They may consider how their main water supply intake is from a local river that regularly floods in extreme rainfall.

*Vulnerability* looks at the extent to which this exposure affects them (sensitivity) and how well they can cope with it (adaptive capacity). They may consider the condition of the water intake infrastructure, whether they close off the water intake when there are extreme rainfall warnings to prevent polluted water from entering their supply, or the availability of back-up water supplies.

### Step 4: Risk Assessment Calculation



Review your answers to vulnerability and exposure before moving to the next section. We advise saving your work before continuing.

The tool will use your responses to determine the most significant climate risks for your industry using the risk rating matrix shown below. The risk rating matrix shows extreme risks in red (where there is high or extreme exposure and vulnerability) through to low risks in green (where there is minimal exposure and vulnerability).

		Exposure			
		Low	Moderate	High	Extreme
Vulnerability	Extreme	Moderate	High	Extreme	Extreme
	High	Low	Moderate	High	Extreme
	Moderate	Low	Moderate	Moderate	High
	Low	Low	Low	Moderate	High

The Excel tool includes rules that estimate how exposure scores may increase by 2050 and 2100 under the RCP8.5 high emission scenario. The results are visible on the 'View Results Report' tab (see Analysing & Interpreting Results section of this Guidance Note).

You can use this same matrix to assess the climate risk for any 'other' feature outside of the Excel tool.

#### Understanding the risk rating:

If you rated exposure as 'high' and vulnerability as 'moderate' for a specific element and hazard, the excel tool would rate the present-day risk as 'moderate'.

		Exposure			
		Low	Moderate	High	Extreme
Vulnerability	Extreme	Moderate	High	Extreme	Extreme
	High	Low	Moderate	High	Extreme
	Moderate	Low	Moderate	Moderate	High
	Low	Low	Low	Moderate	High

## Step 5: Existing Climate Risk Management

## Step 6: Adaptation management measures

## Step 7: Hazard Forecasting Measures



Steps 5 – 7 capture information on existing risk reduction and adaptation activities that you have undertaken. It is an opportunity to document your current actions and become familiar with the concepts of the PARA ('Protect', 'Avoid', 'Retreat' and 'Accommodate') adaptation framework (examples are provided in the Excel tool) and available hazard forecasting resources.

Your answers in Steps 5-7 will be incorporated into the final rapid climate risk assessment report and will further develop awareness and understanding of your industry's current and potential future climate risk environment.

**You've completed entering information into the Rapid Climate Risk Assessment Framework tool!**

DRAFT

# Analysing & Interpreting Results

## What you can find in your Results Report ('View Results Report' tab)

**Rapid Climate Risk Assessment Framework (RCRAF) - FOR INTERNAL USE ONLY**

Results Report  
 Completion date: Wednesday, 10 October 2023  
 Assessment completed by: User: For Case Risk Report/Success  
 Industry/sector assessed: Therapeutic Dive Industry - Tourism Sector in Vanuatu

The user has selected the objective of completing the Rapid Climate Risk Assessment as follows: First test of our (case study) industry's current and future climate related risks affecting the Dive industry within the tourism sector.

**1. Understanding Industry: Interactions and activities**  
 The industry relies on both natural and built features.  
 The industry reliance on the following natural features: Coastal / Marine Ecosystems. The industry also relies on the following built features: Inhabited Buildings, Ports / Wharves, Airports / Airfields, Telecommunications, Electricity, Wastewater Infrastructure, Transportation Assets, Water Supply, Stormwater / Flood Management, Uninhabited Buildings, and Evacuation Structures.  
 The user defined built feature has not been assessed in the climate risk assessment framework but it is recommended that a similar process is used to understand the possible exposure and vulnerability this element may have.  
 The user has identified that the industry involves the following activities and/or operations: Outdoor Marine Activities, Outdoor Coastal Activities, Land Transportation Activities, Water Transportation Activities, Office / Shop / Admin Activities, and Goods Supply Activities.  
 The identified activities or features above provide a high-level overview of the potential activities or features that may be vulnerable or exposed to climate hazards as assessed in the following sections.

**2. Climate Hazard Exposure**  
 The following climate hazard events are events that are relevant to the industry and have been observed in the past: Coastal Inundation, Extreme Rainfall, Tropical Cyclone, Marine Heat Waves, and Extreme Temperature. These impacted the industry in the following ways: Coastal inundation occurs with some tropical cyclones that affect us (TC Pam in 2015, TC Ivy in 2003). Extreme in addition the industry has elements with the following qualities that suggest possible exposure:  
 - located within 100m of the coastline  
 - located at less than 10m elevation above the sea level  
 - impacted by or reliant on ocean conditions  
 - that critically rely on natural water supply  
 High temperature have been assessed by the user as a feature that can significantly impact the effectiveness or safety of work activities, recreational, agricultural products or related infrastructure.  
 Based on the above information, the framework assesses the industry's exposure to the following climate hazards: Coastal Inundation, Extreme Rainfall, Tropical Cyclone, Drought, Marine Heat Waves, Ocean Acidification, and Extreme Temperature. The framework asks the user to input a baseline score for the PRESENT exposure for each of the climate hazards based on their industry knowledge. If a score is blank, the framework will use default exposure score ratings based on Van-KIRAP data. The user's baseline scores are then adjusted using RCRAF's to estimate future exposure at 2050 and 2100. The default exposure takes into account the elements' general proximity to the climate hazard and the expected frequency and intensity over time.

**3. Vulnerability**  
 Vulnerability assesses the industry's sensitivity or capacity to adapt to the hazards identified above.  
 The vulnerability assessment has used default preliminary vulnerability scores. The default vulnerability considers how sensitive the element typically is to the climate hazard and how able it is to adapt to the changing climate.

**4. Risk Assessment**  
 Risk is a product of hazard exposure and vulnerability. Using the assessments completed above, risk ratings have been created for the elements and hazards relevant to the industry.  
 The below table identifies overall risk ratings (up to top 3) for the industry and overall risk ratings both now and in the future (combining the 2050 and 2100 rating). It identifies which elements are at high or extreme risk from this climate hazard. Overall risk ratings are calculated using a weighted average of the risk ratings for all elements at risk from each climate hazard.

Climate Hazard	Overall Present Risk Score	Overall Future Risk (2050 & 2100)	Associated elements:
Tropical Cyclone	Extreme	Extreme	Immediate high/Extreme risks from Tropical Cyclone to Coastal / Marine Ecosystems, Inhabited Buildings, Ports / Wharves, Airports / Airfields, Electricity, Transportation Assets, Water Supply, Stormwater / Flood Management, Uninhabited Buildings, Outdoor Marine Activities, Outdoor Coastal Activities, Land Transportation Activities, Office / Shop / Admin Activities, and Goods Supply Activities.
Extreme Rainfall	High	High	Immediate high/Extreme risks from Extreme Rainfall to Transportation Assets, Stormwater / Flood Management, Outdoor Marine Activities, Outdoor Coastal Activities, Land Transportation Activities, and Water Transportation Activities.
Marine Heat Waves	High	High	Immediate high/Extreme risks from Marine Heat Waves to Coastal / Marine Ecosystems.

The below table identifies overall risk ratings (up to top 5) at overall risk for the industry, provided information for the high or extreme climate hazards that are contributing to the overall risk through a weighted average of risk ratings from all climate hazards relevant to the industry.

Top climate hazard	Overall Present Risk Score	Overall Future Risk (2050 & 2100)	Associated elements:
Coastal / Marine Ecosystems	High	Extreme	Immediate high/Extreme risks to Coastal / Marine Ecosystems from Coastal Inundation, Tropical Cyclone, Marine Heat Waves, and Ocean Acidification.
Outdoor Coastal Activities	High	Extreme	Immediate high/Extreme risks to Outdoor Coastal Activities from Coastal Inundation, Extreme Rainfall, and Tropical Cyclone.
Ports / Airfields	High	High	Immediate high/Extreme risks to Ports / Airfields from Coastal Inundation and Tropical Cyclone.
Stormwater / Flood Management	High	High	Immediate high/Extreme risks to Stormwater / Flood Management from Extreme Rainfall, and Tropical Cyclone.
Inhabited Buildings	High	Extreme	Immediate high/Extreme risks to Inhabited Buildings from Coastal Inundation, and Tropical Cyclone.

**5. Understanding Existing Climate Risk Management**  
 Given the risks identified for the industry, it is worth considering whether:  
 - A more in-depth assessment could be beneficial to define the potential climate risks to the industry  
 - Exposure to the climate hazards could be minimized or managed through altering how the industry functions  
 - The impact on the industry's operations or exposure to future climate events could be managed or reduced (i.e. continuity planning/emergency response plan, education awareness material, monitoring and alerts)  
 - There are any opportunities to adapt to the increased risk through changes to infrastructure and other industry functions

The user has identified that the industry has prepared or implemented measures to manage risks associated with Coastal Inundation, Tropical Cyclone, Marine Heat Waves, Ocean Acidification, and Extreme Temperature.

**6. Adaptation**  
 Adaptation is the process of adjustment to actual or expected climate hazards and their effects, in order to moderate risk, protect, accommodate, retreat and avoid (PARR) framework has been introduced as a way to identify options to adapt.

The user has identified that a PROTECT action has been taken. This is explained as: Sea wall constructed at Port Vila. This management approach has been tested in an event and was effective at managing the risk.  
 The user has identified that an ACCOMMODATE action has been taken. This is explained as: Shade sails have been installed on our boats to ensure there is shelter from direct sunlight during marine transportation. Logistics for the immediate harvesting of Port Vila ship to reduce flooding in an extreme event. This management approach has not been tested in an event.  
 The user has not identified any RETREAT actions that have been taken. This is explained as: We have the ability to pick the dive locations we visit based on currents and the time of year to get optimal water visibility.  
 The user has not identified any AVOID actions that have been taken.

**7. Hazard Forecasting Awareness**  
 The user has stated that the industry uses formal warning systems to forecast climate hazard events, and traditional indicators to notify of upcoming potential issues.  
 There can be key links to improve industry preparedness to climate hazards. For further information on these resources please see the below links.

Formal warning systems: Vanuatu Meteorology & Geo-Hazards Department  
 Traditional indicators: National Advisory Board on Climate Change & Disaster Risk Reduction, Government of Vanuatu  
 Van-KIRAP Climate Futures Portal  
 Username: test  
 Password: van@rap123

The framework results presented in this report should be considered in conjunction with other non-climate factors to inform decision making. This report has been designed to be able to be exported as a PDF. Please click on the 'New Report' and save it under a specific file name for your industry.

End of Report

Key information on assessment date, purpose, relevant sector and assessment owners.

Your industry's interactions and interactions that may be vulnerable or exposed to climate hazards. This pulls from the questions on natural features, built features and operations/activities.

Your understanding of how climate hazards have been observed in the past and other elements indicating your industry might be exposed to certain hazards. The report then explains the logic for calculating exposure from the exposure and vulnerability tables.

Provides a definition of vulnerability. It explains whether you have relied on the default vulnerability scores or provided updated information. It will show any reasoning you provided for your updates.

These two tables are the key outputs from the Rapid Climate Risk Assessment Framework and show your top risks at both a climate hazard and element level. These are ordered using a weighted average of the risk scores with present risks weighted higher than those forecast to occur in 2050 and 2100. If you want further detail on the rating logic please refer to the Methodology Report.

**Example:** Tropical cyclone is the top climate hazard due to it being a 'high' present risk and 'extreme' future risk. This rating is due to the immediate risks from tropical cyclones to terrestrial ecosystems, inhabited buildings, and electricity.

Top climate hazards	Overall Present Risk Score	Overall Future Risk (2050 & 2100)	Associated elements:
Tropical Cyclone	High	Extreme	Immediate high/Extreme risks from Tropical Cyclone to Inhabited Buildings, and Electricity.

These sections provide some points to consider for next steps and record any existing risk management and adaptation measures.

A list of links to additional resources on formal warning systems, traditional indicators and the Van KIRAP Climate Futures Portal.

To easily share the report with others, we recommend saving it as a PDF by going to 'File', 'Export' and using a specific file name for your industry.

## How to use your Results

Now that you have quickly assessed your top climate risks, they can be used to support the following activities:



Consider the questions below to how you can make the most of this information. We recommend discussing these questions with key industry stakeholders.



For adaptation opportunities, we recommend revisiting the 'PARA' framework introduced in the Excel tool to understand what types of actions are available and best suited to your situation.

*Example:* A rapid climate risk assessment for an infrastructure provider identifies that there is extreme risk of coastal inundation for their uninhabited buildings. As a next step they decide to do a detailed assessment using site specific inundation modelling. This will help them develop design solutions to 'accommodate' and 'protect' against these risks.

## FAQs and Troubleshooting

### Further climate risk assessment information

For more detailed information on risk ratings beyond the top three climate hazards and top five elements at risk, or for a more granular analysis at the individual element and hazard level, please refer to the Appendix located at the bottom of the 'View Results Report' tab in the Excel tool.

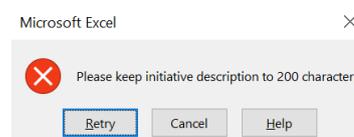
### Making future changes to your climate risk assessment

Information on how our climate is changing, and what the potential impacts may be, is constantly evolving. We therefore recommend updating your assessment if new climate projection information for Vanuatu becomes available to use this new information. Additionally, since industry activities and infrastructure change over time, we recommend updating the assessment if any significant changes occur to your industry's activities, hazards, exposure, or vulnerability.

To update your assessment please make changes in a copy of the assessment rather than overwriting the original. If your updates include changes to the 'Understanding Industry' section, remove first any subsequent answers in the Exposure and Vulnerability matrix tables. You can cross-check against your original assessment to confirm if element exposure or vulnerability has changed and then enter data into the new assessment to develop an updated report on your top climate risks.

### Character limits in the 'Response Form' tab

Some questions in the 'Response Form' tab have limits on how long an answer can be entered. If you enter too much text a notification will pop up as shown to the right. Simply click 'Retry' and shorten your commentary to continue.



## Glossary

TERM	DEFINITION
<b>Adaptation</b>	Initiatives and measures to reduce the vulnerability of natural and human systems against actual or expected climate change effects. Various types of adaptation exist, e.g. anticipatory and reactive, private and public, and autonomous and planned.
<b>Adaptive Capacity</b>	The ability of systems, institutions, humans, and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences.
<b>Airports/Airfields</b>	Airports refers to all 26 airports in Vanuatu, including operational assets such as the airplanes, runways, vehicles etc.
<b>Climate Driver</b>	A changing aspect of the climate system that influences a component of a human or natural system.
<b>Climate Projection</b>	A projection of the response of the climate system to emission or concentration scenarios of greenhouse gases and aerosols, or radiative forcing scenarios, often based upon simulations by climate models under different climate scenarios.
<b>Climate Variability</b>	Climate variability refers to variations in the mean state and other statistics (such as standard deviations, or the occurrence of extremes) of the climate on all spatial and temporal scales beyond that of individual weather events.
<b>Coastal inundation</b> (see <i>Van-KIRAP website explainer here</i> )	Coastal inundation is the flooding of coastal areas, caused by a range of factors, including tides, storm surges, storm waves, interannual sea level variability and sea level rise.
<b>Coastal/Marine Ecosystem</b>	Coastal ecosystems exist in the land close to the sea or the part of the marine environment that is strongly influenced by land-based processes, for example salt marshes and estuaries. Marine ecosystems are aquatic environments with high levels of salt (i.e. Pacific Ocean). Vanuatu has many marine ecosystems, including coral reefs, mangroves, seagrass areas, seamounts and deep-sea trenches. These ecosystems support over 770 fish species, whales, dolphins and sea turtles and are susceptible to a range of climate hazards.
<b>Consequence</b>	The outcome of an event that may result from a hazard. It can be expressed quantitatively (e.g., units of damage or loss, disruption period, monetary value of impacts or environmental effect), semi-quantitatively by category (e.g., high, medium, low level of impact) or qualitatively (a description of the impacts).
<b>Construction Activities</b>	Construction activities refers to operations associated with the construction of assets or infrastructure, for example constructing buildings, infrastructure such as ports and bridges, roadworks. Construction activities can be disrupted due to climate events, causing delays in projects.
<b>Direct Risk</b>	Where there is a direct link between a hazard and an element at risk that is exposed and vulnerable. For example, storms and flooding damaging buildings and infrastructure, droughts leading to crop failure, or extreme temperatures causing heat stress.
<b>Drought</b> (see <i>Van-KIRAP website explainer here</i> )	Drought is an acute lack of water compared to normal conditions due to a lack of rainfall over an extended period, usually more than a few months. The water shortage can impact activities, groups, sectors, and related natural resources.
<b>El Niño Southern Oscillation (ENSO)</b>	ENSO is a periodic bimodal variation in the sea surface temperature and air pressure across the equatorial Pacific Ocean. El Niño: Easterly trade winds over the Pacific Ocean weaken, slowing the ocean current drawing surface water away from the Western coast of South America, reducing the upwelling rate of colder deep ocean water on this coast and flattening the thermocline allowing the surface water on the east of the Pacific basin to warm. La Niña: Easterly trade winds over the Pacific strengthen, increasing the ocean current drawing surface water away from the Western coast of South America, increased the upwelling rate of nutrient-rich cold deep ocean water on this coast and increasing the

	thermocline, reducing the surface water temperature on the east of the Pacific basin. ENSO is strongly correlated with multiple tele-connections globally, causing effect to temperature, atmospheric pressure, and precipitation.
<b>Electricity</b>	Electricity refers to all assets and infrastructure associated with the generation, transmission, and distribution of electricity to end-use customers. For example, power plants, transmission lines and electricity meters.
<b>Elements at risk</b>	People, values, species, sectors, assets etc. that are potentially vulnerable to climate change impacts.
<b>Evacuation Structures</b>	Evacuation structures refers to elevated structures with sufficient height to elevate evacuees above inundation due to tsunami waves, and cyclone shelters. Legislation in Vanuatu regarding Natural Disasters determines the logistic hubs during a disaster of Port Vila and Luganville.
<b>Exposure</b>	The presence of people; livelihoods; species or ecosystems; environmental functions, services, and resources; infrastructure; or economic, social, or cultural assets in places and settings that could be adversely affected.
<b>Extreme rainfall</b> <i>(see Van-KIRAP website explainer here)</i>	The risk of extreme rainfall is due to a combination of factors, including tropical cyclones, interannual rainfall variability (wet season from November – April), and the El Niño Southern Oscillation. The total amount of rainfall can be used as an additional indicator of extreme rainfall.
<b>Extreme Temperature (hottest day of the year)</b> <i>(see Van-KIRAP technical report here)</i>	Temperature has a spatial and bimodal variation within Vanuatu as it is influenced by the seasons, ENSO, and atmospheric pressure. Extreme temperature from VanKIRAP measures the annual hottest day, annual coldest night, annual hottest night and 1-in-20year extreme maximum daily temperature (95th percentile)
<b>Freshwater Ecosystem</b>	Freshwater ecosystems are a subset of aquatic ecosystems and refer to water from rivers, lakes, and underground streams. Freshwater is used by a wide variety of plants and animals and are often used for recreation. Vanuatu is home to a number of freshwater springs, known as the blue holes, which attract both locals and tourists. Such freshwater sources are susceptible to many climate hazards including extreme rainfall, tropical cyclones, and drought.
<b>Goods Supply Activities</b>	The supply of critical physical goods/services the operation requires to operate. Those which are susceptible to a range of climate-related impacts, including extreme weather events, resource scarcity such that potential disruptions would prevent the operation. For example, a restaurant relies on food supply, a construction company relies on materials.
<b>Hazard</b>	The potential occurrence of a physical event or trend that may cause loss of life, injury, or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, ecosystems, and environmental resources.
<b>Industry</b>	An industry is a group of businesses, organisations or departments within a sector that have similar goods or services.
<b>Impacts</b>	The consequences of realized risks on natural and human systems, where risks result from the interactions of climate-related hazards, exposure, and vulnerability. Impacts generally refer to effects on lives, livelihoods, health and well-being, ecosystems and species, socio-economic and cultural assets, services, and infrastructure. Impacts may be adverse or beneficial.
<b>Inhabited Buildings</b>	Inhabited buildings refer to all buildings in which people reside or work, relating to the industry and its operations. For example, office buildings, shops, hotels etc.
<b>Land Transport Activities</b>	Driving activities refers to any land transport operations, for example transport of goods or taxi services.
<b>Marine Heatwaves</b> <i>(see Van-KIRAP website explainer here)</i>	Marine heatwaves (MHWs) are a “discrete, prolonged anomalously warm water event” which lasts for five or more days, with temperatures warmer than the 90th percentile. MHW events were defined by their duration (number of days above the 90th percentile threshold), maximum intensity (maximum temperature above the climatological mean attained during the event), mean intensity, and cumulative intensity (sum of the daily intensities through the duration of the MHW event occurrence; Hobday et al. 2016).

	MHWs are categorised into four intensity categories, defined by multiples of difference between the mean climatology and the 90th percentile threshold, and includes “Moderate” (Category I, 1-2x), “Strong” (Category II, 2-3x), “Severe” (Category III, 3-4x), and “Extreme” (Category IV, >4x).
<b>Ocean Acidification</b> <i>(see Van-KIRAP website explainer here)</i>	A reduction in the pH of the ocean, caused by an increased uptake of carbon dioxide (CO <sub>2</sub> ) from the atmosphere, accompanied by other chemical changes (primarily in the levels of carbonate and bicarbonate ions) over the time scale of years to decades.
<b>Office/Shop/Admin Activities</b>	Office/shop/admin activities refers to operations taking place within buildings, for example, retail, desktop-based business, education and indoor training.
<b>Outdoor Coastal Activities</b>	Outdoor coastal activities refer to operations taking place within the coastal environment, for example surfing and fishing.
<b>Outdoor Freshwater Activities</b>	Outdoor freshwater activities refer to operations taking place within freshwater environments, for example fishing and recreational swimming.
<b>Outdoor Land activities</b>	Outdoor land activities refer to operations that take place inland and aren't protected by buildings/infrastructure, for example farming, tourist activities like hiking and ziplining.
<b>Outdoor Marine Activities</b>	Outdoor marine activities refer to operations taking place within the marine environment, for example fishing, scuba diving, education and training.
<b>PARA Framework</b>	Refers to the Protect, Avoid, Retreat and Avoid framework for adaptation measures. This includes: <ul style="list-style-type: none"> <li>- Protecting assets from risk (e.g., Building protective structure)</li> <li>- Accommodating risk (e.g., Incorporating adaptation options into development designs)</li> <li>- Retreating from risk (e.g. relocating existing development away from high risk areas)</li> <li>- Avoiding risk (e.g. locating new development away from areas prone to hazards)</li> </ul>
<b>Ports/Wharves</b>	Ports refer to harbour areas in which ships and boats load and unload goods and passengers. Wharves are used to dock yachts and small boats. Vanuatu has two major ports, Port of Vila in the capital Vila on Efate Island, and Port of Luganville in Santo. There are numerous wharves located across Vanuatu.
<b>Risk</b>	The potential for adverse consequences for human or ecological systems, recognising the diversity of values and objectives associated with such systems. Relevant adverse consequences include those on lives, livelihoods, health and wellbeing, economic, social, and cultural assets and investments, infrastructure, services (including ecosystem services), ecosystems, and species. Risks result from interactions between climate-related hazards with the exposure and vulnerability of the affected system.
<b>Sea Level Change/Rise</b>	Sea level can change, both globally and locally, due to; (1) changes in the shape of the ocean basins; (2) changes in the total mass of water and, (3) changes in water density. Factors leading to sea level rise under climate change include both increases in the total mass of water from the melting of land-based snow and ice, and changes in water density from an increase in ocean water temperatures and salinity changes.
<b>Sea-Surface Temperature</b>	The temperature of the ocean surface. The term sea-surface temperature is generally representative of the upper few metres of the ocean as opposed to the skin temperature, which is the temperature of the upper few centimetres.
<b>Sector</b>	Within the context of this Framework, sectors refer specifically to the Vanuatu Infrastructure, Fisheries, Water, Agriculture and Tourism government sectors.
<b>Sensitivity</b>	Refers to the degree to which an element at risk is affected, either adversely or beneficially, by climate variability or change. Sensitivity relates to how the element will fare when exposed to a hazard, which is a function of its properties or characteristics.
<b>Storm Surge</b>	The phenomenon of temporary sea level rising that is commonly associated with low-pressure weather systems (cyclones), excluding waves.
<b>Storm Water/Flood Management</b>	Stormwater/flood management refers to all stormwater infrastructure and assets, and any flood management infrastructure in place
<b>Telecommunications</b>	Telecommunications refers to all infrastructure associated with information transmitting technologies and communications, including wired phones, cellphones, radio and television broadcasting and the internet.

<b>Terrestrial Ecosystem</b>	Terrestrial ecosystems are ecosystems found on land, including temperate deciduous forest, tropical rain forest, and grassland. Vanuatu's tropical and subtropical rainforests are home to a wide range of flora and fauna and are susceptible to changes in temperature and rainfall.
<b>Traditional Knowledge</b>	The understandings, skills and philosophies developed by societies with long histories of interaction with their natural surroundings. For many Indigenous peoples, this knowledge informs decision-making about fundamental aspects of life, from day-to-day activities to longer-term actions. This Traditional Knowledge (TK) is integral to cultural complexes, which also encompass language, systems of classification, resource use practices, social interactions, values, ritual, and spirituality. The TK informs weather and climate predictions based on the behaviour of plants and animals, temperature and rainfall, and astronomical indicators such as stars and the sun.
<b>Transportation Assets</b>	Transportation assets refers to the assets and infrastructure associated with transport, including private vehicles, public transport vehicles and infrastructure, roads, bridges, cycle, and foot paths.
<b>Tropical Cyclone</b> <i>(see Van-KIRAP website explainer here)</i>	Tropical cyclones are rotating storms that develop over tropical oceans that are over 25.5 °C and within 5 degrees of latitude from the equator where there is sufficient Coriolis force to create the rotation. In the South Pacific Ocean, a tropical cyclone is defined by a 10-minute sustained wind speed of 17.5 metres-per-second or greater.
<b>Uninhabited Buildings</b>	Uninhabited buildings refer to all buildings in which are not normally occupied and may store assets or materials relating to the industry and its operations. For example, boat sheds, warehouses, and barns.
<b>User Defined, or Other</b>	Any element not listed that is relevant to the industry and its operations.
<b>Vulnerability</b>	The propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts and elements including sensitivity or susceptibility to harm, and lack of capacity to cope and adapt
<b>Wastewater Infrastructure</b>	Wastewater infrastructure refers to the network of pipes that collect and carry residential, business, and industrial effluents to wastewater treatment systems, and the treatment systems themselves.
<b>Water Supply</b>	Water supply refers to the source, treatment, transportation, and distribution of potable water, for example wells, bores, pumps, pipe networks and treatment facilities.
<b>Water Transportation Activities</b>	Boating activities refers to any marine transport operations, for example boat tours, water taxi services and fishing.

