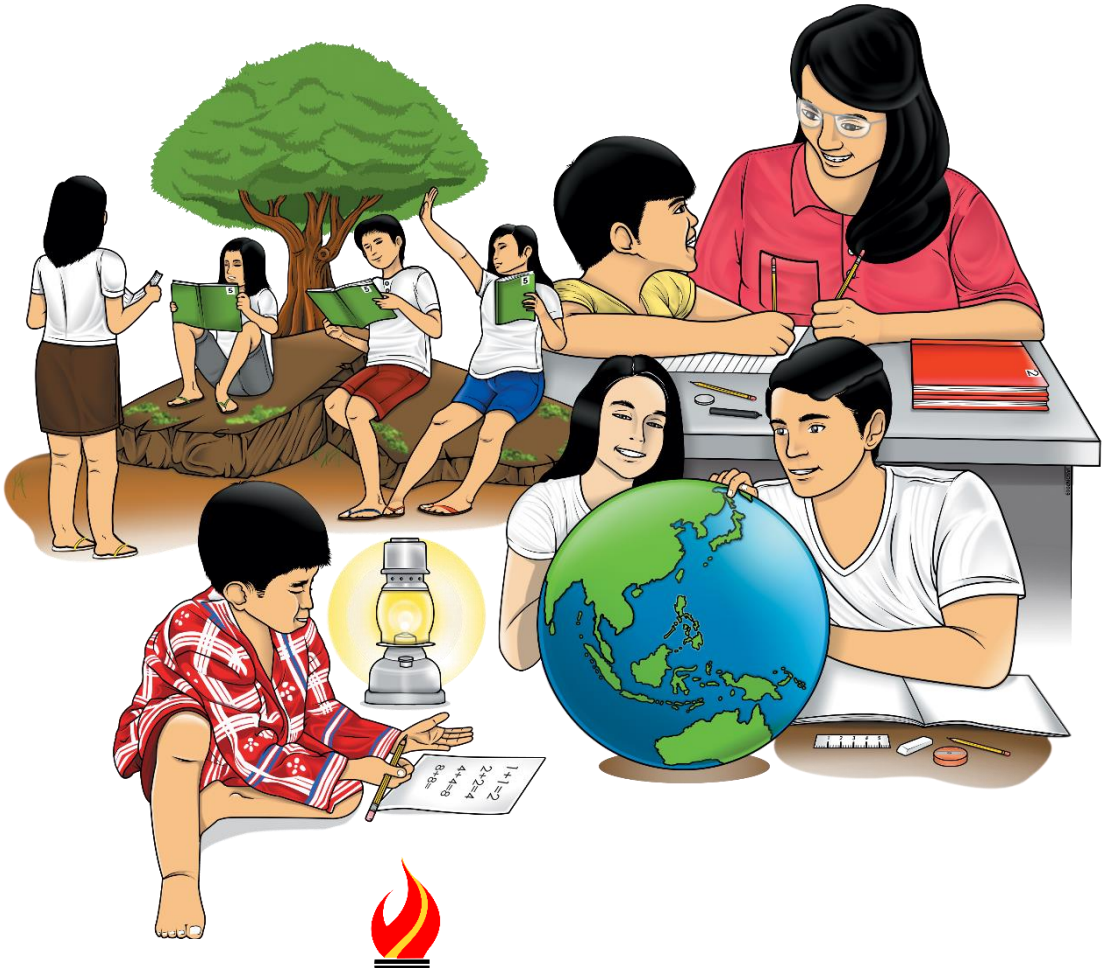
Senior High School

DepED
DEPARTMENT OF EDUCATION

Earth Science for STEM

Quarter 1 – Module 12:
Soil Conservation



ALTERNATIVE DELIVERY MODE
ADM

Earth Science for STEM
Alternative Delivery Mode
Quarter 1 – Module 12: Soil Conservation
First Edition, 2021

Published by the Department of Education
Secretary: Leonor Magtolis Briones
Undersecretary: Diosdado M. San Antonio

Development Team of the Module

Writer: Dennis B. Masangcay

Editors: Ferdinand M. De Castro, Czarina Portia M. Villalobos

Reviewers: Mark Anthony P. Lagumen, Ma. Ruby A. Mendoza, Rogelio D. Canuel, Reyna M. Orlanes, Cyrus T. Festijo Rowena D. Cabanding

Illustrator: Lallie C. Buensalida

Layout Artist: Annaliza Q. Aviles

Management Team: Francis Cesar B. Bringas
Job S. Zape Jr.
Ramonito O. Elumbaring
Reicon C. Condes
Elaine T. Balaogan
Fe M. Ong-ongowan
Sacoro R. Comia
Fe M. Fallurin
Marieta N. Perez

Printed in the Philippines by _____

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

Senior High School

Earth Science for STEM

Quarter 1 – Module 12:
Soil Conservation

DepED
DEPARTMENT OF EDUCATION

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

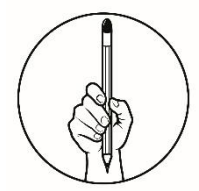
This module was designed and written with you in mind. It is here to help you understand the concepts on soil conservation, specifically, the primary methods and practices adopted to support sustainability for future generations. The scope of this module permits it to be used in many different learning 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 tackles only one lesson, namely:

- Lesson 1 – Soil Conservation Methods and Practices

After going through this module, you are expected to:

1. site different methods to conserve and protect the soil for future generations;
2. determine the conservation projects and programs implemented by the country; and
3. make a poster expressing the different ways on conserving and protecting the quality of soil.



What I Know

Read each item carefully. Analyze each statement and discriminate whether the statement express correct expression or not based on the underlined word/group of words. Write:

A – if the statement is always correct.
B – if the statement is incorrect.
C – if the statement is sometimes correct.

1. Contour plowing helps in slowing the water runoff and prevents soil from being washed away along the slope.

2. Some pathogens tend to build up in soil if the same crops are cultivated again and again.

3. The uptake of nutrients by plants also depends on the pH of soil.

4. Watering soil is a good measure of soil conservation.

5. The salinity of soil increases due to insufficient accumulation of salts in the soil.

6. The death of vegetation leads to soil erosion.

7. Bacteria and fungi help keep the plant healthy.

8. Continuous cultivation of the same crop always leads to imbalance in the fertility demands of the soil.

9. The process of tilling is always beneficial in mixing fertilizers in the soil, making rows and preparing the surface for sowing.

10. Philippine Rice Terraces is a good manifestation of soil conservation method.

11. Denuded forest affects the quality of the soil.

12. Rotation reduces the risk of insect and disease problems, thus decreasing a pesticide dependency.

13. Using fertilizers is good for the soil.

14. Soil needs to be conserved and protected only for the current generation.

15. Food production highly depends on soil.

Lesson 1 Soil Conservation Methods and Practices

Soil as one of the most important natural resources needs personal and societal actions devising and implementing ways of how to conserve and protect it. Analyzing the food pyramid, plants (plant foods) are at the base signifying that they are fundamental to the existence of life. Most organisms are dependent to the food produced by plants as being autotrophic (self-feeder). Plants require soil for survival as their roots get the necessary nutrients to grow and to bear fruits. Soil is one of the three primary factors for plant growth, together with sunlight and water. Saying such, it is an important element of the ecological system and, therefore, its conservation is essential for the upcoming generations.

What's In

Reviewing the previous lessons, you learned that there are activities primarily induced by human that affect greatly the quality of soil threatening the food security of the future generations. Realizing the responsibility to view the current soil usage in a sustainable frame, everyone should take their part in conserving and protecting the soil quality. Soil conservation is an effective blending of strategies and practices used to protect the soil quality from degradation for future purposes. In eying the process, the conservation involves treating and caring the soil as a living ecosystem that necessitates basic requirements. This implies rehabilitation and restoration by returning organic matter to the soil on a continual and sustainable basis.

Notes to the Teacher

The target lesson may effectively connect to students by allowing them to go to the area where the soil is present. Activities like simple planting and gardening may give them more realization on how important the soil is. The teacher may also employ song writing and drawing activities expressing the importance of soil.

What's New

Footprint on the Soil

Soil is threatened due to progressing degradation processes caused by climate change and other factors. Thus, soil conservation and protection are in the limelight emphasizing the informational, educational, and motivational impact of all the measures. The success of any program cannot be attained without the active participation of every member of the community. It targets to elevate public awareness and the farmers' traditional and professional knowledge about protecting the landscapes by having real efforts to comply with mandated practices and technologies.

Activity 1
Seeing the Real Essence...

The success of any program targeting soil conservation is highly dependent on the strategy of letting people understand about soil importance.

Study the Figure 1.1 – 1.4. Determine the importance of soil based on the given figures.

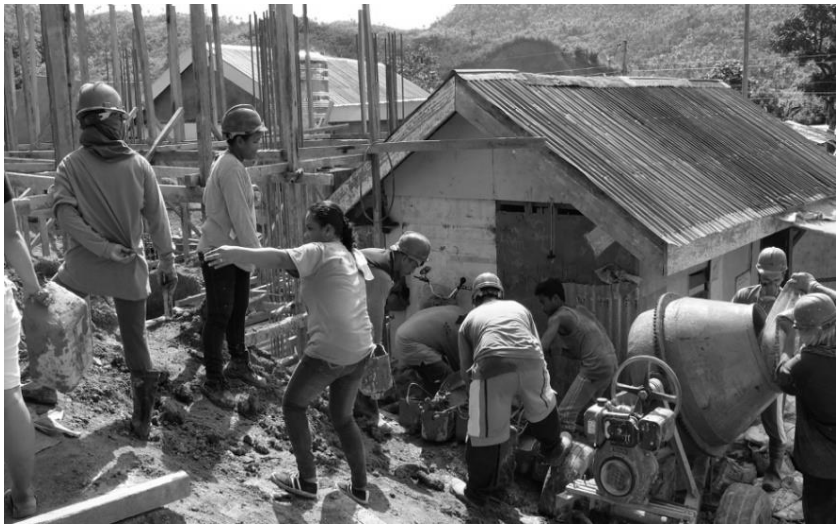
Figure 1.1

For your information...
This is a village in the UNESCO-listed Batad Rice Terraces, Cordillera Administrative Region
Source: *https://www.ttgasia.com/2018/02/06/philippines-points-travellers-towards-rural-tourism/*

The soil is important because...

_____
_____
_____

Figure 1.2

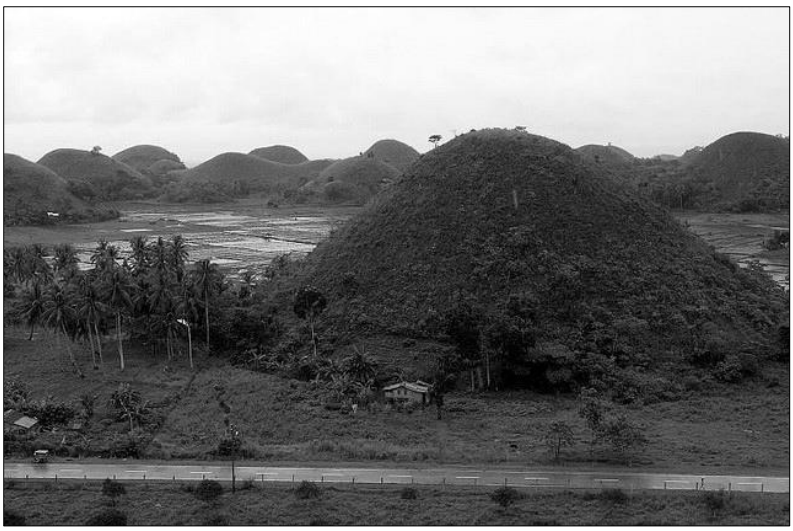


For your information…
Part of the 'Build! Build! Infrastructure Plan of Duterte Administration is the construction of schools for children
Source: *http://www.build.gov.ph/*

The soil is important because…

_____
_____
_____

Figure 1.3



For your information…
The Chocolate Hills are a group of unusually shaped hills located in the middle of the island of Bohol in Philippines.
Source: *http://www.chocolatehills.net/*

The soil is important because…

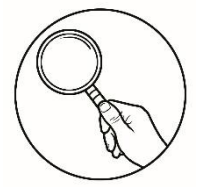
_____
_____
_____

Figure 1.4

For your information…
The Philippine Eagle named 'Kalabugao' is from the forest of Manolo Fortich in Bukidnon.
Source: *https://www.wheninmanila.com/philippine-eagle-featured-in-our-planet-documentary/*

The soil is important because…

_____
_____
_____



What is It

Among the cited importance of soil, which of them gives you more realization that soil should be protected and conserved? Explain your answer.

_____
_____
_____

Based on your observation (e.g. what you heard from news and read in newspapers), how does the country conserve and protect the soil?

_____
_____
_____

Why do you think soil should be conserved and protected?

_____
_____
_____

Activity 2
Practice Makes Perfect!

Knowing the essentiality of the soil is the starting point to convince the participation of an individual in any conservation activity promoted by the government or an organization. Figures 2.1 – 2.4 provides some of the common methods and practices of conserving the soil for sustainability. In the 'what I know' box, write your thoughts about how those methods can help in soil conservation. In 'what I heard" box, write the information that you get from someone who is knowledgeable about the figure. In the 'what I read" box, write the ideas that you read from a research article or any credible references.

Figure 2.1. Plant Trees

What I see is…

_____
_____
_____
_____
_____
_____
_____
_____
_____

Source: https://flyingketchup.ph/denr-deped-pushing-to-plant-trees-in-schools/

What I Know

I think…
_____
_____

What I heard

According to…
_____
_____

What I read

_____
_____
Reference: _____

Figure 2.2. Build Terraces

What I see is…

_____
_____
_____
_____
_____
_____
_____
_____

Source: https://zenrooms.com/?fbclid=IwAR1CD5v4QXWjyxs75BlAqgiK4TV0dV43DsL2H7lWuiGQlp8JbQ2BGrQ-PI

What I Know	I think… _____ _____
What I heard	According to… _____ _____
What I read	_____ _____ Reference: _____

Figure 2.3. No-till Farming

What I see is…

_____
_____
_____
_____
_____
_____
_____
_____

Source: https://www.no-tillfarmer.com/articles/7688-making-no-till-cover-crops-work-in-the-dust-bowl

What I Know	I think… _____ _____
What I heard	According to… _____ _____
What I read	_____ _____ Reference: _____

Figure 2.4. Crop Rotation

What I see is…

_____
_____
_____
_____
_____
_____
_____
_____
_____

Source: https://drecampbell.com/crop-rotation-all-you-need-to know/?fbclid=IwAR2iauE0TXk9UDk_od32D3FD4gO9uXaaqXyHeLeKSPmOsm21FNP61DQac4Q

What I Know	I think… _____ _____
What I heard	According to… _____ _____
What I read	_____ _____ Reference: _____

Based on the figures, what are the common methods of conserving and protecting the soil?

_____
_____
_____
_____
_____
_____
_____
_____

Based on your observation in your community, what method is commonly applied? Cite an example scenario.

_____
_____
_____
_____
_____
_____
_____
_____

Among the cited methods, which of them you could probably make yourself participate with? In what way, you can involve yourself in the said method?

_____
_____
_____
_____
_____
_____
_____
_____

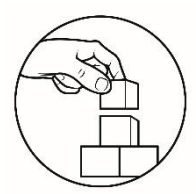
In our country, what are the common methods that are promoted by Department of Science and Technology and Department of Agriculture?

_____
_____
_____
_____
_____
_____
_____
_____

Can you identify some provinces implementing programs for soil conservation?

Province	Program	Description

Aside from the given methods, contour plowing, maintaining soil pH level, watering the soil, managing its salinity, promoting symbiotic organisms, and growing indigenous crops can also help to conserve and protect the soil. Through personal and organizational initiatives, the good soil resources can still benefit the future generations.



What's More

Practice Makes Perfect!

Select the word/group of words in the box that match to the given description in each item below.

watering	terrace	bacteria
same-crop cultivation	soil salinity	no-till farming
soil pH	dry stonewalling	crop rotation
earthworms	tilling	contour plowing

_____1. process of preparing soil for plowing

_____2. a leveled section of a hilly cultivated area

_____3. the method of plowing across the contour lines of a slope

_____4. a method used to create terraces in which stone structures are made without using mortar for binding.

_____5. leads to imbalance in the fertility demands of the soil.

_____6. method of growing a series of dissimilar crops in an area.

_____7. an indicator of the level of nutrients in soil.

_____8. a way to prevent soil erosion caused by wind.

_____9. accumulation of salts in the soil.

_____10. help decompose organic material in the soil.

What I Have Learned

My Brain Works!

Based on the activities and your understanding, write your own definition of soil conservation.

What's in my Brain!

Read Me!

Soil is one of the most important natural resources that require conservation practices. Most of the methods that are utilized to promote sustainable use of the soil are:

1. **Tree Planting**: Roots of trees firmly hold on the soil making it stagnant and prevent soil erosion. As they grow, their roots go deeper and spread wider into the soil. In addition, soil under a vegetative cover is saved from erosion due to wind as this cover acts as a wind barrier.

2. **Terraces Building**: A terrace is a leveled section of a hilly cultivated area. Having its unique topography, it prevents rapid surface runoff of water. Terracing gives the landmass a stepped appearance like the famous Philippine Rice Terraces, thus slowing the washing down of soil. Dry stonewalling is a method used to create terraces in which stone structures are made without using mortar for binding.

3. **No-till Farming**: Tilling is the process of preparing soil for plowing. In conserving the soil, no-till farming which is a way of growing crops without disturbing it through tillage is highly recommended. The process of tilling is beneficial in mixing fertilizers in the soil, making rows and preparing the surface for sowing. Unfortunately, tilling activity can lead to compaction of soil, loss of organic matter in the soil and the death of soil organisms. No-till farming is a way to prevent the soil from this harm.

4. **Contour Plowing**: This practice of farming on slopes considers the slope gradient and the elevation of soil along the slope. It is the method of plowing across the contour lines of a slope. This method helps in slowing the water runoff and prevents soil from being washed away along the slope. Contour plowing also helps in percolation of water in the soil.

5. **Crop Rotation**: Some pathogens tend to build up in soil if the same crops are cultivated again and again. Continuous cultivation of the same crop also leads to imbalance in the fertility demands of the soil. To save the soil from these adverse effects, crop rotation is practiced. It is a method of growing a series of dissimilar crops in an area. Crop rotation also helps in the improvement of soil structure and fertility.

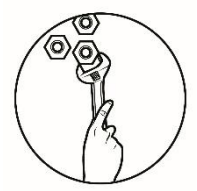
6. **Maintaining Soil pH**: The contamination of soil by addition of acidic or basic pollutants and due to acid rains has an adverse effect on the soil pH. Soil pH is an indicator of the level of nutrients in soil. The uptake of nutrients by plants also depends on the pH of soil. Maintaining the correct value of soil pH, is thus essential for soil conservation.

7. **Water the Soil**: We water plants, we water the crops, but do we water the soil? We seldom do. Watering soil is a good measure of soil conservation. Watering the soil along with plants growing in it is a way to prevent soil erosion caused by wind.

8. **Salinity Management:** The salinity of soil increases due to excessive accumulation of salts in the soil. This has a negative effect on the metabolism of crops. The salinity of soil is detrimental to the vegetative life in it. The death of vegetation leads to soil erosion. Hence, salinity management is an indirect way of conserving soil.

9. **Promote Helpful Soil Organisms**: Nitrogen-fixing and denitrifying bacteria are important constituents of the nitrogen cycle. They live in soil. Bacteria and fungi help keep the soil healthy. Organisms like earthworms help decompose organic material in the soil. They aid soil aeration and help it maintain porosity. Rodents too, help soil the same way. This increases the absorbing capacity of soil. Earthworms, through aeration of soil, enhance the availability of macronutrients. These helpful organisms boost soil fertility and help in soil conservation.

10. **Grow Indigenous Crops**: Planting native crops is beneficial for soil conservation. If non-native plants are grown, fields should be bordered by indigenous crops to prevent soil erosion, thus achieving soil conservation.



What I Can Do

Awareness is the Key!

People work in unity when they are aware of the real vision and purpose of certain movement or program. That is why it is important that they are being reached with core information. When an individual knows the issue, he/she can proactively participate in each activity initiated by an organization and government.

To help increase the awareness, you are tasked to make a poster that shows the importance of soil and how it will be conserved and protected. Below are samples and rubric for grading the output.

Samples:

Source: https://www.postermywall.com/index.php/art/

Making a Poster: Poster Rubric

Category	4	3	2	1
Required Elements	The poster includes all required elements as well as additional information.	All required elements are included on the poster.	All but 1 of the required elements are included on the poster.	Several required elements were missing.
Labels	All items of importance on the poster are clearly labeled with labels that can be read from at least 3 feet away.	Almost all items of importance on the poster are clearly labeled with labels that can be read from at least 3 feet away.	Many items of importance on the poster are clearly labeled with labels that can be read from at least 3 feet away.	Labels are too small to view or no important items were labeled.
Graphics-Relevance	All graphics are related to the topic and make it easier to understand. All borrowed graphics have a source citation.	All graphics are related to the topic and most make it easier to understand. Some borrowed graphics have a source citation.	All graphics related to the topic. One or two borrowed graphics have a source citation.	Graphics do not relate to the or several borrowed graphics do not have a source citation.
Attractiveness	The poster is exceptionally attractive in terms of design, layout, and neatness.	The poster is attractive in terms of design, layout, and neatness.	The poster is acceptably attractive though it may be a bit messy.	The poster is distractingly messy or very poorly designed. It is not attractive.
Grammar	There are no grammatical/ mechanical mistakes on the poster.	There are 1-2 grammatical/ mechanical mistakes on the poster.	There are 3-4 grammatical/ mechanical mistakes on the poster.	There are more than 4 grammatical/ mechanical mistakes on the poster.

Source: www.uen.org › lessonplan ›

Assessment

Read each item carefully. Write only the letter of the correct answer.

1. Soil conservation is _____
    a. a combination of practices used to protect the soil from degradation.
    b. a set of standards for using the soil in relation to current situations.
    c. a process of studying the soil profile.
    d. a policy of declaring a soil area to be protected for future use.

2. Which of the following are best reasons for doing soil conservation methods?
    I. To ensure a secure food supply at reasonable prices.
    II. To improve wildlife habitat.
    III. To maintain an adequate amount of organic matter and biological life
    IV. To save farmers from the effect of climate change
    a. I and II only
    b. II and II only
    c. I, II and III only
    d. II, III and IV only

3. Why is planting trees help in conserving the soil? It is because _____
    a. it helps in maintaining soil moisture content.
    b. its roots hold the soil firmly avoiding erosion.
    c. it gives nourishment to the soil.
    d. all of the above

4. It is a leveled section of a hilly cultivated area.
    a. Hill
    b. Terrace
    c. Valley
    d. Mountain

5. Which of the following is a process that involves planting seeds into the residue of the previous crop?
    a. Contour Farming
    b. No-Till Farming
    c. Crop Rotation
    d. Strip Cropping

6. This practice of farming on slopes considers the slope gradient and the elevation of soil along the slope.
    a. No-Till Farming
    b. Crop Rotation
    c. Strip Cropping
    d. Contour Farming

7. Which of the following is/are advantage of crop rotation?
    I. It avoids the building up of soil pathogens.
    II. It balances the fertility of soil.
    III. It maintains good pH level of the soil good for crops.
    a. I only
    b. I and II only
    c. II and III only
    d. I, II and III

8. The soil contamination can be indicated by its pH level. The statement is
    a. True, because it may be due to addition of acidic or basic pollutants.
    b. False, because the soil has its own way of controlling pH level
    c. True, because additional nutrients will always make the soil acidic
    d. False, because low amount of nutrients will make the soil basic.

9. Watering the plants is beneficial to soil because it prevents
    a. compaction
    b. erosion
    c. sedimentation
    d. eutrophication

10. The salinity of soil
    a. increases when there is an excessive amount of acids.
    b. decreases when there is an insufficient amount of acids.
    c. increases when there is an excessive amount of salts.
    d. decreases when there is an insufficient amount of salts.

11. They are important organisms for the nitrogen cycle.
    a. earthworms
    b. millipedes
    c. rodents
    d. bacteria

12. Which of the following will happen when salinity of the soil has increased?
    I. Metabolism of crops will be negatively affected.
    II. Death of vegetation will occur.
    III. Soil erosion will happen.
    a. I only
    b. II only
    c. I and II only
    d. I, II and III

13. Different plants/ crops require certain pH level. The statement is _____
    a. true, because pH level depends on the amount of nutrients.
    b. false, because pH level depends on the amount of humus.
    c. true, because high pH level is required by plants to grow.
    d. false, because low pH level is required by plants to grow.

14. It is a method of growing a series of dissimilar crops in an area which helps in the improvement of soil structure and fertility.
    a. Contour Farming
    b. No-Till Farming
    c. Crop Rotation
    d. Strip Cropping

15. Which of the following is a method helps in slowing the water runoff and prevents soil from being washed away along the slope?
    a. Crop Rotation
    b. Contour Farming
    c. No-Till Farming
    d. Strip Cropping

Additional Activities

I am Soil Warrior

Using your poster, you may post it on different social media platforms. You may also print the material in your community and post it on different sites where people can be informed and raise their awareness.

Source: https://cultureofyes.ca/2019/10/08/social-media-and-technology-related-but-different/

Answer Key

What I Know

1. a
2. c
3. a
4. c
5. b
6. a
7. b
8. c
9. b
10. a
11. a
12. a
13. c
14. b
15. a

What's More

1. Tilling
2. Terrace
3. Contour plowing
4. Drystone walling
5. Same-crop cultivation
6. Crop rotation
7. Soil pH
8. watering
9. Salinity
10. Bacteria

Assessment

1. a
2. c
3. d
4. b
5. b
6. d
7. d
8. a
9. b
10. c
11. d
12. d
13. a
14. c
15. b

References

"10 ways to conserve the soil," accessed https://savetheearthsavelife.wordpress.com/2014/09/11/10-ways-to-conserve soil/

Johnston County, "Soil conservation," accessed https://www.johnstonnc.com/swc/content.cfm?pageid=wisc

"Soil protection," accessed https://ec.europa.eu/jrc/en/research-topic/soil-protection

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 * blr.lrpd@deped.gov.ph