

Lesson 1 Introduction to Unit

Overview

Lesson One introduces sedimentation as a nonpoint source of pollution involving soils in runoff from the watershed into the surface waters. The Three Major Types of Dirt activity allows students to make observations on three major types of soils and analyze ways that soils can differ. The Nonpoint Source of Pollution worksheet gives the students a chance to practice applying the definitions of point and nonpoint sources of pollution to practical situations.

Objectives.

1. Observe and record observations on three major soil types.
2. Identify ways that soils can vary.
3. Distinguish between point and nonpoint sources of pollution.
4. Understand that all pollution harms life, but you cannot necessarily see it in the water.
5. Identify a watershed.

TEKS for 6th grade

(b) [Knowledge and Skills](#)

- (2) Scientific investigation and reasoning. (A) (B) (C) (E)
- (3) Scientific investigation and reasoning. (A) (B)

TEKS for 7th grade

(b) [Knowledge and Skills](#)

- (4) Scientific investigation and reasoning. (A)
- (8) Earth and space. (B) (C)

Recommended Procedure

1. Show the Power Point for Lesson One or the overhead for Lesson One.
Students should take notes on the vocabulary (not what we will study).
2. Have the students do the Activity of Three Major Types of Dirt.
3. When the students finish the Three Major Types of Dirt activity have them start on their homework of Nonpoint Source Pollution Worksheet.
4. The students should turn in their notes from the Power Point or Overhead Lesson before they leave the classroom. Make it clear that you will need their soil activity and homework first thing the next class period.
5. If all of the students complete the activity and some of them have also completed the Nonpoint Source Pollution Worksheet, you can start on the Power Point (Or overhead) for Lesson Two.

I found it useful to be certain the students were taking notes the on the definitions in the discussion the first day. . Some of them simply wrote down the words, but not the definitions. They need to understand the importance of getting the definitions to new terms accurately recorded in their notes.

Materials needed for this lesson

The Power Point/overhead for Lesson One requires two similar transparent containers (quart or liter size are fine) one filled with clear water and the other with the same amount of water but with dirt in it. Mix it up before class to show sediment in water.

The Three Major Types of Dirt student activity needs: Course sand, loam (potting soil will do), and clay soil (this is most difficult one). A small container for each student such as a petri dish, individual apple sauce (the students can bring these from home), magnifying lens, eye droppers or plastic pipettes (for use with water), a ceramic, glass or plastic small surface (old saucers will work), clear container (plastic best, but glass will work with care) with a leak proof lid, water in the clear container, community old towels and a plastic bucket to avoid spills.



Dirty Water

1. Here you have two containers:

HOW SHOULD WE LABEL THESE CONTAINERS?

The teacher will have two transparent containers the same size and both filled with water. One will have dirt that you have recently stirred up and the other will be clear water with no dirt (sediment) visible. The students will probably call one dirty water and the other clean water.

In this unit we will be studying sediment (better known as dirt) in water. Soil in water is an important Nonpoint Source of Pollution.

2. Sedimentation: dirt that comes into water and eventually settles down.
3. Total Suspended Solids: measurement of small particles while still suspended.

(Pictures of sedimentation in waterway compared to Cypress Creek is appropriate here)



4. In this unit we will be studying:

- a. Major kinds of soils and their origins.
- b. How soils get into the water.
- c. Harm to aquatic ecosystem from sedimentation.

Make certain the students understand the meaning of “aquatic ecosystem” –water habitat with producers, consumers, and abiotic (not living) factors such as rocks, temperature, etc. List some aquatic ecosystems such as streams, rivers, lakes, ponds and oceans.

- d. Why sedimentation is considered a NONPOINT SOURCE OF POLLUTION.

If they ask about nonpoint source of pollution, briefly say it comes from a broad range of places, not a specific point.

- e. How we can minimize the soil that gets into the water.

5. It is clear which container is dirty with soil, but how do we know for certain that the clear one has no pollution?

Give the students a chance to answer this question. Hopefully they will understand that not all pollution is visible.

6. WHAT IS POLLUTION?

Give the students a chance to answer this question.

7. Pollution is anything (in the water) which is harmful to life.

8. We say water pollution can be either:

- Point source OR Nonpoint source

Point source pollution is from an easily identifiable source such as a pipe from industry or water treatment plant entering the water at one point.

Nonpoint source is a general source of pollution coming from many sources over a wide area. With nonpoint source of pollution you are not able to identify the precise source of the pollution. Soil washed down into the water is an example of nonpoint source of pollution; it comes from many sources over a wide area

9. Point source pollution can be traced back to the point of origin.

Nonpoint source pollution is from several sources and cannot be traced back to origin.

10. Which is easier to control and monitor?

- Point source or Nonpoint source?

Point source is easier to monitor because you know the source.

11. There is a special word that we use that means the area over which the runoff water from a rain flows into a specific body of water (lake, river, and stream).

- All of this land with arrows is called the *WATERSHED* of this stream.

12. ALL land is in the watershed of SOME body of water (stream, river, lake, and ocean).
- A watershed is the area of land whose runoff water feeds a specific body of water.

Stress to the students that ALL LAND is in the watershed of some body of water

13. Is this school in a watershed?

If you know what watershed your school is located in, please tell the students what it is.

14. The particulate matter (sediment) gets into the water from the soils in the watershed. There are many sources of sediment and it is therefore a nonpoint source of pollution.

Now you will do an activity with soils.

What Is Nonpoint Source Pollution?

Nonpoint source (NPS) pollution results when small amounts of contaminants from a large number of sources are carried by rainfall runoff into streams, lakes, or bays. For example, pollutants may be washed off lawns, construction areas, farms, or highways during a heavy rain and carried to a nearby creek. Nonpoint source pollution is difficult to control because it comes from the everyday activities of many different people, such as fertilizing a lawn, using a pesticide, or constructing a road or building.

In contrast, pollution from point sources comes in large amounts from a single source, such as an industrial operation or a wastewater treatment plant. Pollution from most point sources is controlled through regulations that require treatment of a facility's wastewater before it is discharged into a nearby lake or stream.

The large number of nonpoint sources and the fact that they are difficult to regulate make the voluntary efforts of citizens, businesses, service organizations, and other groups an essential part of the effort to address NPS pollution in Texas.

Above material taken from:

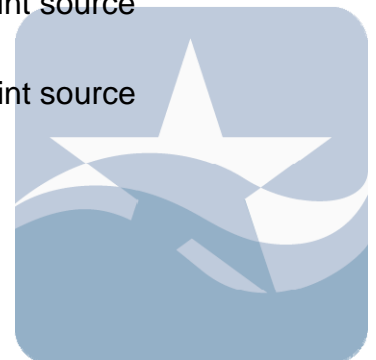
<http://www.tceq.state.tx.us/compliance/monitoring/nps/mgmt-plan/index.html#nps>

Circle either Point or Nonpoint for each of the following:

- | | | | |
|-------------------------------|--------------|----|-----------------|
| 1. Factory pipe | point source | or | nonpoint source |
| 2. Leaking Septic Tank | point source | or | nonpoint source |
| 3. Washing Car | point source | or | nonpoint source |
| 4. Agriculture..... | point source | or | nonpoint source |
| 5. Solid Waste Landfill | point source | or | nonpoint source |
| 6. Fertilizers | point source | or | nonpoint source |
| 7. Animal Wastes..... | point source | or | nonpoint source |
| 8. Litter..... | point source | or | nonpoint source |
| 9. Erosion..... | point source | or | nonpoint source |

Which is more difficult to control? point source or nonpoint source

Grade for accuracy # 1,4,6,10 because they are all specifically discussed in the introduction on this sheet. Remind the students that they need to read the introduction material.



Student Activity

There are over 70,000 types of soil and we are going to examine three major types.

Goal:

Your observations will enable you to list some of the ways that soil can vary.

Materials:

- ☐ Course sand, loam (potting soil will do), and clay soil (this is most difficult one)
- ☐ A clear container with a leak proof lid for water (plastic is best, but glass will work with care)
- ☐ A small container for dirt (Petri dish, individual plastic apple sauce container, lids, etc. that students can be bring from home)
- ☐ Water in the clear container
- ☐ Magnifying lens
- ☐ Eye droppers or plastic pipettes (for use with water)
- ☐ Community old towels
- ☐ A plastic bucket to avoid spills.
- ☐ A ceramic, glass or plastic small surface (old saucers will work)

Procedure:

1. Each student will receive a soil type (hand these out before the lab in small containers) and get in a group so that all three soil types are visible. Use your magnifying lens to help with your initial observations and record your observations on the color, appearance and smell of the soils in the appropriate boxes below.

Each student will fill in the chart for all three soils.

Check to be certain that all three different soils are in each group and that students are filling in the boxes for all three types of soil.

2. Fill your clear container $\frac{3}{4}$ full of water, if it does not already have water in it. Wet your finger in the water and get a small quantity of each soil (one at a time) and rub it between your fingers. Describe the feel for each soil in the data table. Rinse your fingers off in the water between testing the different soils. **Each student should try this with each soil type and reach a group conclusion.**
3. Your teacher will make three small, equal in height, piles on a flat waterproof surface; one small pile of sand, one small pile of loam and one of clay. Fill the dropper with water and drop ONE drop of water on each pile, continue to add one drop at a time to each pile, observing how the different soils react to the drops of water. Keep going around to each pile until you can describe the reaction of the soil to the water.



Fill in the data table with your conclusions.

I used the plastic lid of their container to make the three separate piles that were equal in height. It is easier for the teacher to make the piles uniform. You could alternatively do the three piles of soil as a demo on the overhead.

4. Do not fill in the last row until after the class discussion.

Data Table:

	Sand	Loam	Clay
Color/appearance	<i>Answers vary depending upon the source of the soils.</i>		
Smell	<i>Accept their answers.</i>		
Describe the feel between wet fingers	<i>"gritty"</i>	<i>Varies</i>	<i>"slick", "slippery"</i>
Which pile loses height with water first/ which pile absorbs water best/ which breaks down into muddy sediment	<i>Varies, usually loses height first</i>	<i>Usually absorbs water best</i>	<i>Usually breaks down into mud sediment</i>
PowerPoint: size of particles and composition (fill in later)	<i>After PowerPoint they say largest</i>	<i>Medium sized</i>	<i>Smallest size</i>

Conclusion:

List at least three different ways that soils can vary:

Be certain that the three ways they list are truly different. I would expect them to use ways we listed above such as color, smell, size and interaction with water.

- 1).....
- 2).....
- 3).....

4)

Nonpoint Source Pollution Worksheet

What Is Nonpoint Source Pollution?

Nonpoint source (NPS) pollution results when small amounts of contaminants from a large number of sources are carried by rainfall runoff into streams, lakes, or bays. For example, pollutants may be washed off lawns, construction areas, farms, or highways during a heavy rain and carried to a nearby creek. Nonpoint source pollution is difficult to control because it comes from the everyday activities of many different people, such as fertilizing a lawn, using a pesticide, or constructing a road or building.

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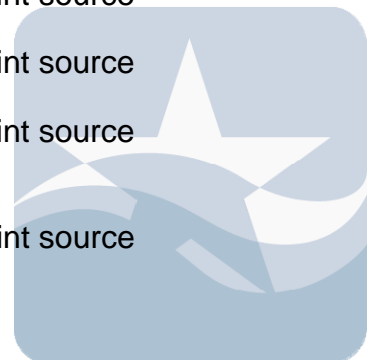
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Which is more difficult to control? point source or nonpoint source



Lesson 1: Three Major Types of Dirt

Student Activity

There are over 70,000 types of soil and we are going to examine three major types.

Goal:

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Materials:

- ☐ Course sand, loam (potting soil will do), and clay soil (this is most difficult one)
- ☐ A clear container with a leak proof lid
- ☐ A small container for dirt
- ☐ Water in the clear container
- ☐ Magnifying lens
- ☐ Eye droppers or plastic pipettes
- ☐ Community old towels
- ☐ A plastic bucket to avoid spills.
- ☐ A ceramic, glass or plastic small surface

Procedure:

1. Each student will receive a soil type and get in a group so that all three soil types are visible. Use your magnifying lens to help with your initial observations and record your observations on the color, appearance and smell of the soils in the appropriate boxes below. **Each student will fill in the chart for all three soils.**
2. Fill your clear container $\frac{3}{4}$ full of water, if it does not already have water in it. Wet your finger in the water and (one at a time) get a small quantity of each soil and rub it between your fingers. Describe the feel for each soil in the data table. Rinse your fingers off in the water between testing the different soils. **Each student should try this with each soil type and reach a group conclusion.**
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Lesson 1: Three Major Types of Dirt

Data Table:

	Sand	Loam	Clay
Color/appearance			
Smell			
Describe the feel between wet fingers			
Which pile loses height with water first/ which pile absorbs water best/ which breaks down into muddy sediment			
PowerPoint: size of particles and composition (fill in later)			

CONCLUSION:

List at least three different ways that soils can vary:

1)

2)

3)

4)

Teacher Instructions for Lesson One

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2. Identify ways that soils can vary.
3. Distinguish between point and nonpoint sources of pollution.
4. Understand that all pollution harms life, but you cannot necessarily see it in the water.
5. Identify a watershed.



Teacher Instructions for Lesson One

TEKS for 6th Grade:

- A. Introduction.(1) In Grade 6, the study of science includes conducting field and laboratory investigations using scientific methods, analyzing data, making informed decisions, and using tools ... to collect, analyze, and record information. Identify ways that soils can vary.
- B. Skills and Knowledge.
 - 2 (B) collect data by observing;
 - (D) communicate valid conclusions

Recommended Procedure

1. Show the Power Point for Lesson One or the overhead for Lesson One.

Students should take notes on the vocabulary (not what we will study).
2. Have the students do the Activity of “Three Major Types of Dirt”.
3. When the students finish the “Three Major Types of Dirt” activities have them start on their homework of “Nonpoint Source Pollution Worksheet”.
4. The students should turn in their notes from the PowerPoint (or overhead) Lesson before they leave the classroom. Make it clear that you will need their soil activity and homework first thing the next class period.
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