LEARNING STRAND 2
SCIENTIFIC AND CRITICAL THINKING SKILLS

MODULE 3: WHY IS IT STILL HOT DURING THE RAINY SEASON?

ALS Accreditation and Equivalency Program: Junior High School

WHY IS IT STILL HOT DURING THE RAINY SEASON?

SCIENTIFIC AND CRITICAL THINKING SKILLS
MODULE 3

DEVELOPMENT TEAM

User's Guide

For the ALS Learner:

Welcome to this Module entitled Why Is It Still Hot During the Rainy Season? under Learning Strand 2 Scientific and Critical Thinking Skills of the ALS K to 12 Basic Education (BEC).

This module was designed to provide you with fun and meaningful opportunities for guided and independent learning at your own pace and time. You will be able to process the contents of the learning resource while being an active learner.

This module has the following parts and corresponding icons:

	Let's Get to Know	This will give you an idea of the skills or competencies you are expected to learn in the module.
	Pre-assessment	This part includes an activity that aims to check what you already know about the lesson. If you get all the answers correct (100%), you may decide to skip this module.
	Setting the Path	This section provides a brief discussion of the lesson. This aims to help you discover and understand new concepts and skills.
	Trying This Out	This comprises activities for independent practice to solidify your understanding and skills of the topic. You may check the answers to the exercises using the Answer Key at the end of the module.
	Understanding What You Did	This includes questions that process what you learned from the lesson.
	Sharpening Your Skills	This section provides an activity that will help you transfer your new knowledge or skill in real-life situations or concerns.
	Treading the Road to Mastery	This is a task which aims to evaluate your level of mastery in achieving the given learning competency.
	Don't Forget	This part serves as a summary of the lessons in the module.
	Explore More	In this portion, another activity will be given to you to enrich your knowledge or skill of the lesson learned. This also tends retention of learned concepts.
	Reach the Top	This part will assess your level of mastery in achieving the learning competencies in each lesson in the module.
	Answer Key	This contains answers to all activities in the module.
	Glossary	This portion gives information about the meanings of the specialized words used in the module.

At the end of this module you will also find:

References   This is a list of all sources used in developing this module.

The following are some reminders in using this module:

1. Use the module with care. Do not put unnecessary mark/s on any part of the module. Use a separate sheet of paper in answering the exercises.
2. Don't forget to answer the Pre-assessment before moving on to the other activities included in the module.
3. Read the instruction carefully before doing each task.
4. Observe honesty and integrity in doing the tasks and checking your answers.
5. Finish the task at hand before proceeding to the next.
6. Return this module to your ALS Teacher/Instructional Manager/Learning Facilitator once you are through with it.

If you encounter any difficulty in answering the tasks in this module, do not hesitate to consult your ALS Teacher/Instructional Manager/Learning Facilitator. Always bear in mind that you are not alone.

We hope that through this material, you will experience meaningful learning and gain deep understanding of the relevant competencies. You can do it!

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LET'S GET TO KNOW

Tuguegarao   Davao

Having spent their school vacation in Metro Manila, Josh and Jeck went back to their provinces to continue studying. Once, they arrived home in August, they asked each other how they were doing. In Davao, Josh said that it was already the rainy season because it would not stop raining in their area even if there was no typhoon. He was afraid that classes might get suspended the next day. Jeck could not relate because it had been too hot in Tuguegarao since he arrived. How could this be happening? Let us help Josh and Jeck find out about this phenomenon.

MODULE 3
PRE-ASSESSMENT

Directions: Choose the letter of the best answer. Write your answers on a separate sheet of paper.

1. Which of the following refers to the earth's layers of gases?

   A. atmosphere   C. radiation
   B. greenhouse   D. air

2. Which of the following is NOT a gas in the atmosphere?

   A. nitrogen   C. oxygen
   B. iodine   D. carbon dioxide

3. Which of the following sequences show the layers of the atmosphere from closest to farthest from the earth's surface?

   A. thermosphere, exosphere, troposphere, stratosphere, mesosphere
   B. mesosphere, thermosphere, exosphere, troposphere, stratosphere
   C. troposphere, stratosphere, mesosphere, thermosphere, exosphere
   D. exosphere, troposphere, stratosphere, mesosphere, thermosphere

4. Which of the following layers of the atmosphere primarily cause the changes in weather patterns?

   A. stratosphere and exosphere
   B. mesosphere and troposphere
   C. thermosphere and mesosphere
   D. troposphere and stratosphere

5. Which of the following is NOT an atmospheric condition that affects the formation of weather?

   A. population   B. temperature   C. moisture   D. pressure

6. Which of the following is true about greenhouse gases?

   A. Greenhouse gases come from green-colored plants.
   B. Greenhouse gases regulate the earth's temperature.
   C. Greenhouse gases are gases formed inside the house.
   D. Greenhouse gases shield the earth from radiation.

7. Which of the following processes is NOT involved in a greenhouse effect?

   A. Some amount of heat is bounced back to the earth's surface.
   B. A greenhouse gas will not allow all of the heat to return to space.
   C. Earth's surface begins to cool once it comes in contact with sunlight.
   D. Excess heat on earth will be released into the atmosphere.

8. Which of the following groups contain a gas that is NOT a greenhouse gas?

   A. carbon dioxide, water, perfluorocarbons
   B. water, nitrous oxide, sulfur hexafluoride
   C. methane, nitrous oxide, perfluorocarbons
   D. argon, nitrous oxide, perfluorocarbons

9. Which of the following is the major contributor to the drastic increase in greenhouse gas levels?

   A. industrial/man-made sector
   B. photosynthetic process
   C. ozone layer depletion
   D. global warming

10. Which of the following is NOT a result of climate change?

   A. stronger rainfalls   C. droughts
   B. hyperthermia   D. longer seasons

11. Which of the following is an evidence of global warming?

    A. lowering sea levels
    B. thickening of snow covers in the Northern Hemisphere
    C. increasing numbers of intense tropical cyclone activities
    D. decreasing surface (land and ocean) temperature

12. Which of the following is true about climate types and seasons in the Philippines?

    A. The Philippines has two climate types and two seasons.
    B. The Philippines has two climate types and four seasons.
    C. The Philippines has four climate types and four seasons.
    D. The Philippines has four climate types and two seasons.

13. Which of the following best describes a place with high humidity?

    A. The atmosphere of the place has high moisture content.
    B. The atmosphere of the place has a low temperature.
    C. The atmosphere of the place has high pressure.
    D. The atmosphere of the place has low wind speed.

14. Which of the following does NOT refer to adaptation to climate change?

    A. adjusting to the climate
    B. minimizing the causes of climate change
    C. decreasing the negative effects of climate change
    D. coping with the expected future climate

15. Which of the following is NOT considered as an adaptive measure to climate change?

    A. early warning systems   C. reduction of smoke-belching cars
    B. climate-resilient infrastructure   D. mangrove protection

WHAT IS THE DIFFERENCE BETWEEN WEATHER AND CLIMATE?

At the end of this lesson, you will be able to:

- describe the difference between weather and climate (LS2SC-DR-PSE-AE/JHS-19);

- discuss the factors affecting weather and climate (LS2SC-DR-PSE-AE/JHS-19); and

- explain the four types of climate in the Philippines (LS2SC-DR-PSE-LE/AE/JHS-20).

TRYING THIS OUT

1. Your parents had just finished rearranging the family closet.

2. You found two sets of clothes in different closets.

3. *Question*: Why did your parents arrange these clothes for each closet?

4. *Question*: If you suddenly encounter a hot sunny day in August while preparing for school, would you still wear the same clothes in the closet? If yes, why? If not, encircle the proper attire for that school day.

5. Question: If the news tells you that it will rain on April 11, would you still wear the same clothes in the closet? If yes, why? If not, encircle the proper attire.

UNDERSTANDING WHAT YOU DID

The most common explanation why your parents would have chosen the set of clothes shown in each closet is that they have years of experience and they know that it is almost always sunny and dry from March to May. Meanwhile, it is almost always rainy and cold from July to September.

Our planet has a series of sunny days and rainy days. These, in science, are called weather and climate. More often than not, people interchange the words, thinking that they have the same meaning. But, we will soon discover that there is a way to describe Earth's "days" and "years."

The Earth is composed of layers of gases called the **atmosphere**. These gases make life possible by surrounding our planet for thousands of kilometers. Examples of gases in the atmosphere are nitrogen, oxygen, argon, carbon dioxide, and others (hydrogen, ozone, methane, and water vapor).
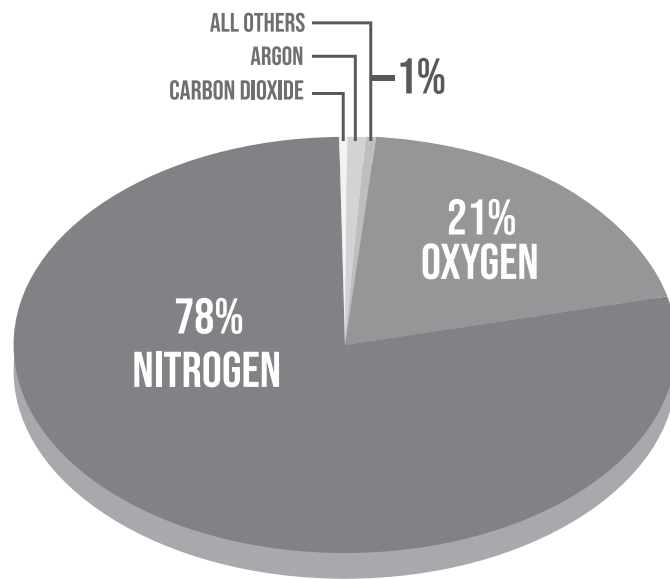
Figure 1.1. Gases in the atmosphere.

As mentioned earlier, the atmosphere is made up of several layers extending to thousands of kilometers. These are the **troposphere**, **stratosphere**, **mesosphere**, **thermosphere**, and **exosphere**. The temperature, thickness, and composition (what it is made of) of each layer are different.
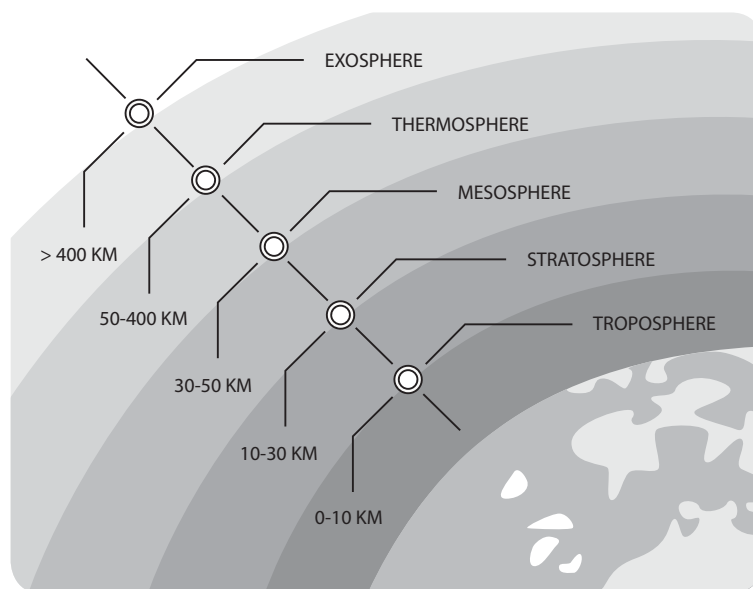
Figure 1.2. Layers of the atmosphere.

The troposphere and stratosphere are the main reasons why we experience sunny, windy, and rainy days. Although it is sunny here in the Philippines, it can be cold in Japan. This is because the composition of the atmosphere in the two countries is different. Conditions such as temperature, clouds, rainfall, moisture, atmospheric pressure, and wind can tell you whether today, tomorrow, or the rest of the week will be sunny or not. The result of these conditions is called **weather.**

Figure 1.3. Different types of weather.

In our activity, the clothes you wear are mainly dependent on what the day is like – whether it is sunny or rainy. No matter what the season may be, you are aware that tomorrow may be different from today. Additionally, it can change from sunny to rainy within the same day. This is a distinguishing property of weather - it can change within a short period of time (hours, days, weeks, or months).
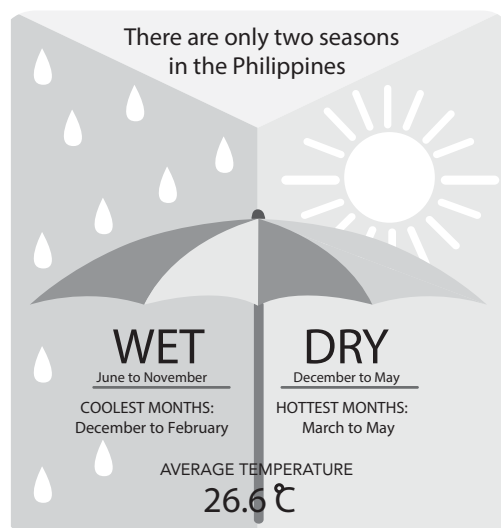
Figure 1.4. Seasons in the Philippines.

The set of clothes for each closet tells you which condition will most likely occur in the coming months. The March to May closet tells you to wear loose outfits because it will be sunny most of the time, while the July to September closet tells to wear your jacket because it will be rainy most of the time. One sunny day in August

does not remove the fact that it will be a rainy month, nor a rainy day during the dry month of April. This is because experiences and studies have shown that there is one dominant weather for these months. For our planet, when you get the average of the atmospheric conditions (or simply the weather) in a certain region over a long period of time, we call it **climate**.
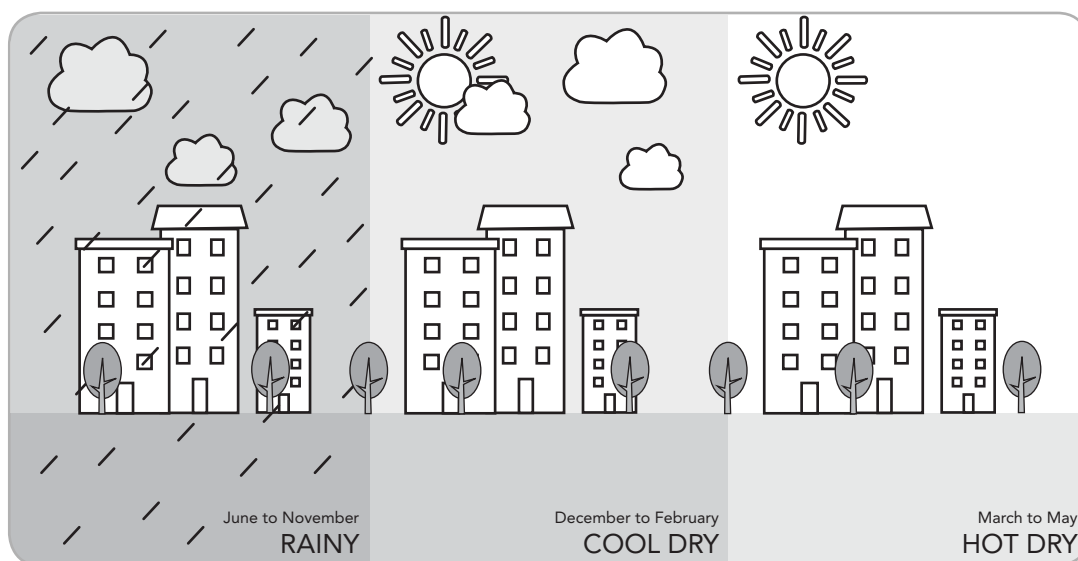
Figure 1.5. Weather vs. Climate.

The climate of a region usually varies for different seasons. For example, dry seasons mean having warm and humid weather, while rainy seasons mean having cold and wet weather. By recording these observations for a long period of time (years, decades, or centuries), we will be able to know the climate.

The Philippine climate is tropical and maritime, which means that our country has an average of high temperature, high humidity, and abundant rainfall. This climate is similar to the climate of the countries of Central America (e.g., Costa Rica, Nicaragua, and Panama).

To determine the climate of the Philippines, factors such as temperature, humidity, and rainfall play the most important roles.

1. **Temperature** is a measurement of the heat in a substance. In this case, when we measure how hot a certain region is, we can tell its temperature. The Philippines has an average annual (yearly) temperature of 26.6°C.

2. **Humidity** refers to the moisture content (amount of water vapor) of the atmosphere. Since the Philippines has a high temperature and is close to large bodies of water, it has high humidity. The Philippines has an average monthly humidity between 71% in March and 85% in September, which means that the air can hold water at 71% to 85% of its capacity.

3. **Precipitation** is the falling of any form of liquid or solid from the atmosphere to the surface of the earth. In the Philippines, the most common form of precipitation is rainfall. The average amount of rainfall in

As of 06-Nov-2015 02:00 PM
21 stations are updated

Figure 1.6. Temperature map/index of the Philippines in 2019.

10%
Relative Humidity

90%
Relative Humidity
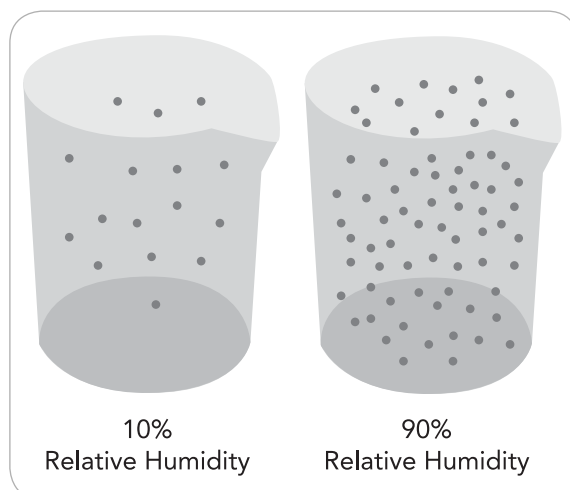
Figure 1.7. Higher values of relative humidity means more water molecules are held by air.

the Philippines varies from 965 to 4, 064 millimeters annually.
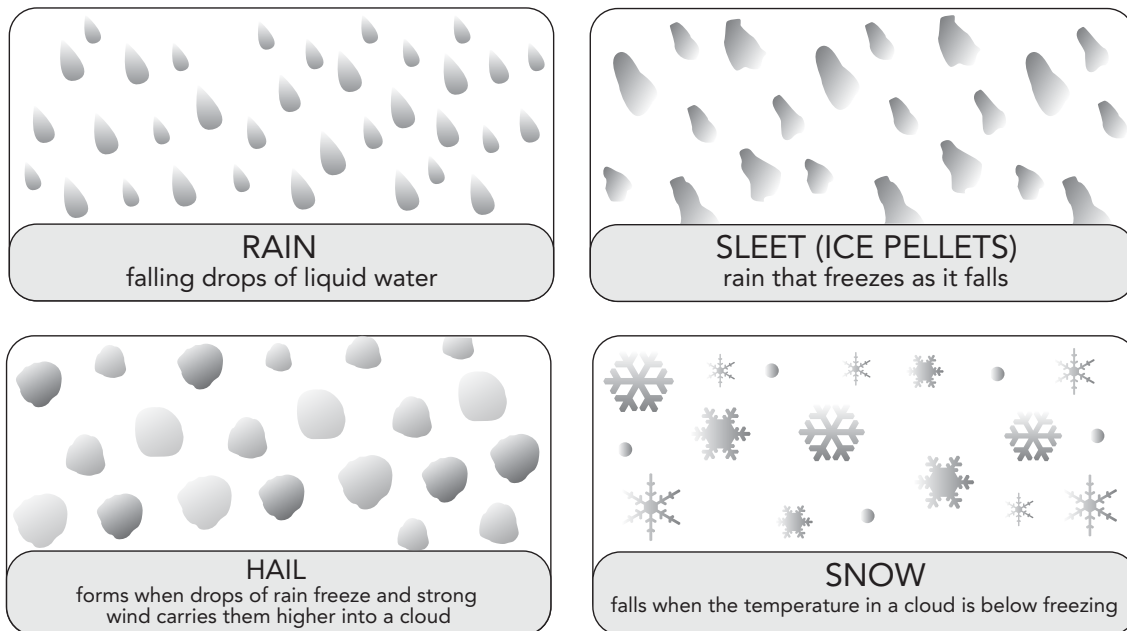
Figure 1.8. Types of precipitation.

Using the factors mentioned above as bases, the climate of the Philippines can be divided into two major seasons:

1. Rainy Season – June to November

2. Dry Season – classified further as:
   a. **Cool Dry Season** – December to February
   b. **Hot Dry Season** – March to May

I. **Directions**: On a separate sheet of paper, write **TRUE** or **FALSE**.

_____ 1. The atmosphere is the layer of water that surrounds the Earth.

_____ 2. The atmosphere extends for thousands of kilometers.

_____ 3. The atmosphere is mainly oxygen.

_____ 4. Weather is a result of the atmospheric conditions of the Earth over a short period of time.

_____ 5. Weather changes every week. These changes can vary greatly.

_____ 6. Climate is the result of the average atmospheric conditions in a certain region over a long period of time.

_____ 7. The weather of a region or city is its climate, averaged over many years, decades, or centuries.

_____ 8. The climate of the Philippines is tropical and maritime. It is characterized by relatively low temperature, high humidity, and minimal rainfall.

_____ 9. Humidity refers to the moisture content of the atmosphere.

_____ 10. The climate of the Philippines can be divided into two major seasons: rainy season and windy season.

Aside from having seasons, climates can also be classified according to distribution of rainfall for a certain region (how often rainfall occurs in a certain region).

The Philippines has four climate types:

TYPE	SEASONS	WHEN	WHERE
I	Dry	November to April	• Western parts of Luzon • Mindoro • Negros • Palawan
	Wet	May to October	
II	Dry	None	• Catanduanes • Sorsogon • Eastern part of Albay • Eastern and Northern parts of Camarines Norte and Sur • Eastern part of Samar • Large portions of Eastern Mindanao
	Wet (strong)	November to January	
III	Dry (weak)	November to April	• Western part of Cagayan • Isabela • Northern Mindanao • Eastern Palawan
	Wet (weak)	May to October	
IV	None	Even distribution of rainfall throughout the year	• Batanes • Northeastern Luzon • Southwest Camarines Norte • West of Camarines Sur • Albay • Northern Cebu • Bohol • Central, Eastern, and Southern Mindanao

Retrieved from: https://dirp4.pids.gov.ph/ris/eid/pidseid0502.pdf

Climate Map of the Philippines

Type I - Two pronounced seasons: dry from November to April, wet during the rest of the year.

Type II - No dry season with a very pronounced rainfall from November to April and wet during the rest of the year.

Type III - Seasons are not very pronounced; relatively dry from November to April, wet during the rest of the year.

Type IV - Rainfall is more or less evenly distributed throughout the year.

Figure 1.9. Climate map of the Philippines. (Retrieved from: http://bagong.pagasa.dost. gov.ph/information/climate-philippines)

WHY IS IT STILL HOT DURING THE RAINY SEASON?

II. Directions: On a separate sheet of paper, write **TRUE** or **FALSE**.

_____ 1. There are five types of climate in the Philippines.

_____ 2. Typhoons have little effect on the climate and weather conditions of the Philippines.

_____ 3. A great portion of the rainfall, humidity, and cloudiness is due to the influence of monsoons.

_____ 4. Frequent rainfall makes the southern Philippines very desirable for agriculture and industrial development.

_____ 5. A Type I climate has two pronounced seasons: dry from November to April and wet throughout the rest of the year.

_____ 6. The western parts of Luzon, Mindoro, Negros, and Palawan experience a Type II climate.

_____ 7. A Type II climate is characterized by the absence of a wet season but with a very pronounced maximum drought period from November to January.

_____ 8. A Type III climate has seasons that are not very pronounced but are relatively dry from November to April and wet during the rest of the year.

_____ 9. The western part of Cagayan is partly sheltered from tradewinds but are open to habagat and are frequented by tropical cyclones.

_____ 10. A Type IV climate is characterized by a more or less even distribution of rainfall throughout the year.

LESSON 1
TREADING THE ROAD TO MASTERY

Directions: For each test below, write your answers on a separate sheet of paper.

I.   Using a Venn Diagram, describe the differences and similarities of weather and climate. Use the figure and guide questions below.

Weather   **Climate**

Weather and Climate

How is weather **different** from climate?

What are the **similarities** of weather and climate?

How is climate **different** from weather?
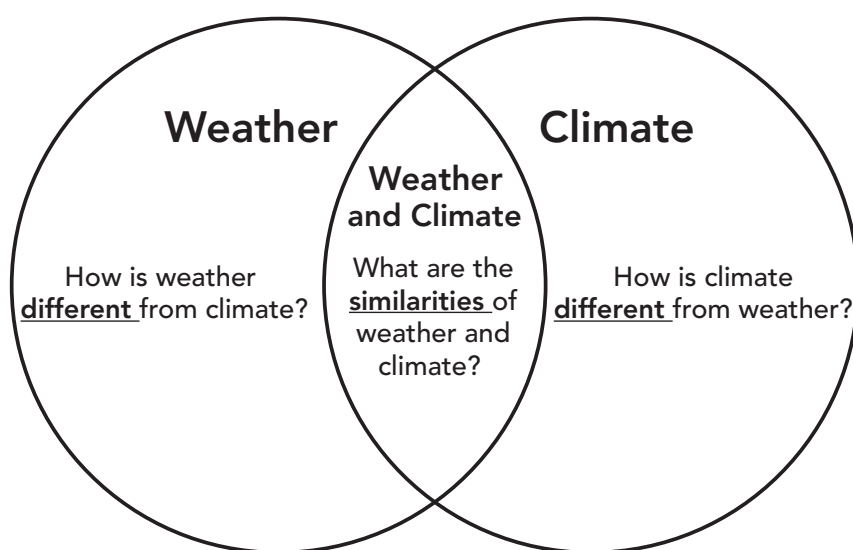
II.   How do the factors affecting weather and climate change from the dry season to rainy season? Explain in three to five sentences.

III. Compare the factors affecting weather and climate to the four types of climate in the Philippines during the month of April. Write ">" for greater than, "<" for less than, and "=" for equal.

TEMPERATURE		
TI _____ TII		
TII _____ TIII		
TIII _____ TIV		

HUMIDITY		
TI _____ TII		
TII _____ TIII		
TIII _____ TIV		

RAINFALL		
TI _____ TII		
TII _____ TIII		
TIII _____ TIV		

![Lesson icon]

WHAT IS THE DIFFERENCE BETWEEN GLOBAL WARMING AND CLIMATE CHANGE?

At the end of this lesson, you will be able to:

- discuss the greenhouse effect as a cause of global warming (LS2SC-DR-PSE-LE/AE/JHS-21);

- discuss pollution as a cause of global warming (LS2SC-DR-PSE-LE/AE/JHS-21);

- describe the difference between global warming and climate change (LS2SC-DR-PSE-LE/AE/JHS-22); and

- identify the evidence of climate change around the world (LS2SC-DR-PSE-LE/AE/JHS-22).

TRYING THIS OUT

1. It is a cold December night at home and you are ready to sleep.

2. *Question*: Before going to bed, your mom asks to keep your body warm. So, she gives you a blanket. Why does your mom think it is effective?

3. *Question*: Your mom still thinks that it is still too cold. So she gives you another blanket. What do you think would happen?

4. *Question*: If you end up using five blankets to sleep with, what would your body normally feel?

5. *Question*: How do the layers of the blankets affect the temperature of the air under the blanket? How will the same air affect your body?

UNDERSTANDING WHAT YOU DID

Just as an ordinary blanket would help keep your body warm, our atmosphere makes sure that our planet is also warm enough to keep all living things, including us, alive. By definition, the atmosphere is the layers of gases on Earth. The gases which serve as our planet's "blanket" are called **greenhouse gases**.

Figure 2.1. A greenhouse traps sunlight inside to keep the air warm and humid for plant life.

As sunlight passes from space through the atmosphere, it heats our land and oceans. Since there is excess heat, the warmed Earth will release it back to space. A greenhouse gas will not allow all of the heat to return to space. Instead, it will absorb some and reflect them back to our land and oceans. This process, called the **greenhouse effect**, keeps our planet warm. Without it, Earth would be too cold which could mean the end of life in general.

Figure 2.2. The greenhouse effect involves the trapping of sunlight passing through the atmosphere thus increasing the Earth's temperature.

Greenhouse gases can be produced by natural processes and human activities. Examples of these gases are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and industrial gases (hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride). Water vapor can also be considered as a greenhouse gas because of the large bodies of water on Earth. It absorbs thermal energy, further warming the Earth.

2%
FLUORINATED GASES

6%
NITROUS OXIDE (N_2O)

16%
METHANE (CH_4)

76%
CARBON DIOXIDE (CO_2)
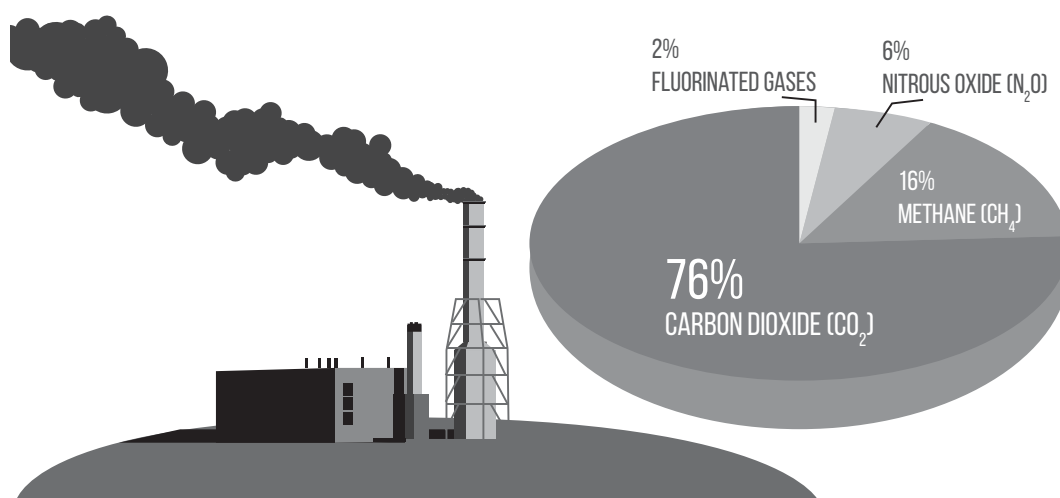
Figure 2.3. Greenhouse gases in the atmosphere.

In the past 200 years, greenhouse gases have continued to increase in levels. This is because as years go by, more and more factories, cars, and other industrial (**man-made**) sectors have been built. Fossil fuel is a popular example. This type of fuel comes from carbon (plants and animals) that had been stored deep in the Earth. When factories burn carbon to make fossil fuel (called **combustion**), carbon dioxide is released into the atmosphere. Excess levels of these emissions are called **pollution**.

Figure 2.4. Greenhouse gases from fossil fuels.
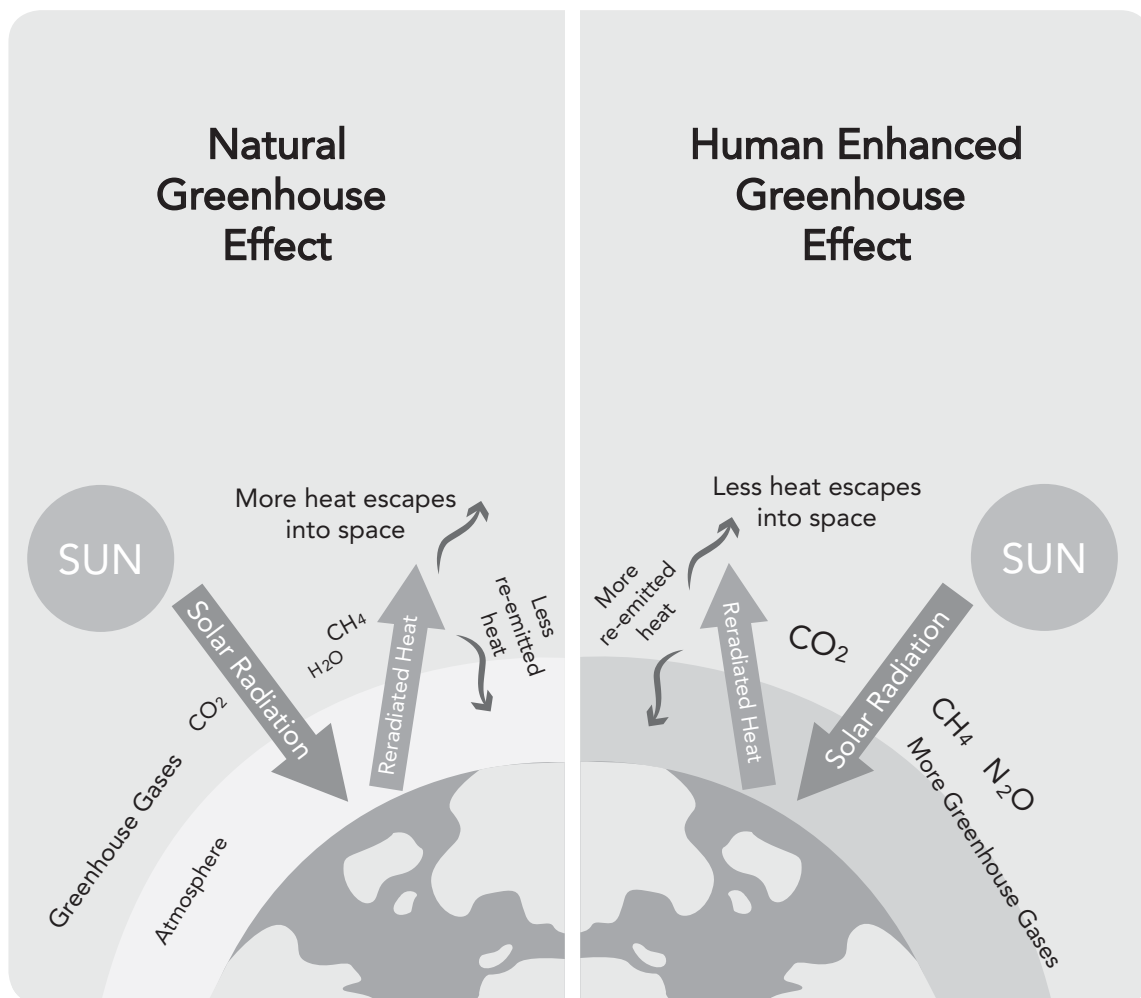
Figure 2.5. Natural vs. Man-made greenhouse effect.

According to the Intergovernmental Panel on Climate Change (IPCC), the increase in greenhouse gases is alarming to many because it makes our planet hotter by the rising of the average global temperature in the last century. Just like adding more blankets to your warm body, having more greenhouse gases means that heat stays around the Earth and makes it uncomfortable. This phenomenon is commonly known as **global warming**.

HEAT WAVE   DRY SPELL   TROPICAL
                                      CYCLONES

DROUGHT   LANDSLIDE
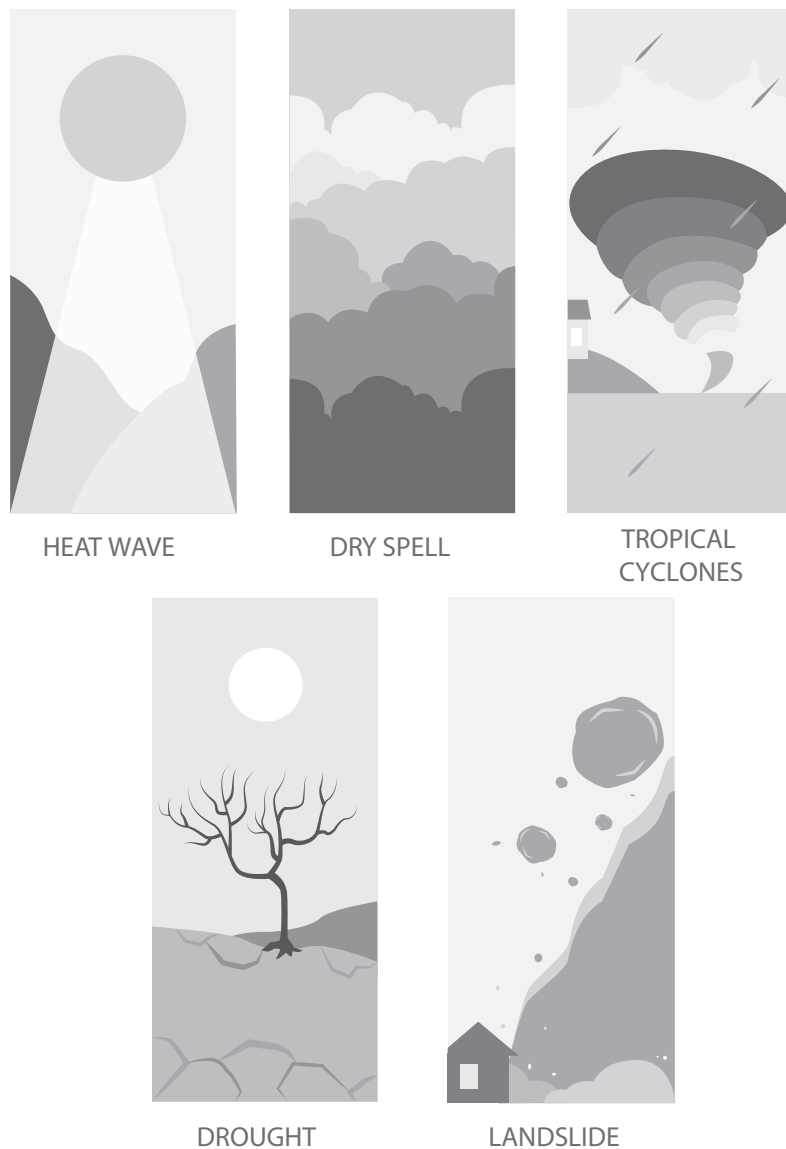
Figure 2.6. Extreme weather events caused by man-made greenhouse effect.

Although it might not be too obvious, changes in the Earth's temperature can cause serious consequences such as stronger rainfalls and snowfalls, droughts, cloudiness, humidity, and longer seasons. As the average of these weather systems continue to shift, we have now caused what is also known as **climate change**.

SHARPENING YOUR SKILLS

I.   **Directions**: On a separate sheet of paper, write **TRUE** or **FALSE**.

_____ 1. Greenhouse gases allow sunlight to freely pass through the Earth's atmosphere and heat the land and oceans.

_____ 2. Greenhouse gases will not let all of the sunlight (from Earth) pass through the atmosphere and radiate it back down to Earth.

_____ 3. Greenhouse gases are produced through natural processes only.

_____ 4. Water vapor is the most abundant greenhouse gas and plays an important role in regulating the climate.

_____ 5. Atmospheric concentrations of several important greenhouse gases have increased significantly since large-scale industrialization began around 200 years ago.

_____ 6. Fossil fuel combustion converts oxygen that had been stored deep in the Earth to carbon dioxide which enters the atmosphere.

_____ 7. Burning fossil fuels and performing other human activities have caused a large increase in carbon dioxide concentrations.

_____ 8. Global warming refers only to the Earth's rising surface area, while climate change includes warming and the "side effects" of warming.

_____ 9. Global warming may also mean human-caused warming. Climate change can mean human-caused changes or natural ones.

_____ 10. As the average of weather continues to change toward rising global temperature, climate change can happen.

While some people do not believe in global warming, the IPCC had already provided evidence of the Earth's rising temperature. The IPCC said that warming of the climate system is caused by the increase in greenhouse gases from man-made activities in the last 50 years or so.
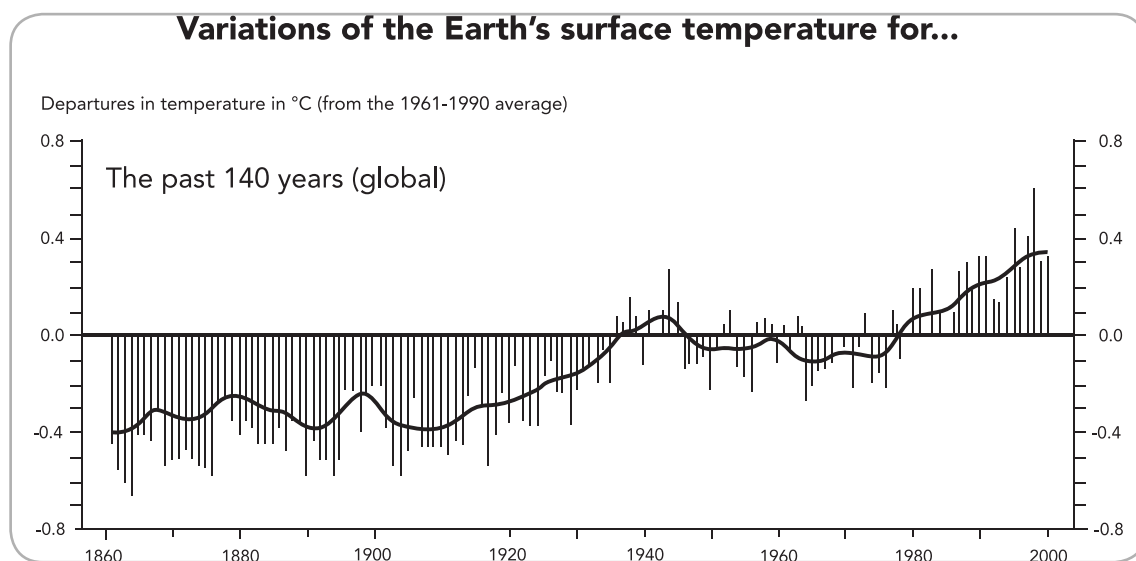
Figure 2.7. Global mean temperature anomalies since the mid-19th century compared with the 1961-1990 average. (Retrieved from: http://bagong.pagasa.dost.gov.ph/information climate-change-in-the-philippines)

Figure 2.7 shows the 0.74°C increase in average global temperature during the last 150 years compared with the 1961-1990 global average. It has evolved into a worldwide concern because poor developing countries are becoming more vulnerable to the extreme changes of temperature.

The IPCC also provided evidence of global warming:

1. rising surface (land and ocean) temperature
2. rising sea levels
3. decreasing snow covers in the Northern Hemisphere
4. cold days, cold night, and frost becoming less frequent
5. more frequent hot days, hot nights, and heat waves
6. increasing numbers of intense tropical cyclone activities

II. **Directions**: Identify what is/are being described in each statement. Write your answer on a separate sheet of paper.

_____ 1. Evaluates the risks of climate change and provides objective information to governments and various communities.

_____ 2. Main source of greenhouse gases as cause of the Earth's warming during the last 50 years or so.

_____ 3. Increase in global mean temperature during the last 150 years (number).

_____ 4. Most vulnerable sector from the steep increase in temperature since the mid-20th century.

_____ 5.

_____ 6.

_____ 7.

six evidence of global warming

_____ 8.

_____ 9.

_____ 10.

TREADING THE ROAD TO MASTERY

Directions: Think of a forest fire that happened in the Philippines and explain how it affected the following:

1. greenhouse gases
2. pollution
3. global warming
4. climate change

In two to three sentences, write a brief explanation for each number on a separate sheet of paper.

SETTING THE PATH

HOW DO PEOPLE ADAPT TO CLIMATE CHANGE?

At the end of this lesson, you will be able to:

describe how people adapt to climate change (LS2SC-ASPSE-LE/AE/LJHS/AJHS 23); and

explain why people need to adapt to climate change (LS1CS/EN-W- PSE-AJHS-23).

TRYING THIS OUT

1. You have been assigned to a home for the elders.
2. Your job is to attend to the needs of the older adult in the home.
3. *Question*: Lolo John is feeling cold, but he does not want to wear a jacket nor a sweater. What can you do to help him?

4. *Question*: Lolo Ermil is feeling hot but does not want to remove his jacket. What can you do to help him?

5. *Question*: Lola Nanette is having trouble reading what she is typing on her phone but does not want to wear glasses. What can you do to help her?

LESSON 3
UNDERSTANDING WHAT YOU DID

When faced with a challenge to think beyond what you are used to, it can become too tiring. But, you will soon realize that a problem can be solved in many ways. Just like how you would deal with the elders in the activity. Since you cannot simply force them to do something they do not want to, you will be the one to adjust to their needs. You are expected to adapt.

According to the National Aeronautics and Space Administration or NASA (n.d.), climate change is a global problem experienced in different scales locally. This phenomenon is bound to last for decades and centuries to come. Therefore, humanity will continue to endure the effects of climate change.
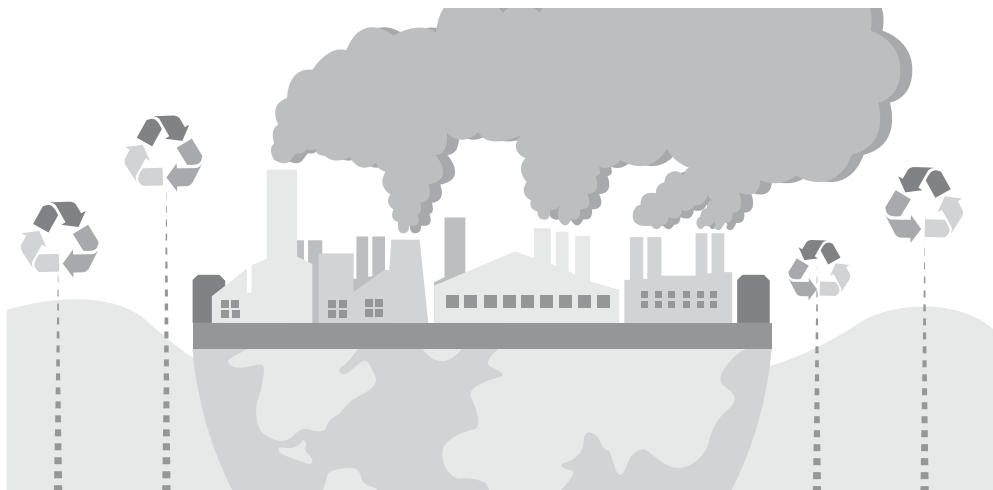
There are two ways to respond to climate change and its effects. **Mitigation** is the reduction of the flow of greenhouse gases into the atmosphere, thereby minimizing the causes and maximizing the solutions. **Adaptation** is the adjustment to the actual climate or expected future climate, thereby finding ways to decrease the negative effects. In this lesson, we will be focusing on how people should adapt to climate change. Adaptation is important especially for people living in the Philippines because the country is considered as one of the vulnerable countries to the negative effects of climate change.

Based on a report by the Global Commission on Adaptation, there are five ways of adaptation that countries should prioritize:

1. Early Warning Systems (EWS)

EWS are devices that provide accurate forecasts of incoming storms, heatwaves, or other extreme weather events. According to the report, if an EWS can give at least a 24-hour forecast, damages can be reduced by 30%. Imagine a community that loses five out of ten houses (50%) during a typhoon. If an EWS is used, 50% is reduced to 20% which means eight houses can now be saved.
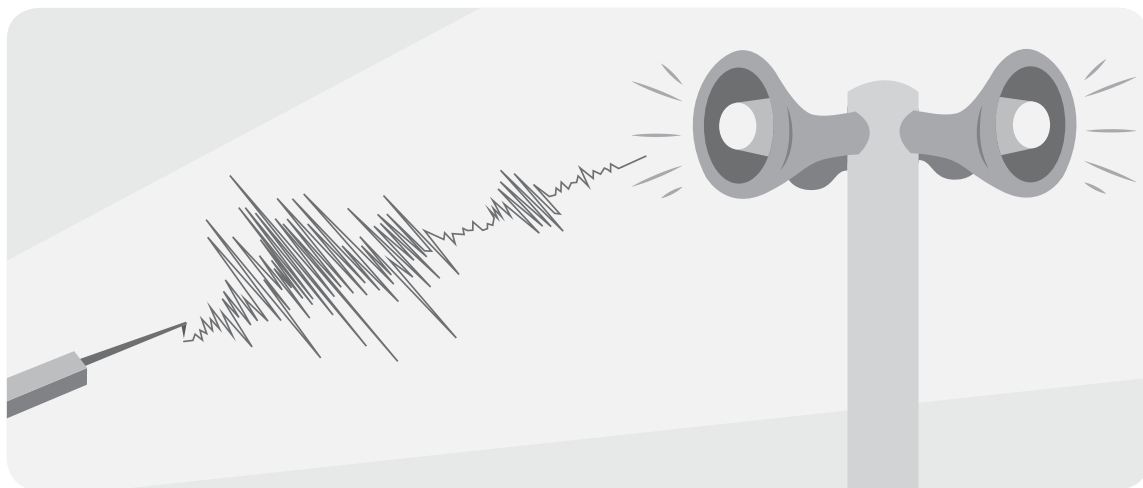
Figure 3.1. Early warning systems – seismograph (left) used to indicate abnormal movements of the earth which could lead to earthquakes or volcanic eruptions, and sirens (right) to inform members of a community to prepare, monitor and/or evacuate.

2. Climate-resilient infrastructure

Improving the living conditions of each household, including housing, water, sanitation, drainage, and waste management, can minimize vulnerability and increase adaptive capacity. The report states that although there is a 3% increase in the cost of construction, there is also around a 200-peso benefit for every estimated 50 pesos cost.

Figure 3.2. A good housing plan is important to reduce vulnerabilities of a family.

3. Improving dryland agriculture

As our main source of food, agriculture should be kept safe during extreme weather events. This can be done by investing in drought-resistant crops (examples are cassava, sweet potato, and chickpeas or garbanzo beans) and modernizing irrigation systems.
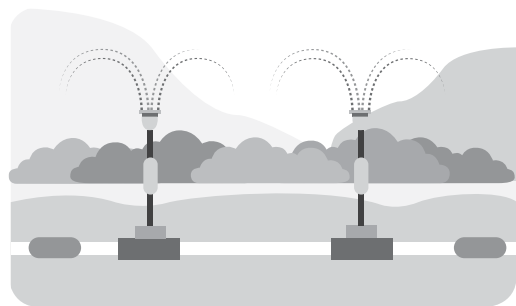
Figure 3.3. Irrigation system on farms.

4. Mangrove protection

Mangroves are trees that grow in coastal swamps. They reduce the impact of storm surges in coastal areas. According to a report, mangroves can protect up to eighteen million people during coastal flooding. Mangroves can also reduce the amount of greenhouse gases since they can readily absorb excess carbon dioxide in the atmosphere.

Figure 3.4. Mangroves growing in coastal swamps.

Figure 3.5. Mangroves in Puerto Princesa, Palawan.

5. Making water resources management more resilient

Almost 3.6 billion people in the world do not have access to enough water for at least one month every year. Focusing on the construction of water infrastructures (groundwater wells, surface-water intakes, dams, reservoirs, storage tanks, drinking-water facilities, pipes, and aqueducts) and watersheds (areas where multiple streams or rivers drain excess water) can increase the supply of clean water.

Figure 3.6. Examples of water infrastructures (groundwater wells, dams, and storage tanks).
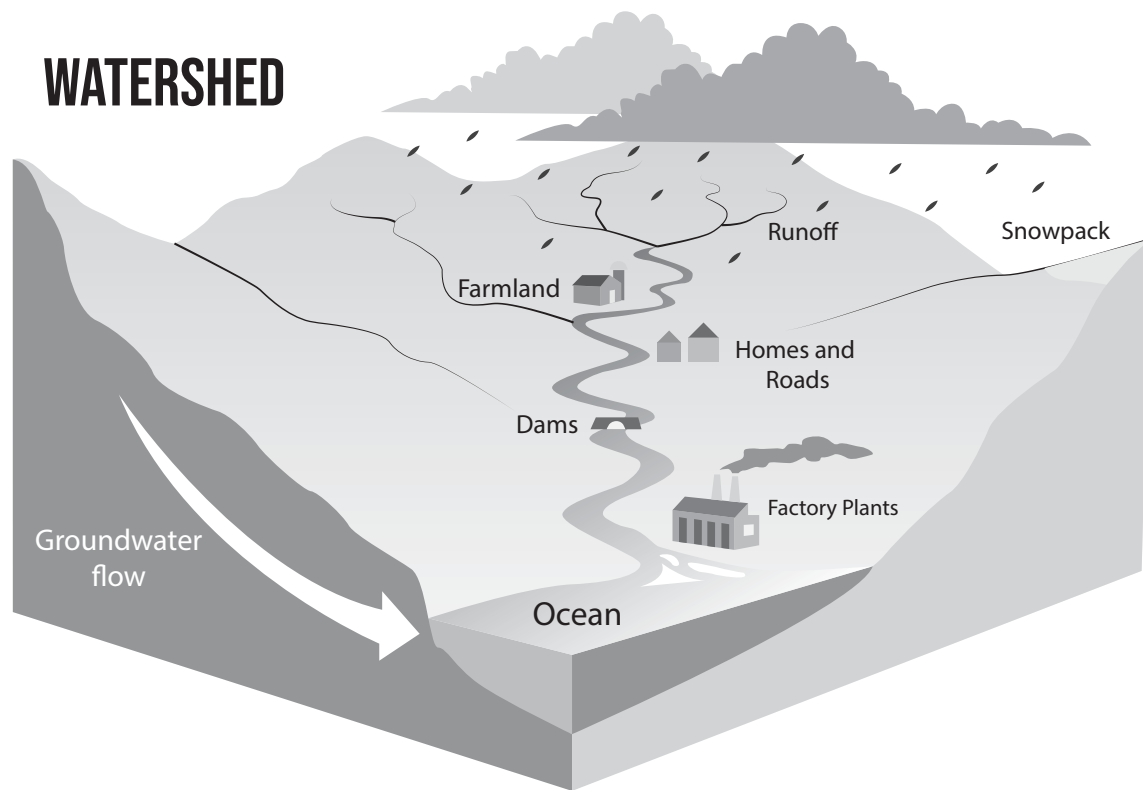
WATERSHED

Figure 3.7. Watersheds as collection basins from other water bodies.

LESSON 3
SHARPENING YOUR SKILLS

I. **Directions**: Look around your community. Using the checklist below, identify if the given adaptation strategies are available. Provide an explanation for each number in three to five sentences. Write your answers on a separate sheet of paper.

ADAPTATION STRATEGY	IS THIS AVAILABLE IN YOUR COMMUNITY?	
	YES WHAT IS ITS PURPOSE?	NO DOES YOUR COMMUNITY NEED IT? WHY OR WHY NOT?
1. Early Warning System		
2. Climate-resilient infrastructure		
3. Improving dryland agriculture		
4. Mangrove protection		
5. Making water resources management more resilient		

II. **Directions**: Interview a leader, preferably a barangay captain or president of the homeowners' association, in your community using the questions below. Write your reflections for each number on a separate sheet of paper.

1. What is the most common weather disturbance in your community? What are its negative effects?

2. Why is the community vulnerable to these negative effects?

3. How does the community adapt to these negative effects? Are they effective? Why? Why not?

4. How does the government help the community in adapting to these negative effects?

Directions: On a separate sheet of paper, write the letter of the answer that is being described in each number.

1. A global problem experienced locally in different scales.

   A. global warming   **C.** climate change
   B. greenhouse effect   **D.** carbon emissions

2. How long is climate change proposed to last?

   A. minutes to hours   **C.** months to years
   B. days to weeks   **D.** decades to centuries

3. What refers to minimizing the causes and maximizing the solutions?

   A. adaptation   **C.** mitigation
   B. reduction   **D.** emission

4. What refers to adjusting to the actual climate or expected future climate?

   A. adaptation   **C.** mitigation
   B. reduction   **D.** emission

5. It provides accurate forecasts about incoming weather events.

   A. ambulance   **C.** fortune tellers
   B. early warning system **D.** social media

6. Which of the following is not improved in climate-resilient infrastructures?

   A. housing   **C.** sanitation
   B. finances   **D.** drainage

7. Which of the following includes planting drought-resistant crops and modernizing irrigation systems?

    A. improving dryland agriculture
    B. improving coastal areas
    C. improving forest tourism
    D. improving housing constructions

8. What will happen to access to clean water upon the construction of water infrastructures and watersheds?

    A. increase   **C.** no affect
    B. decrease   **D.** remove

9. Which of the following is NOT a type of water infrastructure?

    A. pipe   **C.** beach
    B. well   **D.** tank

10. Watersheds are basins of other water bodies for which process?

    A. evaporation   **C.** precipitation
    B. collection   **D.** condensation

DON'T FORGET

"

- The **atmosphere** is the layer of gases that surrounds the earth and makes life possible on the planet.

- **Weather** is a result of the atmospheric conditions at a certain place over a short period of time.

- **Climate** is the result of average atmospheric conditions in a certain region over a long period of time.

- **Weather** is the condition of the atmosphere over a short period of time, while **climate** is how the atmosphere "behaves" over relatively long periods of time.

- The **Philippine Climate** is tropical and maritime. It is characterized by relatively high temperature, high humidity, and abundant rainfall.

- Based on the distribution of rainfall, **four climate types** are recognized in the Philippines.

- Greenhouse gases allow sunlight (shortwave radiation) to freely pass through the Earth's atmosphere and heat the land and oceans. The warmed Earth releases this heat in the form of infrared light (longwave radiation), invisible to human eyes.

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"

Some of the infrared light released by the Earth passes through the atmosphere back into space. However, greenhouse gases will not let all the infrared light pass through the atmosphere. They absorb some and radiate them back down to Earth. This phenomenon, is called the **greenhouse effect**.

- Even though the most important greenhouse gases occur naturally and are important for life on Earth, burning fossil fuels and performing other human activities have caused a large increase in their concentrations.

- **Global warming** refers only to the Earth's rising surface temperature, while climate change includes warming and its "side effects" such as melting glaciers, heavier rainstorms, or more frequent drought.

- The world has increasingly been concerned with the changes in our climate due largely to adverse impacts being seen not just globally, but also in regional, national, and even local scales

- Climate change is a global problem experienced locally in different scales and will last for decades and centuries to come.

"

"

- **Mitigation** is the reduction of the flow of greenhouse gases into the atmosphere, thereby minimizing the causes and maximizing the solutions.

- **Adaptation** is the adjustment to the actual climate or expected future climate, thereby finding ways to decrease the negative effects.

"

EXPLORE MORE

For additional activities related to the topics of this module, these resources may be helpful:

Climate Change Adaptation
https://www.youtube.com/watch?v=FO46sPwm4xk

Climate Kids
https://climatekids.nasa.gov/menu/play/

Climate Zones of the Earth
https://www.youtube.com/watch?v=5tC8OOxOFEk

Crash Course: Weather and Climate
https://www.youtube.com/watch?v=YbAWny7FV3w

Weather and Climate
http://studyjams.scholastic.com/studyjams/jams/science/weather and climate/weather-and-climate.htm

You are almost done! On a separate sheet of paper, answer the following questions below.

I.   **Directions**: Write **W** if the statement refers to weather and **C** if it refers to climate.

         _____ **1.** Yesterday, it rained in Quezon City.
         _____ **2.** A yearly average of twenty tropical cyclones enter the Philippine Area of Responsibility.
         _____ **3.** Baguio has cold rainy seasons.
         _____ **4.** The rainy season is between June and October every year.
         _____ **5.** The forecast for the next three days is hot and sunny.

II.   **Directions**: Write an upward arrow (↑) for increase and a downward arrow (↓) for decrease for each of the factors and conditions below.

         _____ **1.** Yesterday, it rained in Quezon City. What will happen to humidity?
         _____ **2.** A yearly average of twenty tropical cyclones enter the Philippine Area of Responsibility. What happens to precipitation during a tropical cyclone?
         _____ **3.** Baguio has cold rainy seasons. What will happen to temperature?
         _____ **4.** The rainy season is between June and October every year. What will happen to humidity?
         _____ **5.** The forecast for the next three days is hot and sunny. What will happen to precipitation?

III. **Directions**: Write **1** if the statement refers to a Type I climate, **2** if it refers to a Type II climate, **3** if it refers to a Type III climate, and **4** if it refers to a Type IV climate.

_____ 1. Isabela province experiences rainy days during the month of August.

_____ 2. It is mostly raining in Batanes for the entire year.

_____ 3. Mindoro experiences hot weather from November to April.

_____ 4. Catanduanes experiences strong typhoons in December.

_____ 5. Large portions of Mindanao rarely experiences dry seasons.

IV. **Directions**: Write FAST if the statement contributes to global warming and SLOW if it prevents the occurrence or effects of global warming.

_____ 1. burning fossil fuels

_____ 2. improving dry land agriculture

_____ 3. cutting down rainforests

_____ 4. smoke belching

_____ 5. climate-resilient infrastructure

_____ 6. improper waste segregation

_____ 7. early warning systems

_____ 8. overfishing

_____ 9. building watersheds

_____10. mangrove protection

ANSWER KEY

PRE-ASSESSMENT

1. A
2. B
3. C
4. D
5. A
6. B
7. C
8. D
9. A
10. B
11. C
12. D
13. A
14. B
15. C

LESSON I: WHAT IS THE DIFFERENCE BETWEEN WEATHER AND CLIMATE?

SHARPENING YOUR SKILLS
ACTIVITY I

1. FALSE
2. TRUE
3. FALSE
4. TRUE
5. TRUE
6. FALSE
7. FALSE
8. FALSE
9. TRUE
10. FALSE

ACTIVITY II

1. FALSE
2. FALSE
3. TRUE
4. TRUE
5. TRUE
6. FALSE
7. FALSE
8. TRUE
9. TRUE
10. TRUE

ANSWER KEY

TREADING THE ROAD TO MASTERY

ACTIVITY I

Weather: sunny/windy/rainy days, daily/monthly/yearly atmospheric conditions

Climate: average of atmospheric conditions, decade/century weather conditions

Weather and Climate: atmosphere, seasons, temperature, humidity, rainfall

ACTIVITY II

CRITERION	Exemplary (2)	Proficient (1)
Support/ Evidence (x3)	argument is clearly supported by accurate evidence considered credible by the audience; there is sufficient detail to support the main points of the argument	some evidence is provided, but information is not fully explained; important pieces of evidence have not been included; some data are relevant or credible but inaccurate
Clarity/ Conciseness (x2)	sentences flow smoothly, are structurally correct, and convey the intended meaning; no wordiness	majority of ideas expressed are awkward, incorrectly constructed, or wordy
Strategy/ Audience	content, structure, and language of argument are geared to intended audience	argument is missing a substantial portion of content required by audience

ACTIVITY III

Temperature		
TI	>	TII
TII	<	TIII
TIII	>	TIV

Humidity		
TI	>	TIII
TI	<	TIV
TII	=	TIV

Rainfall		
TI	<	TII
TII	<	TIV
TI	<	TIII

ANSWER KEY

LESSON II: WHAT IS THE DIFFERENCE BETWEEN GLOBAL WARMING AND CLIMATE CHANGE?

SHARPENING YOUR SKILLS

ACTIVITY I

1. TRUE
2. TRUE
3. FALSE
4. FALSE
5. TRUE
6. FALSE
7. TRUE
8. FALSE
9. TRUE
10. TRUE

ACTIVITY II

1. Intergovernmental Panel on Climate Change (IPCC)
2. man-made activities
3. 0.74°C
4. poor developing countries
5. rising surface (land and ocean) temperature
6. rising sea levels
7. decrease in snow covers in the Northern Hemisphere
8. cold days, cold night, and frost becoming less frequent
9. hot days, hot nights, and heat waves becoming more frequent
10. increasing intense tropical cyclone activities

ANSWER KEY

TREADING THE ROAD TO MASTERY

CRITERION	Exemplary (2)	Proficient (1)
Support/ Evidence (x3)	argument is clearly supported by accurate evidence considered credible by the audience; there is sufficient detail to support the main points of the argument	some evidence is provided, but information is not fully explained; important pieces of evidence have not been included; some data are relevant or credible but inaccurate
Clarity/ Conciseness (x2)	sentences flow smoothly, are structurally correct, and convey the intended meaning; no wordiness	majority of ideas expressed are awkward, incorrectly constructed, or wordy
Strategy/ Audience	content, structure, and language of argument are geared to intended audience	argument is missing a substantial portion of content required by audience

ANSWER KEY

LESSON III: HOW DO PEOPLE ADAPT TO CLIMATE CHANGE?

SHARPENING YOUR SKILLS

ACTIVITY I AND ACTIVITY II

CRITERION	Exemplary (2)	Proficient (1)
Support/ Evidence (x3)	argument is clearly supported by accurate evidence considered credible by the audience; there is sufficient detail to support the main points of the argument	some evidence is provided, but information is not fully explained; important pieces of evidence have not been included; some data are relevant or credible but inaccurate
Clarity/ Conciseness (x2)	sentences flow smoothly, are structurally correct, and convey the intended meaning; no wordiness	majority of ideas expressed are awkward, incorrectly constructed, or wordy
Strategy/ Audience	content, structure, and language of argument are geared to intended audience	argument is missing a substantial portion of content required by audience

TREADING THE ROAD TO MASTERY

1. C
2. D
3. C
4. A
5. B

6. B
7. A
8. A
9. C
10. B

ANSWER KEY

ACTIVITY I

1. W
2. C
3. C
4. C
5. W

ACTIVITY II

1. ↑
2. ↓
3. ↓
4. ↑
5. ↓

ACTIVITY III

1. 3
2. 4
3. 1
4. 2
5. 2

ACTIVITY IV

1. FAST
2. SLOW
3. FAST
4. FAST
5. SLOW
6. FAST
7. SLOW
8. FAST
9. SLOW
10. SLOW

GLOSSARY

Cope	deal effectively with something difficult
Emission	the production and discharge of something, especially gas or radiation
Evidence	signs or indications of something
Gas	a state of matter which expands freely to fill the whole of a container, having no fixed shape
Heat	the quality of being hot; thermal energy transferred between two systems at different temperatures that come in contact
Mass	a large quantity or amount of something
Rain	moisture condensed (water) from the atmosphere that falls visibly in separate drops
Season	each of the two divisions of the year (dry and wet) marked by particular weight patterns and daylight
Temperature	the degree or intensity of heat present in a substance or object
Typhoon	a tropical cyclone in the region of the Indian Ocean or Western Pacific Ocean

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