

MODULE

1

THE
PHILIPPINE ENVIRONMENT

Overview

Everything that we see around us makes up our environment. The landforms and bodies of water that make up the landscape, the mountains and valleys, rivers and seas; the climate, the rains brought by the monsoons, the warm, humid weather that we frequently experience; the natural resources that we make use of; every plant and animal that live around us. Truly, the environment is made up of a lot of things.

All these things that we find in our surroundings and all the natural phenomena that we observe are not due to some random luck or accident. What makes up our environment is very much related to where our country is on the globe. Or, to say it in a different way, the characteristics of our environment are determined by the location of the Philippines on the planet.

Latitude and Longitude

Before we learn about the characteristics of our environment, let us first talk about the location of the Philippines. Where is the Philippines? The Philippines is on Earth, of course, but where exactly is it located? To answer this question, you have to learn a new skill: locating places using latitude and longitude.

Activity 1**Where in the world is the Philippines? (Part I)**

Objective

After performing this activity, you should be able to describe the location of the Philippines using latitude and longitude.

What to use

globes

What to do

1. Study the image of a globe on the right. Then get a real globe and identify the parts that are labelled in the image. Be ready to point them out when your teachers asks you.
2. After studying the globe and the image on the right, try to define “equator” in your own words. Give your own definition when your teacher asks you.
3. The “northern hemisphere” is that part of the world between the North Pole and the equator. Show the northern hemisphere on the globe when your teacher asks you.
4. Where is the “southern hemisphere”? Show the southern hemisphere on the globe when your teacher asks you.
5. Study the drawing on the right. It shows the lines of latitude.

Q1. Describe the lines of latitude.

Q2. Show the lines of latitude on the globe when your teacher asks you.

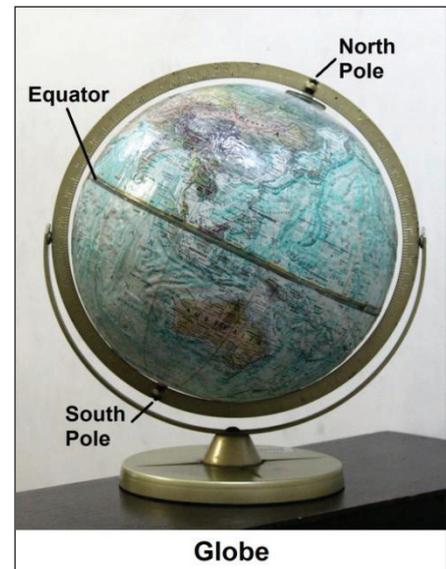


Figure 1. What does the globe represent?

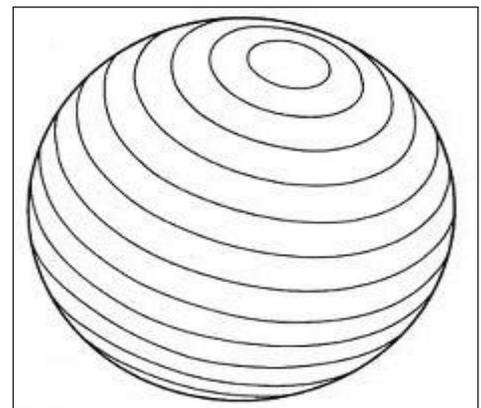


Figure 2. What is the reference line when determining the latitude?

Q3. The starting point for latitude is the equator. The equator is at latitude 0° (0 degree). At the North Pole, the latitude is 90°N (90 degrees north). At the South Pole, the latitude is 90°S (90 degrees south). Show the following latitudes when your teacher calls on you: 15°N ; 60°N ; 30°S ; 45°S .

Q4. The globe does not show all lines of latitude. If you wish to find 50°N , where should you look?

6. Study the drawing on the right. It shows the lines of longitude.

Q5. Describe the lines of longitude.

Q6. Show the lines of longitude on the globe when your teacher asks you.

Q7. The starting point for longitude is the Prime Meridian. The Prime Meridian is at longitude 0° . Show the Prime Meridian on the globe when your teacher asks you.

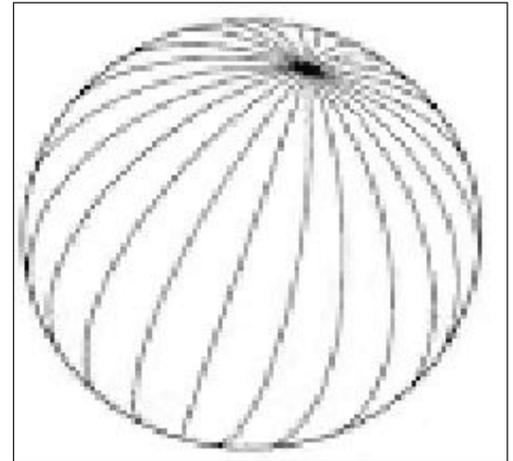


Figure 3. What is the reference line when determining the longitude?

Q8. To the right of the Prime Meridian, the longitude is written this way: 15°E (15 degrees east), 30°E (30 degrees east), and so on. To the left of the Prime Meridian, the longitude is written as 15°W (15 degrees west), 30°W (30 degrees west), and so on. On your globe, find longitude 180° . What does this longitude represent?

Q9. Not all lines of longitude are shown on a globe. If you want to find 20°W , where should you look?

Q10. The location of a place may be described by using latitude and longitude. To the nearest degree, what is the latitude and longitude of Manila?

Q11. Compared to the size of the world, Manila is just a tiny spot, and its location may be described using a pair of latitude and longitude. But how would you describe the location of an “area” such as the whole Philippines?

Now you know how to describe the location of a certain place using latitude and longitude. The lines of latitude are also known as parallels of latitude. That is because the lines of latitude are parallel to the equator and to each other. Five lines of latitude have special names. They are listed in the table below. The latitude values have been rounded off to the nearest half-degree.

Latitude	Name
0°	Equator
23.5°N	Tropic of Cancer
23.5°S	Tropic of Capricorn
66.5°N	Arctic Circle
66.5°S	Antarctic Circle

Get a globe and find the Tropic of Cancer and the Tropic of Capricorn. Trace the two lines of latitude with a red chalk. The part of the world between the two chalk lines is called the tropics. Countries that are located in this zone experience a tropical climate where the annual average temperature is above 18°C.

Now, find the Arctic Circle and the Antarctic Circle on the globe. Trace them with blue chalk. Between the Tropic of Cancer and the Arctic Circle is the northern temperate zone; between the Tropic of Capricorn and the Antarctic Circle is the southern temperate zone. Countries in these zones go through four seasons – winter, spring summer, and autumn.

Finally, the areas within the Arctic Circle and Antarctic Circle are called the polar regions or frigid zones. People who choose to live in these areas have to deal with temperatures that never go above 10°C. It is cold all year round and even during the summer months, it does not feel like summer at all.

To sum up, the closer the latitude is to the equator, the warmer the climate. The closer it is to the poles, the colder. Thus, it is clear that there is a relationship between the latitude of a place and the climate it experiences, and you will find out why in the next module.

Landmasses and Bodies of Water

Using latitude and longitude is not the only way that you can describe the location of a certain area. Another way is by identifying the landmasses and bodies of water that are found in that area. So, what are the landmasses and bodies of water that surround the Philippines? Do the following activity and get to know the surrounding geography.

Activity 2 Where in the world is the Philippines? (Part II)

Objective

After performing this activity, you should be able to describe the location of the Philippines with respect to the surrounding landmasses and bodies of water.

What to use

globe or world map

What to do

1. Using a globe or a world map as reference, label the blank map below.
2. Your labelled map should include the following:

A. Landmasses

Philippine archipelago
Asian continent
Malay peninsula
Isthmus of Kra
Indonesian archipelago
Australian continent

B. Bodies of water

Philippine Sea
South China Sea
Indian Ocean
Pacific Ocean

- Q1. Which bodies of water in the list are found to the west of the Philippines?

Q2. Which body of water in the list is located to the east of the Philippines?

Q3. Which large landmass is found to the north of the Philippines?

3. Be ready to show the map with your labels when your teachers asks you.



Figure 4. Where is the Philippines in the map? Why is the Philippines called an archipelago?

By now you can say that you really know where the Philippines is. You can now describe its location in two ways: by using latitude and longitude, and by identifying the landmasses and bodies of water that surround it. What then is the use of knowing where the Philippines is located? You will find out in the next section and also in the following module.

Are We Lucky in the Philippines?

Planet Earth is made up of different things - air, water, plants, animals, soil, rocks, minerals, crude oil, and other fossil fuels. These things are called natural resources because they are not made by people; rather they are gathered from nature. Sunlight and wind are also natural resources. We use all these things to survive or satisfy our needs.

The Philippines is considered rich in natural resources. We have fertile, arable lands, high diversity of plant and animals, extensive coastlines, and rich mineral deposits. We have natural gas, coal, and geothermal energy. Wind and water are also harnessed for electricity generation.



Photo: Courtesy of Cecile N. Sales



Photo: Courtesy of Kit Stephen S. Agad



http://en.wikipedia.org/wiki/File:POTW_MichelleELLA01.jpg

Figure 5: What kind of natural resources are shown in the pictures? Do you have similar resources in your area?

Why do we have rich natural resources? What geologic structures in the country account for these bounty? Is our location near the equator related to the presence of these natural resources?

The next lessons will help you find answers to some questions about natural resources in the country namely, rocks and minerals, water, soil, varied life forms, and energy.

- How does our latitude position affect the water, soil resources, and biodiversity in the country?
- What mineral deposits do we have in the country? Where are they located and why only in those places?
- Given our location, what energy resources are available?
- Which of our practices in using natural resources are sustainable? Which are not sustainable?
- How can we help conserve natural resources so that future generations can also enjoy them?

Hopefully, the knowledge and skills acquired in the lessons will help you value your responsibility as a productive citizen so that you can help prevent protected and vulnerable places from being mined, forests from being overcut, and natural resources like metals from ending up in a dumpsite.

Water Resources and Biodiversity

The Philippines boasts of many different kinds of natural water forms, such as bays, rivers, lakes, falls, gulfs, straits, and swamps. Because it is made up of islands, the country's coastline (seashore) if laid end-to-end, would measure around 17.5 thousand kilometers. And you know how we are proud of our coastlines! The bodies of water and its surrounding environment not only support the survival of diverse organisms for food but are also used for other economic activities. All these you learned in *Araling Panlipunan*.

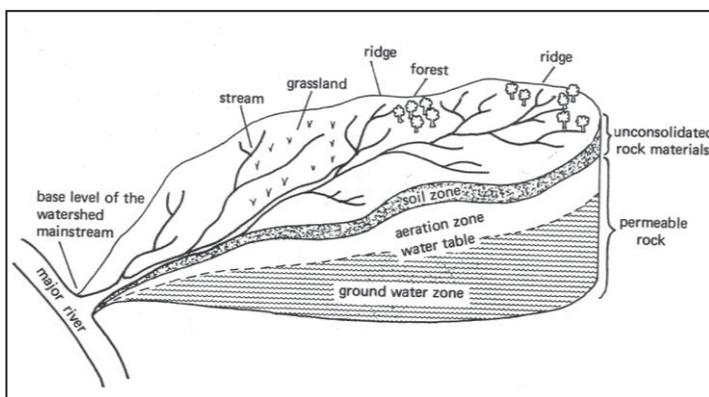
In the previous activity you identified two big bodies of water on the west and east side of the country: the Pacific Ocean in the east and south China Sea in the west (sometimes referred to as the West Philippine Sea). These bodies of water are the origin of typhoons which on the average, according to Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA), is about 20 a year. Typhoons and the monsoons (*amihan* and *habagat*) bring lots of rain to the Philippines.

What is your association with too much rainfall? For some, rain and typhoons result in flooding, landslides, and health related-problems. But water is one of nature's gifts to us. People need fresh water for many purposes. We use water for domestic purposes, for irrigation, and for industries. We need water to generate electricity. We use water for recreation or its aesthetic value. Many resorts are located near springs, waterfalls or lakes.

Where does water in your community come from? You collect them when the rain falls or get them from the river, deep well, or spring. But where does water from rivers, lakes, and springs originate?

They come from a watershed – an area of land on a slope which drains its water into a stream and its tributaries (small streams that supply water to a main stream). This is the reason why a watershed is sometimes called a catchment area or drainage basin. It includes the surface of the land and the underground rock formation drained by the stream.

From an aerial view, drainage patterns in a watershed resemble a network similar to the branching pattern of a tree. Tributaries, similar to twigs and small branches, flow into streams, the main branch of the tree. Streams eventually empty into a large river comparable to the trunk.



<http://en.wikipedia.org/wiki/File:Maria1637jf.JPG>

Figure 6. The network of streams in a watershed area is illustrated on the left and a photo of a watershed area is on the right. How does the concept “water runs downhill” apply to a watershed?

Watersheds come in all shapes and sizes. They cross towns and provinces. In other parts of the world, they may cross national boundaries.

There are many watersheds in the Philippines basically because we have abundant rainfall. Do you know that Mt. Apo in Davao-Cotabato, Makiling-Banahaw in Laguna and Quezon, and Tiwi in Albay are watersheds? You must have heard about La Mesa Dam in Metro Manila, Pantabangan Dam in Pampanga, and Angat Dam in Bulacan. These watersheds are sources of water of many communities in the area. The Maria Cristina Falls in Iligan City is in a watershed; it is used to generate electricity. Locate these places in your map. Ask elders where the watershed is in or near your area? Observe it is used in your community.

But watersheds are not just about water. A single watershed may include combination of forest, grassland, marshes, and other habitats. Diverse organisms in the Philippines are found in these areas! Being a tropical country, the Philippines has abundant rainfall, many bodies of water, and lots of sunshine. The right temperature and abundant rainfall explain partly why our country is considered to be a mega-diverse country. This means that we have high diversity of plants and animals, both on land and in water (Philippine Clearing House Mechanism Website, 2012).

Reports show that in many islands of the Philippine archipelago, there is a high number of endemic plants and animals (endemic means found only in the Philippines). The country hosts more than 52,177 described species of which more than half is found nowhere else in the world. They say that on a per unit area basis, the Philippines shelters more diversity of life than any other country on the planet.

For now remember that the main function of a watershed is the production of a continuous water supply that would maintain the lifeforms within it and in the area fed by its stream. Later you will learn that besides supporting the survival of varied life forms, abundant water in the country is important in moderating temperature. This topic will be discussed later.

Have you ever asked yourself the following questions? If we have abundant rainfall to feed watersheds, why do we experience drought some parts of the year? What factors affect the health of a watershed? Is there a way of regulating the flow of water in watershed so that there will be enough for all throughout the year? What can people do to keep watersheds 'healthy'? Find out about these in the next activity.

Activity 3

What are some factors that will affect the amount of water in watersheds?

Objective

You will design a procedure to show how a certain factor affects the amount of water that can be stored underground or released by a watershed to rivers, lakes and other bodies of water.

What to do

1. In your group, choose one factor that you want to investigate.
 - a. Vegetation cover
 - b. Slope of the area
 - c. Kind of soil
 - d. Amount of rainfall
 2. Identify the variables that you need to control and the variable that you will change.
 3. Design a procedure to determine the effect of the factor you chose on watersheds.
 4. Be ready to present your design in the class and to defend why you designed it that way.
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Soil Resources, Rainfall and Temperature

Recall in elementary school science that soil is formed when rocks and other materials near the Earth's surface are broken down by a number of processes collectively called weathering. You learned two types of weathering: the mechanical breaking of rocks or physical weathering, and the chemical decay of rocks or chemical weathering.

Let us review what happens to a piece of rock when left under the Sun and rain for a long time. Do the next activity.

Activity 4

How are soils formed from rocks?

Objectives

1. Using the information in the table, trace the formation of soil from rocks.
2. Identify the factors acting together on rocks to form soil.

What to use

Drawing pens

What to do

1. Processes involved in soil formation are listed in the table below. Read the descriptions of the processes and make your own illustrations of the different processes. Draw in the designated spaces.
2. Use the descriptions and your drawings to answer the following questions.

Q1. What are the factors that act together on rocks to form soil?

Q2. What does the following sentence mean, “Soils were once rocks”?

<i>Processes of soil formation</i>	<i>Illustrations of processes</i>
<i>When a piece of rock is exposed to the Sun, its outer part expands (becomes bigger) because it heats up faster than the inner part (Drawing A).</i>	<i>Drawing A</i>
<i>On cooling, at night time, the outer part of the rock contracts or shrinks because the outer part of the rock cools faster than the inner portion (Drawing B). The process of expansion and contraction are repeated over the years and produce cracks in the rock causing the outer surface to break off.</i>	<i>Drawing B</i>

Processes of soil formation	Illustrations of processes
<p><i>Once broken, water enters the cracks causing some minerals to dissolve. The rock breaks apart further. (Drawing C).</i></p>	<p><i>Drawing C</i></p>
<p><i>Air also enters the cracks, and oxygen in the air combines with some elements such as iron to produce iron oxide (rust or kalawang) which is brittle and will easily peel off. In a similar way, carbon dioxide from the air reacts with water to form an acid causing the rock to soften further. Once soft and broken, bacteria and small plants start to grow in the cracks of the rock (Drawing D).</i></p> <p><i>After some time, the dead plants and animals die and decay causing the formation of more acidic substances which further breaks the rocks. The dead bodies of plants and animals are acted upon by microorganism and breakdown into smaller compounds while the minerals from the rock return to the soil.</i></p>	<p><i>Drawing D</i></p>

Soil covers the entire Earth. Temperature, rainfall, chemical changes, and biological action act together to continuously form soil. Climate, expressed as both temperature and rainfall effects, is often considered the most powerful soil-forming factor.

Temperature controls how fast chemical reactions occur. Many reactions proceed more quickly as temperature increases. Warm-region soils are normally more developed or more mature than cold-region soils. Mature soils have more silt and clay on or near the surface. Thus, soils in the tropical areas are observed to sustain various farming activities and account for why the primary source of livelihood in the Philippines and other countries in the

tropical region is their fertile land. What is the effect of very little rainfall on food production?

Climate (temperature and rainfall) is a significant factor not only in soil formation but also in sustaining diversity of plants and animals in the country. On the other hand, water also directly affects the movement of soluble soil nutrients from the top soil to deep under the ground (leaching). These nutrients may no longer be available to shallow rooted plants. Acidic rainwater may also contribute to the loss of minerals in soil resulting in low yield. So rainfall determines the kind of vegetation in an area. In turn, the degree of vegetation cover, especially in sloping areas, determines how much soil is removed. Are there ways to protect soil resources?

Rocks and Mineral Resources

History tells us that rocks have been used by humans for more than two million years. Our ancestors lived in caves; they carved rocks and stones to make tools for hunting animals, cultivating crops, or weapons for protection. Rocks, stones, gravel, and sand were and are still used to make roads, buildings, monuments, and art objects.



http://commons.wikimedia.org/wiki/File:Dirkvdm_rocks.jpg

Figure 7. What are the features of the rocks? What environmental factors may have caused such features?



http://en.wikipedia.org/wiki/File:Pana_Banaue_Rice_Terraces.jpg

Figure 8. What kind of tools do you think were used to build the Rice Terraces? Why are terraces useful?

The mining of rocks for their metal content has been considered one of the most important factors of human progress. The mining industry has raised levels of economy in some regions, in part because of the kind of metals available from the rocks in those areas.

Activity 5

Where are the minerals deposits in the Philippines?

Mineral deposits can be classified into two types: metallic and non-metallic. You have already learned the symbols of some metals and nonmetals. Review them before you do the activity.

Objectives

After performing this activity, you will be able to

1. locate the metallic mineral deposits across the country;
2. find out what geologic features are common in areas where the deposits are found;
3. give a possible reason/s for the association between metallic mineral deposits and geologic features in the country; and
4. infer why your area or region is rich or not rich in metallic mineral deposits.

What to use

Figure 9: Metallic Deposits Map of the Philippines

Figure 10: Map of Trenches and Faults in the Philippines

Figure 11: Map of Volcanoes in the Philippines

2 pieces of plastic sheet used for book cover, same size as a book page

Marking pens (two colors, if possible)

What to do

Part I

1. Familiarize yourself with the physical map of the Philippines. Identify specific places of interest to you in the different regions.
2. In your notebook, make a four-column table with headings similar to Table 1.

Table 1: Metallic Minerals in the Philippines and Their Location

Metal, in Symbols (Example: Au) (1)	Metal, in Words (2)	Province/Region Where the Metals are Found (3)	Geologic Structure Near the Location of the Metallic Deposits (4)

3. As a group, study the Metallic Deposits Map of the Philippines. See Figure 9. In the map you will see symbols of metals. Fill in the information needed in Columns 1 and 2 of your own table.
4. Check with each other if you have correctly written the correct words for the symbol of the metals. Add as many rows as there are kinds of metals in the map.
5. Analyze the data in Table 1.
 - Q1. Identify five metals which are most abundant across the country. Put a number on this metal (1 for most abundant, 2 next abundant, and so on).
 - Q2. Record in Column 3 where the five most abundant metals are located.

**METALLIC MINERAL
DEPOSITS
OF THE
PHILIPPINES**

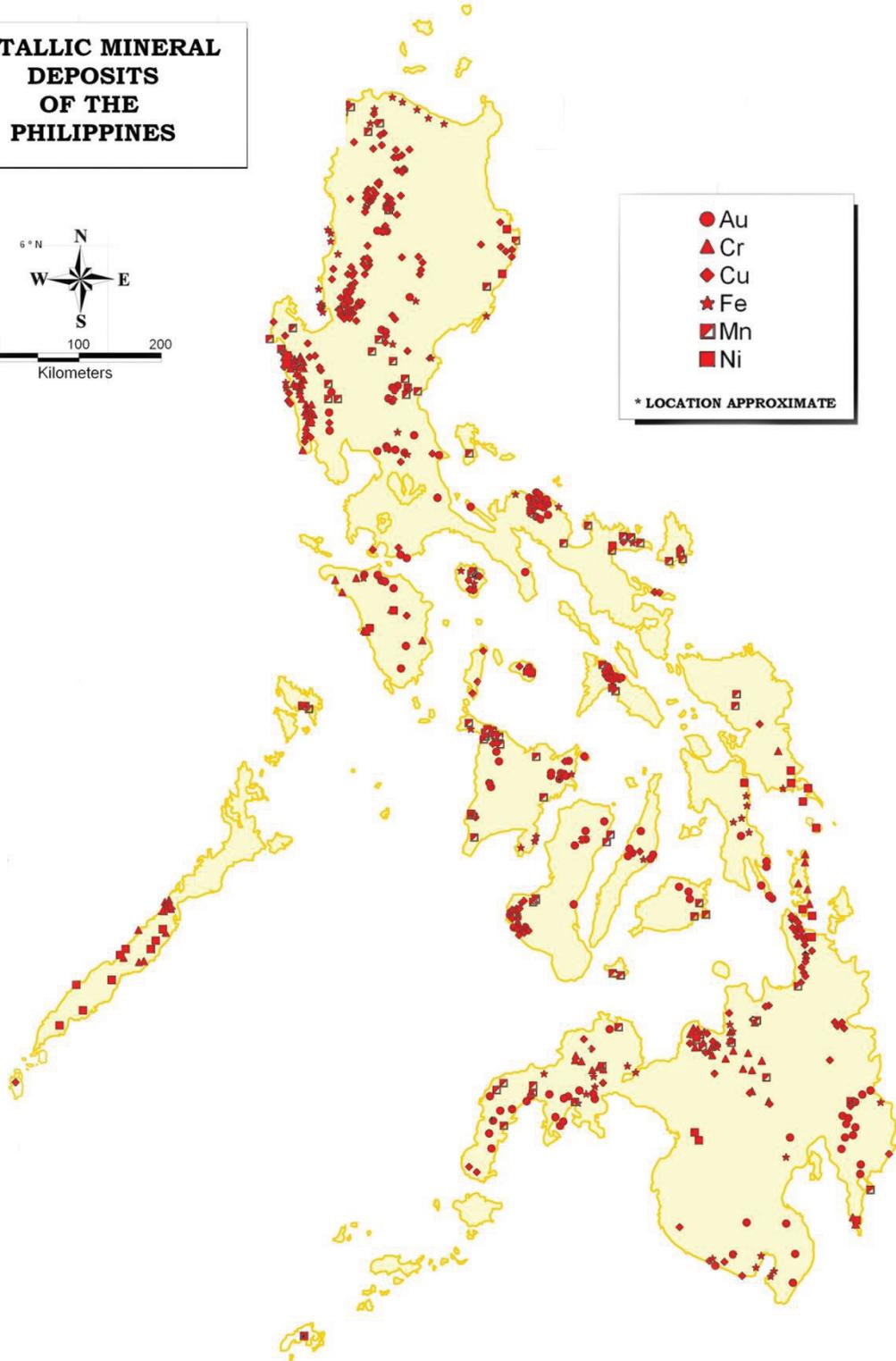
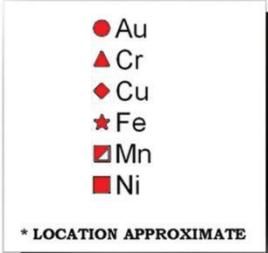
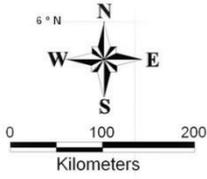


Figure 9. Metallic Deposits in the Philippines

Distribution of Active Faults & Trenches in the Philippines

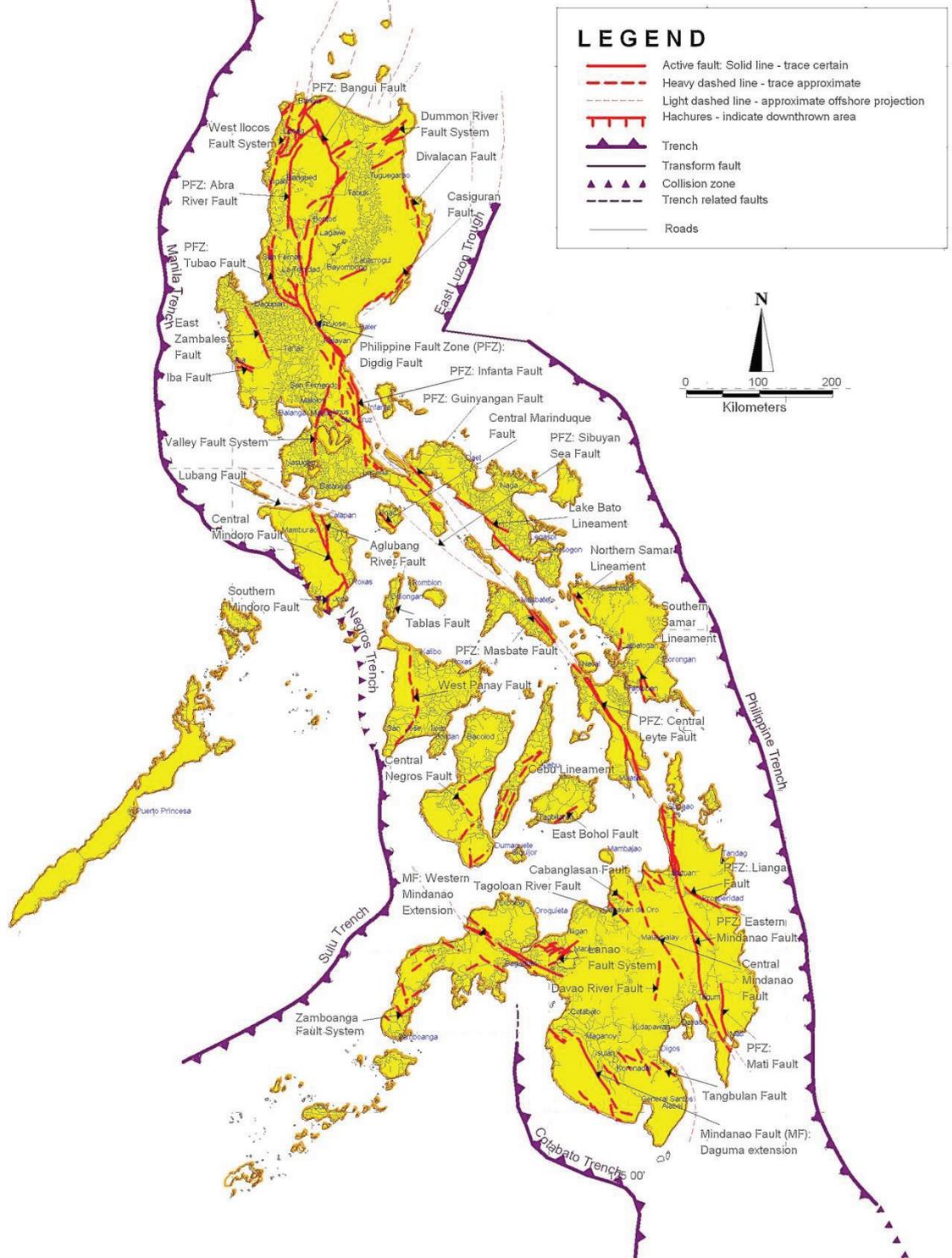


Figure 10. Trenches and Faults in the Philippines