



Fort Wayne History and Regulatory Issues

Activity Time

10 Minutes Reading
Time

10 Minutes
Discussion

15 Minutes for
Crossword
Puzzle

Materials Needed

- Copies of Background Information Section
- See Activity Instructions for materials needed.

Module Contents

Teacher's Guide

Background Information

Crossword Puzzle

3rd—5th grades
Answer Key

Crossword Puzzle

6th—8th grades
Answer Key

Crossword Puzzle

9th—12th grades
Answer Key

Image

Fort Wayne
Watershed Map

Map It Out

Worksheet

**What contributes to water pollution in Fort Wayne?
What are the rules for cleaning up the problem? What is
Fort Wayne doing to clean up pollution in our rivers?**

An exercise to identify water pollution sources within Fort Wayne and look at regulations that are in place to solve the problem. Exercises include the following topics:

- ♦Fort Wayne watershed structure
- ♦Activities that contribute to pollution
- ♦Fort Wayne activities to improve water quality
- ♦Role the government plays in cleaning up pollution

Objective

To educate students on the basic stormwater issues Fort Wayne faces and give an understanding of key concepts and vocabulary.

Science State Standards

Version 1

3.4, 4.2, 5.4

Version 2

6.3, 6.4, 6.6, 7.4,
7.6, 8.3

Version 3

BIO.1
ENV 1&2
PS. 6

Activity 1: The Pollution Solution - Crossword Puzzle

This module contains a crossword puzzle that has been created to facilitate understanding and retention of key terms and concepts contained in the “Background Information.” There are three separate versions of the crossword puzzle, “The Pollution Solution;” each version has been modified to fit a particular age group and skill set. Crosswords may be found using the “**Module 3: Crossword Puzzles**”

<u>Version</u>	<u>Grade Levels</u>	<u>Worksheet</u>
1	3rd-5th	1A
	Answer Key	1B
2	6th-8th	2A
	Answer Key	2B
3	9th-12th	3A
	Answer Key	3B

Prep and Tools Needed:

It is recommended that students be provided with a copy of the “Background Information” document to read and use as a reference. For the lower grade levels, the instructor may choose to read the information out loud as a class; participate in a class discussion of key concepts; and answer any questions about the material prior to attempting the puzzle.

Activity 2: Map it Out**Prep and Tools Needed:**

This activity is suitable for students in grades 6 through 12. This activity uses the image “**Module 3: Fort Wayne Watershed Map.**” This is best done using the largest printed version possible; 24” X 36” is recommended. The drawing portion of this exercise is to be done in class, but the writing exercises may be given as a take-home assignment.

Steps:

1. Post the map in a location where students can easily see it.
2. Use a star to mark the location of your school on the map.
3. Have each student use a small circle or dot to mark the general vicinity of his or her home on the map.
4. Follow the attached worksheet for reflection and writing topics.
5. After students have completed the writing topics, lead a class discussion to share opinions and theories.



Look at the map provided. Mark with a circle or dot where your home is located on the map.

1. Explain what a watershed is: _____

2. In which watershed do you live? _____

3. In which watershed do you go to school? _____

4. Which river do you think you and your family personally affect the most every day? How? Consider where you spend most of your time: school, activities, home, etc.

5. Think about the entire City of Fort Wayne: where the most populated areas are; where most of the industrial buildings are; and the downtown area.

Which water watershed do you think has the *greatest* amount of water pollution and why?

6. Which watershed do you think has the *least* amount of water pollution and why?

What is a watershed?

The City of Fort Wayne is divided into four watersheds: the Maumee River, St. Mary's River, the Little Wabash River, and the St. Joseph River. A **watershed** is a land area whose water runoff drains into a river, stream, lake, or ocean. In Fort Wayne, rain water runoff that falls washes its way to the Maumee, St. Mary's, or St. Joseph rivers, which terminate in Lake Erie, or to the Little Wabash, which terminates in the Mississippi River.



Each one of these watersheds functions the same way. When it rains, water falls onto rooftops, streets, driveways, lawns and other surfaces. This water flows to our storm drains, ditches, and creeks, and eventually makes its way to our rivers. Unfortunately, along the way, the water picks up pollutants such as pesticides from our lawns; oil and grease from the roads; litter; waste from our pets; and other items that are on surfaces throughout our city.

The Pollution Problem

An American settlement has existed at Fort Wayne since 1794. As the city grew, a series of ditches and underground pipes was installed to carry rain water runoff away from the streets. When homes began to have indoor plumbing, the waste was piped into these same sewers. Today, some parts of Fort Wayne still have what is called a **combined sewer system**. The pipes carry sewer water from homes and businesses. When it rains, these same pipes collect rain water runoff. Most of this combined sewage goes to a sewage treatment plant, where it is cleaned before the water is sent to the river.

In the parts of Fort Wayne with a combined sewer system, a rainstorm may cause sewer lines to take in more water than they can carry. When this happens, some of the combined sewer water and rain water is dumped into the rivers at certain locations. These locations and the discharges from them are called **combined sewer overflows**. When the combined sewer water and rain water goes into a river without going to the sewage treatment plant first, it causes water pollution.



Cities contain lots of impervious surfaces. **Impervious surfaces** are areas such as roofs, sidewalks, streets, parking lots and other hard surfaces that stop rain water from getting to the natural ground. As Fort Wayne continues to be developed, and as hard surfaces cover more and more of the natural ground, there are fewer places where the water can soak in. Water may stand in puddles or run into ditches, creeks, and streams, causing flooding.

There are two basic types of water pollution: point source and non-point source. **Point source pollution** is easy to understand because it can be traced directly to its source. If a sewage treatment plant has a broken pipeline that leaks sewage into a river, you can "point" your finger at the exact source of the pollution. Point source pollution was a big concern in the past, but today, stricter laws and regulations have drastically reduced the problem.



Non-point source pollution is a little more difficult to understand. It cannot be traced back to a specific source, but instead comes from many different sources throughout the environment. Stormwater runoff (including rain and snowmelt) is a type of non-point source pollution. In stormwater runoff, pollution is picked up from a large variety of sources and carried into large bodies of water, such as rivers. Non-point source pollution is the primary cause of water pollution today. You can't point to the specific origin of the contamination; it comes from too many places and is difficult to trace.

Stormwater runoff can carry many different types of non-point source pollution. Each can affect your watershed in a different way. **Sediment** (dirt, soil, and sand) can increase the **turbidity** (a measure of water cloudiness) of a water body. Turbidity can block sunlight from reaching aquatic plants, making it impossible for them to grow. Without plants, animals lose a food source, and it is more difficult to filter pollutants from the water. Excess nutrients carried in stormwater runoff can also negatively affect our water supply. These **nutrients**, primarily nitrogen and phosphorus, can come from lawn fertilizers or natural sources, such as manure. Nutrients can cause algae and bacteria, which can grow rapidly. Continued on next page ⇨

Algae will consume oxygen in the water, increase turbidity in the water body, and eventually die along with the fish and other aquatic life that need oxygen to live. **Pathogenic** (capable of causing disease, especially in humans) bacteria and other microorganisms can also be carried by stormwater into a water body. This creates health hazards and can cause lakes and beaches to be closed.



Debris such as plastic bags, bottles and cigarette butts can wash into a water body and interfere with aquatic life. Other hazardous wastes can also be carried into a water body. These include **insecticides** (chemicals used to control or kill insects), **herbicides** (chemicals used to kill unwanted plants), paint, motor oil, and excess fertilizers. All of these items can cause illness not only to aquatic life, but also to humans.

The Pollution Solution

Water pollution around the United States is a common problem. Because of this, our government created a basic set of guidelines to control discharges of pollutants into open water, and to set standards for surface water. The **Clean Water Act (CWA)** was passed in 1972; new guidelines have been added several times since. The CWA lays out very strict rules that give us guidance on how to keep our streams, rivers, oceans, and drinking water clean. The passage of the CWA has helped the U.S. make tremendous advances in cleaning up the aquatic environment by controlling pollution from industries and sewage treatment plants.

The **watershed approach** is the preferred way to improve a stream, river, or lake. It looks past the water body itself and considers the entire watershed, looking at all the potential sources of pollution. **Water conservation** uses practices and technologies that limit water use. Conserving water reduces the demand on existing water supplies, and limits the amount of water that runs off the land. Runoff can also be minimized by using **low impact development (LID)** techniques. LID techniques work with the natural landscape and native plants to soak up more rain water by improving infiltration. LID solutions include rain gardens and green roofs, which treat rain water as a precious resource.

The City of Fort Wayne has implemented several measures to clean up rivers and comply with the CWA. In particular, the City has started a **rain garden** program. Rain gardens are a great way to cut down on water runoff by allowing plants in the garden to use the rain water and to help it soak into the ground. The plants in the rain garden also filter out pollutants as they drink the water the garden collects.

Now you know that pollution from stormwater runoff can contaminate our rivers and streams. What can you do to prevent this problem?

- ♦ Build a rain garden to help filter out pollutants
- ♦ Never dump anything down storm drains
- ♦ Use fertilizers sparingly
- ♦ Control soil erosion by planting over bare spots in a landscape
- ♦ Collect rain water in rain barrels for lawn use
- ♦ Sweep driveways, sidewalks, and roads instead of using a hose
- ♦ Properly dispose of hazardous household chemicals
- ♦ Minimize pesticide use
- ♦ Direct downspouts away from paved surfaces
- ♦ Use a car wash instead of washing the car in the driveway
- ♦ Check a car for leaks, and recycle motor oil
- ♦ Properly dispose of pet waste
- ♦ Inspect and pump the septic tank regularly
- ♦ Recycle
- ♦ Don't litter, and pick up any trash you see
- ♦ Educate friends, family, and neighbors

