Earthwatch Australia

ClimateWatch Vanuatu

Management Manual

earthwatch AUSTRALIA

Department Vanuatu Meteorology and Geo-Hazards

Global EbA Fund

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Introduction:

The World Risk Report has ranked Vanuatu as the world's most at-risk country to natural disasters and extreme weather events, making climate change the greatest ongoing threat to the well-being and livelihoods of its people and ecosystems. Terrestrial ecosystems have been subjected to increased seasonal variability due to temperature and precipitation changes with implications for biodiversity and agriculture. Coastal and marine ecosystems (e.g., mangroves, coral reefs) have been greatly impacted by rising temperatures with evidence of coral bleaching and increased fish mortality. These risks are expected to continue to increase with climate change.

In Vanuatu, traditional knowledge has typically been used for climate forecasting. Unfortunately, due to urbanisation, intergenerational transfer of traditional knowledge has greatly decreased. With decreasing circulation of traditional knowledge and a mistrust in current contemporary forecasts, rural communities have become extremely vulnerable to climate change and extreme weather events.

ClimateWatch-Vanuatu will provide nation-wide impact through the development of a contextually relevant and accessible data collection tool (ClimateWatch application) supported by concentrated activities at targeted sites (ClimateWatch Trails). The Vanuatu-modified ClimateWatch app will empower community members to record traditional indicator species at their own pace through user-oriented design. By providing community members with access to their own data collection tool, ClimateWatch-Vanuatu has the ability to reach anywhere in Vanuatu.

ClimateWatch-Vanuatu will target a mix of coastal, terrestrial and marine species from a combination of subsistence agricultural ecosystems, lowland rainforests, mangrove forests and marine ecosystems.

This manual has been developed for use by VMGD staff and other ClimateWatch users to train ni-Vanuatu communities how to use the ClimateWatch app and engage as Citizen Scientists to capture valuable information on Traditional Knowledge species in Vanuatu.

Program objectives:

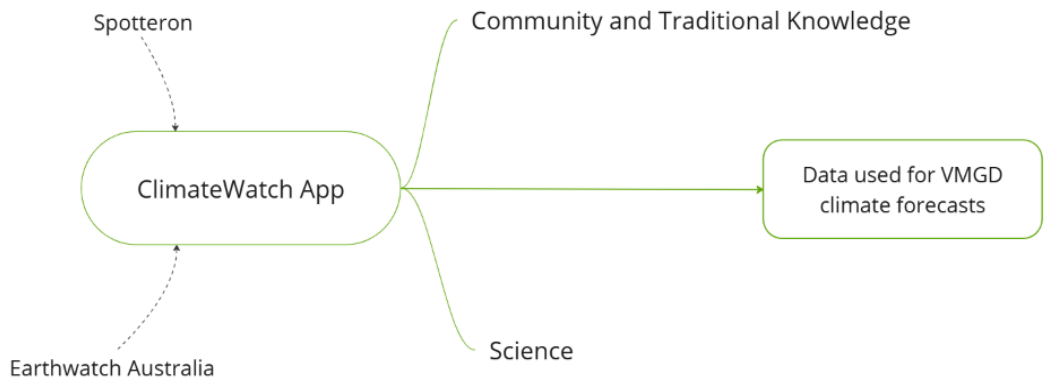
Increased ni-Vanuatu community response to climate forecasts and projections, leading to increased community resilience to climate change and extreme weather.

Over many generations, knowledge about plants and animals and future weather and climate events has allowed communities in Vanuatu to plan and prepare for local conditions. In recent times VMGD has been producing forecasts and warnings based on ocean and atmospheric conditions. Traditional knowledge (TK) and science can be used together to provide climate and weather information that is easier to understand and help keep communities safe

However, we need to better understand how TK forecasts work, and if climate change is impacting their effectiveness. To do this we need to monitor the TK plants and animals and the climate conditions. This will also help us understand how climate, including climate change, alters the behaviour of plants and animals.

Program architecture:

The ClimateWatch App development and data use process are illustrated below. Earthwatch Australia first developed the ClimateWatch app for an Australian context in 2009 in partnership with Austria based app developed Spotteron. In 2023, the app was redeveloped for a Vanuatu context. A rigorous scientific framework and understanding of community and Traditional Knowledge feed into the development of the app. Information and data generated by the app is fed to VMGD for use in climate forecasts.



ClimateWatch Vanuatu program structure illustration

ClimateWatch Vanuatu Species:

ClimateWatch species have been selected based on their existing link to ni-Vanuatu traditional knowledge climate forecasting and easily identifiable phenological phases. A full list of ClimateWatch Vanuatu species and the behaviour and phenophase tracked through the ClimateWatch app can be identified in Appendix 1 of the document.

Phenology is the field of science that seeks to understand natural events and their relation to climate. A short explainer video on phenology has been produced for use by ClimateWatch managers and can be found in the resource list below.

Species field guides have been developed for each of the ClimateWatch species that provide useful guides for community engagement. These can be found in the resource list at the end of the document. See the table below to see the list of ClimateWatch species, their English and Bislama name and link to Traditional Knowledge forecasting.

Common English Name	Bislama name	Scientific name	Traditional Knowledge Indicator
Plants			
Orange Tree	Aranis	*Citrus sinesis*	The presence of lots of flowering and lots of fruit is a sign that it will be an active cyclone season.
Banana Tree	Banana	*Mus acuminata*	Banana trees bearing many/large bunches of fruit is a sign that cyclone season is approaching. Lots of banana leaves turning yellow is a sign that the wet season is beginning.
Breadfruit	Bredfruit	*Artocarpus altilis*	The presence of lots of flowering and lots of fruit is a sign it is going to be an active cyclone season. The greater the number of fruits, the stronger the cyclones.
Beach Hibiscus	Burao	*Hibiscus tilieceus*	When the leaves are heavily green, and the flowers are more yellow, then it is a sign that a cyclone season is approaching.
Mandarin Tree	Mandarin	*Citrus reticulata*	The presence of lots of flowering and lots of fruit is a sign that the cyclone season is approaching.
Mango	Mango	*Mangifer indica*	The presence of lots of flowering and lots of fruit is a sign that the cyclone season is approaching and it is going to be an active cyclone season.
Banyan	Nabanga	*Ficus obliqua*	The presence of lots of flowering is a sign that cyclone season is approaching.
Malay Apple	Nakavika	*Syzigum malaccense*	Presence of flowers and/or fruit is a sign that wet season is approaching.
Polynesian Chestnut	Namamber	*Inocarpus fagifer*	The presence of lots of fruit and flowering is a sign that it is going to be an active cyclone season. When Namamber starts to give out its flowers, it is the wet season.
Pacific Lychee	Nandao Tri	*Pometia pinnata*	The presence of lots of fruit and flowering is a sign that it is going to be an active cyclone season.
Tall-silt Mangrove	Natongton	*Rhizophora apiculate*	The presence of lot flowering is a sign of an active cyclone season.
Polynesian vi-apple	Nau	*Spondias dulcis*	The presence of lots of flowering and lots of fruit is a sign that cyclone season is approaching and that it will be an active cyclone season. Heavy fruiting indicates stronger cyclones.

Cutnut	Naval	*Barringtonia edulis*	The presence of lots of flowering and lots of fruit is a sign that a cyclone will occur in a few months' time and it is going to be an active cyclone season. Flowering very late in the season is a sign that the wet season is approaching.
Naviso		*Saccharum edulis*	
Wild Cane	Wael Cane	*Misanthus sp.*	The presence of flowers is a sign that it is going to be an active cyclone season. Flowering at the end of winter indicates the wet season is approaching.
Marine			
Green Turtle	Gren Totel	*Chelonia mydas*	When the Green Turtle nests further up the beach/further inland it is a sign that cyclone season is approaching.
Hawksbill Turtle	Hoksbil Totel	*Eretmochelys imbricata*	When the Hawksbill Turtle nests further up the beach/further inland it is a sign that cyclone season is approaching.
Leatherback Turtle	Leta Bak Totel	*Dermochelys coriacea*	When the Leatherback Turtle nests further up the beach/further inland it is a sign that cyclone season is approaching.
Palolo Worms	Palolo Worm	*Palola viridis*	A heavy presence of Palolo worms is a sign that cyclone season is approaching.
Birds			
Pacific Emerald Dove	Sot Leg	*Chalcophaps longiristris sandwichensis*	When the dove lays its eggs close to the ground a strong tropical cyclone is expected in a few months.

ClimateWatch Vanuatu species divided by species type, with English, Bislama and Scientific name alongside Traditional Knowledge climate predictor

ClimateWatch Trails:

ClimateWatch trails provide a unique service to the ClimateWatch program and to the public by:

- Concentrating public data collection efforts, leading to repeat datasets that are important for phenological studies
- Providing infrastructure to engage the public in their local flora and fauna (e.g. a place to host community climate walks)
- A way to educate communities on how to use the ClimateWatch App and the importance of their local Traditional Knowledge species.

Australia currently has 85 ClimateWatch trails across the country that can be viewed here as examples: Trails - ClimateWatch Australia- Citizen Science App. Through the ClimateWatch Vanuatu project we have committed to developing 5 ClimateWatch trails through Vanuatu at each of the Community Climate Centres (CCC's).

Developing trails:

Trails should be developed with at least 5 stationary ClimateWatch species such as plants, and publicly accessible to all community members. Developing trails can be a great way to engage with botanic gardens and the tourism sector to develop and promote trails collaboratively.

Once the trail location, path and species has been agreed with the landowners and other interested stakeholders, VMGD staff will need to send the trail data to ClimateWatch staff at Earthwatch Australia. Earthwatch staff will then work with app developers Spotteron to digitize the trail and update the app and the ClimateWatch website/CMS. Trail and species information sheets will also be developed as a tool for community engagement.

VMGD staff can promote the new trail by producing material for social media and invitations to community members to attend the launch. Templates for these collateral materials can be found in the resources list at the end of the document.

Data to collect by VMGD staff to establish trails:

- Trail name
- Locate and take GPS points and photos of the CW species (record in the app and comment the name of the intended trail)
- GPS trace or multi-segment line (QGIS or ArcGIS) of the trail
- Determine signage with landowner
- Create trail and species guide using the templates in the resource list.

All of these points will be done in collaboration with EW Australia. Training to enable VMGD to set up and create trails independently is an option for September 2024.

Managing the app:

Logging into the admin user on the app can be done with the details below:

Username: cwvanuatu@spotteron.net

Password: FromIslandsToScience843!

From the app interface, spots, comments and validation scan be made. Logging in to the backend of the app through the webpage interface allows admins to conduct their data validation and management activities.

URL: https://www.climatewatch.org.au/administrator/

Login: cwvanuatu@spotteron.net

Password: FromIslandsToScience843!

Data Validation:

Weekly routine tasks:

- ☐ Validate new spots made by community members through the website interface
- ☐ Comment moderation
- ☐ Check, disable or delete inappropriate content

Monthly routine tasks:

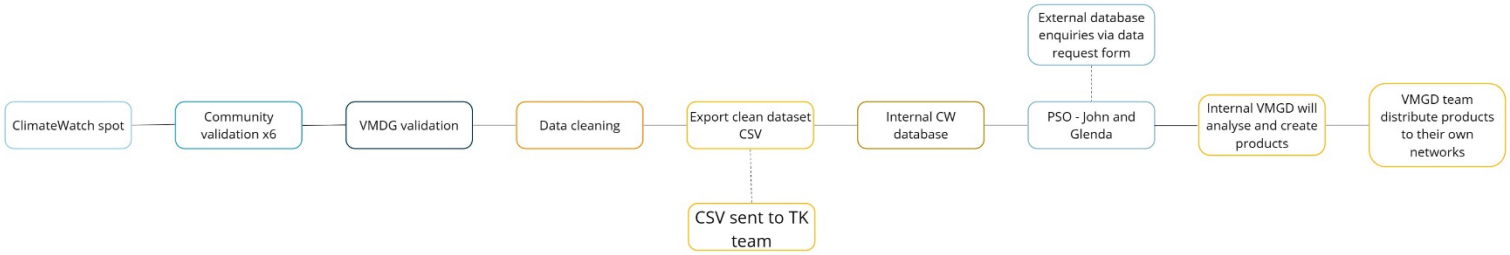
- ☐ Have all necessary spots been manually entered
- ☐ Database cleaning – e.g., have all flagged spots for location updates been modified, have all comments been addressed
- ☐ Cleaned and validated data status is on – are they all labelled as checked and status 'on'.
- ☐ Status of incomplete, incorrect or inappropriate as status 'off' or disabled
- ☐ Inappropriate content deleted; problem users flagged for deletion
- ☐ Export clean data set CSV and follow data transfer pathway. Check with Spotteron to ensure no flagged or inappropriate data handed on to the TK team.
- ☐ Plan and schedule push messaging with a specific call to action for ClimateWatch Vanuatu users and reinforce this message on your socials and any community outreach you are doing that month e.g. "Have you noticed more Mango fruit on your trees? Take spots of Mango trees with fruit to help us plan for cyclone season."

Future task:

- ☐ Reassign traditional TK species currently used in 'other' category as ClimateWatch species e.g. Narara tree

Data pathway:

An illustration of how data from a ClimateWatch spot is processed for use by the VMGD team.



The data pathway from a species spot through the ClimateWatch app, to analysis and distribution by VMGD

Troubleshooting and communication pathways:

If problems are identified with the app or the admin interface, VMGD staff John, Glenda and Moirah should be notified and work through the problem where possible. If needed, VMGD staff will escalate the problem to the Earthwatch ClimateWatch team through the agreed contact details below. The same pathway can be taken for external stakeholders through VMGD. Earthwatch hold the relationship with the app developer Spotteron and requests can come to the Earthwatch contacts listed below.

VMGD Contact:

Glenda Pakoa (gpakoa@meteo.gov.vu)

John Ruben (fairuajhn@gmail.com)

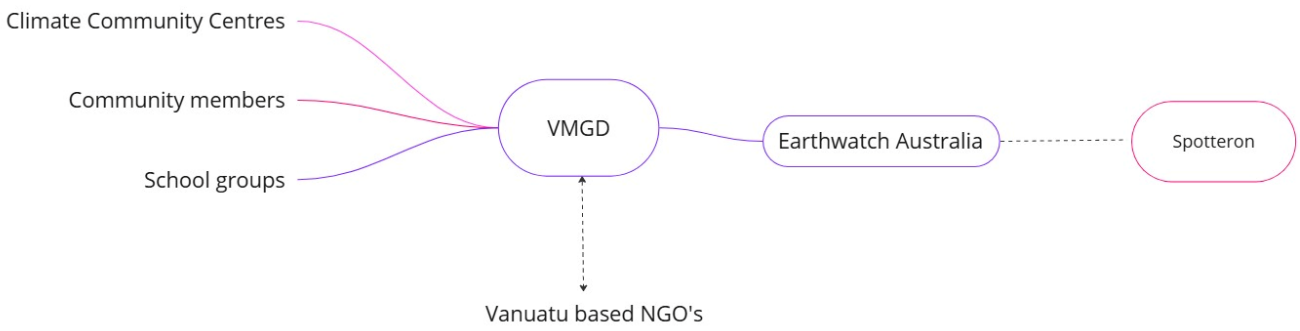
Moirah Matou (mmatou@meteo.gov.vu)

Earthwatch Contact:

ClimateWatch Australia inbox (climatewatch@earthwatch.org.au)

Shannon Anstee (sanstee@eartwhatch.org.au)

Elizabeth Irvine (eirvine@earthwatch.org.au)



Communication pathway between stakeholders, VMGD and Earthwatch Australia

Community and school engagement:

There are many ways to engage with your community, administrators can add content and update the app with comments featured spots and push messages, creating digital trails and exporting use data to land owners and stakeholders. There a suite of resources available for engagement including PPT presentations, pamphlets and introductory videos.

Partnering with World Vision and other NGO's with community outreach is a great way to reach communities. Introducing the project and practicing spotting on identify trees they can spot is a great way to get people to download and use the app. Bringing an iPad for use and an internet dongle will help to overcome identified access barriers.

Schools are also a great target for outreach, and the education department is an interested stakeholder. Offline functionalities of the app can be utilised for schools to meet their offline/phone free requirements for students. Each school may be different so gain an understanding from each of them what their restrictions are to determine a solution with support from Earthwatch where required. Providing the school with detailed booklets and the introductory video can be a useful way for teachers to engage their students. Updating schools and community groups on data trends and updates can be a fun and interesting way of maintaining their engagement.

Frequently asked questions:

Should I spot the same individual more than once?

> Absolutely! Repeated data points on a single individual are important references for phenological data studies to track its change over time. There is no limit to the number of spots that can be made on any particular individual.

What happens if my tree is cut down?

> Take a photo of where the tree used to be and make a comment that the tree is no longer there. The ClimateWatch administrators will then know it is the end of the dataset for that individual.

Can I record species not on the app?

> Yes, for each species group there is an “other” option that can be selected when you identify interesting species that are not on the app. Fill out the phenophase details as best as possible and utilise the comments box to provide as much detail as possible as to what you are seeing. Try to ensure the spots you are making have a link to traditional knowledge.

Can I edit a spot?

> Yes, if you have submitted a spot and later recognise an edit that you wish to make, you can find and edit your spot through your profile. Click your profile in the top right, navigate to your spots and select the one you wish to edit. You can update any of the data entered including map location, photo and phenophase data.

Why are photos compulsory?

> Upon advice from our science advisory panel and other large-scale citizen science programs, compulsory photos have been introduced to assist the data verification process and to improve the quality of data submitted. Compulsory images have increased the number of records we can validate by 30%, meaning more records can be used for scientific purposes. If uploading sightings via the website, please make sure it is your own photo of that sighting and not one from the internet.

If I’m offline or in a low-reception area, will my observations still be uploaded?

> Spots submitted by users are stored locally on your device and can be sent in as soon as the app is back online thanks to the offline features of the app. Offline spots are stored in the menu under “Waiting Spots”.

How often should I ClimateWatch?

> As often as you can (daily, weekly, monthly). Science often relies on precise measurements; and, identifying the exact date when a species moves into an area, washes up on the beach or increases dramatically in abundance is very important for long term data sets like ours. Regular recording also enables you to identify exactly when changes have occurred in your area, just like a personalised log book. Moreover, when trying to understand phenology - the timing of seasonal events - and how these are being influenced by climate change, we want as many regular sightings as possible to get an idea of the start, peak and end of these cycles.

Can I ClimateWatch anywhere in Vanuatu?

Yes! There are over 20 species to spot all over Vanuatu. The next time you are out, see if you can spot any ClimateWatch indicator species. If you're unsure of where to start, try a ClimateWatch trail.

I'm in a group, should everyone submit recordings?

Yes. Multiple entries enable scientists to ensure there is consistency amongst observations and also help to improve our sampling processes. It also helps to observe with others in case you are unsure of a sighting.

What if I'm not 100% sure I have the right species?

If you think you have the right species but are a little unsure, record it and leave a message for our scientists in the 'comments' section of the data recording page, write: "SPECIES REQUIRES CHECKING". Make sure you submit a good quality photo. If you are only 50% or less sure you have the correct species, do not record it but take several photos and send them to the ClimateWatch team on our website for verification. When there is an option to select "unsure" for a particular phenophase or behaviours, don't be afraid to select "unsure" as a certain unsure is better than an uncertain submitted sighting. You could also try to practice recording one species at a time, to become familiar with its behaviours and identification, and moving on to monitor more species once you become confident.

What happens to my observations/spots?

Observations made through the app are verified by the community before checked by staff at VMGD and used as part of the Traditional Knowledge database.

Resource list:

A list of existing resources available to assist ClimateWatch managers engage and teach their communities. These resources exist on the Google Drive set up for the project and accessible here. Resources will continue to be added as they are developed. Please **do not** share this link to anyone outside the project as anyone with the link can access.

- ClimateWatch introductory pamphlet
- ClimateWatch step-by-step use pamphlet in Bislama
- Introduction to ClimateWatch and how to use the app PPT
- Species field guides for all ClimateWatch Vanuatu species
- Bislama introductory videos
    - Video 1 – Phenology
    - Video 2 – Kids CW intro (Mango tree and turtle)
    - Video 3 – Adults CW intro (Breadfruit and turtle)
- How to set up and use ClimateWatch video for trainers
- Standard community engagement day invitation template
- Social media tiles for community engagement and outreach
- ClimateWatch app download poster
- Community outreach PPT

Annex 1: List of Vanuatu ClimateWatch Species and their phenological traits tracked by the ClimateWatch App.

1: is in the app new

0: not in a speciesim pp age changed

Website Images required

Amphibians

EN Category Bislama/English	Meta EN Latin Name	Behaviour Calling	Courting or	Presence	NUMBER OF PHENOPHAS ES

Birds

EN Category Bislama	Infopane	Region	GEO JSO	Meta EN Latin Name	Behaviour Bird on	Bird in	Bird on	Bird on	Bird	Calling	Courting or	Feeding	Other	Height of	NUMBER OF PHENOPHAS ES
Sot leg	Yes	iNat image	VU	*Chalcophaps longirostris sandwichensis*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	1	8

Insects

EN Category Bislama/English	Meta EN Latin Name	Behaviour Present	Presence of	Presence	Egg	Calling Courting or Chrysalis	Synchronise Presence of	Other	NUMBER OF PHENOPHAS ES

Mammals

EN Category Bislama/English	Meta EN Latin Name	Behaviour Present	Absent	Courting	Young in	Young on	Young	Fruit	Other

Marine

EN Category Bislama				Meta EN Latin Name	Behaviour Present	Absent	Abundanc	other	
Palolo Wom	Yes	iNat image	VU	*Palola viridis or Palola sicilensis*	1	1	1		3

Plants

EN Category Bislama			Meta EN Latin Name	Phenophase First fully open single flowers are	Full Flowering (>50% of (95% of g open)	End of Flowering have	Not Flowerin	Unsure about Flowering	First Leaf to change colour (<25% of leaves	Leaves changing colour (>50% of leaves	Open Seed Pods	No Fruit/Seed/ Pods	Unsure about Fruit/Seed/ Pods	NUMBER OF PHENOPHASES	Closed Seed/Po ds Pods present t	Green Ripened Fruit dropped to the ground	% Fruit present	% Many old Leaves present in flower	Tree with leaves (or	Tree yellowing and dropping	very Fruits small	Flower (or small	
Banana	Yes		VU	*Musa acuminata*	1	1	1	1	1	1	1		1				1	1	1	1	1	
Nabanga	Yes		VU	*Ficus obliqua*	1	1	1	1	1				1	1					1	1		
Bredfrut	Yes		VU	*Artocarpus altilis*	1	1	1	1	1				1				1	1	1	1		
Burao	Yes		VU	*Hibiscus tiliaceus*	1	1	1	1	1	1	1		1				1	1	1	1		1
Mandarine	Yes		VU	*Citrus reticulata*	1	1	1	1	1				1	1			1	1	1	1		
Mango	Yes		VU	*Mangifera indica*	1	1	1	1	1				1	1			1	1	1	1		
Nakavika	Yes		VU	*Syzygium malaccense*	1	1	1	1	1				1	1			1	1	1	1		
Namambe	Yes		VU	*Inocarpus fagifer*	1	1	1	1	1				1	1			1	1	1	1		
Nandao Tri	Yes		VU	*Pometia pinnata*	1	1	1	1	1					1					1			
Natongtong	Yes		VU	*Rhizophora apiculata*	1	1	1	1	1				1	1			1	1	1	1		
Naus	Yes		VU	*Spondias dulcis*	1	1	1	1	1				1	1			1	1	1	1		
Naval	Yes		VU	*Barringtonia edulis*	1	1	1	1	1				1	1			1	1	1	1		
Naviso	Yes		VU	*Saccharum edule*	1	1	1	1	1				1	1			1	1	1	1		
Aranis	Yes		VU	*Citrus sinensis*	1	1	1	1	1				1	1			1	1	1	1		
Wael Ken	Yes		VU	*Miscanthus sinesis or Miscanthus floridulus*	1	1	1	1	1				1	1					1			

Reptiles

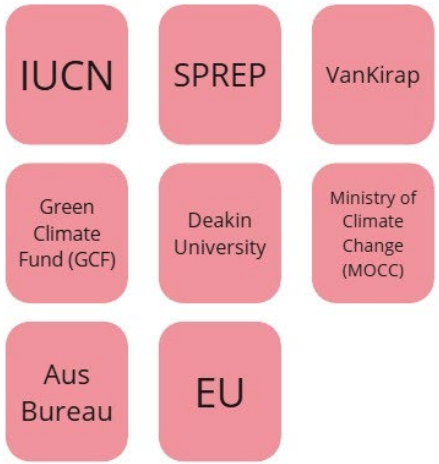
EN Category Bislama			Meta EN Latin Name	Behaviour Feeding	Courting or	Hatched	Presenc	Nesting	Nest	Other	
Leta bak totel	yes	VU	*Dermochelys coriacea*	1	1	1	1	1	1		6
Hoksbil totel		VU	*Eretmochelys imbricata*	1	1	1	1	1	1		6
Grin totel	Yes	VU	*Chelonia mydas*	1	1	1	1	1	1		6

Spiders

EN Category	Meta EN

Annex 2: ClimateWatch Vanuatu Stakeholder Mapping

Existing Donor/Funder Stakeholders



Existing Admin/Support Stakeholders

Annex 3: ClimateWatch Vanuatu Workplanning