



# The Effects of Soil Quality on Animal Life

## Middle School Food and Agricultural Literacy Curriculum

### Precepts

- A. Action
  - A5. Communicate effectively with others
- B. Relationship
  - B2. Interact and work with others

### National Standards

- NRS.02.04.03.a.a Identify characteristics of a healthy wildlife habitat.
- NL-ENG.K-12.4 – Communication Skills
- NL-ENG.K-12.12 – Applying Language Skill
- NS.5-8.6 – Science in Personal and Social Perspectives

### Student Learning Objectives

- As a result of this **unit** the students will...
- Explain the importance of maintaining soil quality.
- As a result of this **lesson** the students will ...
- Describe the impact of soil quality on animal life.

### Content Outline

**Objective 1:** Describe the impact of **soil quality** on animal life.

#### I. What is **soil quality**?

- A. **Soil quality** is the ability of soil to perform functions that are essential for people and the environment.

#### II. How can **soil quality** impact animal life?

- A. Soil provides for animals
  - 1. Plants are the basis of a food chain – therefore plants provide nutrition for animals
    - a. Animals rely on healthy plant growth to ensure proper nutrition. With poor **soil quality**, plant growth will be limited, impacting animals' lives in a negative way.
  - 2. Pastures/grazing lands
  - 3. Habitat for wildlife

### Time

Instruction time for this lesson: 45 minutes.

### Resources

Doran, J.W., et al. (2009). Soil Quality Basics. Retrieved August 29, 2009, from Soil Quality: The functional value and stability of soil resources Web Site: <http://soilquality.org/basics.html> —National FFA Organization. (2003). LifeKnowledge Precepts and Signs of Success

### Tools, Equipment, and Supplies

Overhead projector or writing surface  
LCD projector or SMART board (optional)  
Writing utensil  
Plain, white paper – one for every two students  
MS.NR.4.2.TM.A – overhead or one copy per four students  
MS.NR.4.2.TM.B – one per teacher  
MS.NR.4.2.TM.C – one per teacher  
MS.NR.4.2.TM.D – overhead or one copy per four students  
MS.NR.4.2.TM.E – one per student  
MS.NR.4.2.AS.A – four animal ID cards, four habitat ID cards per group of four students  
MS.NR.4.2.ASSESS.A – one per student

### Key Terms

The following terms are presented in this lesson and appear in **bold italics**:

***Soil quality***

#### B. Environmental impact

1. When ***soil quality*** decreases, plant life will become limited and result in less abundance for animal consumption. Pollution can have a direct impact on ***soil quality***. Oil spills, chemical spills, and landfills will result in a decrease in ***soil quality***.

### Interest Approach

Prior to beginning class, obtain a copy of **MS.NR.4.2.TM.A** to be shown either on an overhead or copied on paper, one per group of four students. As students arrive, welcome them to class and acknowledge them for being prepared today.

Look at these two pictures.

Refer to **MS.NR.4.2.TM.A**.

The two pictures represent different environments. When I say GO, take 30 seconds to generate a list



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of similarities and differences between these two photos. Fold a piece of paper in half, hot-dog style, labeling one side "similarities" and one side "differences." List as many items as possible, even thinking about people, places, or things that could be impacted by living in these places. How long will we have to complete this activity? Wait for student response. Great. Oh – you conduct this activity in pairs.

Pass out one sheet of plain white paper for every two students.

What questions are there? GO.

As students frantically get their ideas together, obtain MS.NR.4.2.TM.B. This transparency master can be used on the overhead; however, for classroom discussion it may be ideal to keep **MS.NR.4.2.TM.A** projected for reference. **MS.NR.4.2.TM.B** can easily be recreated on a writing surface similar to a whiteboard or a large poster board to record similarities and differences generated by students. At the end of 30 seconds, regain focus of the classroom.

Great job working in pairs! Everyone discovered there were many similarities and differences between these two environments. Who will be first to share one of the similarities they discovered?

Allow several students to share their similarities. Both have trees, are located outside, have wood in the picture.

Great job! As you can see, there are several things that are similar between these two environments; however, there are also several things that are different. Who will be first to share one of the differences their group came up with?

Allow several students to share their differences. The health of the trees, they way the trees look.

Excellent list! From these two pictures we can see two different environments that have many similarities and many differences. If we were animals, looking for an environment to live in, which environment would we choose and why?

Allow several students to give their opinions on which place they would rather live. If they do not mention food availability, ask them where they think there would be more food available.

Great job! Thank you for sharing!

The health of an environment can have a vital impact on the quality of plant, animal, and human life. The last time we met we talked about how soil erosion can lead to the poor quality of soil due to the washing away of the important nutrient layers. Those important layers can result in pictures like these

Refer to **MS.NR.4.2.TM.A**.

Notice the environments that have intact, healthy soil and those that have been subject to soil erosion and have diminished **soil quality**. Today we are going to look a little further into the impact **soil quality** has on animal life. Let's put our thinking caps on and investigate the importance of **soil quality**!

## Summary of Content and Teaching Strategies

Content outline can be found on **MS.NR.4.2.TM.C** and can aid in instruction via an overhead or writing surface available to display information. Information can be written on a large poster board or piece of paper prior to class for easy access and instruction. If technology, similar to an LCD projector or a SMART board, is available, prepare the following information in presentation software prior to class meeting. This will be lengthy, so ensure enough time is allotted to transfer material. Make sure all students have appropriate writing utensils and distribute **MS.NR.TM.E** to expedite the note-taking process.

Raise your hand if you have ever heard the word quality before. Allow students to raise their hands. Great. When I say QUALITY, take 10 seconds to think quietly of a one-word definition for the word. What questions are there? QUALITY.

Allow students to think about the word quality. At the end of 10 seconds, regain class's attention.

Who will be first to share their one-word definition of quality?

Allow several students to share what they think quality means. Students could focus on several different aspects of things having quality, but if they struggle for words, have them think about the quality of their food or clothing. If they still struggle with how these can help us define quality, have them think of the quality of food and why spoiled food will not perform the same purpose as fresh food.



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From everyone's definition, we can come to the conclusion that quality is a characteristic that describes whether the product performs its specific function. Is something of good quality or poor quality? This could be a variety of things, from the quality of food or clothing to the quality of a store you have visited. So what if we were to talk about the quality of soil? When I say DEFINE, take another 10 seconds to think quietly about a one-word definition of **soil quality**. What questions are there? DEFINE.

Allow students to think about the term **soil quality**. At the end of 10 seconds, regain the class's attention.

Great job thinking quietly. Who will be first to share their one-word definition of **soil quality**? Allow several students to share their definitions.

Project MS.NR.4.2.TM.C on an overhead or writing surface. Only reveal the definition of **soil quality**.

**Soil quality** can be defined as the ability of soil to perform functions that are essential for people and the environment.

Advise students to fill in the blanks on their note taking sheet, MS.NR.4.2.TM.E.

### Objective 1: Describe the impact of **soil quality** on animal life.

#### I. What is **soil quality**?

- A. **Soil quality** is the ability of soil to perform functions that are essential for people and the environment.

For the next activity, students will be split into groups of no more than four. Each group will be given a set of Animal and Habitat ID cards (MS.TM.4.2.AS.A). There are four animal ID cards and four habitat cards. Depending on the size of the class, cards will need to be made prior to students arriving.

Not only is soil important to people, but it can also make a difference in our environment. Things like plant and animal wildlife depend on **soil quality** in order to lead healthy, productive lives. When I say GO, each group will have one minute to match an animal card to its appropriate habitat.

Each set of cards a group receives will have four animals and four habitats. Each animal will only be placed in one habitat and each habitat will only have one animal. All cards are used. After matching the cards together, make sure all group members can tell the class why specific animals were placed with individual habitats.

What characteristics let us know matches are correct? How long will we have to complete this activity?

Allow students to respond.

Correct. Complete this activity in groups (Assign the specific number suited for your classroom). What questions are there? GO.

As students work through the pictures, monitor to ensure that everyone is participating. Since this activity is done in larger groups, there may be a few students who tend to lead and others will follow. Question the reasoning and thought process for their conclusions. At the end of one minute, regain the class's attention.

Great job working in groups! Let's see what everyone came up with. Quickly match the animals with the habitats. The four habitats are arctic tundra, desert, grassland, and forest. This should be pretty easy for the students. If students have trouble determining which animal goes with each habitat, talk about the characteristics of the animals that determine their habitat.

What if the arctic fox were unable to get the nutrition it needed from its habitat? Could it go live in the same habitat as the lizard? Most students will automatically say no. Why could the arctic fox not live in the desert?

Allow students to talk about the difference in temperature, terrain, etc.

If students do not talk about food, lead students to talk about plant life differences in each area. Animals rely on the habitat they live in to supply the proper nutrition to lead healthy lives. Plant growth in an area can be determined depending on the **soil quality**. If there is poor **soil quality**, then plants will be limited and could impact the animal's lives in a negative way. If the supply of food started to disappear for the arctic fox, it would have difficulty finding another habitat to support its needs.



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Reveal Roman numeral II.a. of **MS.NR.4.2.TM.C**. Advise students to fill in the blanks on their note-taking sheet, **MS.NR.4.2.TM.E**.

#### II. How can *soil quality* impact animal life?

##### A. Soil provides for animals

1. Plants are the basis of a food chain; therefore, plants provide nutrition for animals
  - a. Animals rely on healthy plant growth to ensure proper nutrition. With poor **soil quality**, plant growth will be limited, impacting animals' lives in a negative way.
2. Pastures/grazing lands
3. Habitat for wildlife

Nutrition is essential for animal growth and productivity. What if the habitats you looked at were affected by an outside source? Look at the following image.

Display **MS.NR.4.2.TM.D**.

Which habitat of the four we just discussed with the animal ID cards does this one most closely relate to?

Allow students to respond.

If they struggle to ID, help them notice the snow in the area, which closely resembles the arctic tundra card.

That's right. This habitat is a beach located in the arctic tundra. Beaches similar to this picture can be found in Alaska. What are the people doing on this beach?

Refer to **MS.NR.4.2.TM.D**. Allow students to talk about the individuals cleaning up the beach. If students do not talk about the color of water, ask them why they think the water might be black.

These people are working to clean up the beach and the water from an oil spill. Oil spills can occur in the ocean and can cause the water and soil to become contaminated with oil. Environmental contamination such as this oil spill will result in a decrease in **soil quality**. What type of impact could this have on animals?

Allow students to answer. If they struggle to provide an impact, have students think about the plant life that could be affected by the decrease in **soil quality**.

If there is a decrease in **soil quality**, then plant life will become more limited and result in a less abundant supply for animals. Less food could lead to poor nutrition and a decrease in animal population.

Advise students to fill in the blanks on their note taking sheet, **MS.NR.4.2.TM.E**.

##### B. Environmental impact

1. When **soil quality** decreases, plant life will become limited and result in less abundance for animal consumption. Pollution can have a direct impact on **soil quality**. Oil spills, chemical spills, and landfills will result in a decrease in **soil quality**.

Quality doesn't apply to just us and whether our food is good or our clothes are made well. Quality can relate to soil and the amount of nutrients it provides plants to ensure animals stay healthy and productive. Quality can also refer to the effects of environmental impacts, such as oil or chemical spills, and how those can limit plant life in a specific area. Let's take a look back and review all that we have learned today.



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### Review/Summary

The following review activity does not need any prior setup. Students will be reporting as a part of the Eye Witness News e-Moment® the information learned today through interviewing an expert in the field of **soil quality**, or another classmate. Students can use a pen or pencil as their mock microphone for effect. Students will work in pairs, so you can either assign them or allow them to pick. Depending on classroom space, allow students to get up and move around if desired. To extend this activity, recording the interviews might be a fun learning activity.

Utilize the Eye Witness News e-Moment.

Today we will be receiving live coverage from Channel 3 News on important information regarding **soil quality**. When I say REPORT, we will have four minutes to conduct a live interview with a **soil quality** expert, explaining what **soil quality** is and how it can impact animals around the world. This is a live report – make sure you are energetic and really help the public understand why **soil quality** should not be ignored! How long will have you to do this activity?

Allow students to respond.

Two more important details – we will do this activity in pairs, one reporting while the other person is being interviewed. At the two-minute mark switch roles. What questions are there? Are you ready to go live? REPORT.

Allow students to participate in the Eye Witness e-Moment. Monitor interviews and make sure students stay on task throughout. Do not forget to say SWITCH at the two-minute mark so that the roles are changed and each student plays both the role of reporter and expert. At the end of four minutes, regain the class's attention. Select a few groups to conduct their interviews/reports to the class. To check for understanding, ask students what they learned when they conducted their interviews.

Great job reporting this important news! As you can see, **soil quality** is an important factor in providing an animal with a healthy and productive life. Poor **soil quality** can lead to limited plant growth and lack of nutrition for animals. In our next lesson we will look a little more specifically at what is in growing media and how those components can help support plant growth. Great job today understanding **soil quality**!

### Application

#### Extended classroom activity:

Have students look into the **soil quality** in their community. Let them discover if any recent factors, like increased population, have played a factor in impacting local animal life. Bring in a **soil quality** expert.

#### FFA activity:

FFA members can investigate how they can become advocates for maintaining **soil quality** to promote healthy animal communities.

#### SAE activity:

Students can investigate different factors that could improve **soil quality** and which would have the greatest positive effect on improving healthy animal communities.

### Evaluation

MS.NR.4.2.ASSESS.A

### Answers to Evaluation

1. Soil quality is the ability of soil to perform functions that are essential for people and the environment.
2. If **soil quality** is poor, plant growth will be limited. Animals require plants as nutrition in order to lead healthy and productive lives. Without an abundant supply of plants, animal populations could be affected.
3. Environmental factors, such as an oil or chemical spill, can cause soil quality to decrease. Plant growth depends on soil quality, and a decreased level of soil quality could lead to limited plant growth. Animals require plants as nutrition to lead healthy and productive lives. A decreased level in soil quality could affect animal populations through lack of food supply.





What's the Same?  
What's Different?





## Similarities and Differences Chart

## Natural Resources Science: Soil



# What Is Soil Quality?

**Objective 1:** Describe the impact of **soil quality** on animal life.

## I. What is soil quality?

A. **Soil quality** is the ability of soil to perform functions that are essential for people and the environment.

## II. How can soil quality impact animal life?

A. Soil provides for animals

1. Plants are the basis of a food chain; therefore, plants provide nutrition for animals
  - a. Animals rely on healthy plant growth to ensure proper nutrition. With poor **soil quality**, plant growth will be limited, impacting animals' lives in a negative way.

2. Pastures/grazing lands

3. Habitat for wildlife

B. Environmental impact

1. When **soil quality** decreases, plant life will become limited and result in less abundance for animal consumption. Pollution can have a direct impact on soil quality. Oil spills, chemical spills, and landfills will result in a decrease in **soil quality**.



# Arctic Tundra Oil Spill Contamination





# What Is Soil Quality?

## Notes

### I. What is \_\_\_\_\_?

- A. Soil quality is the ability of \_\_\_\_\_ to perform functions that are essential for \_\_\_\_\_ and the \_\_\_\_\_.

### II. How can soil quality impact \_\_\_\_\_?

1. Soil provides for animals

2. Plants are the basis of a \_\_\_\_\_; therefore, plants provide nutrition to animals

a. Animals rely on healthy plant growth to ensure proper nutrition. With poor **soil quality**, plant growth will be limited, impacting animals' lives in a \_\_\_\_\_ way.

3. Pastures/grazing lands

4. Habitat for \_\_\_\_\_

B. \_\_\_\_\_ impact

1. When **soil quality** \_\_\_\_\_, plant life will become limited and result in less abundance for animal consumption. \_\_\_\_\_ can have a direct impact on soil quality. Oil spills, chemical spills, and landfills will result in a \_\_\_\_\_ in **soil quality**.



## Animal Identification Cards

Each group will receive one of each of the following four animal cards.







## Habitat Identification Cards

Each group will receive one of each of the following habitat cards.







# The Importance of Soil Quality Assessment

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Name \_\_\_\_\_

## Short answer

Directions: Answer the following questions.

1. What is soil quality?

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2. How can soil quality affect an animal's nutrition?

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3. How can soil quality be affected by environmental factors such as an oil spill?

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