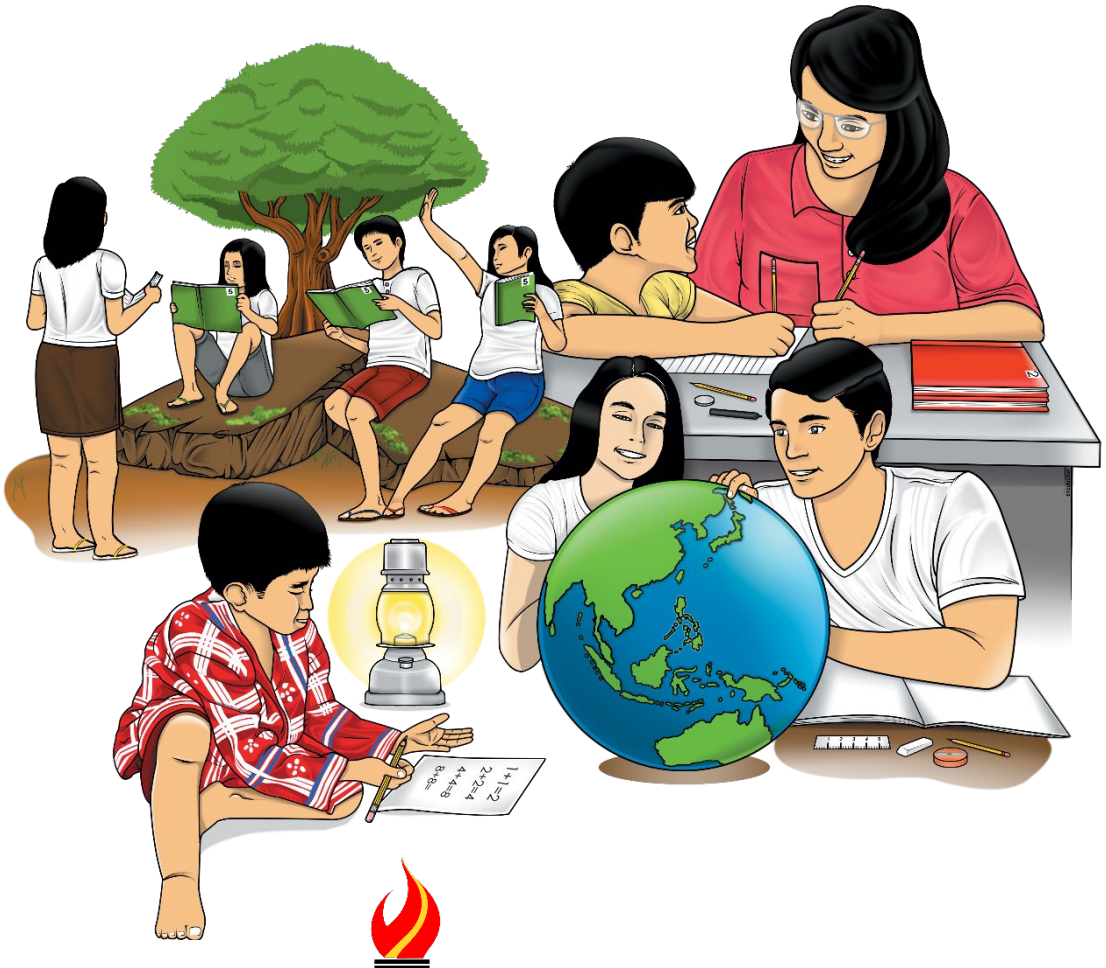
Senior High School

DepED
DEPARTMENT OF EDUCATION

Earth and Life Science

Quarter 2 – Module 10:
Interaction and Interdependence



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Introductory Message

This Self-Learning Module (SLM) is prepared so that you, our dear learners, can continue your studies and learn while at home. Activities, questions, directions, exercises, and discussions are carefully stated for you to understand each lesson.

Each SLM is composed of different parts. Each part shall guide you step-by-step as you discover and understand the lesson prepared for you.

Pre-tests are provided to measure your prior knowledge on lessons in each SLM. This will tell you if you need to proceed on completing this module or if you need to ask your facilitator or your teacher's assistance for better understanding of the lesson. At the end of each module, you need to answer the post-test to self-check your learning. Answer keys are provided for each activity and test. We trust that you will be honest in using these.

In addition to the material in the main text, Notes to the Teacher are also provided to our facilitators and parents for strategies and reminders on how they can best help you on your home-based learning.

Please use this module with care. Do not put unnecessary marks on any part of this SLM. Use a separate sheet of paper in answering the exercises and tests. And read the instructions carefully before performing each task.

If you have any questions in using this SLM or any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator.

Thank you.

What I Need to Know

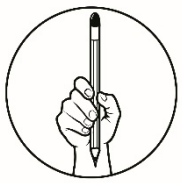
This module was designed and written with you in mind. It is here to help you master the nature of Biology. The scope of this module permits it to be used in many different learning situations. The language used recognizes the diverse vocabulary level of students. The lessons are arranged to follow the 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 covers:

- Lesson 1 – Interaction and Interdependence

After going through this module, you are expected to:

1. Categorize the different biotic potential and environmental resistance (e. g. diseases, availability of food and predators) that affect population explosion
2. Identify biotic factors and abiotic factors; and
3. Categorize biotic potential and environmental resistance that affect population growth.



What I Know

Choose the letter of the best answer. Write the chosen letter on a separate sheet of paper.

1. What refers to the rate at which life forms reproduce when they have perfect conditions that would advance fruitful reproduction?
    A. limiting factor
    B. biotic potential
    C. carrying capacity
    D. environmental resistance

2. These factors that can restrain the expansion of a population, for example, predators, competitors, lack of food and water, diseases and reasonable living space. Which of the following refers to these factors?
    A. biotic potential
    B. carrying capacity
    C. environmental resistance
    D. limiting factor

3. What is the maximum number of organisms that an ecosystem can support?
    A. biotic potential
    B. carrying capacity
    C. environmental resistance
    D. limiting factor

4. Which of the following is an example of environmental resistance?
    A. Predators struggle for a similar prey.
    B. Adequate food and water supply for the people
    C. The health condition of the organisms is stable
    D. Suitable habitat increases the growth of producers.

5. Which of the following is NOT an environmental resistance?
    A. competitors
    B. diseases
    C. predators
    D. reproduction

6. Which of the following constitute an ecosystem?
    A. Living things
    B. Non-living things
    C. Living things and non-living things
    D. Producers, consumers and predators

7. What would happen if a living organism failed to reproduce?
    A. The population confines its growth.
    B. There will be increase in population.
    C. There will be decrease in population growth.
    D. It has no effect on the population of living organism.

8. Which of the following refers to biotic and abiotic factors that prevent the persistent development of a population like food, water and space?
    A. biotic potential
    B. carrying capacity
    C. environmental resistance
    D. limiting factor

9. Living organisms have the ability to reproduce. Which of the following conditions will NOT lead to reproduction?
    A. Disease
    B. Adequate food
    C. Suitable habitat
    D. No competitors

10. Which of the following examples refers to an abiotic factor for environmental resistance?
    A. Fishes eat algae in ponds.
    B. A certain prey has various predators
    C. Coronavirus disease killed many people around the world
    D. Trees are dependent on sunlight and water in an ecosystem

11. What do you call a group of organisms that are of similar species that live in a similar zone?
    A. Community
    B. Ecosystem
    C. Habitat
    D. Population

12. What BEST portrays an ecosystem?
    A. It refers to an interacting group of organisms.
    B. It is the integration of plants, animals and microorganisms.
    C. Different species of living organisms that interact with each other.
    D. The area in which living things interact with one another and with their environment.

13. Which of the following is NOT a biotic factor?
    A. goat
    B. coconut trees
    C. coronavirus
    D. temperature

14. Elmo was bitten by a mosquito. Mosquitoes, tapeworms, hookworms and leeches are examples of what type of organisms?
    A. Parasites
    B. Predators
    C. Prey
    D. Producers

15. Which of the following is an essential factor that determine biotic potential?
    A. Competition
    B. Diseases
    C. Number of offspring
    D. Predators

Lesson 1 Interaction and Interdependence

Every living thing relies upon one another and their environment. No living creature could make due all alone without relying upon different living beings and its environment. Interaction and interdependence are two important relationships in nature. Ecology is the branch of biology that deals with the study of these relationships of interaction and interdependence between living things and their environment. The area wherein living things associate with each other and with their environment is known as the ecosystem. Association among species help shape ecosystem.

What's In

Activity 1

Look around. What do you see in your environment? List 10 living things and 10 non-living things on the table. Answer the questions below.

Living Things	Non–living Things

1. What is the interaction between living things and non-living things?

_____
_____
_____
_____

2. How dependent are we on other organisms and the environment?

_____
_____
_____
_____

Activity 2

Encircle the words in the grid and fill in the blanks with the correct term.

Niche	Parasitism
Competition	Commensalism
Predation	Mutualism
Symbiosis	Habitat
Population	Community

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

1. Different types of organisms that interact with one another in a given area form a _____.
2. A group of organisms of similar species that live in a characterized territory area form a _____.
3. The place or type of environment in which an organism or population lives is called _____.
4. The capacity of a life form or the role it plays in the habitat is known as ecological _____.
5. Interaction between two organisms of various species in which at any rate benefits is called _____.
6. _____ is a harmonious relationship wherein two life forms benefit.
7. The symbiotic relationship in which one organism benefits and the other is unaffected is called _____.
8. _____ is a symbiotic relationship in which one organism benefits, while the other is harmed.
9. The feeding of one organism on another is called _____. Life forms that feed on the other living creature are called predators, while prey refers to life forms eaten by a predator.
10. An environment can't fulfill all the requirements of its individuals so creatures must battle with each other to survive. This sort of interaction when two species utilize a similar limited resource is called _____.

What's New

The ecosystem comprises of all living and non-living things that interact with each other in a given territory. Every living piece of an ecosystem, for example, animals, plants, and other living being are called biotic factors. Living organisms interact in the ecosystem to obtain food in order to survive. Their interactions can be used to classify them as to producers, consumers and decomposers. The non-living parts of an ecosystem are called abiotic factors. Living creatures in a biological system can't be separated independently from the abiotic or non-living components in their natural surroundings.

Activity 3

Read the words in the word box. Classify the following component of ecosystem as to biotic or abiotic factors.

tree	cow	farmer
dog	wind	oxygen
temperature	grass	fish
water	CO_2	sunlight
bacteria	salinity of water	chicken
pH of soil	flower	

Biotic Factors	**Abiotic Factors**
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Refer to the column of biotic factors and classify each as to:

Producers	Consumers	Decomposers

What is It

Biotic Potential and Environmental Resistance

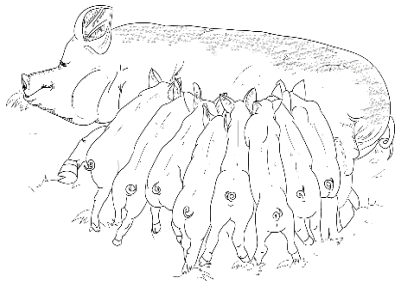
Biotic potential and environmental resistance are the factors that influence the population growth. Biotic potential is the rate at which life forms reproduce when they have perfect conditions that would advance effective generation. It is likewise characterized as capacity of a populace of a species to propagate under perfect conditions, for example, adequate food and water supply, no diseases, suitable habitat and no predators. The biotic potential among creatures' changes from species to species. The following factors determine biotic potential:

1. numbers of offspring per reproduction
2. chances of survival age of reproduction
3. age at which propagation starts
4. how frequently every individual replicate

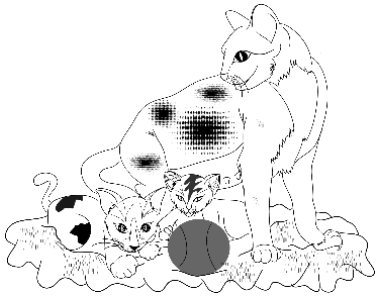
Activity 4

Look at the pictures. Tell something about each picture.

A. _____
_____
_____
_____
_____
_____



B. _____
_____
_____
_____
_____
_____



C. _____
_____
_____
_____
_____

Activity 5

Refer to pictures shown in Activity 4. Answer the following questions.

1. How many offspring does each organism have?
   A. _____
   B. _____
   C. _____

2. At what age does the organism start to have the capacity to reproduce?
   A. _____
   B. _____
   C. _____

3. What will happen if living organisms fail to reproduce?

   _____
   _____
   _____

4. How can a population grow?

   _____
   _____
   _____

5. How can predators affect the population's growth?

   _____
   _____
   _____

6. How does disease affect population growth?

   _____
   _____
   _____

7. What factors control the increase of population?

   _____
   _____
   _____

What's More

Environmental resistance refers to the factors that can limit the growth of a populace. It includes predators, competitors, disease, lack of food and water and unsuitable habitat.

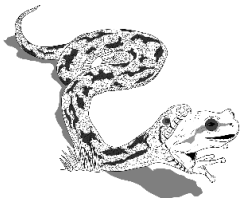
The biotic potential and environmental resistance influence the carrying capacity which is defined as the maximum number of individuals that an ecosystem can support.

Biotic and abiotic factors that prevent the persistent development of a population like food, water and space are called limiting factors.

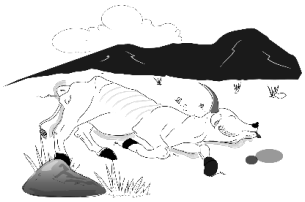
Activity 6

Analyze each picture. Categorize as either biotic potential or environmental resistance. Explain your answer.

1. _____
   Explanation:
   _____
   _____
   _____

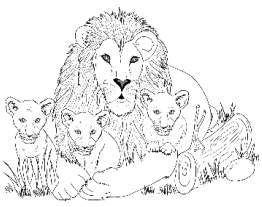


2. _____
   Explanation:
   _____
   _____
   _____



3. _____
   Explanation:
   _____
   _____
   _____

4. _____
   Explanation:
   _____
   _____
   _____



5. _____
   Explanation:
   _____
   _____
   _____

What I Have Learned

Activity 7

Refer to this illustration in answering questions A, B and C.

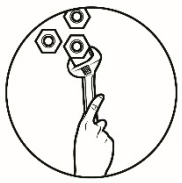
A. What are the abiotic factors in the illustration?
   1. _____
   2. _____
   3. _____
   4. _____

B. What are the biotic factors in the illustration?
   1. _____
   2. _____
   3. _____
   4. _____
   5. _____
   6. _____

C. Identify the environmental resistance that may affect the population in the ecosystem.
   1. _____
   2. _____
   3. _____
   4. _____
   5. _____

D. What is the effect environmental resistance on a population?

   _____
   _____
   _____
   _____



What I Can Do

Activity 8

The year 2020 had been a tough and difficult time for many countries around the world. What environmental resistance affects the Philippines? What measures will you do to protect the community?

Assessment

Multiple Choice. Choose the letter of the best answer. Write the chosen letter on a separate sheet of paper.

1. What biotic relationship occurs in organism where one species is benefited while the other is harmed?
    A. commensalism
    B. mutualism
    C. parasitism
    D. predation

2. Which of the following is an example of environmental resistance?
    A. various predators may compete for a similar prey
    B. suitable habitat restrains the growth of producers
    C. change in seasons can influence conduct of living beings
    D. desert biological systems have restricted life forms because of outrageous parched conditions

3. What are the two important relationships in an ecosystem?
    A. symbiosis and predation
    B. mutualism and parasitism
    C. interaction and interdependence
    D. biotic potential and environmental resistance

4. Which of the following condition does NOT show abiotic factors in an ecosystem?
    A. cactus growing in hot, dry regions
    B. earthworm burrowing for habitation
    C. polar bears living in a very cold environment
    D. A young woman gave birth to a healthy baby boy

5. The carrying capacity is the maximum number of organisms that an ecosystem can support. What factors influence the carrying capacity?
    I. competition
    II. limiting factor
    III. biotic potential
    IV. environmental resistance
    A. I and II
    B. I and III
    C. III and IV
    D. I, II, and IV

6. What factors control the increase in population growth?
    I. water
    II. disease
    III. sunlight
    IV. predation
    V. competitors
    VI. temperature
    VII. adequate food
    VIII. unsuitable habitat
    A. II, IV, V, VII
    B. I, III, V, VIII
    C. I, III, IV, V
    D. II, IV, V, VIII

7. The biotic and abiotic factors that prevent the growth of a population like food, water and space is called?
    A. limiting factor
    B. biotic potential
    C. carrying capacity
    D. environmental resistance

8. Which refers to the symbiotic relationship in which both organisms are benefited?
    A. commensalism
    B. mutualism
    C. parasitism
    D. predation

9. Which of the following essential factors determines biotic potential?
    A. diseases
    B. lack of food
    C. number of offspring
    D. lack of suitable habitat

10. What do you call the area in which living things interact with one another and with their environment?
    A. community
    B. ecosystem
    C. habitat
    D. population

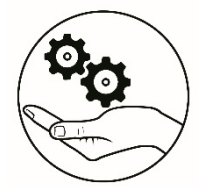
11. What is the connection between biotic potential and environmental resistance?
    A. Biotic potential increases the population whereas environmental resistance confines its growth.
    B. Biotic potential increases the population while environmental resistance decreases its growth.
    C. Biotic potential and environmental resistance are the two factors that increase the population growth.
    D. Biotic potential and environmental resistance are the two factors that limit the population explosion.

12. Which of the accompanying reasons does explain why various life forms have diverse biotic potentials?
    A. Offspring have distinctive survival rates.
    B. Life forms have diverse multiplication rates.
    C. Different life forms will have diverse reproductive life expectancies.
    D. Organisms that abide in a similar situation will have similar potentials.

13. What is the symbiotic relationship in an ecosystem when one organism benefits and the other is unaffected?
    A. Commensalism
    B. Mutualism
    C. Parasitism
    D. Predation

14. What is the type of interaction when the two species use the same limited resources and struggle with one another to survive?
    A. Competition
    B. Mutualism
    C. Predation
    D. Symbiosis

15. What is the role of predator in the ecosystem?
    A. Remove vulnerable prey
    B. Increase the number of prey
    C. Have no effect in the ecosystem
    D. Decrease the number of predator

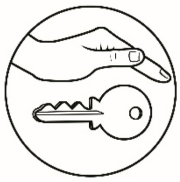


Additional Activities

Cut and paste/ copy and paste or draw pictures of an ecosystem showing environmental resistance and biotic potential.

Biotic Potential

Environmental Resistance



Answer Key

What I Know

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

What's In

Activity 1

Answer may vary among students' perceptions.

Activity 2

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

1. Community
2. Population
3. Habitat
4. Niche
5. Symbiosis
6. Mutualism
7. Commensalism
8. Parasitism
9. Predation
10. Competition

What's New

Activity 3

Biotic Factor	Abiotic Factor
trees	temperature
dogs	water
bacteria	light
fish	Oxygen
cow	CO_2
grass	pH of soil
farmer	salinity of
chicken	water

Producers	Consumers	Dec
trees	dogs	bacteria
grass	fish	
	cow	
	farmer	
	chicken	

*Answers can be interchanged

What is It

Activity 4

Answer may vary among students' perceptions.

Activity 5

1. A – 1
   B – 8
   C – 2
1. A – 12 y.o.
   B – 5 mos.
   C – 4 mos.

3-7. Answer may vary among student

What I Can Do

Activity 8

Answer may vary among students' perceptions.

What's More

Activity 6

1. Biotic potential
2. Environmental resistance
3. Environmental resistance
4. Environmental resistance
5. Biotic potential

What I Have Learned

Activity 7

A. 1. Air/ atmospheric gas (O_2/ CO_2)
   2. light
   3. soil
   4. temperature

B. 1. snake
   2. frog
   3. deer
   4. tiger
   5. tree
   6. grass

C. 1. predator
   2. competitor
   3. disease
   4. lack of food and water
   5. unsuitable habitat

D. Answer may vary among student

*Answers can be interchanged

Assessment

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

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