

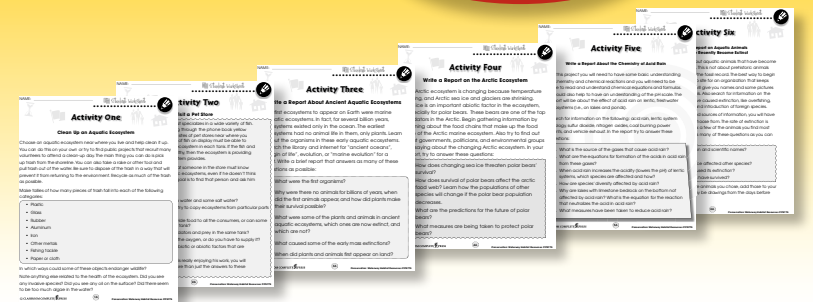
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Changes In Freshwater Aquatic Ecosystems Caused By Human Activity

1. Circle the word **TRUE** if the statement is TRUE or Circle the word **FALSE** if it is FALSE.

- a) Fertilizer improves the health of aquatic ecosystems.
TRUE FALSE
- b) Factories are not allowed to dump pollutants directly into streams.
TRUE FALSE
- c) It is illegal to release any amount of greenhouse into the atmosphere.
TRUE FALSE
- d) Algae are small marine animals.
TRUE FALSE
- e) Adding foreign species to an ecosystem usually increases the numbers of native species.
TRUE FALSE
- f) Some species of fish became extinct because of overfishing.
TRUE FALSE

2. Use the words or groups of words in the list to complete each sentence. Use each word only once. Not all words will be used.

sulfur dioxide spawning acid rain runoff
algae overfishing foreign species fertilizer

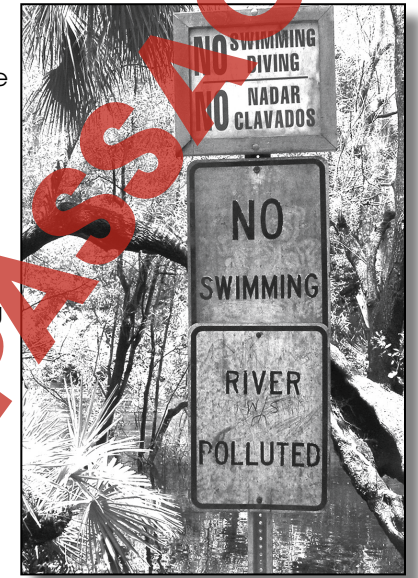
- a) _____ in the atmosphere is one of the causes of _____.
- b) _____ from farm fields can carry _____ into aquatic ecosystems, where it encourages the growth of _____.
- c) Catching fish faster than they reproduce is called _____.
- d) _____ is part of the reproductive cycle of fish.



Changes In Freshwater Aquatic Ecosystems Caused By Human Activity

In the past, many factories in the United States dumped pollutants directly into streams and rivers. In the worst cases, some streams became so polluted, they supported almost no life. There were even rivers covered in such heavy oil slicks that they sometimes caught fire. The law called the Clean Water Act has eliminated almost all such direct pollution.

Indirect pollution, by way of the atmosphere, is still a problem. We have already learned that burning fossil fuels has changed aquatic ecosystems by raising global temperature. Fossil fuels can harm freshwater aquatic ecosystems in another way. **Sulfur dioxide** and **nitrous oxide** gases are released when some fossil fuels are burned. These gases dissolve in raindrops that fall to earth as **acid rain** which flows into streams and lakes. As the water becomes more acidic, many species are unable to survive in the aquatic habitat.



Agricultural **runoff** is another source of pollution of freshwater habitats. When water from fertilized fields runs into streams and lakes, it carries nutrients that encourage algae growth. When the algae die, the decomposition process removes oxygen from the water. If the oxygen content drops far enough, the water will no longer support fish and other organisms that take their oxygen directly from water.

When people build dams, they change freshwater ecosystems. To begin with, a dam changes part of a lotic (flowing) system into a lentic (still) system. This makes the habitat suitable for a different group of organisms. Dams can also disrupt the reproductive cycles of organisms. Dams can cause water temperatures to be unseasonably warm or cold. This confuses organisms whose growth and reproduction is triggered by temperature changes.

Many fish leave large lakes and oceans and swim up streams to lay their eggs. Dams can keep these fish from reaching their **spawning** grounds. Spawning grounds can also



Changes In Freshwater Aquatic Ecosystems Caused By Human Activity

1. Put a check mark (✓) next to the answer that is most correct.

- a) Which of these is an invasive species that has reduced populations of native fish in the Great Lakes?
 - A algae
 - B lampreys
 - C sharks
 - D trout
- b) Enforcement of which law has made streams and rivers in the United States much cleaner?
 - A NCLB
 - B NAFTA
 - C Clean Water Act
 - D Endangered Species Act

2. Draw a line from each word or words on the left to its description on the right

- | | | | |
|---|----------------|--|---|
| 1 | Sulfur dioxide | An invasive species in North America. | A |
| 2 | Zebra mussels | Agricultural runoff can reduce its level. | B |
| 3 | Water hyacinth | One of the causes of acid rain. | C |
| 4 | Oxygen | Small aquatic plants. | D |
| 5 | Algae | An invasive species in Africa's Lake Victoria. | E |

Changes In Freshwater Aquatic Ecosystems Caused By Human Activity

3. Answer the questions in complete sentences.

- a) Explain how sulfur dioxide and nitrous oxide in the atmosphere can raise the acidity of aquatic ecosystems.

- b) Describe one way that a non-native species can invade a freshwater aquatic ecosystem.

Extensions & Applications

- a) Identify **four** threats to the health of freshwater ecosystems. For each threat, describe its cause.
 - 1) Threat: _____
Cause: _____
 - 2) Threat: _____
Cause: _____
 - 3) Threat: _____
Cause: _____
 - 4) Threat: _____
Cause: _____

Activity Four

Write a Report on Government Programs to Protect Aquatic Ecosystems

Learn how governments and other organizations are trying to protect and restore marine ecosystems. Begin by finding information on each of these organizations and programs:

- Marine Protected Area
- United Nations Convention on Law of the Sea
- Clean Water Act
- London Convention
- Marine Stewardship Council

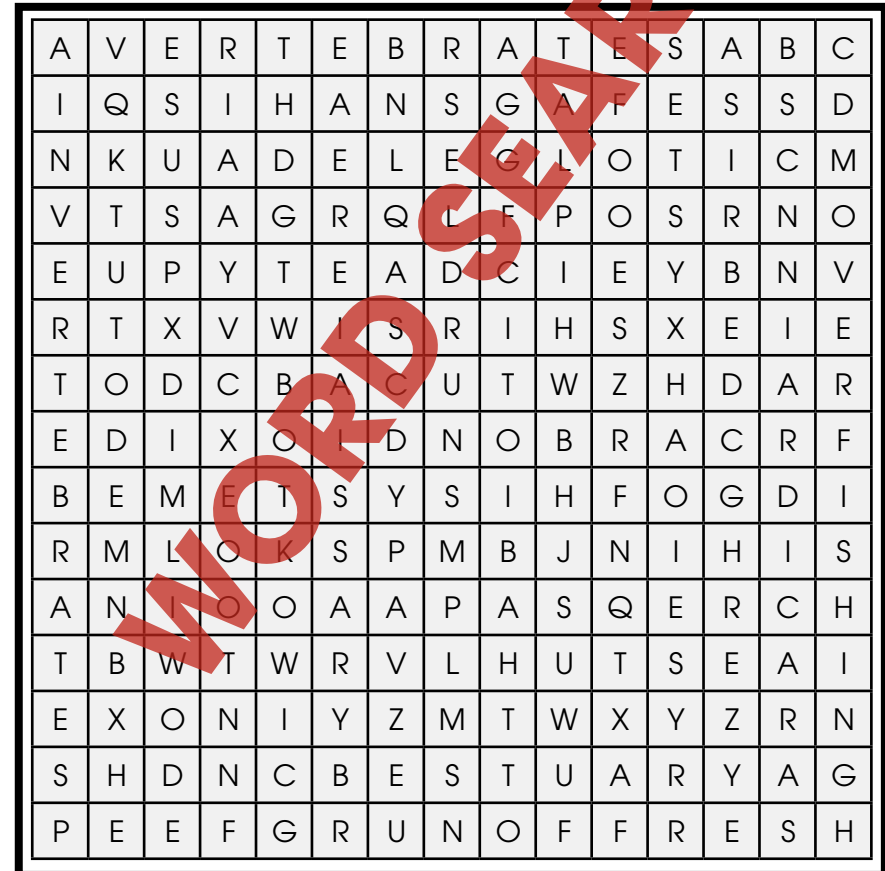
For each of these, give a brief statement of the ecological goals of the organization or program. Choose one of these, and study it in more detail. Try to answer these questions:

1. What is the goal or goals?
2. Are the goals being met?
3. What is the nature of the organization? (national, international, non-profit, industry)
4. How does it enforce its regulations? Can it arrest violators, or does it depend on voluntary cooperation?
5. Are there any specific examples of places where the program has helped an ecosystem or species or examples of where it has failed?

Word Search

Find all of the words in the Word Search. Words are written horizontally, vertically, diagonally, and some are even written backwards.

- | | | | | |
|-----------|----------------|----------------|----------------|--------------|
| abiotic | biotic | fresh (water) | nurdles | salt (water) |
| acid rain | carbon dioxide | greenhouse gas | overfishing | spawn |
| adapt | debris | invertebrates | oxygen | system |
| algae | estuary | lotic | photosynthesis | vertebrates |
| aquatic | fish (ladder) | marine | runoff | |



Part C Comprehension Quiz

Answer each question in complete sentences.

1. Explain why an ecosystem is a system. 3
2. Explain how oxygen (O₂) and carbon dioxide (CO₂) are exchanged between plants and animals in an ecosystem. 3
3. Explain how burning fossil fuels has caused ocean temperature to rise. 3
4. Why does an increase in the amount of dissolved carbon dioxide in the ocean endanger coral reefs? 3
5. Describe **one** thing individuals can do to help protect aquatic ecosystems. 3

SUBTOTAL: /15

Changes in Salt Water Aquatic Ecosystems Caused by Human Activity

