

# Land Use and Pollution Scavenger Hunt

Lesson 7

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## Objectives

The student will be able to do the following:

- Define pollution
- Identify possible sources of pollution to the stream near the school

## Materials

- Worksheet, at least one per group or one per student if desired
- Gold sticky stars
- Mini chocolate bars or other prizes, if desired

## Background

This unit serves as an introduction to pollution. It defines pollution and asks students to immediately apply that information to their watershed by focusing specifically on one spot at the school.

## Advance Preparation

Students will go outside so they may want to dress accordingly.

In this unit, students will fill out worksheets and must check with teachers in order to receive gold stars for their work. Teachers should each have a copy of the answer key or be familiar with possible sources of pollution in the area. Teachers should split up gold stars and prizes so that students have more teachers with which to interact.

Students will fill in the worksheet and check with teachers to see if their answers are “right.” For each right answer, students will receive one gold star. Completely filled in worksheets can receive a prize. PLEASE NOTE: there is no one “right” or “wrong” answer. It will be at the teacher’s discretion to reward students or ask them to continue working. There are many possible answers – the student just has to make his/her case.

Each student or group (as desired) should have a copy of the worksheet.

## Procedure

1. Start with a very short lecture in class.
2. Define pollution: Pollution can be any materials (or things – such as energy) that are added to the environment that HURT the environment.
  - a. What do we mean by “hurt?” Anything that causes living things to die, get sick, or live shorter lives.
  - b. Teachers should note that pollution is anthropogenically defined
3. Why do we care about pollution?
  - a. Human health concerns (e.g. asthma, stomach ailments)
  - b. Animals and plants can be hurt
    - i. Animals and plants are important to keep the ecosystem running
    - ii. Some animals and plants are directly used by humans

4. What are some major types of pollution?
  - a. Air
  - b. Water
  - c. Land
  - d. Noise
5. How does pollution get into the stream?
  - a. Directly – people throw pollutants in or dump them in (Point source)
  - b. Indirectly – pollutants collect over a large area of land and flow into the stream (Nonpoint Source). Water pollution like this is restricted to a watershed.
    - i. Teachers note: Pollution is tightly linked to land uses (we won't cover that here):
      1. Residential areas: fertilizers (nitrates), pesticides, soaps (phosphates), oils, chemicals from paints and cleansers, trash, organic matter (tree cuttings, decomposable trash), bacteria (from septic tanks that overflow)
      2. Commercial/Business – essentially the same things but in different quantities. Large construction sites can provide lots of sediment.
      3. Agriculture – sediment, fertilizers, phosphates, organic matter, pesticides
      4. Parks/recreational areas – pesticides, sediment
      5. Barren/cleared areas – sediment, heat (e.g. where there is no riparian zone)
      6. Industrial areas – metals, chemicals, heat, sediment, soaps
      7. Roads/parking lots – oils and gasoline from leaking cars, heat
      8. Natural areas – very little added pollution, although in Hawaii the prevalence of pigs in the forest can lead to bacteria in the water.
6. Ask kids if they can drink the water in the stream (No!!!).
7. Ask them why not. They should identify that there could be pollution in the stream.
8. What kind of pollution COULD be in the stream? Ask kids to brainstorm types of pollution and as they do so, ask them quickly why the pollution is bad. Write the list of pollutants on the board.
  - a. Dirt/Sediment (things that need light can't live in dirty water; can't drink it)
  - b. Fertilizers (excess nutrients) (causes the wrong things to thrive; can't drink it)
  - c. Soaps (excess nutrients) (causes the wrong things to thrive; can't drink it)
  - d. Oil/Gasoline (animals and plants get sick, possibly die; coats plants and animals)
  - e. Bacteria (makes animals sick)
  - f. Heat (animals in stream aren't used to heat so they die)
  - g. Pesticides/Chemicals (animals and plants get sick, possibly die)
  - h. Trash/Litter (looks bad, can provide all sorts of other pollutants)

- i. Excess organic matter is another kind of pollution, but it is hard to explain it so we'll leave it out here.
9. Where does the pollution come from?
  - a. Dirt/Sediment – from bare areas that have been cleared, any exposed dirt
  - b. Fertilizers – people putting too much fertilizer on gardens or plants, yards
  - c. Soaps – car washes, any soap used outside
  - d. Oil/Gasoline – leaking from cars
  - e. Bacteria – from animals using excreting into the stream or runoff from animals (pigs), dead or decaying animals
  - f. Heat – parts of the stream without any riparian buffer zone are hotter
  - g. Pesticides/Chemicals – from people's gardens or plants, paints, cleansers, yards, golf courses, metals or chemicals from trash thrown in stream (rusting metal, plastics that break down into smaller parts)
  - h. Trash/Litter – from people throwing it in, or it accidentally flying/falling in
10. Ask students which types of pollution they think are in the stream by the school. ALL of the above types of pollution CAN exist in the stream (although they might not all be there).
11. Explain that rather than just guessing, they are going to go outside to look for sources of pollution to try and figure out how these types of pollution can get into the stream.
12. Explain the activity and worksheets.
13. Go outside and allow students the time to identify sources of pollution. This should take up the rest of the class period.

Activity:

1. Students, either alone or as teams, will work to fill in the blanks on the worksheet. The worksheet asks them to identify sources of pollution. They must identify specific sources of pollution (e.g. people washing their cars in the apartment parking lot, somebody fertilizing a garden on the other side of the stream, fertilizers used in the little streambank farm, people throwing trash in the stream, etc.)
2. As students fill out each box on the worksheet, they can come to the teachers for "rewards." If the teacher is satisfied with each box, the teacher can put a gold star in the box. When all boxes have stars, the students can claim a prize (if desired).

# Pollution in the Kalihi Stream

## What is pollution?

Pollution can be anything that is added to the environment that HURTS the environment. Pollution can cause people, animals, and plants to get sick or die.

## What are the major types of pollution?

There are four major types:

1. Water pollution
2. Air pollution
3. Land pollution
4. Noise pollution

## How does pollution get into the stream?

- Sometimes people put pollution in the stream on purpose. This is called a POINT source for pollution
- Sometimes pollution comes in with runoff from the entire watershed. This is called NONPOINT source pollution.

## What kinds of pollution are there?

### What causes pollution?









| Kind of Pollution                   | Where it comes from   |
|-------------------------------------|---|
| Dirt/Sediment                       | From bare areas with exposed dirt   |
| Too many nutrients from fertilizers | From gardens, yards, or plants  |
| Too many nutrients from soaps       | From washing cars, overflowing washing machines, any soap used outside    |
| Oil or Gasoline                     | Dripping from cars onto roads or lots                                     |
| Bacteria                            | From animals that poop near the stream or from dead animals in the stream |
| Heat                                | From parts of the stream that don't have a riparian buffer zone           |
| Pesticides, Chemicals, or Metals    | From gardens, yards, paints, cleaning products, or from trash             |
| Trash or Litter                     | From people throwing it in or from trash accidentally flying/falling in   |

# Pollution Scavenger Hunt!

## Directions:

- Write down ideas for where pollution comes from near the school.
- Be creative. Look everywhere!
- When you have figured out the pollution source, check with the teacher.
- Fill up your worksheet with gold stars, and get a prize!

## Question: How does this pollution get into my stream?

|  |   |
|--|---|
| <b>Dirt/Sediment</b><br>              | <b>Excess Nutrients (Fertilizer)</b><br> |
| <b>Excess Nutrients (Soaps)</b><br> | <b>Oil/Gasoline</b><br>                |
| <b>Bacteria</b><br>                 | <b>Heat</b><br>                        |
| <b>Pesticides/Chemicals</b><br>     | <b>Trash/Litter</b><br>                |

# Land Use and Pollution Scavenger Hunt

## TEACHER KEY

Students can provide ANY or ALL of the answers – at the teacher’s discretion

|   |   |
|---|---|
| <p style="text-align: center;"><b>Dirt/Sediment</b></p> <p>Lots of bare dirt around the school, bare areas on the streambank (where they've been planting), any exposed dirt on other side of stream (below big rocks), dust flying off the highway</p>   | <p style="text-align: center;"><b>Excess Nutrients (Fertilizer)</b></p> <p>People fertilizing yards or gardens in the houses around the school, from landscaping in front of businesses (can't see but they're near the school), fertilizer from the farm left of the bridge.</p> |
| <p style="text-align: center;"><b>Excess Nutrients (Soaps)</b></p> <p>People washing cars, any soaps or detergents that overflow from houses or apartments, from farm left of the bridge (if they use phosphate as a fertilizer)</p>  | <p style="text-align: center;"><b>Oil/Gasoline</b></p> <p>Dripping from cars on the roads or parking lots, parking lot at the school, oil carried in dust from the highway. Lots of parking lots and roads around the school.</p>   |
| <p style="text-align: center;"><b>Bacteria</b></p> <p>From nearby or high up in the watershed – any pigs or animals excreting into runoff; any dead animals in the stream; garbage</p>  | <p style="text-align: center;"><b>Heat</b></p> <p>The part of the stream that is exposed to the sun (without riparian zones – NO SHADE). Particularly left side of stream.</p>  |
| <p style="text-align: center;"><b>Pesticides/Chemicals</b></p> <p>Any pesticides used in people’s gardens, pest sprays, paints, cleansers used in driveways or carports from the houses near the school or the apartments, paint flecks from the wall, pesticides used in the farm left of the stream, garbage thrown into stream</p> | <p style="text-align: center;"><b>Trash/Litter</b></p> <p>Whatever people throw in, things that fly in accidentally from garbage cans in the park</p>   |