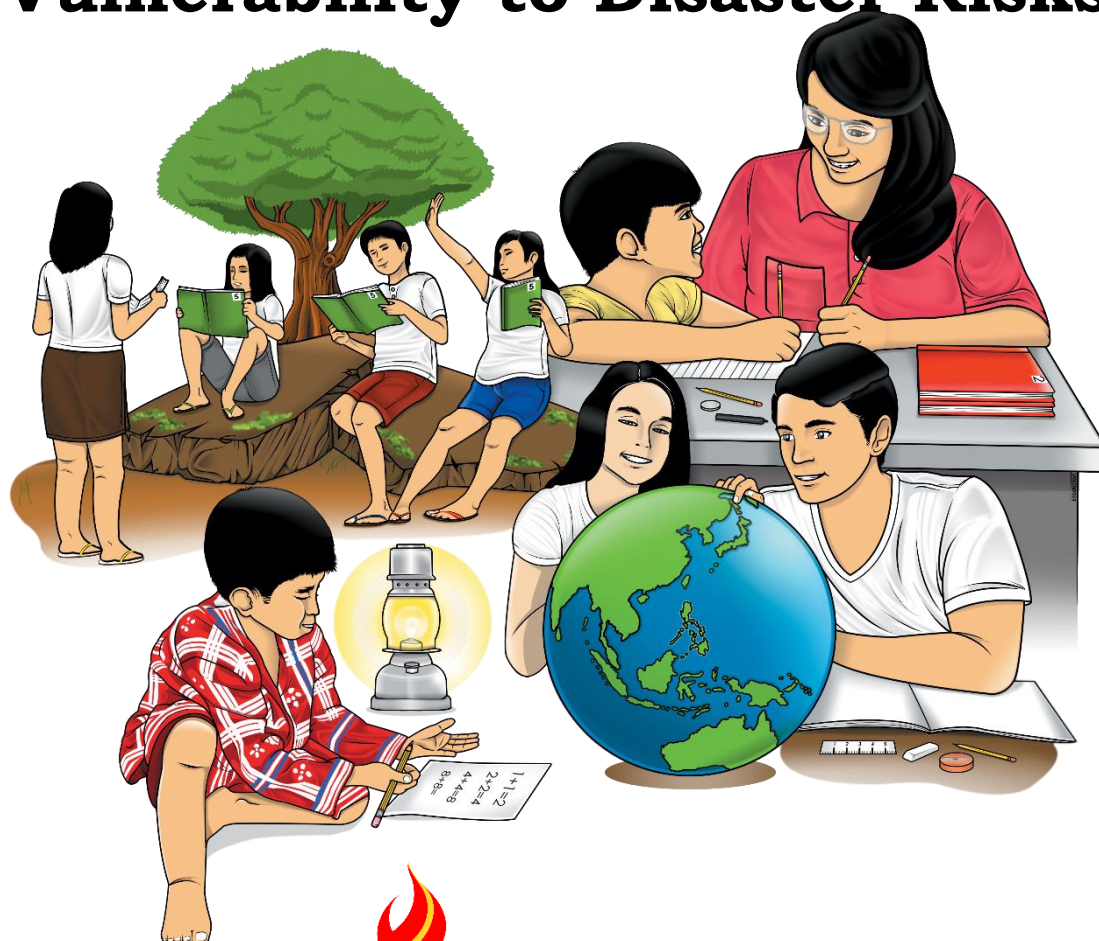


# Disaster Readiness and Risk Reduction

## Quarter 1 – Module 8:

### Effects of Hazard, Exposure and Vulnerability to Disaster Risks



**Disaster Readiness and Risk Reduction  
Alternative Delivery Mode**

**Quarter 1 – Module 8: Effects of Hazard, Exposure and Vulnerability to Disaster Risk  
First Edition, 2020**

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**Development Team of the Module**

**Writer:** Melencia Rosario Coronel  
Ruby C. Bautista  
**Editors:** Josefina M. Fabra  
Anne Marielle R. Del Mundo  
Vanessa R. Ambas  
**Reviewers:** Dolorosa S. De Castro  
Cristeta M. Arcos  
Richard Brian L. Tutor  
**Illustrator:** Leumel M. Cadapan  
Ronan DC Vergara  
**Layout Artist:** Leumel M. Cadapan  
Maria Elinor F. Hemedes  
**Management Team:**  
Wilfredo E. Cabral  
Job S. Zape Jr.  
Eugenio S. Adrao  
Elaine T. Balaogan  
Rosemarie D. Torres  
Ernesto D. Lindo  
Dolorosa S. De Castro  
Cristeta M. Arcos

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**Department of Education – Region IV-A CALABARZON**

Office Address: Gate 2 Karangalan Village, Barangay San Isidro  
Cainta, Rizal 1800

Telefax: 02-8682-5773/8684-4914/8647-7487

E-mail Address: region4a@deped.gov.ph

# **Disaster Readiness and Risk Reduction**

**Quarter 1 – Module 8:**

**Effects of Hazard, Exposure and  
Vulnerability to Disaster Risks**

# Introductory Message

For the facilitator:

Welcome to the Disaster Readiness and Risk Reduction for Grade 11/12 Alternative Delivery Mode (ADM) Module on Effects of Hazard, Exposure and Vulnerability to Disaster Risk!

This module was collaboratively designed, developed, and reviewed by educators both from public and private institutions to assist you, the teacher or facilitator in helping the learners meet the standards set by the K to 12 Curriculum while overcoming their personal, social, and economic constraints in schooling.

This learning resource hopes to engage the learners into guided and independent learning activities at their own pace and time. Furthermore, this also aims to help learners acquire the needed 21st century skills while taking into consideration their needs and circumstances.

In addition to the material in the main text, you will also see this box in the body of the module:



## ***Notes to the Teacher***

This contains helpful tips or strategies that will help you in guiding the learners.

As a facilitator, you are expected to orient the learners on how to use this module. You also need to keep track of the learners' progress while allowing them to manage their own learning. Furthermore, you are expected to encourage and assist the learners as they do the tasks included in the module.

For the learner:

Welcome to the DRRR Grade 11/12 Alternative Delivery Mode (ADM) Module on Effects of Hazard, Exposure and Vulnerability to Disaster Risk!

The hand is one of the most symbolized parts of the human body. It is often used to depict skill, action and purpose. Through our hands we may learn, create, and accomplish. Hence, the hand in this learning resource signifies that you as a learner is capable and empowered to successfully achieve the relevant competencies and skills at your own pace and time. Your academic success lies in your own hands!

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

This module has the following parts and corresponding icons:



***What I Need to Know***

This will give you an idea of the skills or competencies you are expected to learn in the module.



***What I Know***

This part includes an activity that aims to check what you already know about the lesson to take. If you get all the answers correct (100%), you may decide to skip this module.



***What's In***

This is a brief drill or review to help you link the current lesson with the previous one.



***What's New***

In this portion, the new lesson will be introduced to you in various ways such as a story, a song, a poem, a problem opener, an activity or a situation.



***What is It***

This section provides a brief discussion of the lesson. This aims to help you discover and understand new concepts and skills.



***What's More***

This comprises activities for independent practice to solidify your understanding and skills of the topic. You may check the answers to the exercises using the Answer Key at the end of the module.



***What I Have Learned***

This includes questions or blank sentence/paragraph to be filled in to process what you learned from the lesson.



### ***What I Can Do***

This section provides an activity which will help you transfer your new knowledge or skill into real life situations or concerns.



### ***Assessment***

This is a task which aims to evaluate your level of mastery in achieving the learning competency.



### ***Additional Activities***

In this portion, another activity will be given to you to enrich your knowledge or skill of the lesson learned. This also tends retention of learned concepts.



### ***Answer Key***

This contains answers to all activities in the module.

At the end of this module you will also find:

### ***References***

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

The following are some reminders in using this module:

- A. Use the module with care. Do not put unnecessary mark/s on any part of the module. Use a separate sheet of paper in answering the exercises.
- B. Don't forget to answer *What I Know* before moving on to the other activities included in the module.
- C. Read the instruction carefully before doing each task.
- D. Observe honesty and integrity in doing the tasks and checking your answers.
- E. Finish the task at hand before proceeding to the next.
- F. Return this module to your teacher/facilitator once you are through with it.

If you encounter any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator. Always bear in mind that you are not alone.

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



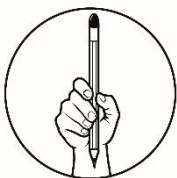
## ***What I Need to Know***

This module was designed and written with you in mind. It is here to help you master the Disaster Readiness and Risk Reduction. 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. But the order in which you read them can be changed to correspond with the textbook you are now using.

The Module is intended to equip you with knowledge and skills in differentiating hazards, exposure, and vulnerabilities as well as explaining the relationship of the three to disaster risk.

After going through this module, you are expected to:

1. define hazards, exposure, and vulnerabilities;
2. explain the difference among hazards, exposure, and vulnerabilities;
3. appreciate the importance of understanding the concepts about hazard, exposure and vulnerabilities so that it will be applied in everyday situations.



## ***What I Know***

**Read each item carefully and choose the best answer. Write your answer on a separate sheet of paper.**

1. It is a harmful event, material, human behavior, or disease that may cause loss of life, injury or other health effects, harm to property, loss of livelihood and services, social and economic disturbance, or damage to the environment.
  - a. disaster
  - b. hazard
  - c. risk
  - d. vulnerability

2. \_\_\_\_\_ signifies the possibility of adverse effects in the future. It is derived from the interaction of social and environmental processes, from the combination of physical hazard and the vulnerabilities of exposed elements.
- disaster
  - hazard
  - risk
  - vulnerability
3. A serious disruption of the functions of a community or a society causing widespread human, material, economic or environmental losses which exceed the ability of the affected community or society to cope using its own. What is it?
- disaster
  - hazard
  - resiliency
  - risk
4. It is the characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard.
- disaster
  - disaster Risk
  - hazard
  - vulnerability
5. It refers to the element at risk from a natural or man-made hazard event.
- exposure
  - hazard
  - risk
  - vulnerability
6. Which group belongs to the most vulnerable?
- employees
  - professional
  - indigenous people
  - small entrepreneurs
7. Which of the following is not a man-made hazard event?
- drought
  - wars and civil strife
  - leakage of toxic waste
  - environmental pollution



8. Disaster Management includes:
  - a. mitigation
  - b. reconstruction
  - c. rehabilitation
  - d. all of the above
9. Which among the following groups of people is more vulnerable in the event of disaster?
  - a. men, women, girls
  - b. men, women, boys
  - c. men, boys, old people
  - d. women, children, old people
10. Which of the following elements is exposed to hazard?
  - a. human Beings
  - b. building structures
  - c. public transport system
  - d. all of the above
11. Hazards can arise during excavations due to the fact that there are many cables and pipelines buried in the ground. This is why 'rules for careful excavation' have been established. What is one of these rules?
  - a. When using an excavator always use a toothed excavator bucket.
  - b. Never dig in areas where cables or pipelines are known to be buried in the ground.
  - c. First, manually dig trial trenches close to the specified location of the cables or pipelines.
  - d. All of the above
12. Which belongs to the elements exposed to hazard?
  - a. environmental Assets
  - b. dwellings of households
  - c. agricultural commodities
  - d. all of the above
13. Which is not an example of types of mitigation measures?
  - a. hazard mapping
  - b. flood plain mapping
  - c. raising of homes in flood-prone areas
  - d. implementing and enforcing building codes

14. It is the action of reducing the severity, seriousness or painfulness of something.
- a. migration
  - b. misconception
  - c. mitigation
  - d. mutation
15. Which is not belong to the General classification of elements at risk?
- a. population
  - b. infrastructures
  - c. essential facilities
  - d. transportation facilities

## **Hazards, Exposure, and Vulnerabilities from actual situations**

Several countries, including the Philippines, have experienced disasters affecting the property, assets and lives of the Filipino people , especially the COVID 19 Pandemic, which kills millions of people not only in the Philippines but worldwide. Today, it 's important to be extra cautious and mindful all the time. The topic will eventually address concepts of hazard, exposure and vulnerability and how they vary from each other and how important they are.



## ***What's In***

### **Activity 1**

**Direction:** Below is a picture of an incident in a mining community in Itogon, Benguet after the onslaught of the Typhoon Ompong in 2018. Look at the picture then answer the questions after the image.



Philippine News Agency, "Itogon landslide After Ompong", September 21, 2018, accessed May 28, 2020  
<https://files.pna.gov.ph/souce/2018/09/20/itogon-landslide-after-ompong.jpg>.

Guide Questions:

1. What is the hazard shown in the picture?

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2. Which area is exposed to hazard?

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3. What do you think is the cause of this incident?

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4. If the portion of the mountain slides down towards the remaining residential buildings on the left, what part of the community will be most affected?

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5. Which part in the presented image will be least likely affected?

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***Notes to the Teacher***

This Lesson comprises of various activities. Ensure all students understand the lesson clearly and encourage them to answer each activity vigorously.



## ***What's New***

### **A Sample essay:**



**Figure 1. The aftermath of Typhoon Ondoy.**

Back when I was 7 years old, when I still lived in the Philippines, I woke up in the middle of night to the sounds of the trees near our home violently swaying against the house and the terrifying howls of the wind. Now, bare in mind, that this was the Philippines. The 2nd country of the world to have the most typhoons. At first, we tried to ignore it, thinking that it would pass by soon but we were quickly proven wrong though once we got a hold of the Wi-Fi and saw online that this weather was labeled as a Signal No. 2. It meant that this certain typhoon was capable of generating floods and strong waves. I became even more terrified when I saw my father get me and my sister down to the 1st floor and in the extra bedroom. Throughout the walk, you could feel the house shake and tremble.

Once we reached the room, with all honesty, I was sure that I was going to die. The thing, too, is that in front of our house, stood a large tree. And during this event, it was swaying so violently that you'd expect it to fall directly

on our house. We were saying our prayers and my parents repeatedly told me and my sibling how much they loved us.

When the night passed by though, we were greatly relieved. We thought the bad fortune was over. Until we saw my cousins' house.

Flooded up to the 3rd floor. Their store collapsed. And barely any of their items were rescued. It saddens me, really, recalling my older cousin, Ate Hannah, who was usually the calm one, sit by the stairs to our home, holding and crying about her stuffed-toy. It was soggy, destroyed, and ruined.

In a way though, it brought our family closer together. My father and I actually also traveled to my cousins' neighborhood and passed out clothes and mattresses. While I felt happy being able to help others, it's sadder seeing some of the families be so desperate.

And at the time, none of us really knew, that we have survived the second most devastating tropical cyclone in the 2009 Pacific typhoon season of the Philippines; Typhoon Ondoy (Ketsana)

Chloe N. "Personal experience; lived in the Philippines", January 24, 2017.  
<https://www.quora.com/What-is-it-like-to-experience-a-typhoon>

**Direction:** Analyze and answer the following questions after the given scenario.

**SITUATION 1:**

You are a mom. You live in Brgy. Aplaya, which is right next to Laguna de Bay. You have a 2-storey house, and the ground floor where your sari-sari store is situated already flooded. You wrapped your baby and went to the second floor, but the flood is fast rising and you are likely to get trapped. Your husband went to Barangay Hall, where they prepared boats, but he has not yet come back.

1. Determine the hazards given in the story.

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2. What are the possible ways to lessen the vulnerability of the exposed elements to hazard? Explain your answer.

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## SITUATION 2:

You are in grade 12, at your age you usually spend your time with your friends and go other places with them. You are very much excited because this is the day where you and your friends have been waiting for, A moment later President Duterte announced the Enhanced Community Quarantine in entire Luzon because of the COVID-19 Pandemic. You and your friends decided not to continue your outing and change it into friends gathering party near you.

1. Determine the hazard given in the story.

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2. What are the possible ways to lessen the vulnerability of the exposed elements to hazard? Explain your answer.

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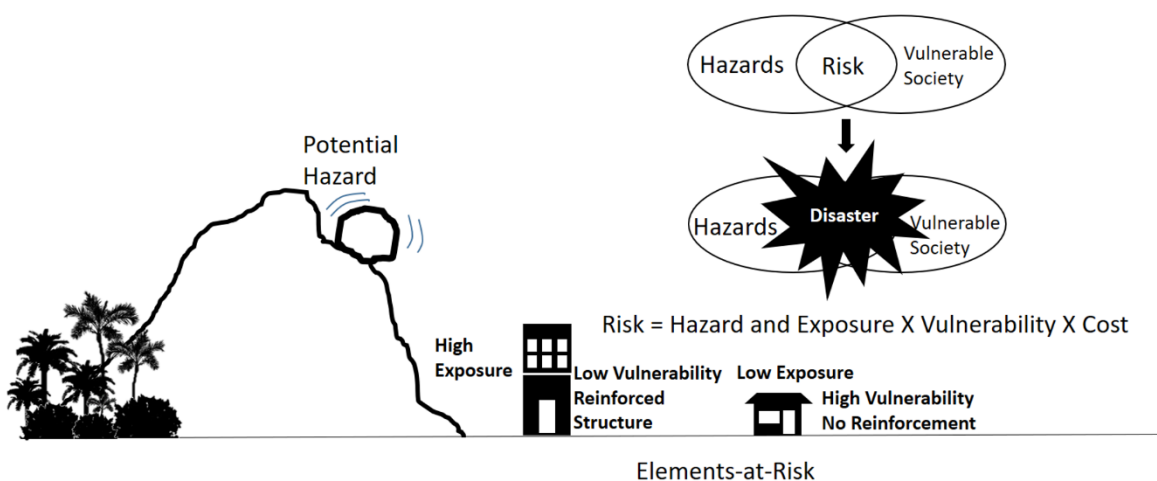
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## ***What is It***

### DEFINING HAZARD, VULNERABILITY AND RISK





**Hazard** is a harmful condition, substance, human behavior or condition that can cause loss of life, injury or other health effects, harm to property, loss of livelihood and services, social and economic disruption or damage to the environment. Any risk which is imminent is threat.

**Exposure** is the presence of elements at risk or chance of being harmed from a natural or man-made hazard event. Elements include the individuals, households or communities, properties, buildings and structures, agricultural commodities, livelihoods, and public facilities, infrastructures and environmental assets present in an area that are subject to potential damage or even losses. The more a community is exposed to hazard factors, the higher is the disaster risk or higher chance disaster occurrence.

**Vulnerability** means the characteristics and circumstances of a community, system, or asset, that make it susceptible to the damaging effects of a hazard and inability of a community to prevent, mitigate, prepare for and respond to hazardous events.

**Risk** implies the probability of possible adverse effects. This results from the interaction of social and environmental systems, from the combination of physical danger, and exposed item vulnerabilities.

**Disaster** is a serious disruption to the functioning of a community or society which causes widespread human, material, economic or environmental losses that exceed the capacity of the community or society concerned to cope with the use of their own resources. It results from the mix of hazards, risk conditions and inadequate capability or measures.

**Exposure and vulnerability**, on the other hand, are distinct. A certain community can be exposed but it does not mean that it is vulnerable. Buildings and structures in Japan are exposed to earthquake, but they are not vulnerable since their architectural and engineering designs are earthquake proof or resistant. However, to become vulnerable, it must be exposed to hazard first.

Exposure to hazard can make a community vulnerable. But not all communities that are exposed to hazard can be considered vulnerable. Vulnerability depends on the preparedness and readiness to a hazard of the community. It depends mostly on how they mitigate, respond, and recover. If a certain community

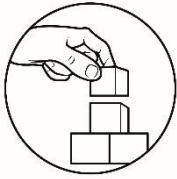


has the ability to reduce the vulnerability by reducing the risk, the said community is already considered as less vulnerable or resilient.

<b>Physical elements</b>  Buildings: Urban land use, construction types, building height, building age, total floor space, replacement costs.  Monuments and cultural heritage	<b>Population</b>  Density of population, distribution in space, distribution in time, age distribution, gender distribution, handicapped, income distribution
<b>Essential facilities</b>  Emergency shelters, Schools, Hospitals, Fire Brigades, Police,	<b>Socio-economic aspects</b>  Organization of population, governance, community organization, government support, socio-economic levels. Cultural heritage and traditions.
<b>Transportation facilities</b>  Roads, railway, metro, public transportation systems, harbor facilities, airport facilities.	<b>Economic activities</b>  Spatial distribution of economic activities, input-output table, dependency, redundancy, unemployment, economic production in various sectors.
<b>Life lines</b>  Water supply, electricity supply, gas supply, telecommunications, mobile telephone network, sewage system.	<b>Environmental elements</b>  Ecosystems, protected areas, natural parks, environmentally sensitive areas, forests, wetlands, aquifers, flora, fauna, biodiversity.

C.J. Van Wester , “General Classification of Elements at Risk”, Caribbean Handbook on Risk Information Management, C.J. Van Wester <http://www.charim.net/methodology/52>

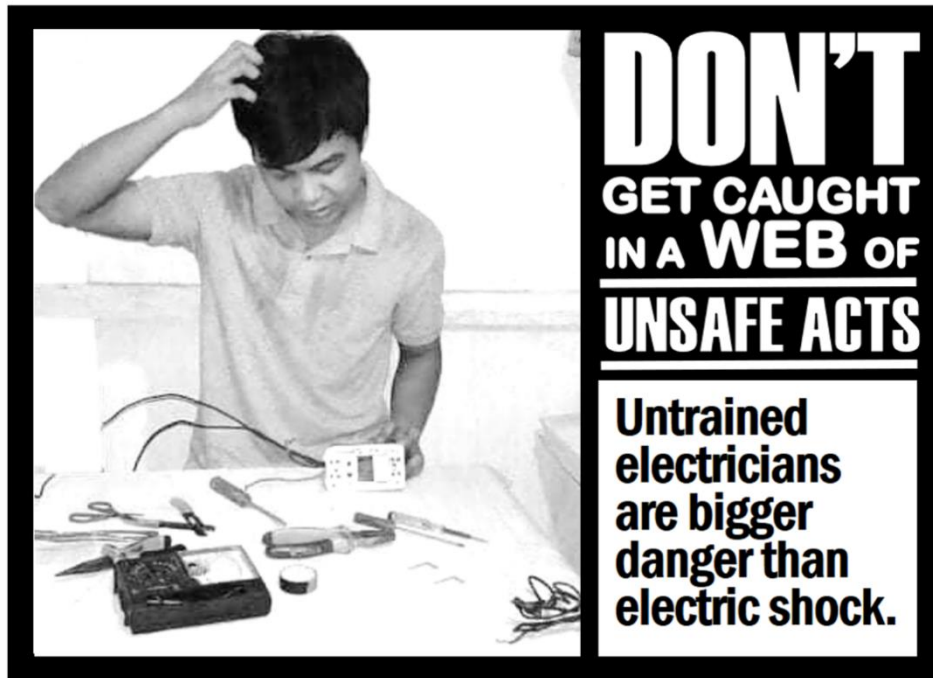
Disaster mitigation measures are those that eliminate or reduce the impacts and risks of hazards by means of proactive measures taken before an emergency or disaster takes place. Mitigation is the action of reducing something's severity, seriousness, or painfulness.



## ***What's More***

### **Activity 1: Tell me!**

**Direction:** Analyze the picture below and answer the questions that follow.



### **Guide Questions:**

1. What can you say about the picture? What does the quotation mean?

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2. What is the hazard in the picture/ situation?

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3. What is being exposed in the picture/ situation?

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4. Why do you think the character in the picture is vulnerable?

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5. Based on your analysis, Explain the hazard, exposure and vulnerability given in the picture.

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## ***What I Have Learned***

### **COMPLETE ME!**

**Directions: Complete the following sentences by giving the appropriate answer needed in the blank.**

Vulnerability is \_\_\_\_\_.

Exposure refers to \_\_\_\_\_

while hazard is defined as \_\_\_\_\_

\_\_\_\_\_.

Hazards may be caused by \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

and can be mitigated through \_\_\_\_\_

\_\_\_\_\_.

The difference between hazard, exposure and vulnerability among each other is

Hazard \_\_\_\_\_

exposed \_\_\_\_\_

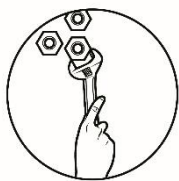
vulnerability \_\_\_\_\_

It is significant to understand hazards, exposure and vulnerabilities because

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



## What I Can Do

### Activity 2.1

**Direction:** Create an information brochure about the elements of hazard exposure. Visit a community using google map (you can choose your own community or barangay. Determine all the elements exposed to hazard in that locality. Use your resources to create a creative brochure. Be creative and include emergency hotlines as much as possible. You will be graded based on the rubrics given.

Criteria's	4	3	2	1
<b>Accuracy</b>	All information is correct and all of the sources are listed	Most of the information is correct and most of the sources are listed	Some of the information is correct and some of the sources are listed	Very little of the information is correct and none of the sources are listed
<b>Neatness</b>	All writing is tidy, photos and artwork are precisely placed, and all sections are orderly	Most of the writing is tidy, photos and artwork are mostly placed carefully, and most of the sections are orderly	Some of the writing is tidy, photos and artwork are somewhat placed carefully, and some of the sections are orderly	Very little of the writing is tidy, photos and artwork are placed poorly, and the sections are disorderly
<b>Creativity</b>	The brochure as a whole is interesting, engaging, imaginative, and original	Most of the brochure is interesting, engaging, imaginative, and original	Some of the brochure is interesting, engaging, imaginative, and original	Very little of the brochure is interesting, engaging, imaginative, and original
<b>Colorful</b>	The brochure is eye catching and vibrant and/or coordinated colors are used	Most of the brochure is eye catching and bright colors and/or mostly coordinated colors are used	Some of the brochure is eye catching and average and/or some mismatched colors are used	Very little of the brochure is eye catching and dull and/or mismatched colors are used

Kellie Hayden, "Teaching Ideas for Brochure-Making With a Rubric",  
Bright Hub Education, June 26, 2010

<https://www.brighthubeducation.com/teaching-methods-tips/75435-rubric-for-brochure-project/>



## **Assessment**

**Read each item carefully and choose the best answer. Write your answer on a separate sheet of paper.**

1. It is a harmful event, material, human behavior, or disease that may cause loss of life, injury or other health effects, harm to property, loss of livelihood and services, social and economic disturbance, or damage to the environment.
  - a. disaster
  - b. hazard
  - c. risk
  - d. vulnerability
  
2. \_\_\_\_\_ signifies the possibility of adverse effects in the future. It is derived from the interaction of social and environmental processes, from the combination of physical hazard and the vulnerabilities of exposed elements.
  - a. disaster
  - b. hazard
  - c. risk
  - d. vulnerability
  
3. A serious disruption of the functions of a community or a society causing widespread human, material, economic or environmental losses which exceed the ability of the affected community or society to cope using its own. What is it?
  - a. disaster
  - b. hazard
  - c. resiliency
  - d. risk
  
4. It is the characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard.
  - b. disaster
  - c. disaster Risk
  - d. hazard
  - e. vulnerability
  
5. It refers to the element at risk from a natural or man-made hazard event.
  - a. exposure
  - b. hazard
  - c. risk
  - d. vulnerability

6. Which group belongs to the most vulnerable?
- employees
  - professional
  - indigenous people
  - small entrepreneurs
7. Which of the following is not a man-made hazard event?
- drought
  - wars and civil strife
  - leakage of toxic waste
  - environmental pollution
8. Disaster Management includes:
- mitigation
  - reconstruction
  - rehabilitation
  - all of the above
9. Which among the following groups of people is more vulnerable in the event of disaster?
- men, women, girls
  - men, women, boys
  - men, boys, old people
  - women, children, old people
10. Which of the following elements is exposed to hazard?
- human beings
  - building structures
  - public transport system
  - all of the above
11. Hazards can arise during excavations due to the fact that there are many cables and pipelines buried in the ground. This is why 'rules for careful excavation' have been established. What is one of these rules?
- When using an excavator always use a toothed excavator bucket.
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12. Which belongs to the elements exposed to hazard?
- environmental assets
  - dwellings of households
  - agricultural commodities
  - all of the above

13. Which is not an example of types of mitigation measures?

- a. hazard mapping
- b. flood plain mapping
- c. raising of homes in flood-prone areas
- d. implementing and enforcing building codes

14. It is the action of reducing the severity, seriousness or painfulness of something.

- a. migration
- b. misconception
- c. mitigation
- d. mutation

15. Which is not belong to the General classification of elements at risk?

- a. population
- b. infrastructures
- c. essential facilities
- d. transportation facilities



## ***Additional Activities***

**Direction:** You were just a Grade 12 student but elected as batang kagawad in your small community. You thought of a first project you want to impose, What ways or actions are you going to implement in your community to help and make it less vulnerable to hazard? Write your answer on a separate sheet.

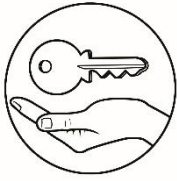
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## Answer Key

<b>What I Know</b>	10. B 11. C 12. A 13. D 14. A 15. C 16. A 17. D 18. D 10. D 11. D 12. D 13. C 14. C 15. C
<b>What's More</b>	1. Hazard exposure. It's a safety slogan reminding everyone to take extra cautious and knowledgeable in chosen field or area. So that it will not cause problem in the future. 2. Electrical wires 3. Electricity. 4. The character on the picture is not a license electrician or qualified electrician that can't perform electrical work. 5. In just one mistake of untrained electrician it will leads to electrical shock and fire and put one's life in danger. It is better to find, seek or contact professional electricians to have a safety assurance and peace of mind.
<b>Assessment</b>	1. B 2. C 3. A 4. D 5. A 6. C 7. A 8. D 9. D 10. D 11. D 12. D 13. C 14. C 15. C



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**For inquiries or feedback, please write or call:**

Department of Education - Bureau of Learning Resources (DepEd-BLR)

Ground Floor, Bonifacio Bldg., DepEd Complex  
Meralco Avenue, Pasig City, Philippines 1600

Telefax: (632) 8634-1072; 8634-1054; 8631-4985

Email Address: [blr.lrqad@deped.gov.ph](mailto:blr.lrqad@deped.gov.ph) \* [blr.lrpd@deped.gov.ph](mailto:blr.lrpd@deped.gov.ph)