

Name(s):

WATER QUALITY DETECTIVES

The search for where and how water is being polluted...
and what we are going to do about it!

YOUR MISSION:

1. Look for clues about water quality at your site.
2. Solve the mystery of how water becomes polluted.
3. Solve the mystery of where water comes from and where it goes in your community.
4. Investigate how the clues you find are linked to the quality of water in your community.
5. Take action!



CODE WORDS

1. **Freshwater** – Water that is not salty.
2. **Investigation** – The process of using inquiry and examination to gather facts and information in order to solve a problem or answer a question.
3. **Water Pollution** – The addition of any substance that has a negative effect on water and the living things that depend on water.

PREDICTION

What do you predict you will find out about the quality of water in your community?

REFLECTION

What did you learn about observation?

MY OBSERVATIONS

Round 1:



Round 2:

ASSIGNMENT #1

SITE INVESTIGATION

Use your detective skills to investigate your site and find:

1. Places where water can get into the ground

2. Sources of water

3. Where water travels

4. Where there is trash and other harmful items on the ground

5. Where water is wasted

CODE WORDS

- 1. Catch Basin** – The opening in a curb or gutter that catches water and directs it to stormdrains.
- 2. Downspout** – A vertical pipe used to drain water from a roof.
- 3. Gutter** – A channel for draining off water.
- 4. Rain gutter** – A channel along the roof that collects and carries away rainwater.



REFLECTION

What did you observe and how do you think it relates to water quality?

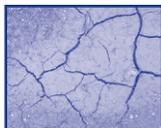
SITE INVESTIGATION

In your designated area, observe what's around you. Use the colored markers/pencils to mark these observations on your map.

- 1. Look for places where water can get into the ground.**
Use green dots :: to show these places on your map.



grass



bare dirt



gardens



tree wells

What other places did you find? _____

- 2. Look for sources of water.**
Use a blue waterdrop ♀ to show these places on your map.



faucets



drinking fountains



sprinklers



hoses

What other sources did you find? _____

- 3. Look for places where water travels.**
Use a purple square ■ to show these places on your map.



gutters



down spout



drain



catch basin

What other places did you find? _____

- 4. Look for trash and other things that could be harmful to water.**
Use a red X to show these items on your map.



lunch trash



candy wrappers



motor oil



lawn/field care products

What kinds of trash and other harmful items did you find in your area? _____

5. Look for areas where water is wasted.

Use a black star ★ to show these areas on your map.



leaky faucets and sprinklers



clogged drains



water sprayed on concrete

What other areas did you find? _____

ASSIGNMENT #2

WHAT IS THE QUALITY OF YOUR WATER?

Use your detective skills to investigate your site and find:

1. What might cause problems to water quality at your site?

2. Where are the problems to water quality at your site ?

CODE WORDS

1. **Fertilizer** – Nutrients used by plants for growth.
2. **Groundwater** – The freshwater that fills the cracks and pores beneath the earth's surface, which supply wells and springs.
3. **Hazardous Waste** – Products that contain chemicals that are harmful to humans and the land. These include house paint, cleaning products, insect poison, and fertilizers.
4. **Land Pollution** – The trash dropped on the land, such as gum, food wrappers, cans, paper, and plastic bags. It also includes pet waste and oil dripped from cars.
5. **Pesticide** – Chemicals used to kill pests. Pests may include ants, termites, mice, rats, and agricultural pests.
6. **Stormdrain** – Above ground or below ground pipes and channels that transport stormwater to the ocean to prevent flooding.



REFLECTION

What may cause the greatest problem to water quality at your site?



NEWS FLASH!

Did you know that almost every living thing on Earth needs and depends on its environment for survival? People, plants, animals, and other living organisms live and interact with each other as part of a community. Every member of that community interacts with its physical environment. Together, a community and its physical environment make up an ecosystem.

The health of an ecosystem affects the ability of people, plants, and animals to survive. The environment of California has 200,000 miles of rivers and streams, 1,100 miles of coastline, more than 10,000 lakes, and more than 1 million acres of bays and estuaries.

Unfortunately, most of these rivers and other water environments have become polluted. For example, when it rains in cities, rainwater picks up many materials that have been left on the ground, including car oil, car grease, garden pesticides, pet droppings, and most of all, trash! All this “land pollution” gets carried by the rainwater into a water or “stormdrain” system that leads to streams and rivers. Even when it is not raining, wasted water from hoses, sprinklers, and faucets send polluted water into drains that lead to streams and rivers.

How does this affect the living organisms that live there?

Rainwater seeping into the soil or washing off hard surfaces can carry harmful chemicals such as garden fertilizers, pesticides, and hazardous wastes such as paint that is left on the ground. These toxic substances pollute groundwater or wash into streams, rivers, and lakes harming the living organisms that live there.

How does this affect our need for healthy drinking water?

The everyday activities of people have an impact on our water ecosystems. Whether we are wasting water, creating more trash instead of recycling, or simply leaving toxic substances on the ground, our actions determine the quality of our water.

Think about the following questions:

- Do you remember the last time you saw trash on the ground? Where did it come from? Where will it go? If it isn't in a trashcan, what is going to happen to it?
- What about the wasted water? How does extra water that flows over hard surfaces impact the organisms living in local rivers and streams?
- How is the quality of the rivers and streams in your area? Think about this when you see trash on the ground or water rushing into the street. Is it harmful to our water and environment?

WHAT IS A WATERSHED?

Use your detective skills to investigate and find out:

1. What is the nearest body of water to your site?

2. Where does water in your community come from?

3. Where does water in your community go?

CODE WORDS

- 1. **Pollution** – A change in the environment that negatively affects living things.
- 2. **Runoff** – Water that flows over the ground because it cannot seep into the soil, evaporate, or transpire through plants. It finds its way into streams and rivers as surface flow, and may pick-up contaminants, such as trash and fertilizer, along the way.
- 3. **Watershed** – The land area that directs water to a drainage or river system.



REFLECTION

Do you think our site impacts the closest body of water? Why or why not?

What questions do you have?

NEWS FLASH!

Your community, whether it is in a city or rural town, is part of a watershed. A watershed is the land area that directs water to a drainage system or river. It helps supply water to our community by allowing it to seep into the ground or channel it into streams, rivers, and other bodies of water. Gravity moves water through the watershed from higher to lower areas.

A watershed includes living components such as people, wildlife, plants, and insects; as well as non-living components, including rock, soil, water, and air. Both components belong to the environment of a watershed community.

Look around. What are the living and non-living components of your watershed?

Your watershed directs water into another system of living and non-living components – a water ecosystem. It is the non-living components that make up the environment for the living organisms – water, sunlight, rocks, soil, and air – and allow them to survive. Without these non-living components, living organisms would not survive.

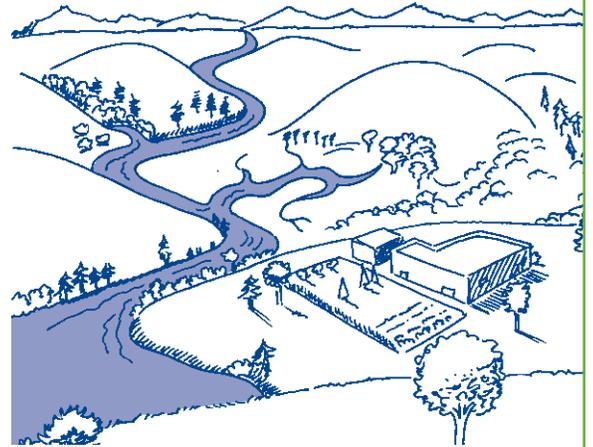
Humans depend on the services of a water ecosystem. Water ecosystems provide us with water, food, recreation, and more. Humans are responsible for protecting these ecosystems. However, pollution can harm these ecosystems and damage their ability not only to provide us with goods, but also maintain the balance of a functioning ecosystem.

For example, large rivers in California such as the Sacramento, American, Feather, and lower San Joaquin provide major fish spawning habitats for salmon, steelhead trout, and striped bass. Young fish depend on small invertebrates – mostly insects and tiny shrimp – for food. When “land pollution,” field pesticides, and erosion from construction sites, run off through a watershed and enter streams and rivers, they kill or seriously harm these food sources and the young fish. These sources of contamination decrease the amount of oxygen the fish have to breathe, reduce the amount of sunlight used to grow the plants they need for food, and finally, cover the available rocks and soil the fish need to lay and cover their eggs. Every non-living component is impacted by this contamination and therefore impacts the living components.

Where is the water from your schoolyard going? To a nearby river, stream, lake or ocean? The watersheds of most cities and school grounds contain up to 90 percent hard surfaces such as rooftops, concrete playgrounds, streets, and parking lots where water collects quickly and runs off into the street. This not only prevents water from seeping into the ground to replenish underground supplies of fresh water but sends “land pollution” directly into our rivers and the ocean.

Think about the following questions:

- What are you observing during your data collection?
Do hard surfaces have an impact?
- What about the “land pollution?” What impact on your local water ecosystem do you think it may have?



INVESTIGATE FURTHER

Use your detective skills to investigate and find out:

1. What issues of water quality are specific to our area?

2. Are any groups in the community involved with water quality?

3. What other questions do you have, or what do you want to find out?

REFLECTION

What do you think you can do at our site or in our community that can help water quality?

What did you find out about water quality issues in your community?

REFLECTION

Using your detective skills what did you find out?

1. What did you learn from your experience?

2. How did your conclusions differ from your prediction?

3. How can your knowledge about water help you make good choices about water quality?

4. Why is clean fresh water important?

5. What is an idea you have for improving water quality at your school or in your community?

**Let others know what you found out about water quality.
Choose a way to express your ideas:**

1. PowerPoint presentation
2. Poster
3. Poem
4. News article
5. Information booklet
6. What is an idea that YOU have?



ASSIGNMENT #6

WATER QUALITY PROJECT

Use what you have learned to take action:

Come up with a project that will help the water quality at your site or in your community.

PROJECT IDEAS

Identify and choose a project that will help improve the water quality on your campus or in your neighborhood.

Be creative! Projects can be as easy as making posters to tell other students or people in your neighborhood to keep trash off the ground. Or, you can do more by creating a trash reduction program at your site. The water quality project is up to you. You have the power to create change!



SO, WHICH PROJECT SHOULD YOU DO?

Follow the instructions to complete the worksheet below to help you decide.

- 1. What problem areas did you find at your site or in your community? (Hint: Where were there red X's on your site map?) List them on the chart.**
- 2. What can be done to teach others about the problems? What can be done to eliminate or reduce the problems? List these ideas next to each of the problems.**

Problem Areas We Found

Solution Ideas



LOOK CLOSER

Look at each idea carefully. Use the worksheets below to explore the top three ideas by answering the questions below for each one. If you are unable to answer any of the questions, you may need to do some research to find the answer.

WATER QUALITY PROJECT IDEA #1:

1. How would this project help the water quality at our site or in our neighborhood?

2. Are there others working on this problem? The Facility/School? Businesses? Organizations?

3. What resources or help are needed to complete this project (money, skills, time, tools, etc.)?

4. Can we accomplish the project in the amount of time we have to do it?

5. How will we know if our solution worked?



WATER QUALITY PROJECT IDEA #2:

1. How would this project help the water quality at our site or in our neighborhood?

2. Are there others working on this problem? The Facility/School? Businesses? Organizations?

3. What resources or help are needed to complete this project (money, skills, time, tools, etc.)?

4. Can we accomplish the project in the amount of time we have to do it?

5. How will we know if our solution worked?



WATER QUALITY PROJECT IDEA #3:

1. How would this project help the water quality at our site or in our neighborhood?

2. Are there others working on this problem? The Facility/School? Businesses? Organizations?

3. What resources or help are needed to complete this project (money, skills, time, tools, etc.)?

4. Can we accomplish the project in the amount of time we have to do it?

5. How will we know if our solution worked?

GET SUPPORT FOR YOUR PROJECT

Tell others about your project and get their support.

Can you and others in your group make a presentation about your project? Who can you invite? How about the supervisor, other staff, parents, and members of the local community?

List below those people who would be interested in knowing about your project and especially those who can help you:

Names

How To Contact Them

For your presentation, tell your audience what you have learned about the environment and about the information you obtained while conducting your site investigation. Share what you have learned and why it is important. Then, explain your water quality project. They may have ideas or resources to help you. More importantly, tell them how they can help!



ASSIGNMENT #7

YOU MADE IT ~ A DIFFERENCE, THAT IS!

The California Water Boards encourage students to get involved. They would love to hear from you about your water quality project and what you accomplished.

1. Please write or email them at the addresses below.

Public Affairs Office
California Water Boards
1001 I Street
P.O. Box 100
Sacramento, CA, 95812
info@waterboards.ca.gov



EVALUATE YOUR PROJECT

1. What were the most successful parts of the project? _____

2. What was the least successful part? _____

3. What did you learn from your experience? _____

4. What would you do differently next time and why? _____

5. Who or what was influenced by your actions? _____

6. Would you like to get involved in another environmental service project like this?
Explain why or why not.
