THE SAN ANTONIO RIVER AUTHORITY

RAINFALL RUNOFF AND POLLUTANT TRAVEL THROUGH WATERSHEDS

OBJECTIVES

- Learn the difference between point and non-point source pollution
- Discover how non-point source pollutants can travel through a watershed

TOPICS

- Watersheds
- Non-point source pollution

TEKS ALIGNMENT

Grade 7 Science:

1A, 2A, 2B, 2C, 2D, 2E, 3B, 3C, 4A, 8C

Grade 8 Science:

1B, 5D, 11B, 11C

BACKGROUND MATERIAL

Pollution is a negative change to the environment, frequently resulting from human activity. There are two major types of pollution that affect rivers, streams and their ecosystems: point source pollution and non-point source pollution.

Point source pollution is pollution that is produced by one source. This type of pollution is usually discharged directly into a stream or river and is fairly easy to trace. As a result, point source pollution is easier to regulate and reduce. The US Environmental Protection Agency (USEPA) and the Texas Commission on Environmental Quality (TCEQ) are responsible for regulating point source pollution.

Non-point source pollution is the result of a combination of many smaller sources of pollution acting together. It does not come from one single source. Often, non-point source pollution is not discharged directly into a stream or river, but ends up being transported with rainfall runoff water that flows from a watershed and to rivers and streams. Some major non-point source pollutants are sediments, nutrients, chemicals and bacteria, resulting from human activities such as construction, urbanization and agriculture. Since non-point sources can come from many places and are not directly discharged into the water, they are much harder to discover and trace. It is also much harder to regulate non-point sources than it is to regulate point sources.

Non-point source pollution is corrected by land use practices rather than by treating the water itself, since you cannot regulate rainfall, and it is rainfall that carries the pollutants into the stream or river. Land use practices that are effective in controlling non-point source pollution are called best management practices (BMPs). The purpose of a BMP is to reduce the amount of pollution that is being produced in the first place, and then to prevent runoff from carrying that pollution into streams.

BMPs include practices such as protecting construction sites and farms from erosion, reducing fertilizer and pesticide use, and grazing pastures properly. Also, leaving a grass border between crop fields and streams is highly recommended to keep pollution out of streams.

KEY TERMS

Best Management Practices are those practices that are effective in preventing non-point source pollution

Non-point source pollution is pollution that cannot be traced back to a single source. Non-point source pollution usually enters the water as overland flow, rather than from a single pipe.

Point Source Pollution is pollution that can be traced back to a single source, such as a factory; the pollution generally flows from a single pipe

Pollutant is any material that causes pollution

Runoff is water that flows over the surface of the land when rainfall is not able to infiltrate into the soil, either because the soil is already saturated with water, because the land surface is impermeable, or because the rate of rainfall exceeds the rate of water infiltration into the ground

Urbanization is the process of creating and enlarging cities and towns

PROCEDURES

A. If your class is not already familiar with the concept of a watershed, they will need to be introduced to this term prior to this activity. See the activity "Building a Watershed Model" for information on watersheds.
B. Ask the students to brainstorm types of pollution to rivers and streams. From where does the pollution come? How does it get to rivers and streams?
C. Introduce the students to the differences between point and non-point source pollution. Ask them to classify the pollutants that they listed into point or non-point sources.
D. Start the activity by having the students build their own watershed model inside of the large aluminum foil baking pan.
E. Instruct the students to cut the cups at the bottom so that they stand at different heights, and have them arrange as many of the cups in the pan as they can fit.
F. Using the aluminum foil, tell the students to cover all of the cups in the tray with one sheet. They can use their fingers to shape the aluminum foil a little bit around the cups, but don't have them push it down into all of the cracks. Ask the students to imagine the foil as being more of a drape over the cups.
G. Have the students put small amounts of the Kool-Aid powder and olive oil all over the watershed, and explain to them that this represents different types of non-point source pollution.
H. Instruct the students to spray the watershed model with water and observe what happens to the "pollutants."
I. Have the students go back to their list of pollutants and ask them to think about which of those on the list could wash into streams and rivers like those in the model.

MATERIALS

- A large aluminum foil baking pan
- About 10 foam or plastic cups
- A plastic spray bottle
- An 18" sheet of aluminum foil
- Powdered Kool-Aid
- Olive Oil

GUIDING QUESTIONS

- In your model, what did the Kool-Aid and olive oil represent?
- In a real situation, what are some sources of non-point source pollution (solid and liquid) in a watershed?
- If these were real pollutants and if this were the watershed in which you live, where could the pollutants end up?
- How could you keep pollutants from ending up in streams and rivers?

EVALUATION

Have the students write a short paper about pollution in their town or area. Have them describe the geography and types of land uses that they observe in the area where they live. As their city or town grows and more homes, streets and parking lots are built, have them describe what might happen with runoff and how this might affect non-point source pollution.

REFERENCES

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