VQA Level: 1

Facilitator Guide

Certificate I in Climate Change and Disaster Risk Reduction

Units 2 and 3: CGCK0216 and CGCV0316

Demonstrate knowledge of climate

Demonstrate knowledge of climatic variations

Facilitator: .....

Organization: .....

Date: .....

Before you get started…

Dear Facilitator,

This Facilitator Guide (together with the relevant Learner Guide) is aimed at facilitators/trainers who will be assisting learners wishing to complete the following units:

Title:	Demonstrate knowledge of climate		
VQA code:	CGCK0216	**VQA Level:** 1	**Credits:** 3

Title:	Demonstrate knowledge of climatic variations		
VQA code:	CGCV0316	**VQA Level:** 1	**Credits:** 3

This guide contains all necessary instructions to ensure that learners will attain the expected competencies required by the above-mentioned units. This guide is designed to be used during the presentation of learning sessions for these units. Learners are advised to read the unit of competency outlines in their own time.

Please discuss the unit of competency outlines with the learners to ensure that they understand what they must do to achieve the required outcomes of these units.

There are three guides, namely the Learner Guide, the Learner Workbook and the Facilitator Guide.

These guides have been developed to address specific aspects of the learning experience. Each of the guides complements the others.

Make this an enjoyable learning experience!

Context of learning

Nowadays everyone is talking about climate change. A lot of information is available but is not always easy to obtain for people living in rural areas of Vanuatu. Some of us do not pay attention to the topic of climate change and some don't even believe that it is happening.

But we are all aware of natural hazards that destroy our lives and our property - cyclones, earthquakes, volcanic eruptions, long periods of drought, floods, landslides, fires, etc. When the effects of a natural hazard become so great that the community cannot handle them by itself, and needs help from outside, the hazard becomes a "disaster".

These two units are the second and third in the course of eleven units entitled "Climate Change and Disaster Risk Reduction". This programme helps us to understand more about climatic changes and disasters that have affected us in the past and at present, and are likely to affect us in the future. Many people say that we cannot do much about these changes and disasters, but this is not true. We can do a great deal to reduce the impacts of climate change and natural hazards, both as individuals and in our local communities, and to adapt to these changes in the future. In fact our communities already have a lot of traditional knowledge that can help in reducing the risks and adapting to change. You will learn more about this as we proceed through the course.

The second unit helps us to understand more about the features of Vanuatu's weather and climate. We shall look at the difference between climate variability and climate change and examine the factors that produce variations in climate within Vanuatu. The third unit helps us to understand the key drivers of climatic variability in the tropical Pacific, as well as long-term climatic change and its effects in Vanuatu.

You, as the facilitator, have the challenge to ensure that the learning materials can be applied to the learners' own context, in other words, to their own situations, their own communities and their own islands. As much as possible, you must help them to refer to local examples of everything that is in the course.

The contextualization of the learning material is a very important step in facilitating the learning experience. You must ensure that enough time and effort is put into this.

How to use this guide…

Throughout the guide information is given specifically aimed at you, the facilitator, to **assist** in the actual presentation of the learning material and/or facilitation of the learning process. Although this guide contains all the information required for attaining competency in these two units, references to additional resources, both printed and electronic, are provided for additional reference by the facilitator and further study by the learner.

Please note that the purpose of this information is merely to **guide** you, the facilitator, and is provided as a suggestion of possibilities. It remains the responsibility of every facilitator to re-assess the learner/s in each learning situation throughout the learning process in order to stay in touch with his or her specific learning needs. The needs of each learner must come first!

As you go through this guide, you will come across certain code words and boxes that will help you to facilitate learning more clearly. They are as follows:

Instructions regarding **activities**, whether to be done in a group or individually, will be provided in this type of box.

Facilitator's 'tip' to give you additional information or to help you and the learners with the answer.

My notes…

(You can use this box for your own notes/comments.)

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What will you be facilitating, and how will you do it?

The learning experience…

On completion of these two units, the learner will be able to:

- explain the difference between weather and climate;
- differentiate between climate variability and climate change;
- describe seasonal changes in Vanuatu's temperature and rainfall, using climatic graphs;
- demonstrate how the water vapour content of the atmosphere rises with temperature, and outline the processes involved in the water cycle;
- explain other factors that cause variations in climate from place to place in Vanuatu;
- explain how climate variability in the tropical Pacific is controlled by key climate "drivers";
- identify the main features of a tropical cyclone and its associated weather;
- analyse evidence for long-term climatic change in Vanuatu.

Before starting these two units, the learner is expected to have:

- some knowledge and experience of the water cycle, seasonal climatic variations and tropical cyclones;
- basic graphicacy skills - graph construction and interpretation, mapping skills;
- knowledge and skills acquired from the preceding unit of competency, CGHR0116.

In general, upon completion of a unit at Certificate I level, the learner will be able to:

- perform a defined range of routine activities, usually under supervision;
- demonstrate basic practical skills;
- apply thinking skills such as induction and evaluation;
- participate in a team or working group;
- communicate effectively and convey information and ideas.

My notes:

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Time frame

Section of Unit	Hours allocated for tutorials (theoretical learning)	Hours allocated for practical activities and personal study	Hours allocated for field work	Total hours
Orientation	1	1	-	**2**
Introduction to Learner Guide	3	-	-	**3**
Section 1	3	5	1	**9**
Section 2	2	2	-	**4**
Section 3	1	4	-	**5**
Section 4	3	6	-	**9**
Section 5	3	6	-	**9**
Section 6	3	8	2	**13**
Section 7	2	4	-	**6**
Section 8	2	4	1	**7**
Preparation for test	-	2	-	**2**
Summative test	-	1	-	**1**
Whole unit	**23**	**43**	**4**	**70**

Facilitator's checklist

Use this checklist to ensure that you are properly prepared and have all the materials needed for the facilitation of successful learning:

Tick this box when you are ready

PREPARATION

Knowledge of the qualification	I have familiarized myself with the qualification that the learners are aiming to obtain	
Knowledge of the unit standard	I have familiarized myself with the required level of the unit standard	
Knowledge of the unit content	I have sufficient knowledge of the unit content to enable me to facilitate with ease	
Application	I have done enough preparation to be able to deliver the programme	
Contextualization	I am ready to include information that is specific to the local community and to Vanuatu	

ABILITY TO RESPOND TO LEARNERS' BACKGROUND AND EXPERIENCE

Understanding of learners	I know something about my learners' gender, age, background and experience and am ready to deliver the programme accordingly	
Enthusiasm and commitment	I am enthusiastic about this subject and am committed to creating an environment that motivates learning	

MATERIALS AND EQUIPMENT

Learner guides	One for each learner	
Learner workbook	One for each learner	
Facilitator guide	One	
Copy of ***Learning about climate change the Pacific way***	One Visual Guide (set of pictures) One Teacher's Guide	
DVD ***Klaod Nasara***	One DVD and one Teacher's Guide	
Writing materials	Notebook, pen, pencil, graph paper & rubber per learner	
Butcher paper	One roll. Alternatively, large sheets of flip chart paper.	
Other materials	Plastic water bottles, straws, blu-tak, natural dyes	
Whiteboard & pens	One whiteboard & set of coloured whiteboard markers	
Blackboard & chalk	One blackboard and coloured chalk	
Data projector	Optional. To be used for power point presentations	
Laptop	Optional. To be used for power point presentations and internet connection. USB flash drive useful.	
Internet connection	Desirable but not always possible	
Attendance register	One	
Course evaluation	One sheet for each learner (copied from Learner workbook p. 33)	
Portfolio of evidence	One portfolio holder for each learner	
Summative test	One copy for each learner	

Contextualization of content

At this stage, it will be useful for you to go through these two units and think about the specific information and local examples that should be included in the learning.

Section	Specific examples from the local area, Vanuatu or the Pacific region
1	
2	
3	
4	
5	
6	
7	
8	

Section 1 Differentiate between weather and climate

Learner Guide: Page 14

After completing this section, the learner should be able to:

1.1 state the main elements of weather and climate;
1.2 **describe the weather at a place at a particular moment, and compare this with the climate of that place;**
1.3 **describe and locate the earth's principal climatic zones;**
1.4 **give a concise explanation of the difference between weather and climate**

Concepts 1.1, 1.2, 1.3 and 1.4	Time frame	Activities related to the concepts
Main elements of weather and climate	**7 hours**	**Activities 1.1, 1.2a, 1.2b, 1.3 and 1.4**
Comparison of weather and climate at a particular place		
Location of the earth's principal climatic zones		
Difference between weather and climate		

Please allow learners to complete activity 1.1 in their workbooks:

Type of activity	Resources
1.1 Class discussion	Learner guide, own observations and knowledge
Instructions to give to the learners	
Activity 1.1: After discussing the elements of weather with your fellow trainees and your tutor, complete the table in the Learner Workbook.	

Activity 1.1

MAIN ELEMENTS OF WEATHER			
1.	Air temperature	**7.**	Cloud type
2.	Ground temperature	**8.**	Cloud cover
3.	Humidity	**9.**	Atmospheric pressure
4.	Precipitation	**10.**	Rate of evaporation
5.	Wind speed	**11.**	Hours of sunshine
6.	Wind direction	**12.**	Dew point

(Continued on the next page)

Activity 1.1 (continued)

Although the elements of weather and climate are very similar, the learners are only being asked to indicate the elements of weather.

You may wish to help them understand more about the following elements:
Wind speed: How fast the wind is travelling. A simple way is just to say whether it is very strong, average, light, very light, none, etc.
Wind direction: The direction that the wind is coming from.
Cloud type: A simple way is just to describe the cloud's shape and its colour.
Cloud cover: How much of the sky is covered in cloud.
Rate of evaporation: How quickly liquid water is evaporating into the atmosphere. It depends on the humidity. If the air is humid, the rate of evaporation will be low.
Hours of sunshine: How many hours of the day when the sun is shining (not blocked by cloud).
Dew Point: Temperature at which water vapour in rising air will condense into droplets of water.

Now allow learners to complete activities 1.2a and 1.2b in their workbooks:

Type of activity	Resources
1.2a Weather observations and calculations	Learner guide, own observations and knowledge

Instructions to give to the learners

Activity 1.2a:

1. Keep a weather log for one week. Choose a time during the day to go outside and observe the weather, then write down your observations about the temperature, the humidity, the rainfall, the wind and the cloudiness. Then do the same thing at the same time for the next 6 days. Look at the example in the Learner Workbook to help you, then record your weather observations in the table in the Learner Workbook.
2. Calculate the mean daily temperature for Sola for 31st May 2014.
3. Calculate the mean monthly temperature for Sola for May 2014.

Activity 1.2a

1. Ask the trainees to go outside the classroom and look at the weather. It does not matter which time of day they choose to make their observations, but it must be the same time every day. For "cloud cover", encourage trainees to look at the amount of the sky that is covered in cloud, and express this as a percentage or a fraction, e.g. ⅛, ⅞, ⅓. For wind, it is important to measure both the wind speed (e.g. strong, not very strong, weak), and the direction from which the wind has come (e.g. south-east, east, south-west, north-west).

2. (30 + 24) ÷ 2 = 27°C

3. 27.06 or 27.1°C

Note that there is an organization known as SPaRCE that supplies basic weather instruments free of charge to schools and training centres in Pacific islands. You can contact them via VMGD or at this website: www.sparce.evac.ou.edu/

Type of activity	Resources
1.2b Class discussion and individual exercise	Learner guide, own ideas

Instructions to give to the learners

Activity 1.2b:

1. After discussing the climate of Port Vila with your fellow trainees and your tutor, answer questions a) to e).
2. Look at the climatic figures for 5 stations in Vanuatu for 2013. Choose one of the places, preferably one that is closest to you. Then describe its climate in the same way that you described the climate of Port Vila in no. 1.
3. Do you think that the weather at your training centre is the same as the climate? Give some reasons for your answer.

Activity 1.2b

1. a) February. Hot.
   b) July and August. Hot.
   c) Very heavy.
   d) D,J,F,M,A.
   e) Hot season.

2. Each trainee only needs to describe the climate at one station. But if a trainee works quickly, invite him or her to describe more than one, and to compare the different climatic stations. Remind the trainees that these were the figures just for the year 2013 and are not average figures. Tell trainees that they don't need to write anything in the grey boxes that are found just above the rainfall totals.

	Sola	Pekoa	Lamap	Whitegrass	Anelgowhat
a)	D. Very hot	N,D,J,F,M. Hot	D,F,A. Hot	D,J,F,M. Hot	D,J,F,M. Hot
b)	J,A,S,O. Hot	J,A,S. Hot	J,J,A,S. Hot	J,A,S. Hot	J,A,S. Hot
c)	Very heavy	Very heavy	Very heavy	Moderate	Very heavy
d)	J,F,M,M,J,O,N	J,F,M,M,J,N	F,M,A,M,J,N	F,M,A,M	F,M,A,M,O,D
e)	Hot /both	Hot	Hot	Hot	Hot
f)	*Answer depends on the station. Trainee must add up the 12 monthly temperatures, then divide by 12.*				

3. You would expect the answer to be "no". Reason - the climate gives the average figures over many years, while the weather is what it is like every day and changes

My notes:

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Now ask learners to complete activity 1.3 in their workbooks:

Type of activity	Resources
1.3 Pair work - questions on the diagrams of world climatic zones	Learner guide

Instructions to give to the learners

Activity 1.3:
In pairs, refer to the diagrams on world climatic zones in your Learner Guide (Fig. 7 and Fig. 8), then answer the following questions.

Activity 1.3

1.

Name of climatic zone	Between which latitudes?	Description of temperature
NORTH POLAR	North Pole and Arctic Circle	COLD
NORTH TEMPERATE	Arctic Circle and 35°N	COOL
NORTH SUB-TROPICAL	35°N and Tropic of Cancer	WARM
NORTH TROPICAL	Tropic of Cancer and Equator	HOT
SOUTH TROPICAL	Equator and Tropic of Capricorn	HOT
SOUTH SUB-TROPICAL	Tropic of Capricorn and 35°S	WARM
SOUTH TEMPERATE	35°S and Antarctic Circle	COOL
SOUTH POLAR	Antarctic Circle and South Pole	COLD

2. a) FALSE b) TRUE c) TRUE d) FALSE e) TRUE

Now ask learners to complete activity 1.4 in their workbooks:

Type of activity	Resources
1.4 Paragraph writing	Learner guide and own knowledge

Instructions to give to the learners

Activity 1.3:
Explain in your own words the difference between "weather" and "climate". Give some examples to illustrate your answer.

Activity 1.4

Weather refers to the current atmospheric conditions at a place - temperature, rainfall, humidity, wind direction, wind speed, cloud cover, etc. - and changes from minute to minute, hour to hour and day to day. Climate refers to the general weather conditions at a place over a month, a year or many years. It is sometimes called "average weather". One example for a trainee at Lonnoc RTC, east Santo, could be that the current weather at 12 noon on 6th June might be very hot and dry, with no wind and no clouds; however the climate for the nearest weather station (Pekoa) indicates that in June, it should be hot, with heavy rain falling from a cloud-covered sky and winds from the south-east.

My notes:

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Section 2 Differentiate between climate variability and climate change

Learner Guide: Page 20

After completing this section, the learner should be able to:

2.1 define "climate variability" and "climate change";
2.2 demonstrate how climate variability and climate change can be shown on graphs.

Concepts 2.1 and 2.2	Time frame	Activities related to the concepts
Difference between climate variability and climate change	**4 hours**	**Activities 2.1 & 2.2**
Climate variability and climate change as shown on graphs		

Please allow learners to complete activities 2.1 and 2.2 in their workbooks:

Type of activity	Resources
2.1 Definitions	Learner guide
Instructions to give to the learners	
Activity 2.1: Write your own definitions of "climate variability" and "climate change".	

Activity 2.1

Climate variability refers to the way that average annual temperatures and annual total rainfall for a place vary from year to year. In other words, it is how climate fluctuates (goes up and down) each year above or below a long-term average value. Warm and cold, wet and dry seasons are not the same from one year to the next. Climate variability in the Pacific is influenced by four key "drivers" - the Trade winds, the Inter-Tropical Convergence Zone, the South Pacific Convergence Zone and the El Niño Southern Oscillation.

Climate change refers to a long-term continuous change in the climate or in the range of weather (with more extreme events), measured over several decades, hundreds, thousands or millions of years, and supported by statistical evidence. Climate change is very slow. According to the Intergovernmental Panel on Climate Change, climate change refers to "any change in climate over time, whether due to natural variability or as a result of human activity."

One difference between them is that climate variability looks at how climate changes from one year to the next, while climate change looks at how the climate or range of weather changes over a much longer period of time - several decades, hundreds, thousands or millions of years.

2.2 Pair work - interpretation of graphs	Learner guide and own ideas

Instructions to give to the learners

Activity 2.2:

1. In section 2.2 of your Learner Guide, study the variability of December temperatures and rainfall at Bauerfield between the years 2010, 2011 and 2012. Then discuss this variability with a friend, and write down what you notice.
2. Discuss the graph on page 9 of your Learner Workbook with your friend, then answer questions a) to e).
3. Discuss the graph on page 10 of your Learner Workbook with your friend, then answer questions a) to d).

Activity 2.2

1. The average December temperature at Bauerfield increased markedly from 25.4°C in 2010 to 26.8°C in 2011, but then showed a decline to 26.6°C in 2012. So there is no clear trend. The December total rainfall was very variable from year to year, being 200 mm in 2010, only 20 mm in 2011, and then increasing to 190 mm in 2012. Again, there is no clear trend.

2. a) The average annual rainfall at Pekoa between 1960 and 2010 (2,600 mm)
   b) Not enough data collected to give a proper total.
   c) 1972
   d) 20
   e) The rainfall is very variable.

(Continued on the next page)

Activity 2.2 (continued)

3. a) It is the average of all monthly temperatures during one year. It is obtained by adding up all monthly temperatures for one year and dividing by 12.
   b) 2008. 25.7°C
   c) The long-term change in annual mean temperature.
   d) Because it shows a rise in annual mean temperature over a period of 25 years.

My notes:

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Section 3 Demonstrate the seasonal changes in Vanuatu's temperature and rainfall

Learner Guide: Page 23

After completing this session, the learner should be able to:

3.1: use a climograph to show how Vanuatu's temperature and rainfall change during the year;

3.2: construct a climatic graph for one of the meteo stations in Vanuatu.

Concepts 3.1 and 3.2	Time frame	Activities related to the concepts
Monthly changes in temperature and rainfall during the year in Vanuatu	5 hours	Activities 3.1 & 3.2
Construction of a climograph		

First allow learners to complete activity 3.1 in their workbooks:

Type of activity	Resources
3.1 Short talk	Learner guide
Instructions to give to the learners	
Activity 3.1: Refer to the table of average monthly temperatures and total monthly rainfall for Port Vila and the associated climograph in your Learner Guide. Divide into pairs. Each member of the pair takes it in turns to describe how Port Vila's temperature and rainfall change during the year. To guide you, make use of these questions suggested in your Learner Workbook: *Which are the hottest and the coldest months? What is the range of temperature? Do you think that the average monthly temperature changes very much during the year? Which are the wettest months? Which are the driest? Can we say that Port Vila has a hot, wet season and a cooler, drier season? Which are the months in each season?*	

Activity 3.1

You as facilitator must circulate around the class to make sure that each member of each pair is giving the talk to the other one. Suggest that each trainee talks about the graph. In addition to covering the answers required by the questions in the Learner Workbook, encourage trainees to add ideas of their own.

The hottest months are January, February and March. The coldest months are July, August and September, but they are not really cold at all (still "hot" by world standards). The annual range of temperature is 4°C. Thus the average monthly temperature doesn't really change very much during the year. The wettest months are January, February and March, with March having the most rainfall. The driest months are August and September. We can say that Port Vila has a hot, wet season from November through to April, and a cooler, drier season from May to October.

Now allow learners to complete activity 3.2 in their workbooks:

Type of activity	Resources
3.2 Drawing a climograph	Learner guide
Instructions to give to the learners	
Choose one meteorological station from the following: SOLA, PEKOA, LAMAP, WHITEGRASS, ANELGOWHAT. Draw a climograph for your chosen station on the graph paper provided in your Learner Workbook. Follow the instructions given on page 24 of your Learner Guide.	

Activity 3.2

You will need to go through the instructions for this activity very carefully. Read through page 22 of the Learner Guide with your trainees, and if necessary demonstrate how to do the graph on the blackboard or whiteboard.

Before asking the learners to start, check that the graph paper given on page 11 of the Learner Workbook is clear and dark enough. If not, give a separate piece of graph paper to everyone. The graph paper should have lines at cm and mm intervals.

It is important that temperature is plotted in pencil in the middle of the space given for each month (one centimetre wide), and that once plotted, the points are joined together with a red line. Use the temperature scale on the left hand side of the graph, in which one centimetre represents 10°C. Make sure that the red line enters the graph in January at the same height that it leaves the graph in December.

After plotting temperature, the top of each rainfall bar can be drawn in for each month, using the mm scale on the right of the graph. Then the whole bars can be drawn in and coloured, preferably in blue.

When the drawing is complete, the graph must be properly labelled, a title given and the scales indicated.

Each trainee only needs to draw one graph. But those who work quickly can draw two or more, then compare them.

My notes:

Section 4 Demonstrate processes in the water cycle

Learner Guide: Page 25

After completing this session, the learner should be able to:

4.1: define humidity and explain how heating can convert liquid water into water vapour through the process of evaporation;
4.2: demonstrate, using a diagram, that warm air can hold more water vapour than cold air;
4.3: draw a diagram to explain the water cycle and the processes of evapo-transpiration, condensation, precipitation, run-off and underground flow.

Concepts 4.1, 4.2 and 4.3	Time frame	Activities related to the concepts
Water vapour, humidity and evaporation	**9 hours**	**Activities 4.1, 4.2 and 4.3**
Warm air can hold more water vapour than cold air; condensation; orographic rainfall		
The water cycle and processes of evapo-transpiration, condensation, precipitation, run-off and underground flow		

Please allow learners to complete activities 4.1 and 4.2 in their workbooks:

Type of activity	Resources
4.1 Matching exercise	Learner guide
Instructions to give to the learners	
On page 12 of your Learner Workbook, match each of the items in List A with the correct word(s) in List B.	

Type of activity	Resources
4.2 Sentence completion	Learner guide
Instructions to give to the learners	
On page 12 of your Learner Workbook, complete the missing words in sentences 1 to 6.	

Activity 4.1

Trainees should join up the dots corresponding to the items in List A with the dots corresponding to items in List B.

1. Amount of water vapour in the air…… HUMIDITY
2. Change of water from gaseous to liquid state …… CONDENSATION
3. Rain occurring when warm moist air rises up a mountain…… OROGRAPHIC
4. Causes evaporation …… HEAT
5. Change of water from liquid to gaseous state …… EVAPORATION
6. Water in a gaseous state …… WATER VAPOUR
7. Visible drops of water/ice that fall from clouds …… PRECIPITATION

Activity 4.2

1. more
2. 16
3. Sun …… evaporate
4. condensation
5. precipitation
6. rain shadow

My notes:

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Now please allow learners to complete activity 4.3 in their workbooks:

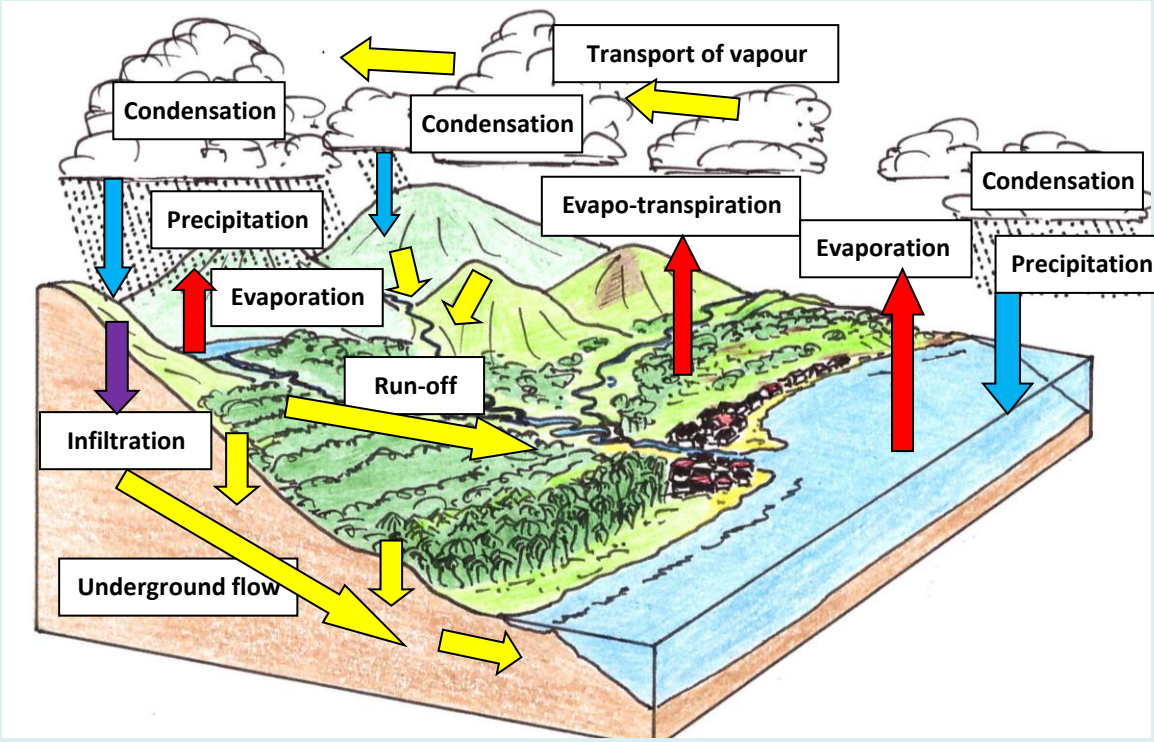
Type of activity	Resources
4.3 Completing and explaining a diagram	Learner guide, own ideas

Instructions to give to the learners

1. Complete the labelling of the diagram on page 13 of the Learner Workbook to show the different processes taking place in the water cycle. Choose your labels from the list below the diagram. Note that some of the labels will appear more than once.
2. Copy the outline on page 14 of the Learner Workbook on to a large sheet of paper. Then complete it to show a simple diagram of the water cycle, with all the main processes.
3. Form pairs. One person in each pair should explain the water cycle to the other person, using the diagram completed in number 2 above.

Activity 4.3

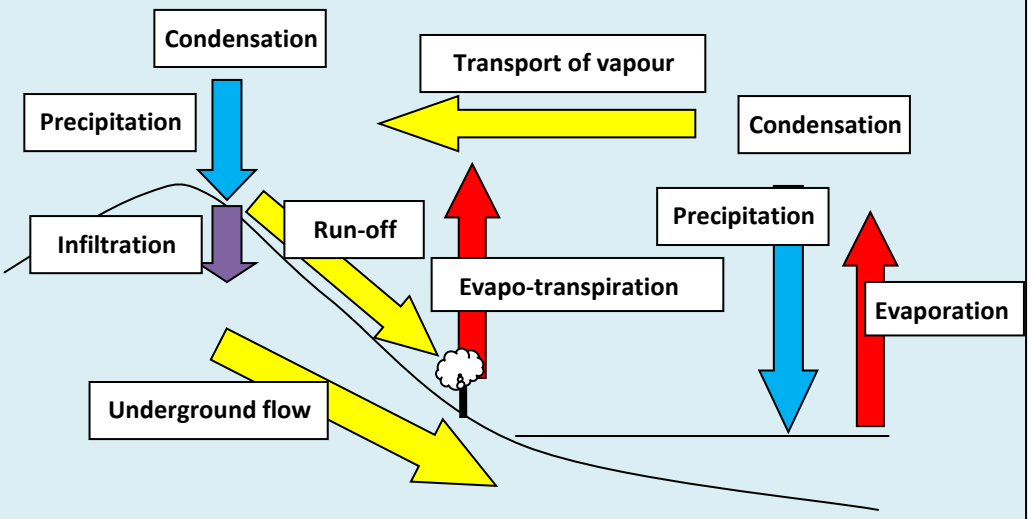
1.



Pierce, C., 2014

Activity 4.3

2.



3. In each pair of learners, one explains the water cycle to the other, using the diagram that he/she has drawn in no. 2 above.

   At this point, the learners might want to learn the Evaporation song, which goes to the tune of "O my darling, o my darling, o my darling Clementine …..". See next page!

Pierce, C., 2014

Activity 4.3 (continued)

Here is the "evaporation" song from *"Learning about climate change the Pacific way: a Teacher's Guide"* (SPC & GIZ, 2014, p. 21):

Evaporation
Condensation
Precipitation all around
Accumulation
Evaporation
The water cycle goes round and round

The learners could do the following actions as they sing the song. They could also make up their own actions:

Evaporation - lifting arms with palms out from knee level to above their heads
Condensation - arms wrapped around themselves, with body shivering
Precipitation - fingers wriggling, arms going up and down as rain
Accumulation - arms outspread, crouching down then bringing hands together
Evaporation - rising up again, lifting arms upwards
Water cycle - arms circling

My notes:

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Section 5 Demonstrate factors that cause variations in climate within Vanuatu

Learner Guide: Page 28

After completing this session, the learner should be able to:

5.1: demonstrate how and why latitude and altitude cause differences in climate from island to island and within islands;
5.2: identify those areas and seasons of Vanuatu that are more liable to drought, and those that may have problems of flooding.

Concepts 5.1 and 5.2	Time frame	Activities related to the concepts
How latitude, altitude and distance from the sea cause differences in climate from island to island in Vanuatu	**9 hours**	**Activities 5.1a, 5.1b, 5.2a and 5.2b**
Areas and seasons in Vanuatu that are more liable to drought, and those that may have problems of flooding		

Please allow learners to complete activities 5.1a and 5.1b in their workbooks:

Type of activity	Resources
5.1a Individual exercise: short answer questions	Learner guide
Instructions to give to the learners	
Say whether each of the statements 1 to 10 is TRUE or FALSE.	

Type of activity	Resources
5.1b Discussion in pairs	Learner guide and own ideas
Instructions to give to the learners	
Work with a friend to find answers to questions 1 to 4.	

Answer to question in Learner Guide page 33

If the temperature at sea level is 27°C, the temperature at 1000 metres will be 17°C .
Calculation: 27 - (1000 ÷ 100) = 27 - 10 = 17°C

Activity 5.1a

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Activity 5.1b

1. Because the Sun's rays are received at a high angle and are concentrated into a small area. Or: Because the sunlight is directly overhead.
2. Because they are closer to the Inter-Tropical Convergence Zone (the zone of rising air and heavy rainfall). They are also closer to the South Pacific Convergence Zone.
3. Because the Sun's rays first heat the ground, and then the ground heats the air above it. So the further you go away from the ground level, the further you go from the source of heating, and the air gets cooler.
4. Because it is facing the prevailing Trade winds, which are coming from the south-east. It is on the windward side of Malakula, where warm moist air rises up and is cooled, therefore causing condensation and precipitation.

My notes:

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Now please allow learners to complete activities 5.2a and 5.2b in their workbooks

Type of activity	Resources
5.2a Answers to class discussion	Learner guide and ideas from class discussion
Instructions to give to the learners	
After discussing the questions on page 36 of your Learner Guide, write your answers in your Learner Workbook.	

Type of activity	Resources
5.2b Group work - drawing a sketch map	Learner guide and own ideas
Instructions to give to the learners	
Form small groups of 3 – 4 trainees. Draw a large sketch map of your island on a piece of butcher paper. On it, show those places that are in the greatest risk of river flooding during a cyclone, and those that are the most likely to suffer from a long period of drought.	

Activity 5.2a

Suggested answers are as follows. Other answers are also possible.

1. Rain-shadow areas of larger islands, e.g. NW Santo, NW Malakula, NW Efate, NW Erromango, NW Tanna. Also, very low islands that do not receive much orographic rainfall, e.g. Aniwa, Moso, Lamen.
2. July, August, September and October - the cooler, drier season.
3. Coastal areas and river valleys in the south-east of larger islands, e.g. SE Aneityum, SE Efate, SE Malakula, SE Santo. Also high islands in the north of Vanuatu with many rivers, e.g. Pentecost, Maewo, Vanua Lava.
4. November, December, January, February, March, April - the cyclone season.

Activity 5.2b

Encourage each group to draw a large sketch map. It does not matter if the map is very accurate. The map could show high ground, forested areas, the direction of prevailing winds and important rivers (if there are any). Areas that have been cleared for cultivation on sloping land could be shown. Areas that are at risk from river flooding will normally be low and flat and near the coast. They could be shaded in blue. Areas in danger of drought might be in the north-western side of the island, or they might cover the whole of the island if it is fairly flat. They could be shaded in yellow.

My notes:

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Section 6 Demonstrate the key drivers that control climate variability in the tropical Pacific

Learner Guide: Page 35

After completing this session, the learner should be able to:

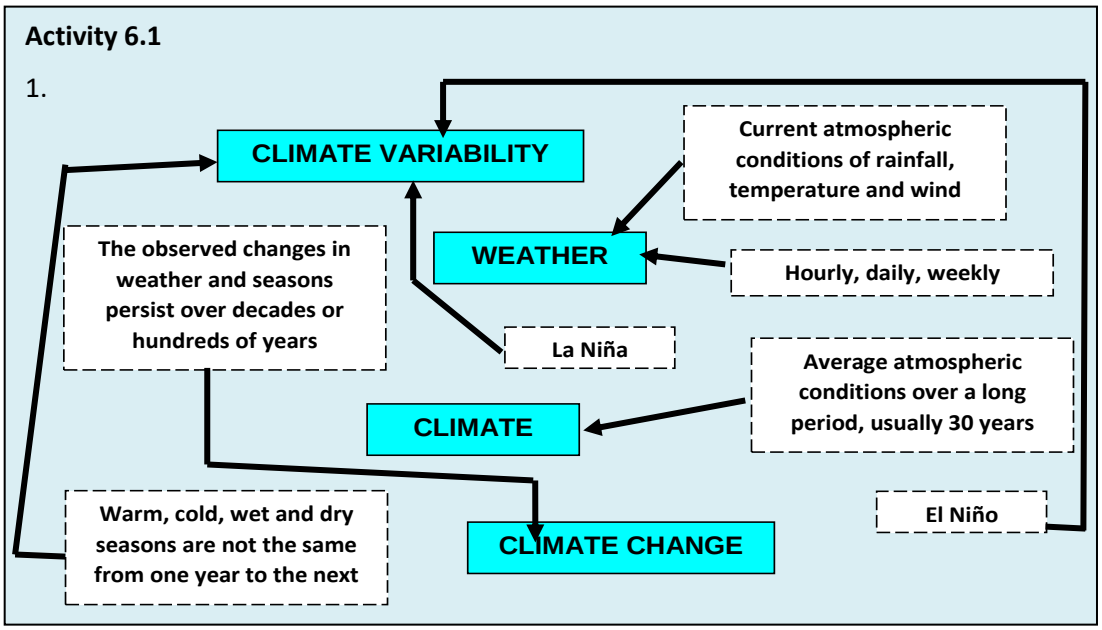
6.1: explain the meaning of a convergence zone and "climate drivers";
6.2: identify the Trade winds, the Inter-Tropical Convergence Zone and the South Pacific Convergence Zone on a large map of the Pacific;
6.3: give simple definitions of an "El Niño" season and a "La Niña" season;
6.4: give a talk on "ENSO" and movement of the warm pool in the South Pacific.

Concepts 6.1, 6.2, 6.3 and 6.4	Time frame	Activities related to the concepts
Convergence zones and "climate drivers"	**13 hours**	**Activities 6.1, 6.2, 6.3a, 6.3b, 6.4**
Identification of Trade winds, the ITCZ and the SPCZ on a map of the Pacific		
El Niño and La Niña periods, movements of the "warm pool", and the El Niño Southern Oscillation		

Firstly, allow learners to complete activities 6.1 and 6.2 in their workbooks:

Type of activity	Resources
6.1 Definitions	Learner guide
Instructions to give to the learners	
1. In the top box on page 17 of your Learner Workbook, draw arrows to join the words in the white boxes with the correct terms in the four blue boxes. 2. Write your own definitions of "convergence zone" and "climate drivers"	

Type of activity	Resources
6.2 Identification of features on a map	Learner guide
Instructions to give to the learners	
Using the map (Fig. 31) on page 38 of your Learner Guide, show the following on the map provided: Equator, Inter-Tropical Convergence Zone, South Pacific Convergence Zone, Trade winds, "warm pool" of water in the western Pacific.	

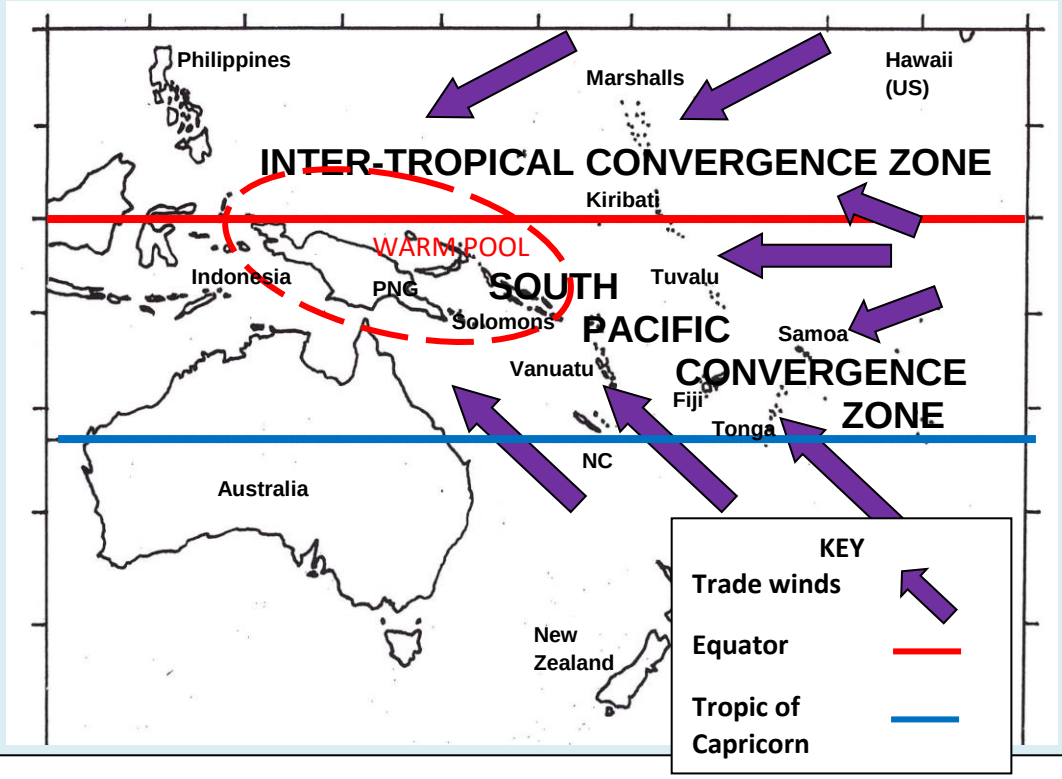


Activity 6.1 (continued)

2. Convergence zone: a line, area or place where two air masses / bodies of air / winds from different directions are meeting together and one or both of them is forced to rise, so making the air cool down and causing the water vapour in the rising air to condense and produce rain.

   Climate drivers: Things or factors that cause, shape or have a strong influence over the climate. Examples in the South Pacific are the Trade winds, the Inter-Tropical Convergence Zone, the South Pacific Convergence Zone and the El Niño Southern Oscillation.

Activity 6.2



Pierce C., 2014

My notes:

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Now please allow learners to complete activities 6.3a and 6.3b in their workbooks:

Type of activity	Resources
6.3a Short answers	Learner guide
Instructions to give to the learners	
Answer questions 1 to 8 on page 19 of your Learner Workbook	

Type of activity	Resources
6.3b Pair work - analysis of a picture	Learner guide and own ideas
Instructions to give to the learners	
In pairs, analyse the picture on page 20 of your Learner Workbook, which shows what might happen on the imaginary Pacific island of Pasifika during an El Niño period. Then write down 6 ways in which El Niño is affecting people, property and the environment.	

Activity 6.3a

1. It moves eastwards across the Pacific, sometimes reaching Peru.
2. It makes the SPCZ shift to the north and east.
3. Much drier conditions. Droughts may occur.
4. It intensifies and moves back westwards across the Pacific, with more warm water than normally.
5. It makes the SPCZ shift to the south and west.
6. Warmer, wetter conditions, with more cyclones and flooding.
7. No. Normal weather in Vanuatu, with a hot, wet season from November to April and a cooler, drier season from June to October.
8. During a La Niña season.

Activity 6.3b

Many answers are possible. Here are some suggestions:

1. The river has dried up and contains little water.
2. Livestock do not have enough water to drink and may die.
3. Fresh water sources have dried up, so people must obtain drinking water from water trucks.
4. Vegetation and crops die.
5. There are bush fires.
6. Fish ponds dry up, and fish farming cannot be carried out.
7. Much less shade to shelter people.
8. Health problems if people drink polluted water.
9. People may migrate away from drought-stricken areas to other islands.

My notes:

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Before starting on activity 6.4, it is suggested that you and the learners watch the DVD *"Klaod Nasara"*, which is a short cartoon film about El Niño and La Niña. Then ask the learners to work on activity 6.4:

Type of activity	Resources
6.4 Pair work - giving a talk about ENSO and its effects	Learner guide and own ideas

Instructions to give to the learners

Form pairs. Each pair should prepare a short talk on the El Niño-Southern Oscillation to give to others in the class or to a group of people in the local community. You should watch the cartoon film "Klaod Nasara", and also think about how a real El Niño or La Niña event has affected your community in the past.

You will need to draw large diagrams to illustrate your talk. You should describe how the warm pool moves from side to side across the Pacific, and how this affects rainfall patterns in Vanuatu. Some suggested diagrams are shown in the Learner Workbook.

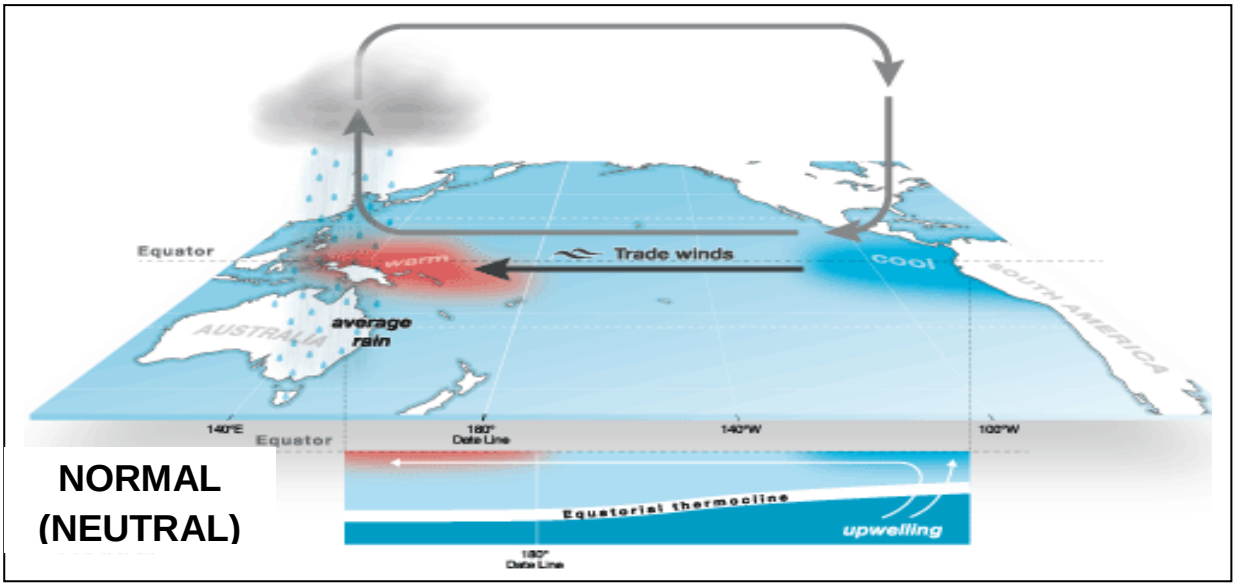
Activity 6.4

Make sure you get a copy of the DVD cartoon film *"Klaod Nasara",* which should be available at your Rural Training Centre. If not, you can contact the GIZ office in Port Vila. The cartoon film will help learners get a better understanding of ENSO and its effects in Vanuatu, and they will enjoy it.

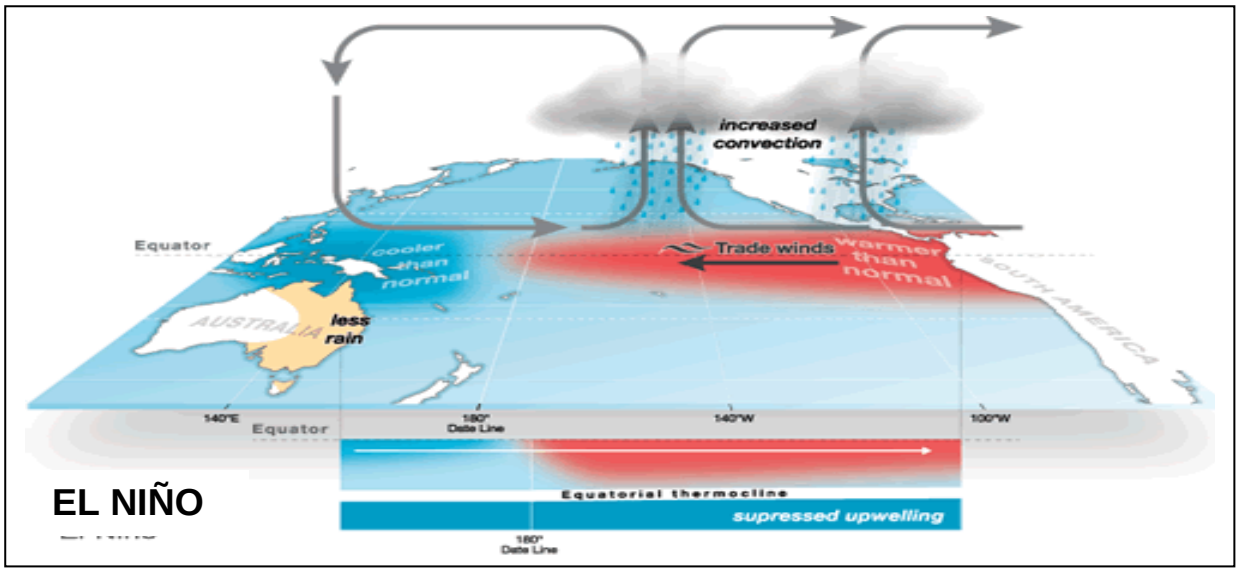
You may also wish to show them the extra maps on ENSO provided on the next page of this facilitator guide (Fig. 1).

After this, they can form pairs and start preparing their talks on ENSO. Ask them to draw on any experience they have had of an El Niño or a La Niña event in their own communities. Remind them that they can make use of the diagrams in both the Learner Guide and the Learner Workbook. You may need to explain the difference between a map (as in Figs 31 and 32 of the Learner Guide) and a cross-section (as in Figs 33-35 of the Learner Guide and Figs. 9-11 of the Learner Workbook).

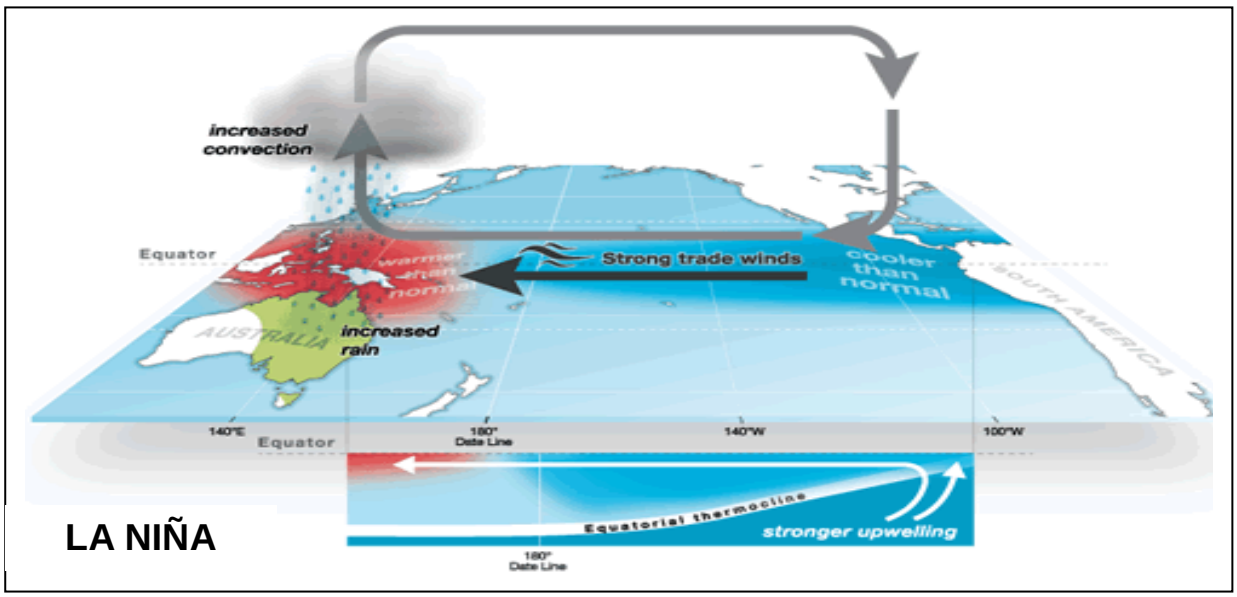
It is not easy to present this topic to others, so you must have lots of patience and give them plenty of encouragement. If possible, the talks should be given to people in the community, but if this is difficult, then pairs can present their talks to each other. What is important is that they convey to others that ENSO is something natural that has been taking place for thousands, perhaps millions of years, and that it is an important driver of climate variability in Vanuatu. The weather patterns associated with "El Niño" and "La Niña" seasons should be emphasized.



NORMAL (NEUTRAL)



EL NIÑO



LA NIÑA

Australian Bureau of Meteorology, 2014

My notes:

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Section 7 Illustrate the main features of a tropical cyclone and its associated weather

Learner Guide: Page 42

After completing this session, the learner should be able to:

7.1: draw a diagram of a tropical cyclone in the southern hemisphere;
7.2: demonstrate features of the weather associated with a tropical cyclone;
7.3: tell stories of personal experiences during a tropical cyclone.

Concepts 7.1, 7.2 and 7.3	Time frame	Activities related to the concepts
Structure of a tropical cyclone in the southern hemisphere	**6 hours**	**Activities 7.1, 7.2a, 7.2b and 7.3**
Weather associated with a tropical cyclone, including variations in winds		

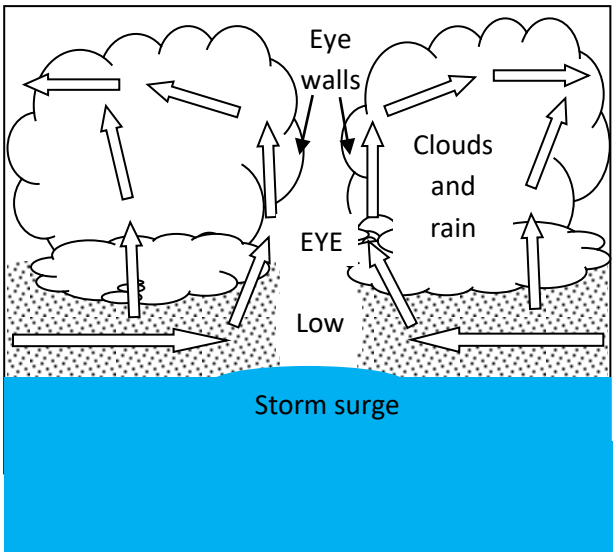
Please allow learners to complete activity 7.1 in their workbooks:

Type of activity	Resources
7.1 Drawing a diagram	Learner guide
Instructions to give to the learners	
In the box provided, draw a diagram to show a cross-section through a tropical cyclone. Show the features listed.	

Activity 7.1

Before you start this activity, remind the learners that they learned something about tropical cyclones in CCDRR01, and that they might like to look back at this.

On the right is an example of the completed diagram.



Pierce, C., 2014

My notes:

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Please allow learners to complete activity 7.2a and 7.2b in their workbooks:

Type of activity	Resources
7.2a Sentence completion	Learner guide
Instructions to give to the learners	
Complete the missing words in the sentences provided.	

Activity 7.2a

As a tropical cyclone approaches, the winds become stronger. They are most destructive in the eye walls of the cyclone. In the eye of the cyclone, there is no wind and the pressure is very low. After the eye passes over you, the winds blow in the opposite direction. A cyclone brings torrential rainfall, which often causes flooding and landslides. A very dangerous part of the cyclone is the storm surge, which can cause great destruction to villages along the coast.

Type of activity	Resources
7.2b Pair work - analysis of a picture	Learner guide, own ideas

Instructions to give to the learners

The picture shows what might happen in the imaginary Pacific island of Pasifika after a severe cyclone during a La Niña period. In pairs, analyse the picture and write down eight ways in which the cyclone has affected people, property and the environment.

Activity 7.2b

Many answers are possible. Here are some suggestions:

1. The river has flooded its banks.
2. Buildings have been destroyed.
3. Food gardens and commercial crops have been destroyed.
4. Wind farm /windmills destroyed.
5. Many people have been injured.
6. Coconut palms and most trees have been uprooted.
7. Infrastructures destroyed, e.g. roads, bridges, electricity poles and wires.
8. Health problems if people drink polluted water.
9. Damage to boats and shipping.
10. People in the villages have no homes and are migrating to towns.

My notes:

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Please allow learners to complete activity 7.3 in their workbooks:

Type of activity	Resources
7.3 Telling stories in a group	Learners' own experiences

Instructions to give to the learners

The class can divide into small groups of 5 or 6 people. In each group, learners can share stories from their own personal experiences of what it was like to be in a cyclone. As far as possible, you should say where you were when the cyclone arrived, and give the cyclone's name and approximate date of arrival. Indicate whether there were any warnings, what you and community did to prepare and protect yourselves, what the weather conditions were like, and what kind of damage was done. This story-telling can be also be done as a whole class activity, if you and the facilitator prefer.

Activity 7.3

If you as facilitator and the learners prefer, this activity can be done as a whole class activity rather than in small groups. You should ask each story-teller to be as specific as possible, giving names and dates and recounting any interesting things that happened.

An extra map is included on the next page for you to show the class (Fig. 2). It is a reminder that Vanuatu suffers from many cyclones!

My notes:

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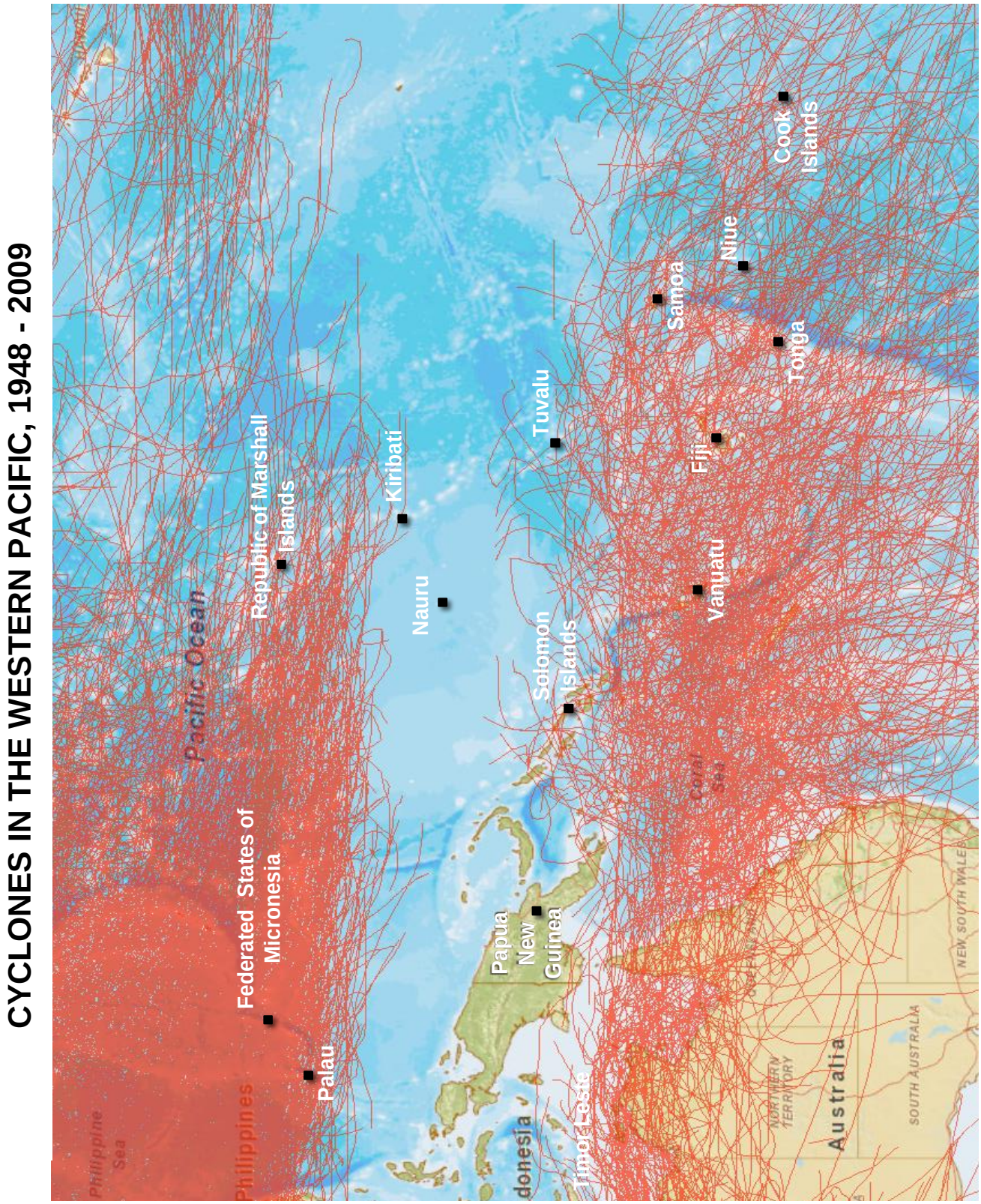
Fig. 2: Cyclones in the western Pacific, 1948 - 2009



Section 8 Demonstrate long-term climatic change in Vanuatu

Learner Guide: Page 47

After completing this session, the learner should be able to:

8.1: use graphical data to show that key climate indicators are changing in Vanuatu.

Concepts 8.1	Time frame	Activities related to the concepts
Evidence of changes in Vanuatu's temperature and rainfall patterns, sea levels and ocean pH	**7 hours**	**Activities 8.1a, 8.1b and 8.1c**
Likely future changes in Vanuatu's weather, sea levels and ocean pH		

Please allow learners to complete activity 8.1a in their workbooks:

Type of activity	Resources
8.1a Pair work - analysis of graphs, maps and diagrams	Learner guide, own ideas

Instructions to give to the learners

1. In pairs, study these graphs of temperature and rainfall changes in Port Vila, then answer the questions that follow.
2. Still in pairs, study the map on page 26 of your Learner Workbook, then answer the questions that follow.
3. Study the summary of future changes in weather, sea level and oceanic acidity that are likely to take place in Vanuatu and answer the questions that follow.

Activity 8.1a

1. Graphs of long-term temperature and rainfall change in Port Vila:
   a) Both climate change and climate variability
   b) Lower than normal
   c) Lower than normal
   d) Higher than normal
   e) Higher than normal
   f) Yes
   g) It has decreased
   h) Yes

2. Map of sea level rise in the western Pacific:
   a) 10-11 mm per year
   b) 4-5 mm per year
   c) Northern islands / TORBA province
   d) Rise in atmospheric and oceanic temperatures, and expansion of sea water upwards
   e) Yes. Because the amount of CO_2 and other greenhouse gases in the atmosphere is increasing. These gases absorb the outgoing heat from the earth.

3. Diagram of future changes:
   Things likely to increase: Wet season rainfall, number of days with extreme rainfall, ocean acidification, temperature, number of very hot days, intensity of cyclones.
   Things likely to decrease: Dry season rainfall, frequency of cyclones.

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Now please allow learners to carry out the experiments in activity 8.1b:

Type of activity	Resources
8.1b Paired activity - an experiment	Resources indicated on p. 28 of the Learner workbook

Instructions to give to the learners

You may wish to conduct the following experiment, which is suggested in the Teacher Guide for *"Learning about climate change the Pacific way"* (SPC & GIZ, 2014).
It will help you to better understand the impacts of climate change on the oceans.

Activity 8.1b

This is an optional activity, but it will give the learners some practical experience of the effects of climate change on the oceans. If you decide to carry out the experiment, give time for the learners to leave the classroom and collect the materials they need. They can conduct the experiment in pairs in their own time, then come together to discuss their findings. You should allow at least one hour for this practical/field work.

Finally, please allow learners to complete activity 8.1c in their workbooks:

Type of activity	Resources
8.1c Individual reflection	Learner guide, own ideas

Instructions to give to the learners

Think about the changes in climate, sea level and ocean acidity that are likely to occur in Vanuatu in the future. Write down some of the ways in which people, their properties and the environment might be affected. Then reflect upon some of the steps that could be taken to reduce the negative impacts of these changes.

Activity 8.1b

The purpose of this activity is to get learners to think for themselves about what is going to happen in the future because of the changing climate. Encourage them to think about how a warmer climate and more extreme climatic events will impact on physical things such as sea level, flooding, cyclones and droughts. Ask them to think about how the changing climate, sea level rise and ocean acidification will impact on fishing, the health of coral reefs and coastal settlements. Ask them to reflect on impacts on social and economic development - agriculture, tourism, rural-urban migration, food security, health, education, land issues, community conflicts, belief systems, etc.

It is very important that trainees think about these issues for themselves before they proceed to discuss them in future units of this course.

You, too, as a facilitator, should be reflecting on these issues. In the space on the next page, write down some of your own ideas.

My notes:

Illustrations

Illustration and page number	Source
Cover	Secretariat of the Pacific Community (SPC) and Deutsche Gesellschaft für Internationale Zusammenarbait GmbH (GIZ), 2014, *Learning about Climate Change the Pacific Way: A Visual Guide – Vanuatu*. Accessed on 12 December 2014 at http://www.spc.int/images/climate-change/cc-project/Vanuatu-complete.pdf
Completed diagram of processes in the water cycle (p. 21)	Pierce, C., 2014, *Processes in the water cycle*
Simple diagram of the water cycle (p. 21)	Pierce, C., 2014, *Completed simplified diagram of the water cycle*
Completed matching exercise (p. 26)	Pierce, C., 2014, *Completed matching exercise on definitions*
Completed map of the South West Pacific (p. 27)	Pierce, C., 2014, *Completed map of the South West Pacific*
Diagrams of El Niño and La Niña (p. 30)	Bureau of Meteorology, Government of Australia, 2014, *What are El Niño and La Niña events?: The three phases of ENSO,* accessed on 13 January 2015 at http://www.bom.gov.au/climate/enso/history/ln-2010-12/three-phases-of-ENSO.shtml
Profile of a tropical cyclone (p. 32)	Pierce, C., 2014, *Profile of a tropical cyclone*
Cyclones on the western Pacific, 1948-2009 (p. 35)	Salesa, K., Vanuatu Meteorology and Geohazards Department, 2012, *Current Status of Climate Services in Vanuatu (*slide 7 of a power point presentation at the Regional Workshop on Climate Services at the National Level for LDCs in Asia and the Pacific, held in Bangkok, Thailand, on 8 October 2012)

What will I do differently next time?

Take some time to **reflect** on your own activities as facilitator of these two Units:

Then write down five of the most important lessons you have learned:

What will I do differently next time?
1.
2.
3.
4.
5.

As a facilitator, you have gained hands-on experience in the application of the two Unit standards. You may have experienced difficulties that the developers did not anticipate.

So it will be very helpful if you could give your comments below. They will contribute towards the future revision of these Units, and should be brought to the attention of the Training Manager of your institution.

Difficulties I had with these Units	Recommended changes to address the difficulties
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