Senior High School

Department of Education
National Capital Region
SCHOOLS DIVISION OFFICE
MARIKINA CITY

Earth & Life Science

First Quarter-Module 10

Hazard Maps

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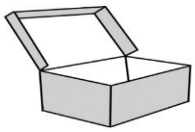


What I Need to Know

This module was designed and written with you in mind. It is here to help you understand how to use hazard maps. The scope of this module permits it to be used in many different learning situations. The language used recognizes the diverse vocabulary level of students. The lessons are arranged to follow the standard sequence of the course.

The module has one lesson which is Using Hazard Maps**.**

After going through this module, you are expected to

1. enumerate and explain the things to remember when using hazard maps;
2. identify activities and situations where hazard maps can be used;
3. use hazard maps; and
4. **using hazard maps, identify areas prone to hazards brought about by tropical cyclones, monsoons, floods, or *ipo-ipo* S11/12ES-Ig-36.**

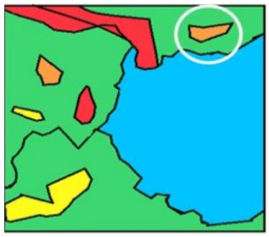
What I Know

Read the question carefully and encircle the letter of the correct answer.

1. Which of the following refers to a map describing the areas at risk of a natural disaster?
   A. Hazard map
   B. Political map
   C. Physical map
   D. Provincial map

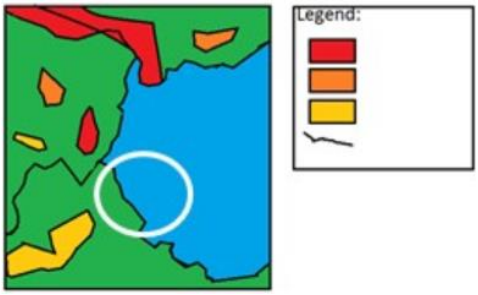
2. Generally, how are areas with higher susceptibility represented in the hazard map?
   A. With light colors
   B. With dark colors
   C. Cannot be determined
   D. At the Point of Interest

3. Refer to the figure below. What does the encircled area represent?



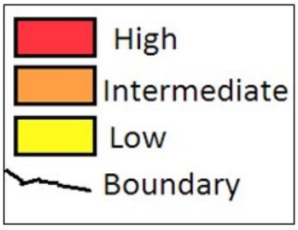
   A. Area cover
   B. Point of danger
   C. Hazardous area
   D. Point of Interest

4. Refer to the figure below. What is the encircled part of the map called?



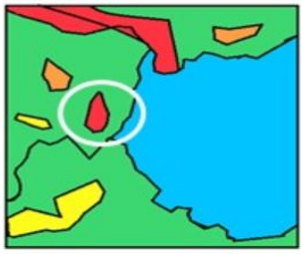
A. Boundary
B. Area affected
C. Point of Interest
D. Low susceptibility area

5. What part of the map is shown below?



A. Legend
B. Boundary
C. Risk indicator
D. Susceptible area

6. Examine the map below. The encircled part of the map shows that the area is highly susceptible to flood. What conclusion can be drawn about the area?

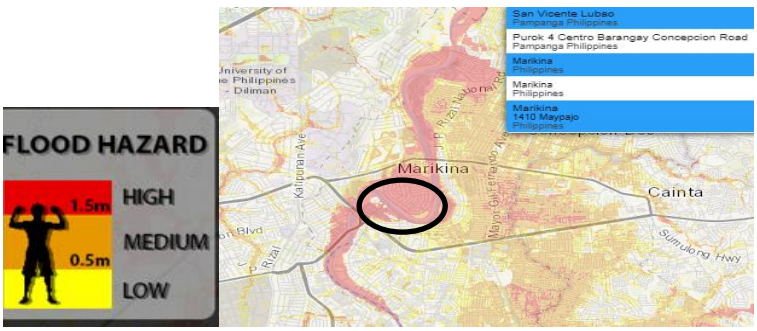


A. Low-lying area
B. Near rivers or other body of water
C. Both A and B
D. No conclusion can be drawn.

7. Which of the following are uses of a hazard map?
   I. As a basis for proper land use planning
   II. Identifying potential areas for evacuation
   III. Planning for disaster mitigation strategies
   IV. Predicting the pattern of natural disasters

A. I and II B. III and IV C. I, II, and III D. I, II and IV

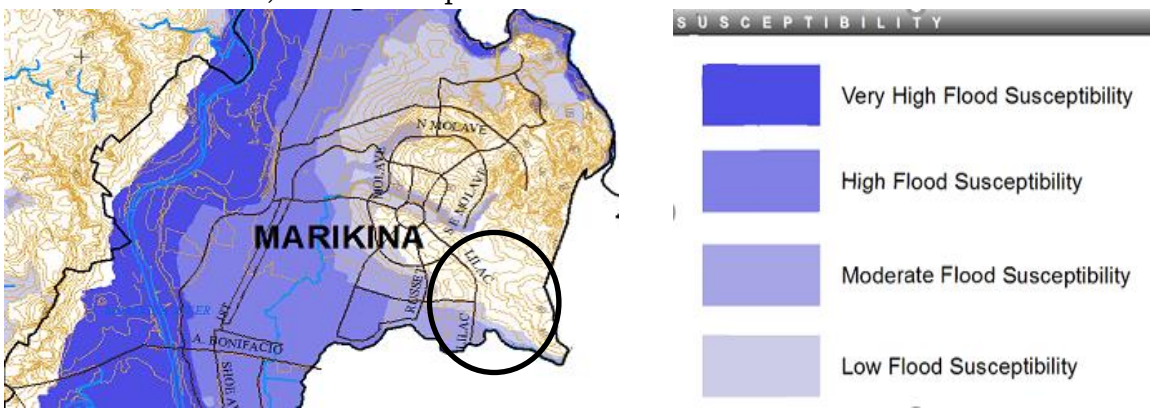
8. Based on the map below, how will you classify the flood hazard in the POI?



Source: *Flood Hazard Map. Digital image. Nationwide Operational Assessment of Hazards (NOAH). Accessed August 24, 2020. http://noah.up.edu.ph/#/section/geoserver/flood5*

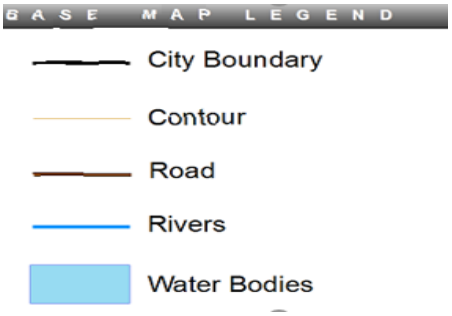
A. Low B. High C. Medium D. Very low

For numbers 9-11, use the map below:



9. What is the level of susceptibility of areas along Lilac Street (see encircled part)?
   A. Low susceptibility
   B. High susceptibility
   C. Low to moderate susceptibility
   D. Some parts have zero while others have low to moderate susceptibility.

10. Use the base map legend below. What is the level of flood susceptibility of areas near rivers and other water bodies?



   A. Zero
   B. Low
   C. Moderate
   D. High to Very high

11. What is one conclusion we can derive about the flood susceptibility of most places in Marikina?
   A. It is high to very high.
   B. It is moderate to high.
   C. It is low to moderate.
   D. It is zero to low.

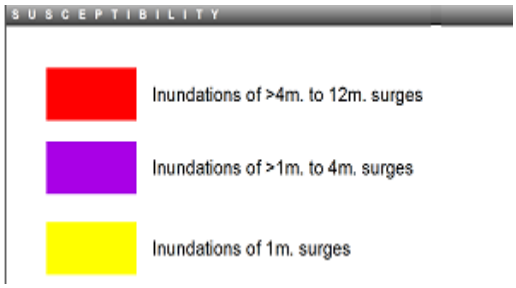
12. The map below is a rain-induced landslide hazard map. What is the area's (encircled part of the map) level of susceptibility to rain-induced landslide?

   A. Low
   B. High
   C. Very low
   D. Intermediate

13. The map below is a rain-induced landslide hazard map. The encircled part of the map shows that the area is highly susceptible to rain-induced landslide. What can we infer about this area?

A. It is far from steep slopes.
B. It is near rivers or other bodies of water.
C. It is far from rivers or other bodies of water.
D. It is located on top or at the base of steep slopes.

14. The following is a Storm Surge Hazard Map.

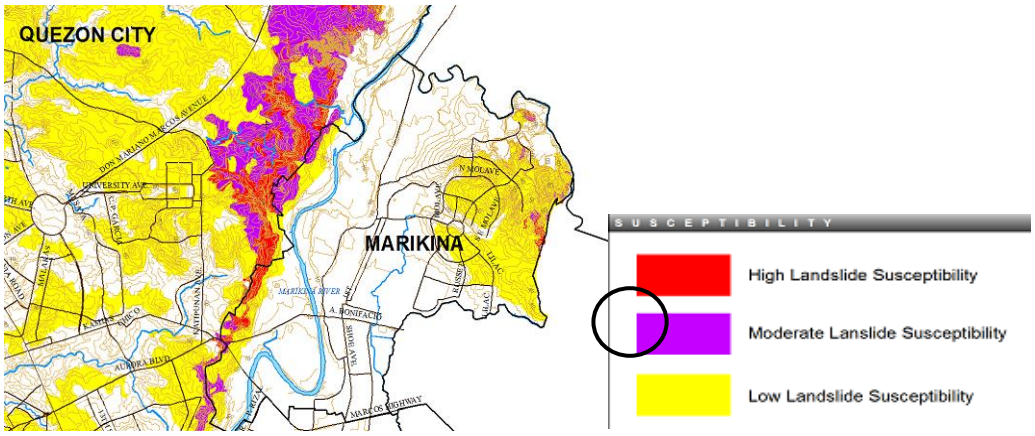


Source: *Storm Surge Hazard Map. Digital image. National Mapping and Resource Information Authority. Accessed August 24, 2020 http://www.namria.gov.ph/download.php*

Which area is more susceptible to storm surges than others?

A. Makati
B. Mandaluyong
C. Navotas
D. Pasay

15. Study the Rain-Induced Landslide Map below:



What can we conclude about the susceptibility of the POI on the map?

A. It is low.
B. It is high.
C. It is very low.
D. It is moderate.

Lesson 1	Using Hazard Maps

What's In

Activity 1.1. Review of Geologic Hazards

Do you still remember the different hazards brought about by earthquake and volcanic eruptions? In the Word Search below, you will find eight hazards. Find them all and categorize them either as earthquake hazards or as volcanic eruption hazards.

R	I	T	M	G	O	T	U	R	Z	W	A	I	X	M
E	V	F	S	R	V	I	Y	Q	A	M	D	Q	S	P
K	G	N	L	U	M	O	R	F	O	H	I	U	E	A
X	Y	P	C	R	N	S	D	M	Z	V	A	C	S	M
G	J	W	O	L	F	A	V	A	L	W	P	L	A	B
I	Q	D	A	N	Z	N	M	C	S	O	S	Z	G	P
T	O	X	S	K	P	C	K	I	P	U	B	V	S	K
P	C	T	G	L	A	N	D	S	L	I	D	E	U	A
T	E	P	H	R	A	F	A	L	L	A	Y	R	O	D
S	U	R	F	A	C	E	F	A	U	L	T	I	N	G
C	Q	C	T	M	U	D	J	N	P	X	N	P	O	L
Y	A	W	U	W	N	H	O	V	B	J	U	D	S	F
K	S	Q	T	C	K	D	U	T	S	N	Z	X	I	Q
M	B	A	G	Z	G	B	L	F	M	J	H	C	O	V
G	N	I	K	A	H	S	D	N	U	O	R	G	P	R

Copy and answer the following on a clean sheet of paper.

Earthquakes Hazards	Volcanic Eruption Hazards

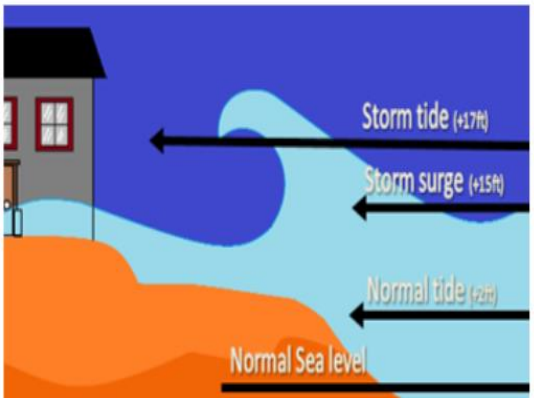
What's New

Activity 1.2. Identifying Common Hydrometeorological Hazards

Identify which hydrometeorological hazard is described in each item. Choose from the options below.

1. Water is pushed towards the shore
2. Rise in inland water level caused by heavy rainfall
3. Massive movement of a large area of soil down a slope
4. Also known as micro-tornadoes, usually found within the eyewall of a typhoon
5. Usually accompanies tropical cyclones, capable of destroying even concrete homes or buildings

A. storm surge



B. strong winds

C. mini-swirls

D. inland flood

E. landslide

Figure 1.1. Hydrometeorological Hazards
Source: *Hydrometeorological Hazards. Digital image. FrontLearners. Accessed August 24, 2020. www.frontlearners.com*

What Is It

The word **hydrometeorological** comes from two Greek words: "hydro" meaning *water* and "meteoros" meaning *sky*. Hydrometeorological hazards refer to hazards of atmospheric, hydrological, or oceanographic nature. They result from hydrometeorological phenomena.

The table below show common hydrometeorological phenomena and hazards in the Philippines. These hazards may bring about damage or loss of property, income, and even lives.

Table 1.1. Common Hydrometeorological Phenomena and Hazards in the Philippines

Phenomena	Associated Hazards
tropical cyclone	• storm surge • strong winds • mini-swirls • inland flood
monsoon	• cyclone • rain-induced landslides • floods • strong winds

You may recall that a tropical cyclone is a system of rotating winds developing in a low-pressure area while a monsoon is a seasonal shift in the prevailing wind direction. Monsoons are usually characterized by a season of heavy rainfall in the tropics. Heavy rainfall may bring about flood. Hazards associated with flood are rain-induced landslide and health hazards.

A **hazard map** can be used to prevent or minimize the impact of these hazards. It is a map that shows which areas are prone to hazards. It also describes how risky (low, medium, high) an area maybe.

Hazard maps are classified into what disaster they are showing. A *flood hazard map* shows the flood prone areas. Recall that low-lying areas near rivers or other bodies of water are most vulnerable to flood. A *rain-induced landslide hazard map*, on the other hand, shows areas prone to rain-induced landslides. Recall that areas on top, at the base, or near steep slopes are the most susceptible to landslides. *Storm surge hazard maps* identify areas prone to storm surges.

How to Read Hazard Maps

There are few simple steps in reading hazard maps.

1. First, locate *point of interest* or *POI*. This is the area of interest.

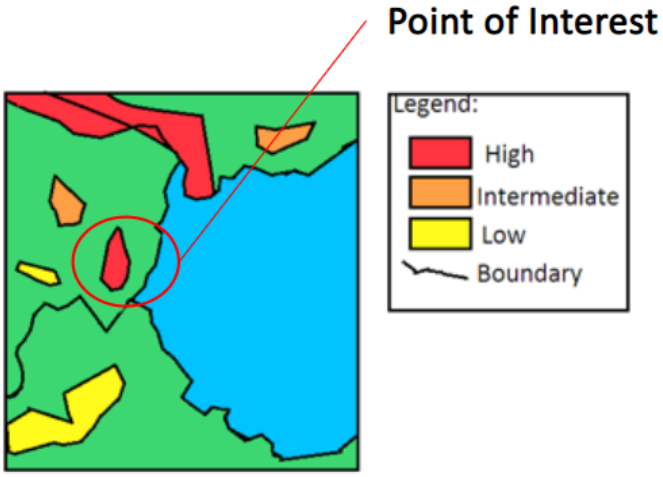


Figure 1.2. Hazard Map
Source: *Hazard Map. Digital image. FrontLearners. Accessed August 24, 2020. www.frontlearners.com*

2. Next check the color or representation of the POI. Look at the example above. *What color represents the area?*

In the simple flood hazard map above, the POI is colored red. Sometimes, if the map is not colored, different kinds of lines or shadings are used to represent an area.

3. Lastly, compare it to the legend. *What does the color or representation mean?*

The **legend** shows or explains the color coding/representation and symbols found in the map. Generally, light colored areas have low susceptibility while dark colored areas have high susceptibility. In our example, the POI has a high susceptibility according to the legend. This means that the area we located is highly prone to floods.

Uses of Hazard Maps

The following are ways by which hazard maps help us

- identifying potential areas for evacuation
- using the map in planning for mitigation strategies and;
- using the map as basis for good and proper land use planning

What's More

Activity 1.3. Using a Flood Hazard Map

Study the flood hazard map below and answer the question that follows. Write your answer on a clean sheet of paper.

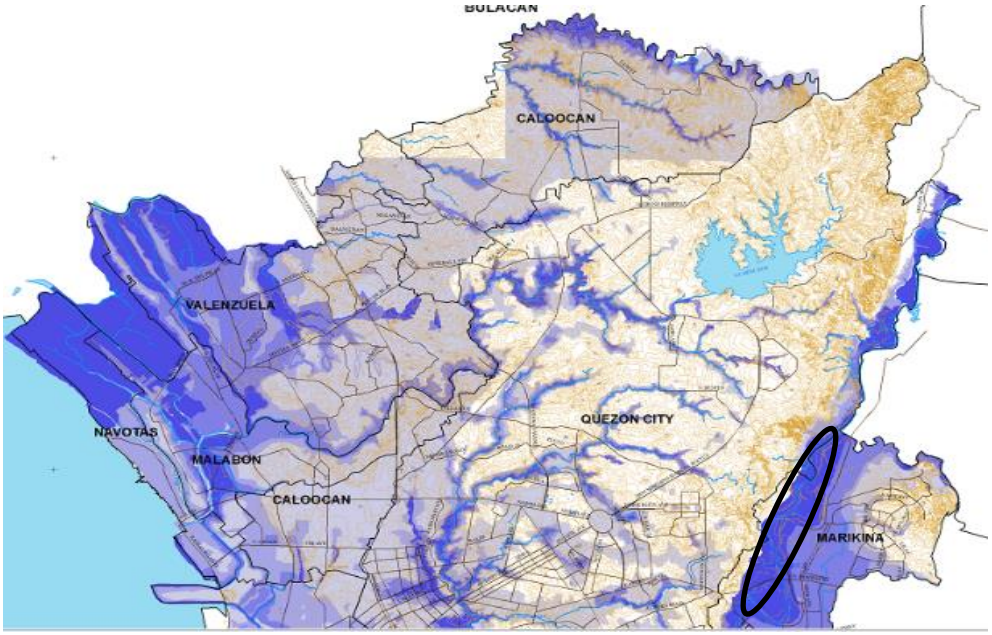
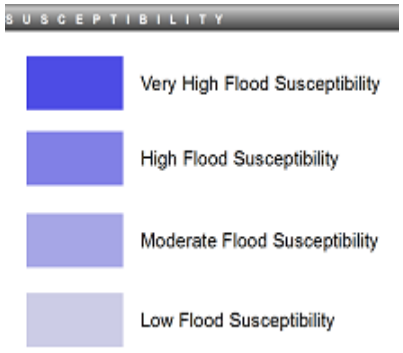


Figure 1.3. Flood Hazard Map
Source: *Flood Hazard Map. Digital image. National Mapping and Resource Information Authority. Accessed August 24, 2020. http://www.namria.gov.ph/download.php*

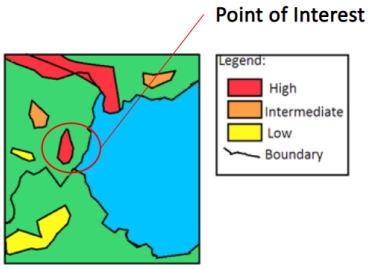


What is the susceptibility of the encircled part (POI) in terms of flood? Explain how you got that answer.

What I Have Learned

Activity 1.4. Lesson Summary

Summarize what you have learned by answering the questions below. Write your answers on a clean sheet of paper.



1. What are hazard maps? Give some examples of hazard maps.
2. What are the three things to remember when using hazards maps?
3. What are hazard maps used for?

What I Can Do

Activity 1.5. Using a Rain-Induced Hazard Map

Study the rain induced landslide map below and answer the questions that follow.

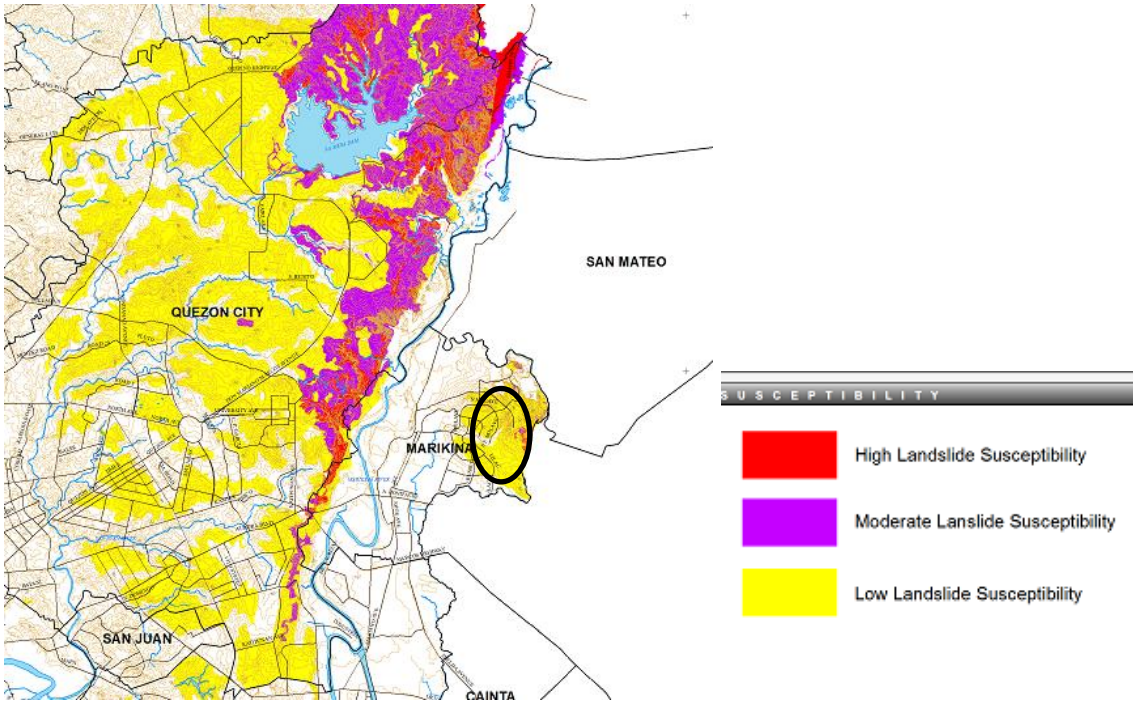


Figure 1.4. Rain-Induced Landslide Hazard Map
Source: *Rain-Induced Landslide Hazard Map. Digital image. National Mapping and Resource Information Authority. Accessed August 24, 2020.http://www.namria.gov.ph/download.php*

1. What is the susceptibility of the encircled part (POI) in terms of rain- induced landslide?
2. If you are living in this area, should you be worried about rain-induced landslide? Why or why not?

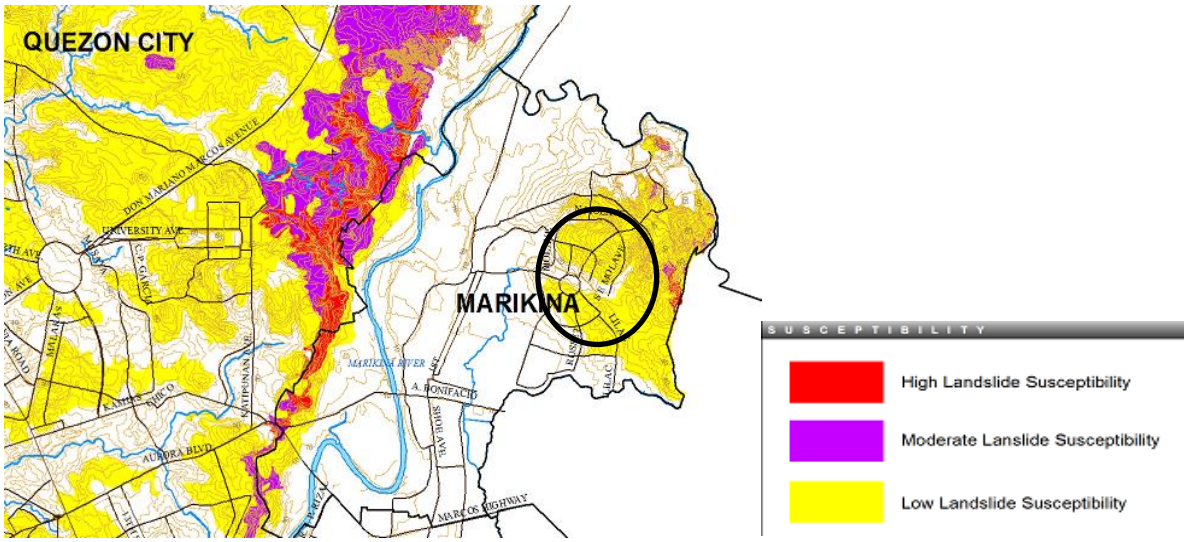
Posttest

Read the question carefully and encircle the letter of the correct answer.

1. Generally, how are areas with higher susceptibility represented?
   A. With light colors
   B. With dark colors
   C. Cannot be determined
   D. At the Point of Interest

2. Which of the following refers to a map describing the areas at risk of a natural disaster?
   A. Hazard map
   B. Political map
   C. Physical map
   D. Provincial map

3. Study the Rain-Induced Landslide Map below:



What can we conclude about the susceptibility of the POI on the map?
   A. It is low.
   B. It is high.
   C. It is very low.
   D. It is moderate.

4. The map below is a rain-induced landslide hazard map. The encircled part of the map shows that the area is highly susceptible to rain-induced landslide. What can we infer about this area?

   A. It is far from steep slopes.
   B. It is near rivers or other bodies of water.
   C. It is far from rivers or other bodies of water.
   D. It is located on top or at the base of steep slopes.

5. The following is a Storm Surge Hazard Map.

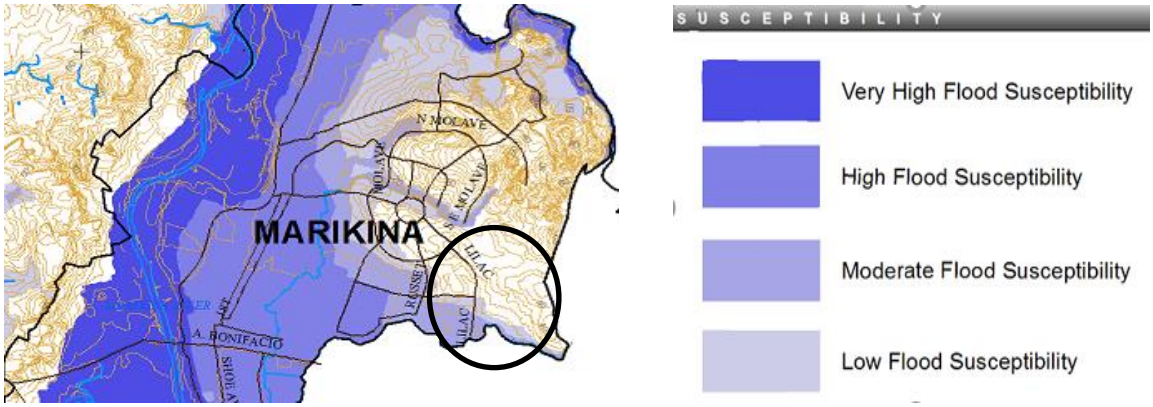
Which area is susceptible to storm surges?

A. Makati
B. Mandaluyong
C. Navotas
D. Pasay

6. The map below is a rain-induced landslide hazard map. What is the area's (encircled part of the map) level of susceptibility to rain-induced landslide?

A. Low
B. High
C. Very low
D. Intermediate

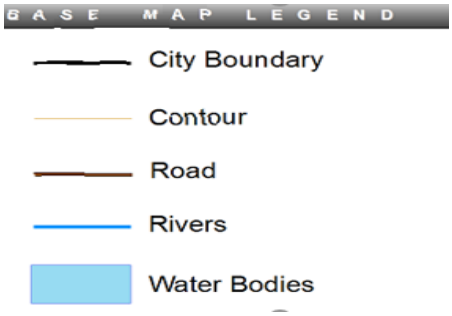
For numbers 7-9, use the map below:



7. What is the level of susceptibility of areas along Lilac Street (see encircled part)?

A. Low susceptibility
B. High susceptibility
C. Low to moderate susceptibility
D. Some parts have zero while others have low to moderate susceptibility.

8. Use the base map legend below. What is the level of flood susceptibility of areas near rivers and other water bodies?

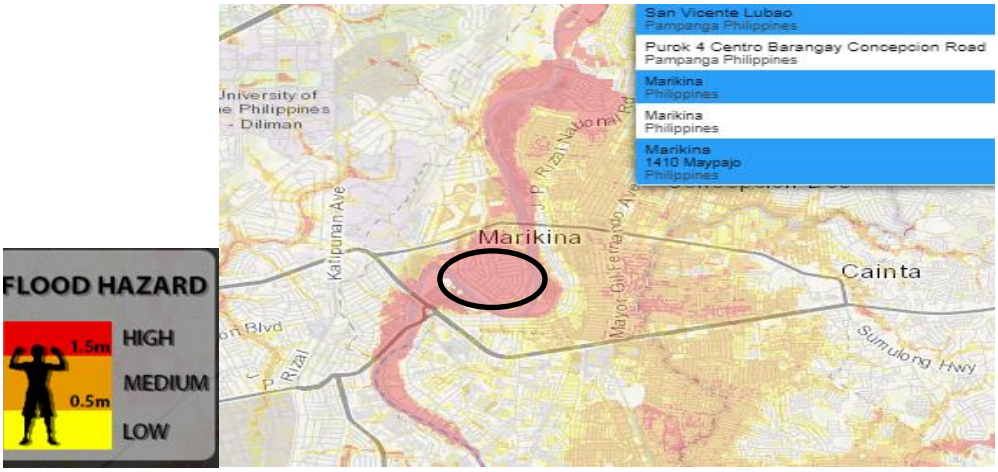


A. Zero
B. Low
C. Moderate
D. High to Very high

9. What is one conclusion we can derive about the flood susceptibility of most places in Marikina?

A. It is high to very high.
B. It is moderate to high.
C. It is low to moderate.
D. It is zero to low.

10. Based on the map below, how will you classify the flood hazard in the POI?



A. Low
B. High
C. Medium
D. Very low

11. Examine the map below. The encircled part of the map shows that the area is highly susceptible to flood. What conclusion can be drawn about the area?

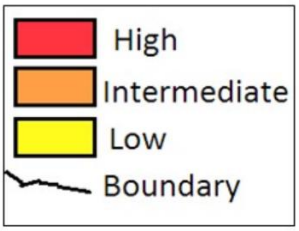
A. Low-lying area
B. Near rivers or other body of water
C. Both A and B
D. No conclusion can be drawn.

12. Which of the following are uses of a hazard map?

I. As a basis for proper land use planning
II. Identifying potential areas for evacuation
III. Planning for disaster mitigation strategies
IV. Predicting the pattern of natural disasters

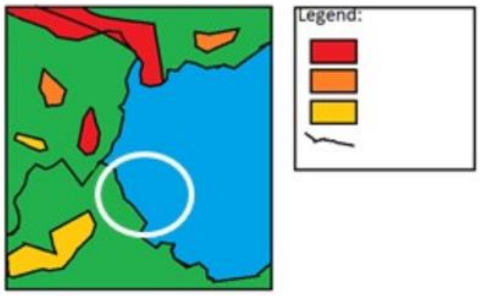
A. I and II
B. III and IV
C. I, II, and III
D. I, II, and IV

13. What part of the map is shown below?



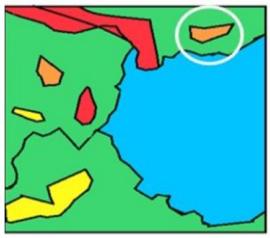
A. Legend
B. Boundary
C. Risk indicator
D. Susceptible area

14. Refer to the figure below. What is the encircled part of the map called?



A. Boundary
B. Area Affected
C. Point of Interest
D. Low Susceptibility Area

15. Refer to the figure below. What does the encircled area represent?



A. Area cover
B. Point of danger
C. Hazardous Area
D. Point of Interest

Additional Activities

The following is from a flood hazard map. Examine the explanation and fill in the table below.

Very high flood susceptibility
Areas likely to experience flood heights of greater than 2 meters and/or flood of more than 3 days. These areas are immediately flooded during heavy rains of several hours; include landforms of topographic lows such as active river channels, abandoned river channels and area along river banks; also prone to flash floods.
High flood susceptibility
Areas likely to experience flood heights of 1.0 to 2.0 meters and/or flood duration of more than 3 days. These areas are immediately flooded during
heavy rains of several hours; include landforms of topographic lows such as active river channels, abandoned river channels and area long river banks; also prone to flashfloods.
Moderate flood susceptibility
Area likely to experience flood heights of 0.5 to 1 meter and/or flood duration of 1 to 3 days. These are subject to widespread inundation during prolonged and extensive heavy rainfall or extreme weather condition. Fluvial terraces, alluvial fans, and infilled valley are areas moderately subjected to flooding.
Low flood susceptibility
Areas likely to experience flood heights of less than 0.5 meter and/or flood duration of less than 1 day. These areas include low hills and gentle slopes. They also sparse to moderate drainage density.

Based on the explanation above, fill in the table below. Write your answer on a separate sheet of paper.

Susceptibility	**Flood Height (meters)**	**Duration of flood(days)**
Very high		
High		
Moderate		
Low		

Answer Key

What's More Activity 1.3

The area shows very high susceptibility.
Based on the legend, if the area is dark colored, it has very high flood susceptibility.

What's New Activity 1.2

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

What's In Activity 1.1

Earthquake Hazards
surface faulting
ground shaking
landslide
tsunami

Volcanic Eruption Hazards
lava flow
poisonous gases
tephra fall
lahar

What I Can Do Activity 1.5

1. Low landslide susceptibility
2. No because the area does not have a high susceptibility to landslides.

What I Have Learned Activity 1.4

1. Hazard maps are tools to identify which areas are at risk of a hazard type. Some examples of hazard maps are flood, rain-induced landslide, and storm surge hazard maps.
2. The things to remember when using hazard maps are:
   First, locate point of interest or POI. This is the area of interest.
   Next check the color or representation of the POI.
   Lastly, compare it to the legend.

3.The following are ways by which hazard maps help us
- identifying potential areas for evacuation
- using the map in planning for mitigation strategies and
- using the map as basis for good and proper land use planning

Additional activities

Susceptibility	Flood Height (meters)	Duration of flood (days)
Very high	Greater than 2	More than three
High	1 to 2	More than three
Moderate	0.5 to 1	1 to 3
Low	Less than 0.5	Less than 1

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