Contents

TEACHER GUIDE

STUDENT HANDOUTS

NAME: _____

Before You Read

How Climate Change Can Affect Fresh Water

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

a) Earth's average temperature is getting warmer.
TRUE **FALSE**

b) The greenhouse effect explains how plants use sunlight to make food.
TRUE **FALSE**

c) Carbon dioxide is a greenhouse gas.
TRUE **FALSE**

d) Ice caps at the North and South Poles are fresh water.
TRUE **FALSE**

e) Polar ice caps are getting larger.
TRUE **FALSE**

f) Ocean levels are rising.
TRUE **FALSE**

g) Rising temperature causes water to evaporate more slowly.
TRUE **FALSE**

h) Using gasoline as a fuel releases greenhouse gases.
TRUE **FALSE**

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

a) **All of these are fossil fuels, *except*:**

- ○ **A** oil
- ○ **B** coal
- ○ **C** wood
- ○ **D** natural gas

b) **Where is most of Earth's fresh water?**

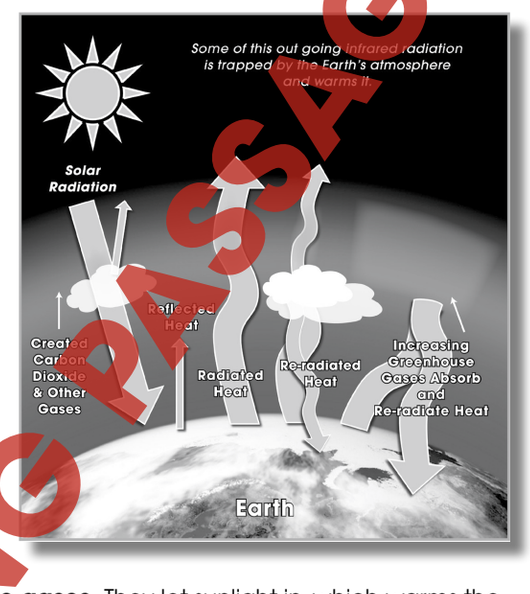
- ○ **A** in lakes
- ○ **B** underground
- ○ **C** in the oceans
- ○ **D** in polar ice caps

Reading Passage

NAME: _____

How Climate Change Can Affect Fresh Water

You may have heard of the **greenhouse effect**. It is the greenhouse effect that makes the inside of a greenhouse warm enough to grow flowers and vegetables when it is snowing outside. Sunlight passes easily through the greenhouse windows and warms the soil inside. The warm soil gives off heat, but heat does not pass through the glass as easily as the light did. The result is a higher temperature inside than outside.



The planet Earth also has a greenhouse effect. Some of the gases in the **atmosphere** act like the glass in greenhouse windows. These gases are called **greenhouse gases**. They let sunlight in, which warms the Earth, but trap some of the heat the Earth gives off. So the greenhouse effect is a good thing. Without it, Earth would be too cold to support life.

But Earth may be in for *too much* of a good thing. The greenhouse effect is becoming greater, and Earth is becoming warmer. This is because people have

When a car is left in the sun with the windows closed, the inside gets hotter than the outside temperature. Explain how this happens in terms of the greenhouse effect.

_____

_____

After You Read

NAME: _____

How Climate Change Can Affect Fresh Water

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

a) **As temperature rises, loss of surface water increases because of increased:**

- ○ **A** condensation.
- ○ **B** evaporation.
- ○ **C** precipitation.
- ○ **D** runoff.

b) **Which correctly describes the greenhouse effect?**

- ○ **A** Heat comes in and light escapes.
- ○ **B** Light comes in and heat escapes.
- ○ **C** Heat comes in and light is trapped.
- ○ **D** Light comes in and heat is trapped.

c) **What would Earth be like if it had no greenhouse effect?**

- ○ **A** The temperature would be too cold to support life.
- ○ **B** All places would have a perfect climate.
- ○ **C** The temperature would be the same everywhere.
- ○ **D** Winter and summer weather would be the same.

2. **Earth's climate is changing and will probably continue to change for several decades. Show how climate change will affect each characteristic of Earth by writing "Increase" or "Decrease" in the blank spaces after each characteristic.**

a) Average temperature _____

b) Sea level _____

c) Amount of ice at the North and South Poles _____

d) Amount of liquid fresh water _____

e) Amount of liquid salt water _____

NAME: _____

After You Read

How Climate Change Can Affect Fresh Water

3. **Answer the questions in complete sentences.**

a) Describe one way that Earth's climate is going to change that can be easily predicted.

_____

_____

b) Describe one way that Earth's climate is going to change that is difficult to predict. The uncertainty can be about which way the change will take place or which places will be affected or both.

_____

_____

Extensions & Applications

The greenhouse effect is a very important factor in determining the climate on the planet Earth.

a) Explain why the moon has no greenhouse effect.

_____

_____

_____

_____

b) Explain how the greenhouse effect causes higher temperature. Give a general explanation that could apply to either a greenhouse where plants are grown or to the planet Earth.

_____

_____

_____

_____

Hands-On Activity # 3

Activity Three

Water Fights

Write a report about water conflicts

The most recent war over water is believed to have taken place 4500 years ago between the kingdoms of Lagash and Umma. Both kingdoms were located in what is now the country of Iraq. Since then there have been many arguments about water rights, but no all-out wars, with the disagreements usually settled with treaties.

Write a report about water conflicts between countries over water. Ask your teacher or a history teacher where you can find books or other sources of information about water conflicts. Try searching in libraries or the Internet for "water wars," "water treaties," and "Lagash and Umma." Rivers that have a long history of conflicts and agreements are the Nile, the Jordan, and the Ganges. You might also look for a history of conflicts within the United States, especially involving the Colorado River.

These are some questions you can try to answer in your report:

- What are the chances of a war over water in the future?
- Why have there been so few wars over water in the past?
- Which rivers are most likely to be a source of conflict in the near future?

After You Read

NAME: _____

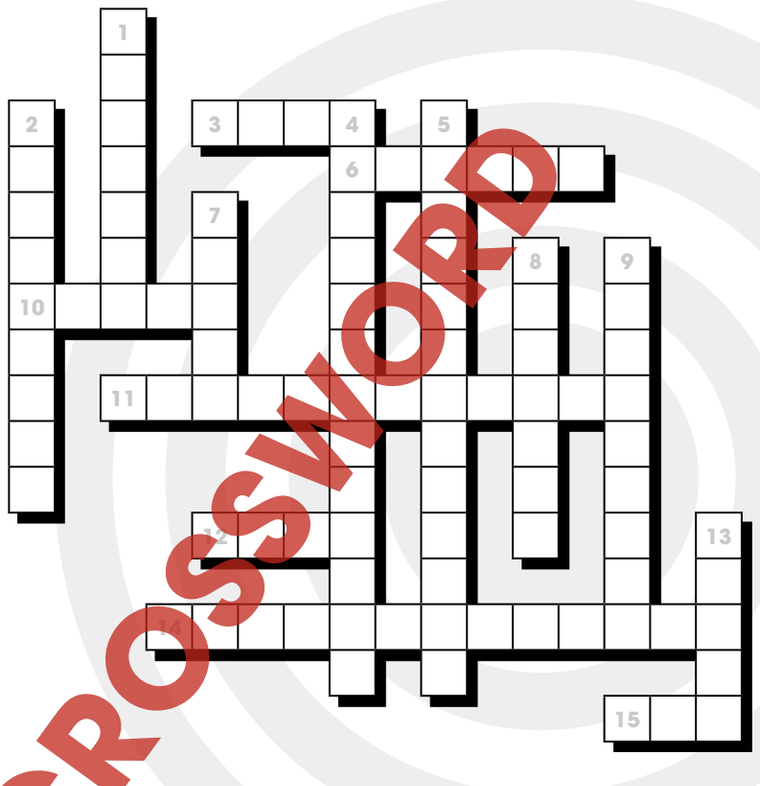
Crossword Puzzle!

Across

3. water-saving kind of irrigation
6. water flowing from a field into a stream
10. the world's most popular drink
11. making fresh water out of salt water
12. to change from solid to liquid
14. the kind of dam electricity comes from
15. solid water

Down

1. a dry spell
2. bathwater or dishwater
4. water falling from the sky
5. Pumping water out faster than it seeps in is _____ use.
7. a big chunk of ice floating in the ocean
8. an undergroud layer of water
9. Some people collect it from their roof
13. Water goes round and round in a _____



Word List

AQUIFER	DROUGHT	PRECIPITATION
BERGS	GRAYWATER	RAINWATER
CYCLE	HYDROELECTRIC	RUNOFF
DESALINATION	ICE	UNSUSTAINABLE
DRIP	MELT	WATER

(Note: For answers of more than one word, do not put a space between the words.)

NAME: _____

After You Read

Part C

Comprehension Quiz

Answer each question in complete sentences.

1. Explain what "unsustainable" withdrawal of water from an aquifer means. (3)

2. Describe the "greenhouse effect" as it applies to Earth's atmosphere. (3)

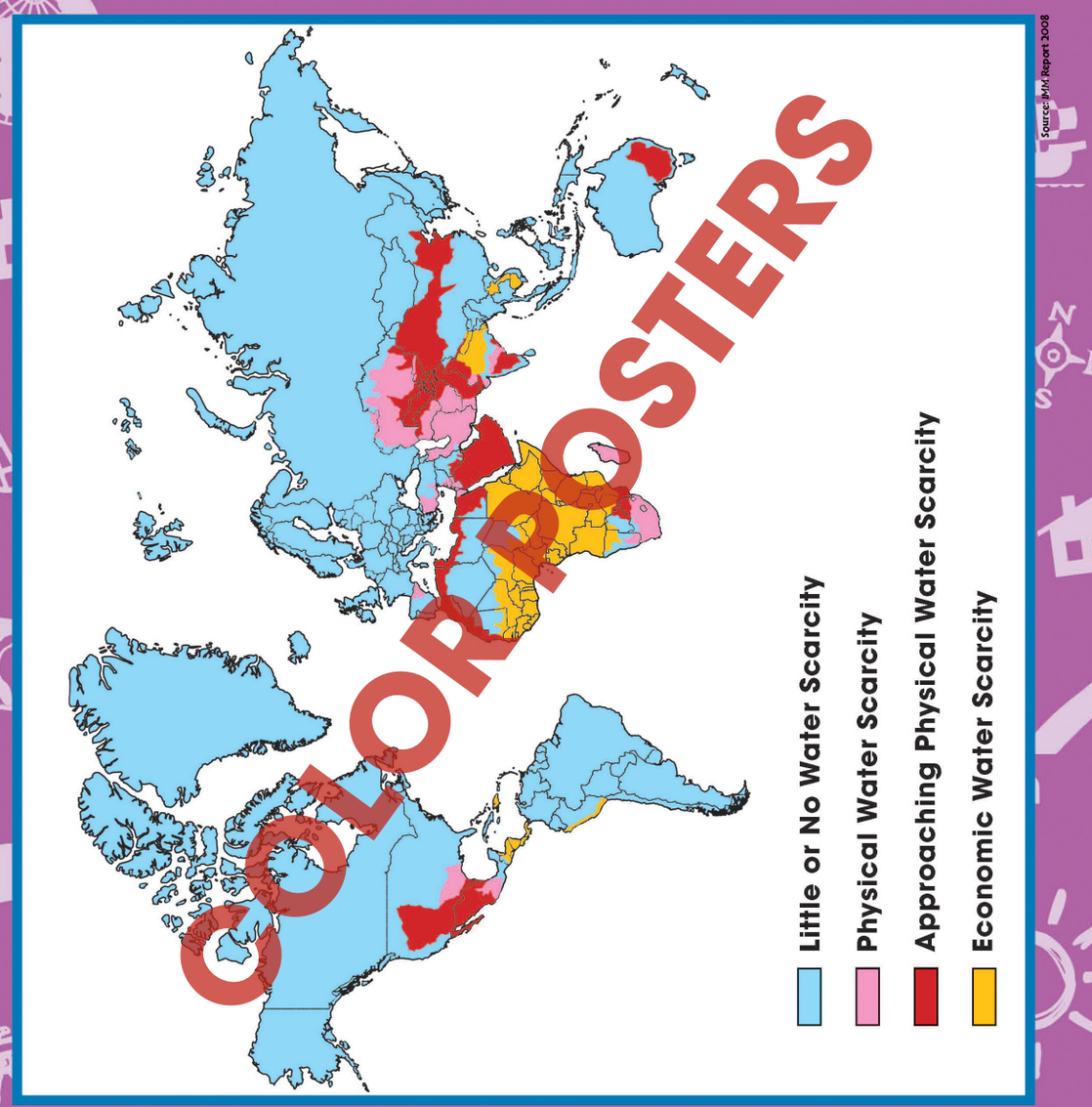
3. Describe one problem that can result when irrigation water for crops runs into a river. (3)

4. Why does a drip irrigation system use less water than a sprinkler system? (3)

5. How is the increasing number of people on Earth related to fresh water shortage? (3)

SUBTOTAL: /15

Areas of Water Scarcity



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_____

_____

_____

_____

EASY MARKING ANSWER KEY

3.

a) (Answers will vary.) Average temperature will rise. Rainfall patterns will change. Etc.

b) (Answers will vary.) Some places will get more rainfall, and some will get less, but the pattern cannot be predicted.

Extensions & Applications

…e moon has …o greenhouse effect because the moon has no atmosphere.

b) Light passes easily through the atmosphere or the glass and heats the surface. The surface releases heat which is partly trapped because it cannot go out as easily as the light came in.

11

Evaporation, and condensation (and perhaps runoff) happened in the jar.

Evaporation happened when the jar was heated, and condensation (and perhaps runoff) happened when the jar was cooled.

The weight did not change because the water was recycled and did not leave the jar (answers will vary).

The beads of condensed water did not taste salty.

13

The temperature was higher inside the jar.

Light came in, heated the inside, and heat was trapped.

14

- Historians tend to believe water conflicts will not lead to wars.
- Some historians say water is too important to fight over.
- (Answers will vary.) The Jordan, the Nile, the Colorado etc.

15

(Answers will vary.)

16