

# Module 7

## Management of Environmental Resources



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UP Department of Broadcast Communication  
UP National Institute for Science and Mathematics Education Development



UP COLLEGE OF MASS COMMUNICATION  
DEPARTMENT OF BROADCAST COMMUNICATION



## **DZUP EskweKalikasan: Para sa kabataan, kapaligiran, at bayan**

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Department of Broadcast Communication  
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The University of the Philippines  
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Quirino Avenue, University of the Philippines Diliman  
Diliman, Quezon City

For additional resources, go to:  
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### **Module and Podcast Writer**

Cien Angela Baurile

### **Module Consultants and Evaluators**

Maria Helen D. Catalan, PhD  
Deborah Anne O. Lumantas

### **Module Supervisor (Teaching and Learning Process)**

Sally B. Gutierrez, PhD

### **Module Supervisor (Concept Development)**

Daphne-Tatiana T. Canlas, PhD

### **Managing Editor**

Ma. Ivy A. Claudio

### **NISMED Project Coordinators**

Aida I. Yap, PhD  
Erlina R. Ronda, PhD  
Ma. Lourdes S. Agad

### **Creative Consultant**

Elizabeth L. Enriquez, PhD

### **In charge of Module Development and Distribution**

Ma. Ivy A. Claudio

### **Project Staff**

Ma. Zarina Mae J. Yamog  
Joseph Vince A. Claudio

### **Artwork**

Rosabelle Jem M. Torrecampo

### **Layout**

Carl Dave Anthony L. Sayat

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## Preface

Para sa bayan, kalikasan, at kabataan? Kayang-kaya!

The project **DZUP EskweKalikasan: Para sa kabataan, kapaligiran, at bayan** is a publicly-funded initiative of the academe, with support from the government and advocates, that aims to contribute to the initiatives to integrate climate change knowledge and concepts about the Philippine environment in formal education.

According to the Climate Change Commission (n.d.), “the Philippines is one of the countries at greatest risk from present and projected climate-related hazards such as tropical cyclones, floods, landslides, and droughts.” These teaching modules were designed to encourage students with a comprehensive examination of the issues confronting the environment. Recognizing the curriculum visions and the objectives of inquiry-based teaching and learning that are adopted and promoted by the Philippine Basic Science Education Curriculum, these modules go beyond increasing public awareness of the environment’s significance in sustaining life on Earth to examining the effects of human actions in the protection or degradation of the environment.

Results of the early studies of Belland, Glazewski, and Richardson (2012) claim that issue-based learning is closely linked with evidence-based learning. It is thus appropriate to use scientific argumentation to implement these modules. Embedded in the modules is the provision for students’ opportunities to deeply engage in evidence-based scientific argumentation while simultaneously developing their critical thinking and communication skills. Thus, the basic components of scientific argumentation such as **claim, evidence, and justification** were strategically presented in the teaching modules. The modules, identified in the Curriculum Entry Points section, can be used in the following Senior High School Core Curriculum Subjects: Earth and Life Science or Earth Science; Understanding Culture, Society, and Politics; and Disaster Readiness and Risk Reduction.

These modules use multimodal learning to create an engaging and exciting learning environment that recognizes diverse learning styles. The concepts and issues presented in each lesson are mirrored in the podcast “*Kayang-kaya!*” to supplement classroom discussion using aural storytelling. Case studies that highlight local experiences while recognizing the various contexts that surround environmental issues, particularly climate change, are made available so the students can better grasp the environmental challenges that we are facing and be acquainted with examples of adaptation and mitigation measures that are currently being practiced.

**DZUP EskweKalikasan** aims to contribute to the wider discussion of environmental issues and the impacts of climate change and disasters in our everyday life, and to enrich conversations about sustainable living, sustainable development, and mindful consumption. These modules aim to be of utmost help for teachers to supplement their resources in their implementation of the Senior Science Education Curriculum.



## The Project

**DZUP EskweKalikasan: Para sa kabataan, kapaligiran, at bayan** is an on-air and online modular educational project about the environment for the youth. The UP Department of Broadcast Communication (CHED Center of Excellence for Broadcasting) and DZUP 1602 (the official radio station of UP Diliman) spearheaded the project with funding support from the Philippine Government under the General Appropriations Act for Fiscal Year 2019 through the initiative of the Office of Senator Loren Legarda. The UP Diliman Office of the Chancellor also provided additional funding support.

Ten modules were conceptualized and developed in collaboration with the UP National Institute for Science and Mathematics Education Development (UP NISMED).

- Module 1.** The Environment and Me
- Module 2.** The Philippine Environment
- Module 3.** Biodiversity Conservation
- Module 4.** Sustainable Living
- Module 5.** Climate Change
- Module 6.** Waste Management
- Module 7.** Management of Environmental Resources
- Module 8.** Environment and Disasters
- Module 9.** Renewable Sources of Energy
- Module 10.** The Youth, the Nation, and the Environment

Each of the teaching modules comes with a **Kayang-kaya!** podcast and an episode of **Go Teacher Go sa DZUP EskweKalikasan (GTG sa DZUP Eskwe)**.

The **Kayang-kaya!** podcast, developed and produced by the UP Department of Broadcast Communication, chronicles the adventure of three Senior High School students residing in Brgy. Luntian, as they seek to understand and uncover the issues confronting the environment.

Meanwhile, DZUP EskweKalikasan and UP NISMED's radio program Go Teacher Go, collaborated to produce **GTG sa DZUP Eskwe**, video guides for teachers in implementing the modules in their classes. **GTG sa DZUP Eskwe** also discusses tips on how to adjust the modules into different modes of learning, i.e. blended, online, remote, etc. All the teaching modules and other learning resources are available for download at [www.dzup.org/eskwekalikasan](http://www.dzup.org/eskwekalikasan).



## How to use this module

The modules promote inquiry-based teaching and learning through scientific argumentation and were designed to encourage students to appreciate Mother Nature and examine the issues confronting our environment. Each module is composed of the following sections:

### Introduction Page / Table

This page contains the general information about the teaching module and its corresponding podcast. These include the following: **module number** and **title**, **podcast topic**, main question in the podcast, **synopsis** of the podcast, and the **teaching module objectives**.

### Curriculum Entry Points

The curriculum entry points serve as guides for the educators in the appropriate use of the teaching module. This will help the educators identify the student **grade level**, **subjects**, and **subtopics** that this material can be applied to, as well as the **content standard**, **performance standard**, and **learning competencies** from the Department of Education's curriculum guide. This part also contains the **prerequisite concepts** based on students' prior knowledge from previous grade levels.

### Teaching and Learning Process

The teaching and learning process guides the teacher in inquiry-based teaching using argumentation. This section identifies the **teaching approach**, and the **materials** that will be used to teach this module. The modules adopt the guided inquiry-based approach through argumentation as a teaching approach. It is composed of two major parts: the **lesson procedure** proper and the **assessment**. Embedded in the lesson procedure in each module is the eliciting of the three main components of argumentation: claim, evidence, and justification. They are placed differently depending on how the concepts are formed whether inductively or deductively. Assessment is used in the module in three ways: for learning (formative assessment), as learning (on-going), and of learning (summative assessment).

### Related Concepts

This part contains the science and other related concepts and their contextualized definitions depending on how they were used in the modules.

### References

This contains all the references used by the writers in writing the modules. The educators may revisit these references for additional information.

### Activity Sheets / Worksheets

Activity sheets may include **case studies** and **guide questions** to answer while listening to the podcast or for presentation purposes, and other types for individual and group activities.

### Answer Keys

The activity sheet/worksheet in each module comes with the corresponding answer key that can help the educators in assessing the student outputs.







## Teaching Module

<b>Module No. and Title</b>	Module 07. Management of Environmental Resources
<b>Podcast Topic</b>	Water Resources
<b>Main Question</b>	Bakit walang lumalabas na tubig sa gripo?
<b>Podcast Synopsis</b>	<p>The frequency of water service interruptions in Barangay Luntian has been alarming for Kali and Naya. This has affected their plans and daily life—like how the opening of a new café has been postponed. They have been looking forward to this event. Because of this, they try to learn more about the country's water resources and the factors that affect their degradation and depletion. They also discuss ways to help conserve water resources.</p> <p><i>Naaalarma na ang magkaibigang sina Kali at Naya sa halos sunud-sunod na water service interruptions sa kanilang barangay. Nakaaapekto na rin ito sa kanilang mga plano at pang-araw-araw na buhay tulad nang hindi natuloy ang opening ng isang café sa barangay. Dahil dito, sinubukang alamin ng dalawang magkaibigan kung ano ang lagay ng mga water resource ng bansa at kung anu-ano ang mga nakaaapekto sa pagkasira at pagkaubosnito. Mapag-uusapan rin nila kung anu-ano ba ang mga maaaring magawa upang makatulong sa pagconserve ng ating water resource.</i></p>
<b>Podcast Objectives</b>	<p>After listening to the podcast, the learners should be able to:</p> <ol style="list-style-type: none"><li>1. review the different water resources;</li><li>2. identify and describe the human activities affecting the quality and availability of water resources;</li><li>3. explain the importance of management and conservation of environmental resources, specifically water resources; and</li><li>4. suggest ways of conserving and protecting water resources.</li></ol>
<b>Teaching Module Objectives</b>	<p>(Adapted from the DepEd curriculum guides)</p> <p>At the end of this lesson, the learners should be able to:</p> <ol style="list-style-type: none"><li>1. recognize how water is distributed on Earth;</li><li>2. identify the various water resources on Earth;</li><li>3. explain how different activities affect the quality and availability of water for human use; and</li><li>4. suggest ways of conserving and protecting water resources.</li></ol>

## Curriculum Entry Points

Grade Level: Grade 11/12 (Earth Science)

Content: Earth Materials and Processes

Content Standard	Performance Standard	Learning Competency
<i>The learners demonstrate an understanding of:</i>	<i>The learners shall be able to:</i>	<i>The learners:</i>
The amount of usable water resources on Earth	Make a plan that the community may use to conserve and protect its resources for future generations.	Recognize how water is distributed on Earth. Identify the various water resources on Earth. Explain how different activities affect the quality and availability of water for human use. Suggest ways of conserving and protecting water resources.

## Prerequisite Concepts

1. The Philippine Environment (Grade 7)
  - location of the Philippines with respect to landmasses and bodies of water
  - protection and conservation of natural resources

## Teaching Process

<b>Teaching Approach</b>	Inquiry-based approach through argumentation
<b>Materials</b>	<ol style="list-style-type: none"> <li>1. Podcast audio file</li> <li>2. PowerPoint presentation</li> <li>3. Student's worksheet</li> <li>4. meta cards</li> <li>5. markers</li> </ol> <p><i>(Please visit <a href="http://www.dzup.org/eskwekalikasan">www.dzup.org/eskwekalikasan</a> to access the podcast, PowerPoint and/or student's worksheet.)</i></p>

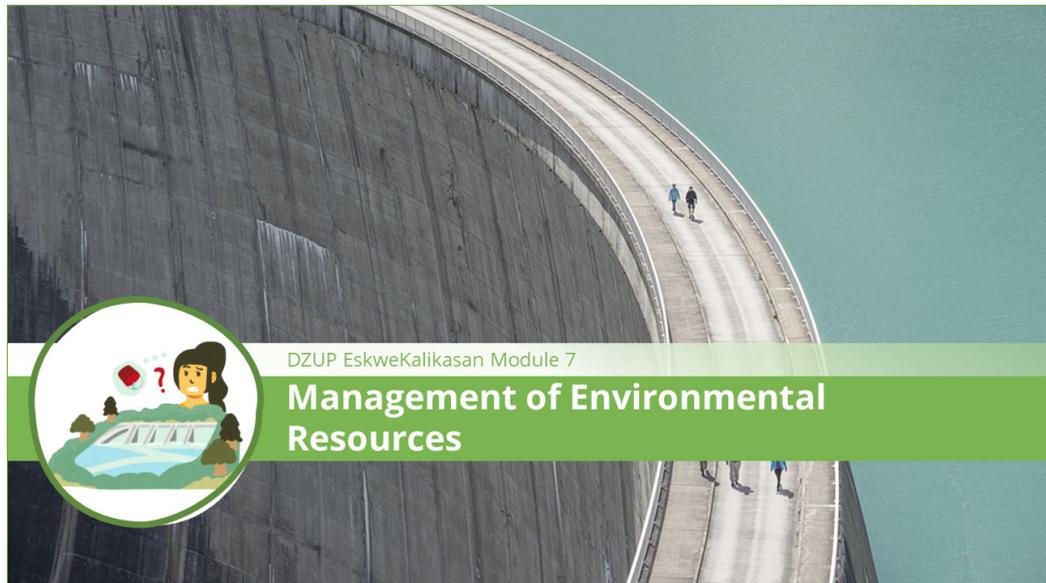
## I. LESSON PROCEDURE

**Previous Session:** Distribute copies of the podcast and worksheet to the class. Instruct the class to listen to the podcast and take down notes using the worksheet in preparation for the next session.

**Preparation and provision of enough background information:**

1. Show **SLIDES 1-3**. Ask the class to recall the podcast introduction when Kali experienced a sudden water interruption while taking a bath.

**SLIDE 1**



**SLIDE 2**

**DZUP ESKWEKALIKASAN PROJECT**

**DZUP EskweKalikasan: Para sa kabataan, kapaligiran, at bayan** is a publicly-funded initiative of the academe, with support from advocates and the government. It aims to raise awareness on emerging and evolving discussions about climate change, disaster risks, sustainable living and development and mindful consumption. Especially designed for senior high school teachers and students, the project has produced several teaching and learning resources such as modules, video guides, podcasts, and radio episodes that are available for free online at [dzup.org/eskwekalikasan](http://dzup.org/eskwekalikasan).

The project (whose title is a portmanteau of the Filipino words for school and nature) is spearheaded by the Department of Broadcast Communication of the University of the Philippines (UP) College of Mass Communication and DZUP 1602, in partnership with the UP National Institute for Science and Mathematics Education Development (UP NISMED) and the UP Diliman of the Office of the Chancellor. It is principally funded by the Philippine Government under the General Appropriations Act for Fiscal Year 2019 through the initiative of the Office of Senator Loren Legarda.

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### SLIDE 3



## KAYANG-KAYA! PODCAST

*Kayang-Kaya!* is a 10-episode podcast in Filipino that follows the adventures of three senior high school students, Kali, Naya, and Alab, as they seek to understand and uncover issues confronting the environment. As an educational tool, the podcast serves to supplement classroom discussion using aural storytelling.

In *Episode 7*, titled *"Bakit walang lumalabas na tubig sa gripo?"*, the frequency of water service interruptions in Barangay Luntian has been alarming for Kali and Naya. This has affected their plans and daily life. Because of this, they try to learn more about the country's water resources, and the factors that affect their degradation and depletion. They also discuss ways to help conserve water resources.

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- **Question 1: Have you experienced an instance when there was no water coming out of your faucet at home? How did you react?**

**Possible Answer/s:**  
(Answers may vary.)

- **Question 2: In the Philippines, which month/s do we usually experience a water crisis? Why?**

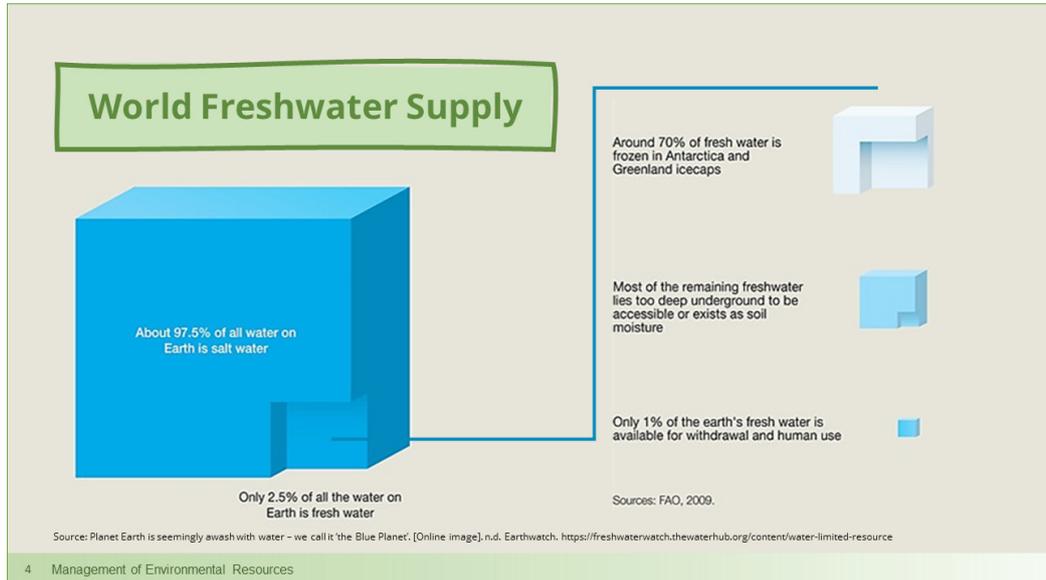
**Possible Answer/s:**  
It is during summer months (March–June) because there is not enough water in our reservoirs which supply fresh water to our households.

- **Question 3: What does "water crisis" mean in terms of the available freshwater resources that we have?**

**Possible Answer/s:**  
There is a limited amount of global freshwater supply.

2. Show **SLIDE 4** (World Freshwater Supply diagram).

### SLIDE 4



3. Optional activity. Show **SLIDE 5** (NASA: *Earth's Water Cycle*) containing the video from the same reference above. Then show **SLIDE 6**.

### SLIDE 5

**Video: Earth's Water Cycle**

Click to go to video

Search for "Earth's Water Cycle" by NASA Goddard Space Flight Center

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The slide features a background image of a large, curved concrete structure, possibly a water treatment facility. It includes a green play button icon and a yellow magnifying glass icon. The text is in a green, sans-serif font.

## SLIDE 6

### Global water availability depends on:

- a) the amount of water a country or region has—e.g., precipitation, the presence of rivers or lakes, and groundwater stores;
- b) the number of people and uses that water has to support — their individual demand/consumption of that water.

**Note:** The absolute amount of global water supply remains the same, but the availability of freshwater is not capable of sustaining the increasing human settlements.

Source: (Earth Watch Europe, Fresh Water Watch, n.d.)

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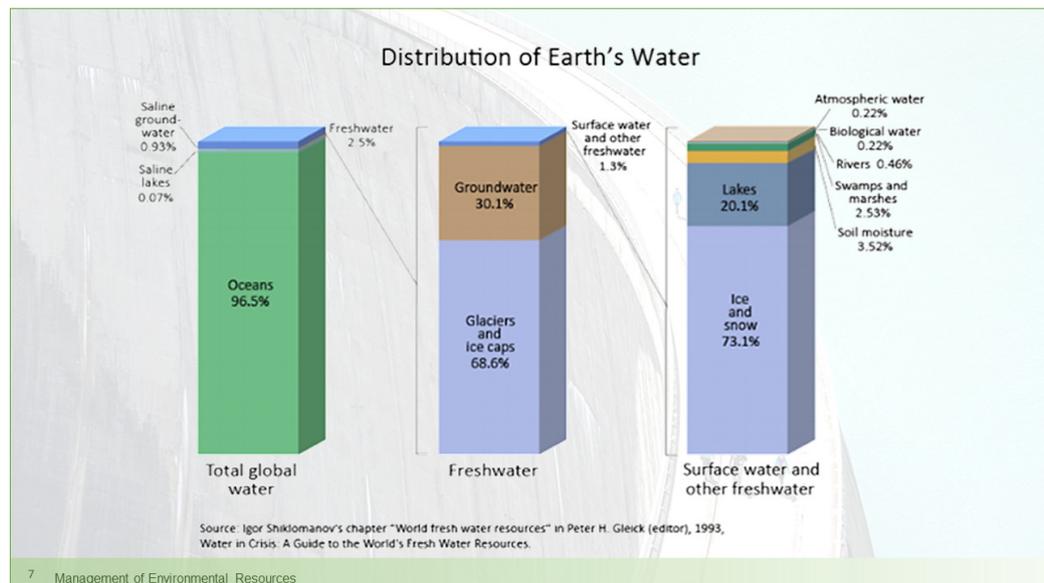
4. Present this additional information:

- **Question 4: What are some of the sources of freshwater?**

#### Possible Answer/s:

lakes, rivers, groundwater

## SLIDE 7



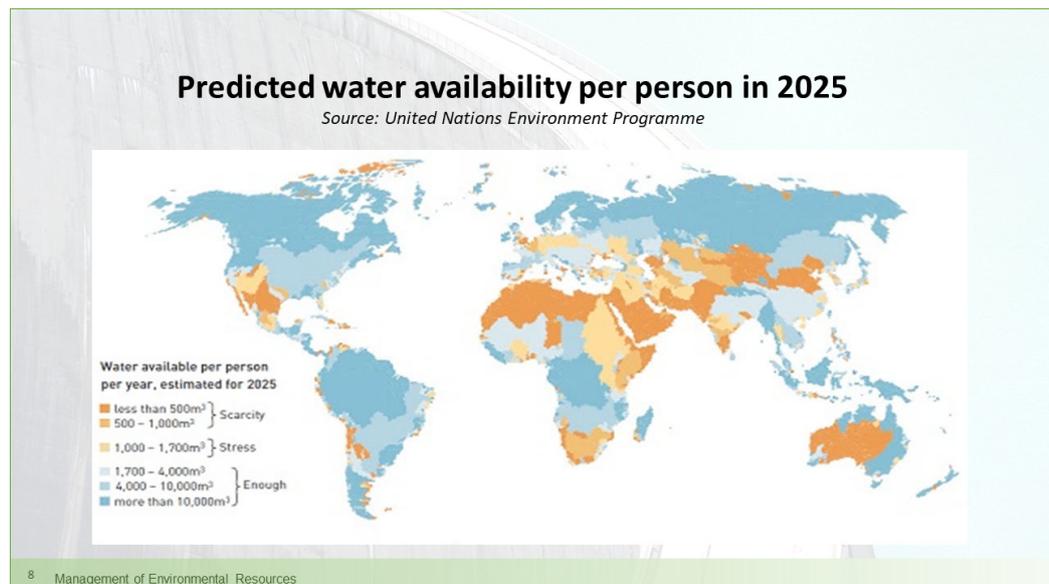
- **Question 5: When do we experience water scarcity from these sources?** (This question may become rhetorical. If so, the teacher may provide the answer below.)

**Possible Answer/s:**

Water scarcity happens when the amount of water withdrawn from the sources is not adequate to supply what is needed by the population.

5. Post this figure containing the predicted amount of global freshwater supply:

**SLIDE 8**



- **Question 6: Will the Philippines be among the countries to be affected by the global scarcity of fresh water?**

**Possible Answer/s:** Yes

- **Question 7: If that time comes, do you think the Philippines is ready to solve this problem? Why?**

**Possible Answer/s:** (Answers may vary.)

- a. Yes, because the government is doing its best to solve this problem of water scarcity, such as the Kaliwa Dam.
- b. No, because there is not enough time and resources to solve the water problem.

- **Question 8: In your own little way, how can you contribute to freshwater conservation?**

**Possible Answer/s:**

*Elicit the following answers:*

- a. Turn off faucets when not in use.
- b. Avoid brushing your teeth while water is running down the faucet.
- c. Use water canisters instead; minimize the use of showers for taking a bath.

6. Add this information:

Be sure to fix leaks right away.

- a. Capture under your colander the potable water you use to rinse fruits or veggies and reuse it in any form, such as watering for plants or for flushing the toilet.
- b. Scrape dishes instead of rinsing them before loading, and you will save up to 10 gallons a load.
- c. Run washing machines with full loads to save water, energy, and detergent.
- d. Lessen the water pressure in toilet flushers.
- e. Use water sprinklers instead of a water hose; it saves energy as well.
- f. Capture rainwater to water plants.

- **Question 9: Which of the following do you usually practice at home or in school?**

**Possible Answer/s:** *(Answers may vary.)*

- **Question 10: Why do we need to conserve our freshwater?**

**Possible Answer/s:**

As it is a limited resource, its availability is always at stake. If we do not conserve now, there will be no more available supply for the coming generations. *(Elicit these answers; please DO NOT lecture)*

7. Add the following information:

It is important to conserve freshwater as early as now because:

- a. **Its uses are endless.** We need water in everything that we do, such as for drinking, bathing, cooking, washing, and other activities. We must conserve water to be able to fulfill all these needs.
- b. **Water grows food.** Water is essential in growing fruits, vegetables, and other food products that sustain human beings. If there is no water to grow the food we eat, we might die from hunger.
- c. **It protects our ecosystem and wildlife.** Aside from human beings, the world's flora and fauna also require water to be able to survive. In short, water is important to sustain all living beings.

- d. **Less water usage means more savings.** Saving water does not only mean saving water but also saving money on water expenses.
- e. **The water supply is already limited.** Although the world is abundant in water, only 0.03 percent of the 70 percent water in the world is made up of freshwater—making it a limited resource. As the population increases the already limited supply of freshwater decreases due to high demand. It means there is a need to conserve the limited water resources that we have.
- f. **Conserving water also saves energy.** Generating water from pumping facilities requires high amounts of energy. If we save water, we will also be able to save energy and reduce our carbon footprint.

## Argumentative Question or Statement

- 8. Introduce the topic for the day on Water Resources. Flash **SLIDE 9** and ask the argumentative question.

*(This question will be used to elicit the students' claim in scientific argumentation.)*

Are humans good stewards of the Earth's water resources?

### SLIDE 9



The slide features a background of water splashing. On the left, there is a circular illustration of a woman with a question mark above her head, looking at a landscape with a dam and trees. To the right of this illustration, the text reads: **Argumentative Question:** Are humans good stewards of the Earth's water resources? At the bottom left corner, there is a small number '9' followed by the text 'Management of Environmental Resources'.

- Flash the learning objectives slide then briefly discuss it with the class.

### SLIDE 10

**Objectives**

- Review the different water resources;
- Identify and describe the human activities affecting the quality and availability of water resources;
- Explain the importance of management and conservation of environmental resources, specifically water resources; and
- Suggest ways of conserving and protecting water resources.

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### **Instruction and Practice**

Instruct the class to bring out their accomplished worksheets to be used in the discussions and activities for the day. The worksheets can be found at the end of this module.

## **Gathering the Pieces of Evidence and Concept formation**

*(Answers to the series of questions in this part will serve as pieces of evidence that the students are expected to answer in order to back up their claims in the argumentative question or statement.)*

### **Part 1**

- Recall the conversation of Kali and Naya in the podcast before the first segment **[TIMESTAMP: 01:00 - 04:18]**. It is about water distribution on Earth and various water resources. Discuss the following questions:

- Question 1: In the first part of the podcast, Kali and Naya were talking. What is the conversation of Kali and Naya all about?**

#### **Possible answer/s:**

The conversation is about the water resources in the Philippines and how the country is abundant in natural resources.

- **Question 2: What are the water resources mentioned by Kali and Naya?**

**Possible answer/s:**

Ocean, sea, river, lake, glacier, ice caps, groundwater

- **Question 3: Given the information about water resources, do you think there is enough water supply for human use? Explain your answer.**

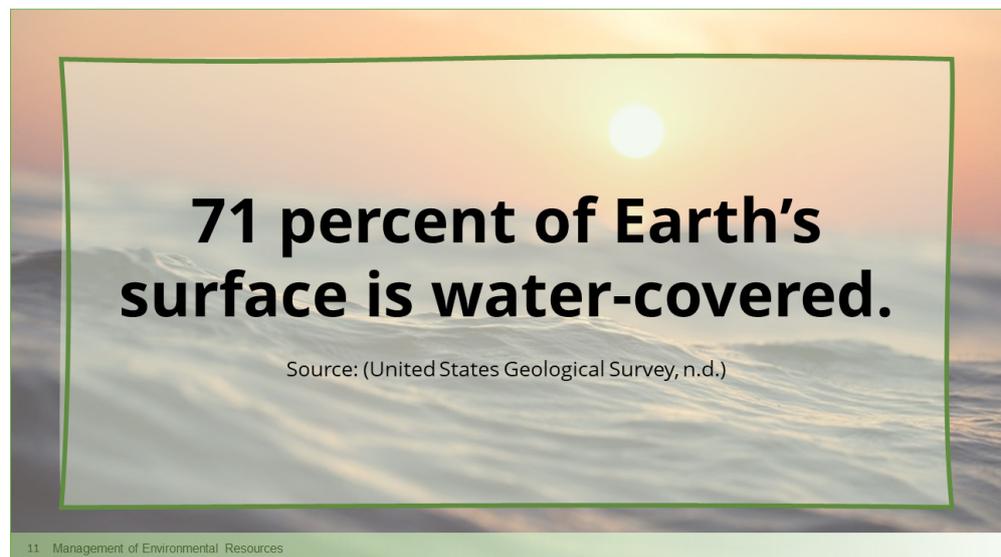
**Possible answer/s:** *(Answers may vary.)*

Yes, because the Earth has abundant water resources.

No, because the Earth has limited freshwater resources.

**NOTE:** Refer to the **SLIDES 11-16** in discussing the succeeding concepts.

### SLIDE 11



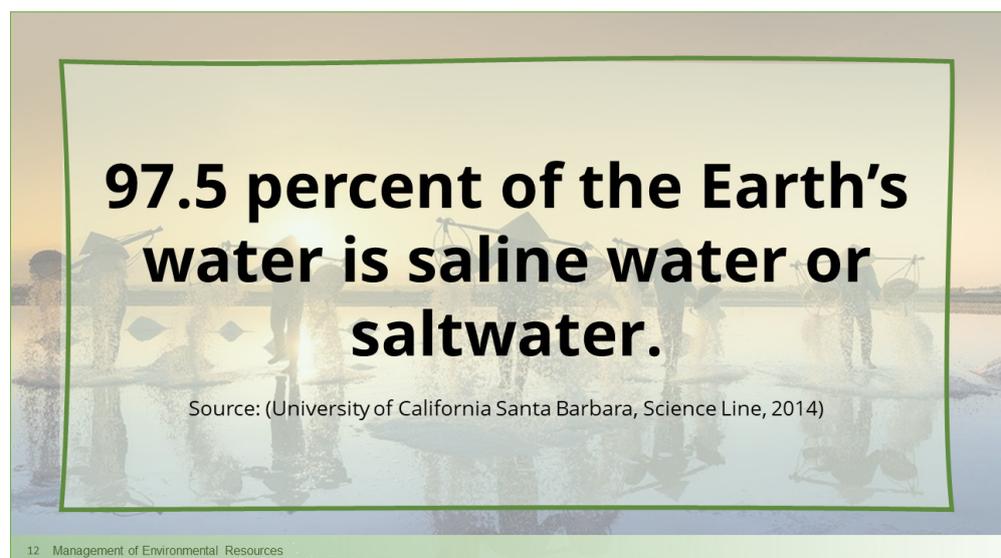
71 percent of Earth's surface is water-covered.

Source: (United States Geological Survey, n.d.)

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This slide features a background image of a sunset over a body of water. The text is centered in a white box with a green border. The source is cited as (United States Geological Survey, n.d.). The slide number and title are in the bottom left corner.

### SLIDE 12



97.5 percent of the Earth's water is saline water or saltwater.

Source: (University of California Santa Barbara, Science Line, 2014)

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This slide features a background image of people working in a salt flat. The text is centered in a white box with a green border. The source is cited as (University of California Santa Barbara, Science Line, 2014). The slide number and title are in the bottom left corner.

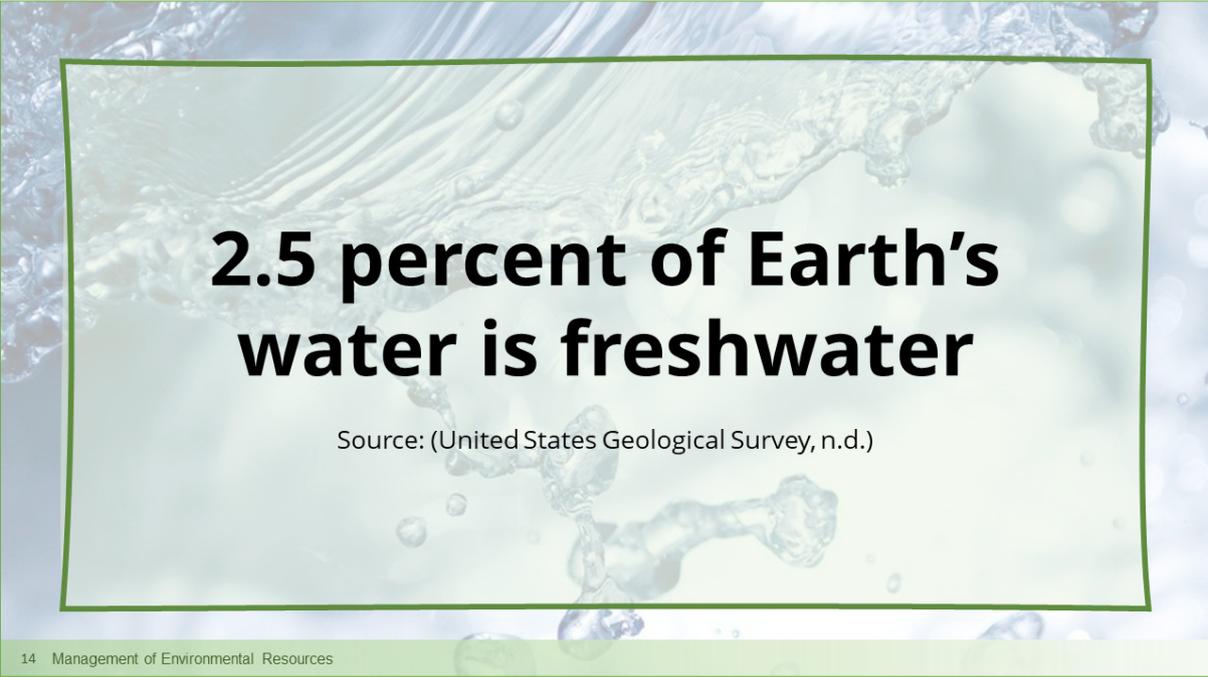
SLIDE 13

## Saline water

It is the **water that makes up the oceans and seas**; salty water with a complex mixture of 96.5 percent water, 2.5 percent salts, and smaller amounts of other substances, including dissolved inorganic and organic materials, particulates, and a few atmospheric gases (Britannica, n.d.).

**Examples of saltwater:** oceans, seas, some lakes

SLIDE 14



# 2.5 percent of Earth's water is freshwater

Source: (United States Geological Survey, n.d.)

## SLIDE 15

## Freshwater

defined as having a **low salt concentration** (University of California Museum of Paleontology, n.d.), by water that is not salty; for instance, water found in lakes, streams, and rivers, but not the ocean. It also refers to things living in or related to freshwater (e.g., "freshwater fish") (Greenfacts, n.d.).

**Examples of freshwater:** ice caps, glaciers, ponds, lakes, rivers, groundwater

## SLIDE 16

## Surface water

It is a body of water above ground, including streams, rivers, lakes, wetlands, reservoirs, and creeks. Meanwhile, the ocean is also considered surface water despite being saltwater (National Geographic, n.d.).

## Groundwater

It is water found underground in the cracks and spaces in soil, sand, and rock. It is stored in and moves slowly through geologic formations of soil, sand, and rocks called aquifers (Groundwater Foundation, n.d.).

3. Ask the class if they have questions about the introduction that has not been discussed yet. If there are any, discuss these with the class.

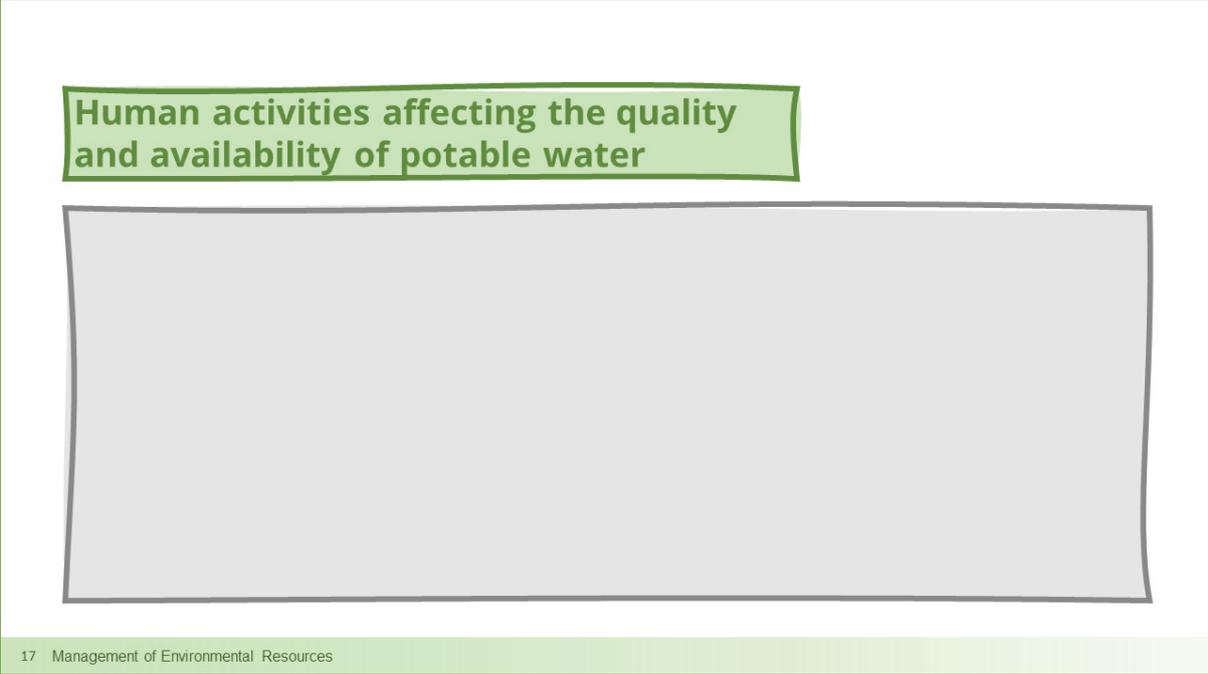
### **Part 2**

1. Divide the class into four groups.
2. Instruct the groups to review their answers to Part 2 of the worksheet as they listen to the podcast.
3. Ask the following question:
  - **Question 1: What are some human activities that affect the quality and availability of potable water?**

Possible answer/s:

- agricultural practices
- urban development
- over-abstraction or the excessive withdrawal of underground water

### **SLIDE 17**



The slide features a title box at the top with the text "Human activities affecting the quality and availability of potable water". Below the title is a large, empty rectangular area with a light gray background and a dark gray border, intended for content. At the bottom left of the slide, there is a small footer that reads "17 Management of Environmental Resources".

**SLIDE 18**

**Human activities affecting the quality and availability of potable water**

Agriculture  
Urban development  
Over-abstraction

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- **Question 2: How do these activities affect the quality and availability of potable water?**

**Possible answer/s:**

- a. Agricultural practices
  - Conversion of land (land modification) for agriculture use can alter the characteristics of the land surface, affecting how water moves from the surface to the ground.
  - Pesticides and other chemicals used in agriculture can contaminate water, causing degradation of water quality.
  - Animal wastes also contaminate water.
- b. Urban development
  - Conversion of land alters the characteristics of the land surface.
  - Wastes from sewage treatment plants, industrial facilities, and other infrastructure contaminates water bodies.
  - The demand for water is increasing because of the growing population.
  - The inefficient use of water.
  - Emissions from industrial facilities and vehicles form acid rain, which in turn pollutes various ecosystems like forests and water bodies.
- c. Over-abstraction:
  - Water bodies dry up because too much water is being drawn from the ground.
  - The irrigation system is inefficient.
  - The water abstraction is illegal, such as wells operating without permit or pumping from bodies of water without permit.
  - The demand for water is increasing.

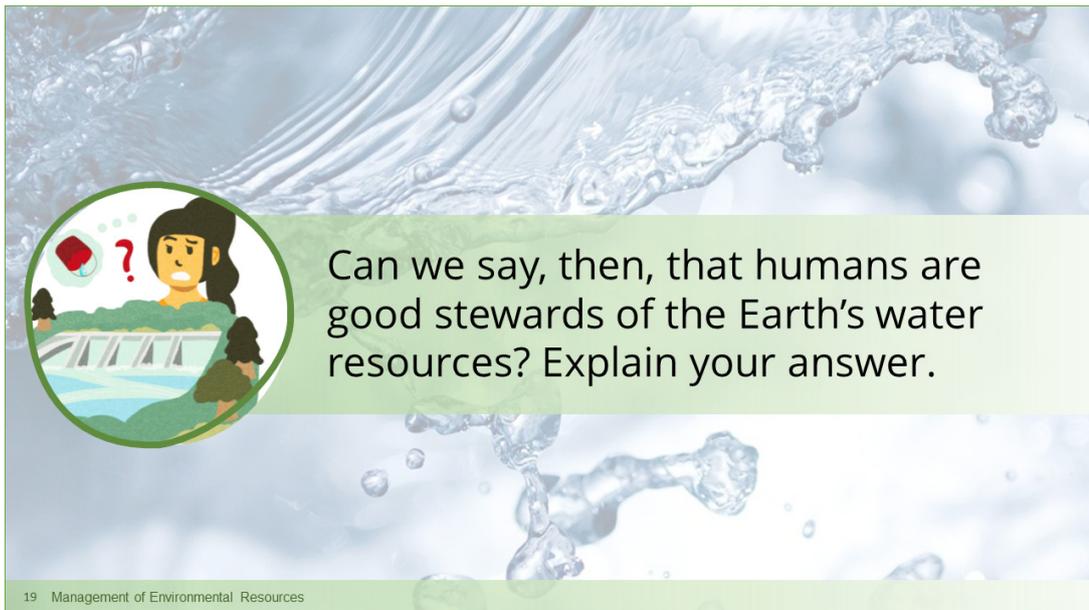
- 4.. Play the podcast from **[TIMESTAMP: 08:40-13:47]**. (Description: Conversation on different human activities affecting the quality and availability of water resources.)
5. Give five (5) minutes to each group to discuss their answers. Instruct them to present their arguments in a bullet form.
6. One representative from each group will present the answer to the class.
7. Assign each group to ask one question to a different group.

## Concluding Question

(This will serve as the justification for their claims. Pieces of evidence will come from the concepts discussed in class.)

**Reiterate:** Can we say, then, that humans are good stewards of the Earth's water resources? Explain your answer.

### SLIDE 19



Can we say, then, that humans are good stewards of the Earth's water resources? Explain your answer.

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### **Elicit the following ideas to establish the consensus:**

- a. No, humans caused the destruction of Earth's water resources. The Earth's water is abundant, and with proper protection and management, can sustain human's daily needs. However, humans use water irresponsibly and inefficiently. Even though we are aware that we have a never-ending need for water and that it is important in our everyday lives, we still continue to perform activities that harm the environment and affect the water supply and quality. We use water lavishly in our households and communities; businesses overexploit water resources for money; and industries pollute the environment.

- b. Yes, humans are actively thinking of ways to protect and conserve water resources for future generations.

- **Follow-up question: In your own simple ways, are you willing to become a good steward on freshwater conservation? If yes, how? If no, why not?**

**Expected answers:** *(Answers can be a reiteration from preparation/provision of background information part of this module.)*

Yes, I want to be a good steward of freshwater conservation because water is very important for living beings—it is essential in our everyday lives.

8. Ask the class if they have questions about the second segment of the podcast and the group presentations that have not been discussed yet. If there are any, discuss these with the class.

**Note:** Refer to the **SLIDES 20–22** in discussing the succeeding concepts.

### SLIDE 20

## Agriculture

- Conversion of land for agriculture use (e.g., irrigation system) alters the characteristics of the land surface, which in turn affects groundwater recharge or how water moves from the surface to the ground; affects the delivery of water and sediments to other surface water bodies, and affects the water cycle.
- Use of chemicals such as pesticides and fertilizers contaminates water, thus contributing to water quality degradation.
- Animal wastes also contaminate water.

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### SLIDE 21

## Urban Development

- Conversion and modification of land for urban development (e.g., construction of roads and infrastructures) change the characteristics of the land surface, affecting water quality and supply
- Wastes from sewage treatment plants, industrial facilities, and other infrastructures contaminate water bodies.
- Increasing population means increasing demand for clean and potable water.
- Air pollution, due to emissions from factories and vehicles, causes acid rain—damaging ecosystems including forests and water bodies.

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## SLIDE 22

### Over abstraction

- Over-abstraction means excessive water withdrawal, where the amount of water taken from the ground is greater than the amount of water falling as rain.
- Water bodies dry up because too much water is being drawn from the ground.

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### **Part 3**

1. Recall the third and fourth segment of the podcast  
(Description: Segment 3: Policy Feature: Philippine Clean Water Act; Segment 4: Activity/Challenge on water conservation)
2. Discuss the following questions with the class:

- **Question 1: Describe the water policy discussed in the podcast.**

**Possible answer/s:**

The Clean Water Act was enacted to protect and maintain the cleanliness of the Philippines' water resources. It was also passed to ensure that Filipinos will have access to clean and potable water.

- **Question 2: Why is there a need to have a policy on the protection of water resources?**

**Possible answer/s:**

We need clean and potable water in our everyday lives. It is very important to ensure that our existing water resources are protected from destruction and pollution.

- **Question 3: What are the different ways to conserve water, as mentioned in the podcast?**

**Possible answer/s:**

- Drink tap water instead of bottled water.
- Turn off faucets.
- Fix leaks.
- Engage communities in the conversation and action for the protection of water resources.

- **Question 4: What specific actions can you take to adhere to the policy?**

**Possible answers:** (Answers may vary.)

Participate in clean-up drives (for example, Manila bay clean up); Report institutions or individuals polluting water bodies

3. Ask the class if they have questions about the third and fourth segments of the podcast that have not been discussed yet. If there are any, discuss these with the class.

**Note:** Refer to the **SLIDES 23-24** in discussing the succeeding concepts.

### SLIDE 23

Why do we need to conserve water?

- WATER IS LIFE! It is because we need water in our everyday life.
- Growing food (e.g., farming, raising animals) needs water.
- Water is essential for the survival of ecosystems and wildlife.
- The use of less water means more savings.
- Water, specifically clean freshwater, is already a limited and critical resource.
- Conserving water is also conserving energy.

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### SLIDE 24

**Be a water saver!**

1. Drink tap water instead of bottled water.
2. Turn off faucets.
3. Take shorter baths.
4. Reuse and recycle water.
5. Fix leaks.
6. Don't pour grease or chemicals down the drains.
7. Eat more fruits and vegetables.
8. PLANT TREES!
9. Encourage discussions on water conservation within your community.

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## Assessment

### A. In Class

1. Instruct the groups to compose a tweet (maximum of 280 characters) about their reflection on the topics below:
  - a. Group 1: Different water resources
  - b. Group 2: Human activities affecting the water quality and availability
  - c. Group 3: Management and conservation of water resources
  - d. Group 4: Ways to conserve and protect water resources
2. The groups should write their answers on the metacards provided and post it on the board.
3. One representative from each group shall briefly explain their reflection.

### B. Homework

1. Discuss the homework to the class. (*See attachments for homework.*)

## Key Concepts

### 1. Natural Resources

- These are materials or substances, such as minerals, forests, water, and fertile land, which occur in nature, and sometimes used for economic gain (Quizlet, n.d.).

### 2. Conservation

- It is the study of the loss of Earth's biological diversity and the ways to prevent this loss (*Britannica*, n.d.).

### 3. Water

- It is a substance composed of the chemical elements hydrogen and oxygen and existing in gaseous, liquid, and solid states. It is one of the most plentiful and essential of compounds (*Britannica*, n.d.).

### 4. Saltwater/Seawater

- It is the water that makes up the oceans and seas, covering more than 70 percent of Earth's surface (*Britannica*, n.d.).
- It is the salty/saline water with a complex mixture of 96.5 percent water, 2.5 percent salts, and smaller amounts of other substances, including dissolved inorganic and organic materials, particulates, and a few atmospheric gases (*Britannica*, n.d.).

5. **Freshwater**

- It is defined as a water body having a low salt concentration (University of California Museum of Paleontology, n.d.).
- It is the kind that is not salty, like water found in lakes, streams, and rivers. It refers to things living in or related to freshwater (e.g., "freshwater fish") (Greenfacts, n.d.).

6. **Groundwater**

- It is the water found underground in the cracks and spaces in soil, sand, and rock. It is stored in and moves slowly through geologic formations of soil, sand, and rocks called aquifers (Groundwater Foundation, n.d.).

7. **Pollution**

- Also called as environmental pollution, it is the addition of any substance (solid, liquid, or gas) or any form of energy (such as heat, sound, or radioactivity) to the environment at a rate faster than it can be dispersed, diluted, decomposed, recycled, or stored in some harmless form. The major kinds of pollution, usually classified by environment, are air pollution, water pollution, and land pollution (*Britannica*, n.d.).

8. **Over-abstraction**

- It is the decrease in the groundwater levels when water is taken from aquifers. If the amount of water taken is greater than the amount of water falling as rain, it is called over-abstraction.
- It also refers to the excessive withdrawal of water.

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## Worksheet

Name: \_\_\_\_\_

Grade and Section: \_\_\_\_\_ Score: \_\_\_\_\_

**Instructions:** Answer the following questions while listening to the podcast.

### Part 1.

1. In the first part of the podcast, Kali and Naya are talking. What is their conversation all about?

2. What are the water resources mentioned in the podcast?

3. Given the information about water resources in the first segment of the podcast, do you think there is enough water for human use? Why or why not?

4. How do you think the unavailability of water impacts human lives?

**Part 2.**

1. Note down the different human activities that affect water quality.

Group 1	Agricultural practices
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Group 2	Urban development
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Group 3	Over-abstraction or excessive withdrawal of groundwater
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**Part 3.**

1. Why do you think the management and conservation of water resources are important?

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2. What is the water policy discussed in the podcast?

3. Why is there a need to have a policy on the protection of water resources?

4. What are the different ways to conserve water, as mentioned in the podcast?

5. What are your current practices in water conservation?

6. What are your personal water conservation goals?



## Worksheet Answer Key

Name: \_\_\_\_\_

Grade and Section: \_\_\_\_\_ Score: \_\_\_\_\_

**Instructions:** Answer the following questions while listening to the podcast.

### Part 1.

1. In the first part of the podcast, Kali and Naya are talking. What is their conversation all about?

They enumerated some of the water resources that can be found in the Philippines. It reiterates that the country has abundant natural resources specifically water resources.

2. What are the water resources mentioned in the podcast?

Ocean, sea, river, lake, glacier, ice caps, groundwater

3. Given the information about water resources in the first segment of the podcast, do you think there is enough water for human use? Why or why not?

Yes, because the Earth has abundant water resources.  
OR  
No, because the Earth has limited freshwater resources.

4. How do you think the unavailability of water impact human lives?

Without water, we cannot grow food, we cannot take a bath, we cannot clean our houses, we have no water to drink, etc.

We cannot live without water. Water is needed in our everyday lives.

**Part 2.**

1. Write down the different human activities that affect water quality.

<p>Group 1</p>	<p><b>Agricultural practices</b></p> <ul style="list-style-type: none"> <li>• Conversion of land (land modification) for agriculture use can alter the characteristics of the land surface, affecting how water moves from the surface to the ground.</li> <li>• Pesticides and other chemicals used in agriculture can contaminate water, causing degradation of water quality.</li> <li>• Animal wastes also contaminate water.</li> </ul> <p>Agricultural practices, such as land modification for agricultural use, affect the flow of water from the surface to other bodies of water as well as how it moves toward the ground. Moreover, pesticides, chemicals, and other agricultural wastes seep through the ground and contaminate groundwater and other surface water bodies—degrading the quality of water.</p> <p>Take the case of Valencia, Spain, as an example. They are now having trouble with preserving their groundwater resources since it is highly contaminated with nitrate, a mineral fertilizer. It also affects the health of the people since their drinking water is also contaminated. It encourages people to buy bottled water (note that production of bottles also uses a large amount of water) instead of drinking from the tap.</p> <p>Additional information here: <a href="https://www.euronews.com/2019/12/17/how-irresponsible-agriculture-has-poisoned-spain-s-water-resources">https://www.euronews.com/2019/12/17/how-irresponsible-agriculture-has-poisoned-spain-s-water-resources</a></p>
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Group 2

### **Urban development**

- Conversion of land alters the characteristics of the land surface.
- Wastes from sewage treatment plants, industrial facilities, and other infrastructures contaminate water bodies.
- The demand for water is increasing because of the growing population.
- The use of water is inefficient.
- Emissions from industrial facilities and vehicles form acid rain, which in turn pollutes various ecosystems like forests and water bodies.

Urban development, like agriculture, also affects water flow when land is modified and converted to housing, buildings, and other infrastructures. But mostly, urban development highly contributes to water quality degradation due to the waste emissions of industrial facilities, households, and other infrastructures polluting water bodies.

The cases of the Meycuayan River and Marilao River are a perfect example. Wastes from surrounding industries (e.g., tanneries, metal refineries, dumpsites, etc.) highly contaminated the rivers, which made them enter in the Dirty Thirty List of the World's World Polluted Places.

Additional information: <https://www.gmanetwork.com/news/news/regions/61154/marilao-meycauayan-listed-among-world-s-dirtiest/story/>

Group 3

**Over-abstraction or the excessive withdrawal of groundwater**

- Water bodies dry up because too much water is being drawn from the ground.
- The irrigation system is inefficient.
- The illegal water abstraction operates without a permit with wells and pumping of bodies of water.
- The demand for water is increasing.

Over-abstraction of groundwater greatly contributes to the drying up of water resources. It is because more water is being drawn from the ground than what is being replenished (through rain). Since groundwater also sustains surface water bodies like rivers and lakes, these water bodies may also dry up if the level of groundwater continue to fall. Excessive withdrawal also disrupts the balance between saltwater and freshwater. It causes intrusion of saltwater to groundwater, making the groundwater less useful (unless desalinated).

The European Environment Agency says that, for instance, Mediterranean countries mostly suffer from saltwater intrusion because of over-abstraction. The groundwater in these countries can no longer be consumed or irrigated unless it undergoes desalination.

Additional information here: <https://www.eea.europa.eu/archived/archived-content-water-topic/water-resources/impacts-due-to-over-abstraction>

Source: Cooper, B. (2018, February19). The Abstraction of Water. Medium. <https://medium.com/the-abs-tract-organization/the-abstraction-of-water-68510e720985>

### Part 3.

1. Why do you think the management and conservation of water resources are important?

We need water in our everyday lives.

The environment is interconnected and interrelated, so you have to protect and conserve one resource in order to protect the others.

Other possible answers (included in the PowerPoint presentation):

- Growing food (e.g., farming, raising animals) needs water.
- Water is essential for the survival of ecosystems and wildlife.
- The use of less water means more savings.
- Water, specifically clean freshwater, is already a limited and critical resource.
- Conserving water is also conserving energy.

2. What is the water policy discussed in the podcast?

Philippine Clean Water Act of 2004

- The Clean Water Act was enacted to protect and maintain the cleanliness of the Philippines' water resources. It was also passed to ensure that Filipinos will have access to clean and potable water.

More information on the act (can be used for discussion):

The Philippine Clean Water Act of 2004 or the Republic Act 9275 was signed by former President Gloria Arroyo on March 22, 2004. It was passed to ensure that the Philippines' water bodies are protected from pollution brought about by industrial and commercial establishments, agriculture, and household activities. This law also wants to ensure that all Filipinos have access to clean water. This is important because, as stated on the website of the Environmental Management Bureau of Region 12, most of the rivers of the Philippines were already polluted and that many illnesses are attributed to the country's polluted waters.

Source: RA 9275 – The Philippine Clean Water Act. (n.d.). Environmental Management Bureau Region 12-Soccksargen. <http://r12.emb.gov.ph/ra-9275-the-philippine-clean-water-act/>

3. Why is there a need to have a policy on the protection of water resources?

We need clean and potable water in everything that we do and in every day of our lives. As mentioned earlier, the Earth has abundant water resources but has limited clean and potable water resources. This limited resource is becoming more scarce because of human activities that cause water pollution and change the flow of water—contributing to water quality degradation and a decrease in water supply.

The policy is important because it provides strategies on how to protect water resources in the country—from management of water quality, cleanups, and penalizing industries and individuals contributing to the further pollution of water bodies.

4. What are the different ways to conserve water as mentioned in the podcast?

- Drink tap water instead of bottled water.
- Turn off faucets.
- Take shorter baths.
- Reuse and recycle water.
- Fix leaks.
- Don't pour grease or chemicals down the drain.
- Eat more fruits and vegetables.
- Plant trees.
- Engage communities in the conversation and action for the protection of water resources.

5. What are your current practices in water conservation?

*Answers may vary.*

Possible answers:

- I make sure the faucet is turned off and not leaking whenever I leave the house.
- I refrain from buying bottled water.
- I use a pail when taking a bath.
- I report leaky pipes.

6. What are your personal water conservation goals?

*Answers may vary.*

Some possible answers:

- I will save water by using a pail instead of using a shower when taking a bath.
- I will save water by using a cup and turning the faucet off when brushing my teeth.
- I will save water by always keeping a tumbler with me instead of buying bottled water.
- I will save water by using used water from washing the dishes to water the plants in the garden.
- I will plant more trees.
- I will encourage more conversation on water conservation.



## Homework: Water Conservation in the Community

**Name:** \_\_\_\_\_

**Grade and Section:** \_\_\_\_\_ **Score:** \_\_\_\_\_

**Instructions:**

1. Choose and visit one body of water in your community or a nearby community.
2. Identify various human activities contributing to the degradation of the body of water.
3. List down possible ways to conserve and protect the body of water:
  - a. Individual
  - b. Community

Body of water	Human activities	Ways to conserve and protect
	1. 2. 3.	Individual: 1. 2. 3.  Community: 1. 2. 3.