

Name: Courtney R. Throckmorton  
 Date: 2/28/15 Block: 2

100%

### MORGAN RUN RIVER

#### BACKGROUND INFORMATION

Recently, an environmental science class did a survey on Morgan Run River, a small tributary that eventually leads to the Chesapeake Bay. Five sites were selected for water quality testing and are labeled A – E on the Morgan Run River map. Most of the upper side of the river is farmland except for the chemical plant for car batteries. The lower side of the river is basically wooded with a sewage treatment plant and a bleach factory. At the end of the river is a large man made lake that is a favorite hangout for fisherman, swimmers, and nature lovers. By the fourth of July, algae which are the result of eutrophication, began showing up in the lake. Using what you have learned, see if you can find the source of this pollution.

#### OBJECTIVES

When students have completed this lesson, they will be able to:

- Analyze and evaluate sample stream data in order to demonstrate knowledge of water quality and its importance to aquatic ecology.

#### MATERIALS

Morgan Run River map

#### PROCEDURE

Use the following data table and the map on Morgan Run River to complete the Analysis questions.

DATA	Area of Morgan River				
	Area A	Area B	Area C	Area D	Area E
<b>CHEMICAL CHARACTERISTICS</b>					
Dissolved Oxygen	6.1 ppm	6.0 ppm	4.7 ppm	4.0 ppm	5.1 ppm
pH	7.1	8.7	4.0	5.2	6.7
Nitrates	0.0 ppm	12.7 ppm	9.4 ppm	6.5 ppm	3.1 ppm
Phosphates	0.1 ppm	2.1 ppm	1.7 ppm	1.2 ppm	0.3 ppm
Turbidity	120 cm	120 cm	50 cm	55 cm	55 cm
Total Dissolved Solids	180 ppm	190 ppm	550 ppm	825 ppm	500 ppm
<b>INDICATOR ORGANISMS</b>					
Are mayflies present?	Yes	No	No	No	No
Are stoneflies present?	Yes	No	No	No	No
Are caddisflies present?	Yes	Yes	Yes	Yes	No
Are fecal coliform bacteria present?	No	No	Yes	Yes	Yes

## ANALYSIS

1. Which areas (A, B, C, D, or E) of the river would be considered unhealthy for the following chemical standards?

- a. DO - (A, D)
- b. pH - (B, C, D)
- c. Nitrates ( $\text{NO}_3^-$ ) - (B, C, D, E)
- d. Phosphates ( $\text{PO}_4$ ) - (B, C, D, E)
- e. Total Dissolved Solids - (D, C, E)
- f. Turbidity -

2. \*Mayflies, stoneflies, and caddisflies probably wouldn't be found in the lake even if the river was not polluted. Why?

(Hint: These insect larvae need rapidly flowing water with **high dissolved oxygen levels**)

The insect wouldn't be present even if the water wasn't polluted because the larvae need rapidly flowing water & high dissolved oxygen in the water.

3. Which site (A, B, C, D, or E) seems to be in the worst condition? Explain your reasoning.

Site C is the worst condition, because almost everything is poor beside the turbidity.

4. What are the two major sources of pollution in Morgan Run? Explain your reasoning.

a) Chemicals because there is a compound plant for car batteries by the river.

b) Fecal matter, there's a waste treatment plant near the river.

5. How would you correct the problem in Morgan Run? Explain at least two possible methods.

• Move the factories to a different location so there no more pollution.

• Put a fine of \$12,000 & up to 5 years in Federal Prison for any pollution.

6. How could the pollution in Morgan Run affect the Chesapeake Bay?

It could cause a Runoff into the Chesapeake.

7. Areas B, C, and D are plagued with an algae bloom. This **eutrophication** killed all the fish in this section of the stream. What caused the algae bloom?

Algae bloom is caused by pollution. The fish die by eutrophication because it takes away the oxygen the fish need.

8. What exactly was the cause of death of the fish in this area of the stream?

low pH levels, Fecal matter was discharged into the stream & algae bloom was present.

9. Explain the relationship between the following terms: eutrophication, nutrients, algae bloom, decay, and dissolved oxygen.

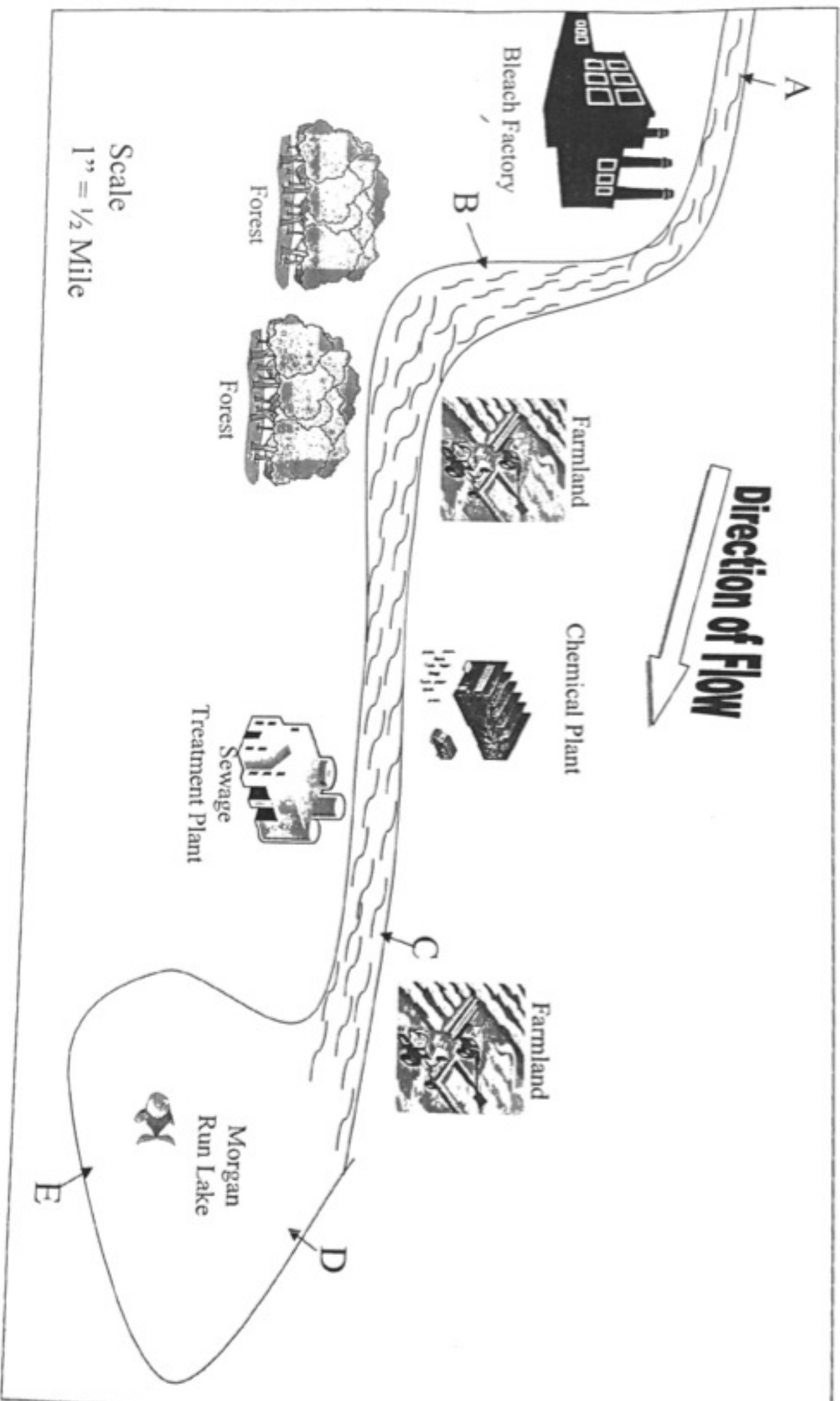
Hint: As organisms decay, chemical reactions use up oxygen

When Algae decay causing dissolved oxygen which takes away nutrients.

10. How could you use indicator organisms when determining the health of a stream?

An indicator organism is the darters, because some organisms are sensitive to pollution.

# Morgan Run River Sampling Points



Name ~~XXXXXXXXXX~~

Date

Block

## Dirty, Dirty Water – BCR Analysis

Read the following passage in order to answer the question below.

two!

One hot summer day, Craig and Lynn Anne are out on a hike along the Gunpowder Falls. Before the trip, they both filled up their canteens with tap water. During the hike, Lynn Anne realizes that her canteen has run out of water and runs over to the river to fill her canteen up. The river water looks clean and clear. As Lynn Anne is about to drink the river water out of her canteen, Craig quickly stops her. He explains that the water may have contaminants in it and that the water may be unsafe to drink.

Identify and explain the methods that one could use to in order to clean the water from the river so that it is safe for drinking. Use your knowledge of filtering and use scientific words: Aeration, Coagulation, Sedimentation, Filtration, Disinfectant)

Order for clean water would be to follow the steps out as (clearing out contaminated water). \* Decontamination process first includes Aeration which allows to add/other gases to the water that help the water escape. Next it continues on with the process of Coagulation which is the process that allows solid particles to chemically "stick together" so they can easily be removed from water. 3<sup>rd</sup> would be called Sedimentation occurs when gravity slowly pulls the particles to the bottom of the container that holds water. Next is a processes called Filtration, during this process when water is filtered through a substance, usually sand and pebbles, by the action of gravity. Lastly is the process called disinfecting, the water may look clear and clean after the previous 4 steps, these still may be harmful chemicals or bacteria, such as coliform, present in the water that cannot be seen.