

WEATHERING & EROSION

How Wind Shapes the Earth

The ancient Greeks listed the four elements as Earth, Air, Wind and Fire. In this program we see how wind is a constant engine of change around the world.

Over one third of the earth's surface is desert, either the well-known sandy deserts, or the polar ice caps. Why this is so is directly attributable to the prevailing winds.

Initially created in the hot-house of the tropics when warm, moist air rises, the wind is twisted and funnelled by the earth's rotation to create the wind currents we have today.

On a global scale this leaves two areas with low chance of rain; areas between 20 and 30 degrees north and south of the equator, and the polar regions. These are where we find most of today's deserts.

Although created by global winds, these dry regions are also shaped by local winds that create sand dunes and fantastically eroded landscapes.

Even today with all our technology, the wind still selects the places where most of us live.



Word Check: Atmosphere, Low Pressure, High Pressure, Hemisphere, Tropics, Trade Winds, Rain Shadow, Desert, Dust Bowl, Saltation, Deflation, Sand Dune, Desert Pavement.

Pre-viewing Questions:

1. From which direction do the major winds come from in your area? What causes these winds to blow?
2. Can you think of any land forms in your area that show signs of wind erosion?

HOW WIND SHAPES THE EARTH

This guide provides you with a summary of the program and follow-up questions (along with their answers). A list of web links leads to further information on the topic.

The question sheet is designed to be duplicated for class distribution.

Before Viewing: Give students an overview of the program. Use the program summary to help provide this introduction. Select pre-viewing discussion questions and vocabulary to provide a focus for students when they view the program.

After Viewing: Use a selection of the follow-up questions to help review the program and encourage students to research the topic further with the internet resources provided.

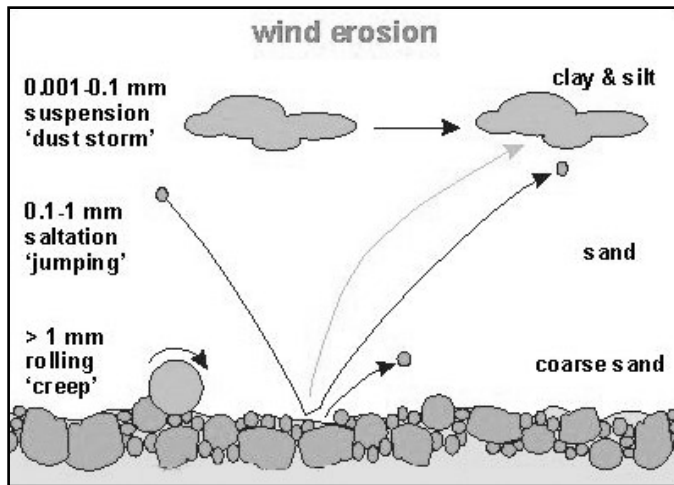
You can cut and paste text from the pdf file to compile your own set of questions or to enter links into a web browser.



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How Wind Shapes the Earth: QUESTIONS



1. How much of the world's land mass is comprised of desert?

Chapter 1: The Atmospheric Wind

2. How is the earth's atmosphere held in place?
3. Why is the earth's atmosphere always moving?
4. Does warm area expand or contract?
5. How is high air pressure created?
6. What is wind?

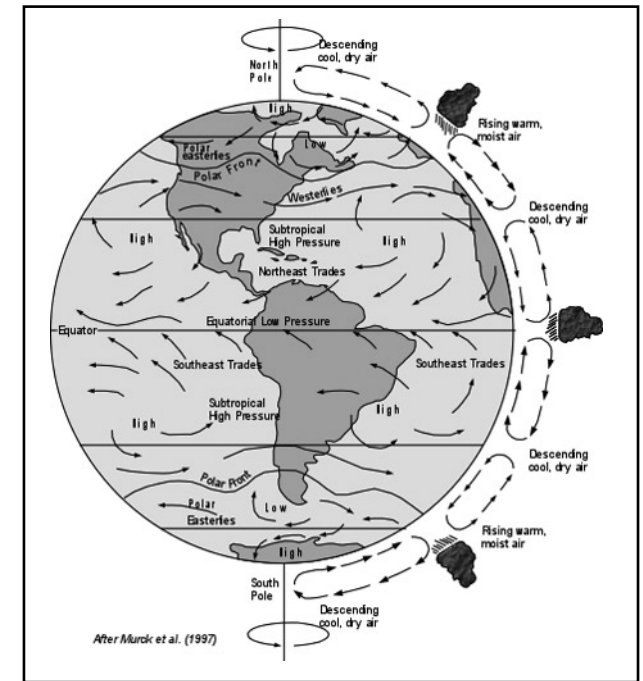
7. Because of the earth's rotation, what direction do the major winds blow in the southern hemisphere?
8. How did the Trade Winds get their name?
9. Why are the polar caps classified as deserts?
10. How do winds help create deserts?
11. What is a rain-shadow?
12. How could a new desert be created?

Chapter 2: Wind Erosion

13. Under what circumstances does wind erosion increase?
14. What created the dust-bowl in the United States during the 1930s?
15. What is saltation?
16. How are rock pinnacles formed?
17. What is deflation?

Chapter 3: Soil Erosion

18. What economic effect can soil erosion have?
19. How do sand dunes form?
20. Which face of a dune is the steep side?
21. What is a desert pavement?



FURTHER INFORMATION

A site with many links concerning the earth sciences:

<http://teams.lacoe.edu/documentation/classrooms/gary/earth/web/earth.html>

A look at erosion from the Australian perspective:
www.waite.adelaide.edu.au/school/Soil/erosion.html

For information on soil erosion:

<http://www.netc.net.au/enviro/fguide/soil1.html>

Good information and diagrams concerning wind erosion:

<http://www.earthsci.org/teacher/basicgeol/windes/windes.html>

How Wind Shapes the Earth:

ANSWERS

1. One third of the land area of the continents is desert – both hot and cold deserts.

Chapter 1: The Atmospheric Wind

2. The atmosphere is held in place by the earth's gravitational pull.
3. Energy from the sun heats some areas of the earth differently to others. This creates areas of high and low pressure which in turn create movement within the atmosphere.
4. Warm air, such as tropical air, expands.
5. When cool air sinks to the ground an area of high pressure is formed.
6. Wind is the movement of air from an area of high pressure to an area of low pressure.
7. The major winds of the southern hemisphere circulate in an anti-clockwise direction.
8. During the days of sail they were used by ships as they traded around the world.
9. Like sandy deserts, there is a lack of rainfall at the poles as well.
10. In some cases the prevailing winds blow any moisture off-shore where it falls as rain in the ocean.

11. A rain-shadow is an area behind a physical barrier, such as a mountain range, that is blocked from receiving rain.
12. If major winds were to change direction then old deserts could be green again, and areas that are green now, could be desert.

Chapter 2: Wind Erosion

13. The drier the soil, the more chance there is for wind erosion.
14. The dust-bowl was created when a series of droughts dried out the soil which was then blown away.
15. Saltation is when sand grains are picked up by the wind and act like a sand-blasting machine.
16. A harder rock on top resists erosion while the softer rock all around is eroded away.
17. Deflation is the removal of all soil in an area.

Chapter 3: Soil Erosion

18. Soil erosion can lead to land losing its agricultural potential.
 19. Sand dunes form when eroded sand particles are forced together by the wind.
 20. The leeward side (facing away from the wind) is the steepest face.
 21. Stones that are too big to be blown away remain behind to form a kind of pavement.
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WEATHERING & EROSION

How Water Shapes the Earth

Water is an essential part of our lives and a valuable resource. It also enriches our lives with its sheer beauty.

Water is one of the world's most abundant resources although much of it is in the form of salt-water in oceans or locked up in the polar ice caps and in glaciers.

But the system is not static, polar ice melts and ocean waters evaporate to keep the system in a continual cycle that brings water from the ocean to the land and back to the ocean again.

After falling on the land in the form of rain or snow, this water begins a slow transformation of the land across which it travels. Some seeps into ground water to emerge as a spring kilometres away, while other water becomes runoff and makes its way into streams and rivers.

These streams and rivers have a hierarchy of forms from the youthful stream in its steep V-shaped valley through to the old river full of meanders and swamps.

Of all water perhaps the most valuable is ground water because of its ability to deliver water to places that may not have sufficient rainfall. In aquifers this water can travel many kilometres before it is pumped out into an artesian well or naturally comes to the surface in the form of a spring.



All this movement of water also leaves its mark on the earth's surface as water erosion is one of the more forceful around. With floods and gradual river erosion, water has largely presented us with the world as we see it today.

Word Check:

Water Cycle, Drainage Basin, Delta, Alluvial fan, Meander, Zone of Aeration, Zone of Saturation, Aquifer, Artesian well.

Pre-viewing Questions:

1. Name some ways in which water shapes the world around us.
2. How can the power of water be both destructive as well as constructive?

HOW WATER SHAPES THE EARTH

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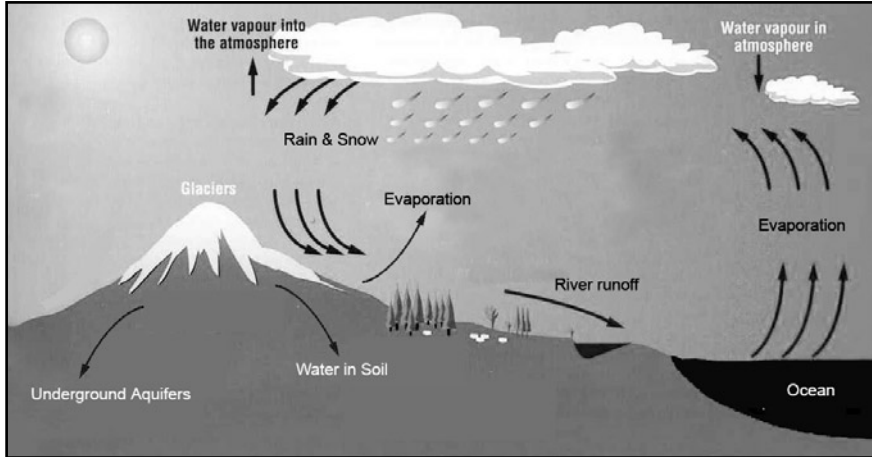


ASTARTE RESOURCES

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How Water Shapes the Earth

QUESTIONS



1. How much of the world's surface is comprised of water?

Chapter 1: The Water Cycle

2. What is the water cycle (shown above)?
3. What is runoff?
4. Why is runoff a problem in cities?
5. How can runoff be slowed?
6. What is erosion?
7. What is a Drainage Basin?
8. What is the ultimate base level for rivers and streams?

Chapter 2: Stream Types

9. What are the characteristics of a youthful stream?
10. What are the characteristics of a mature river?
11. What is a meander?
12. What are the characteristics of an old river?
13. How do sand bars form?
14. What is a Delta?
15. What are Alluvial Fans?

Chapter 3: Ground Water

16. What happens to water in the soil's zone of aeration?
17. What happens in a soil's zone of saturation?
18. How are lakes, ponds and swamps formed?
19. What is an aquifer?
20. What is an artesian well?
21. How does a spring form?
22. How do limestone caves form?
23. What is a sink hole?

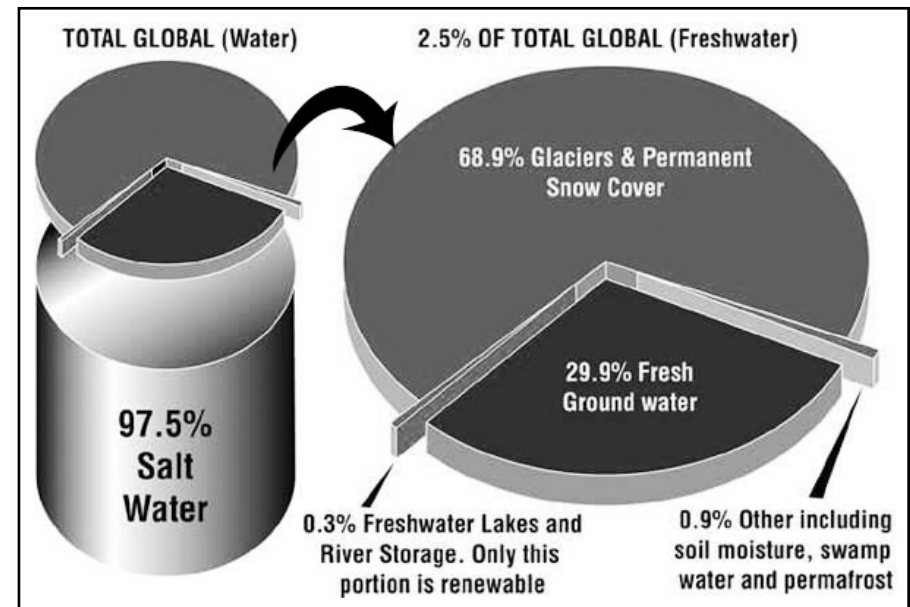
Chapter 4: Water Erosion

24. How does water dissolve sandstone?
25. How do flash floods occur?
26. What is one way the power of water can be used?

FURTHER INFORMATION

Information regarding the water cycle and how long it takes to replenish certain supplies of water:
<http://www.unesco.org/science/waterday2000/Cycle.htm>

A site with links to subjects such as floods etc.:
<http://teams.lacoe.edu/documentation/classrooms/gary/earth/web/earth.html>



How Water Shapes the Earth

ANSWERS

1. Three-quarters of the earth's surface is covered by water.

Chapter 1: The Water Cycle

2. The Water Cycle describes the movement of water from the ocean to the land and back to the ocean again.
3. Runoff is the movement of water across land.
4. Runoff is a problem in urban areas because much of the area is paved and very little water is absorbed into the ground. This increases runoff.
5. Plants slow the rate of runoff and allow more water to be absorbed into the soil.
6. Erosion is the movement of sediments by water or wind.
7. A Drainage Basin is the area drained by a river and its tributaries.
8. Sea level is the ultimate level that all rivers and streams want to reach.

Chapter 2: Stream Types

9. A youthful stream has a steep, V-shaped valley.
10. A mature river has a wide valley with flood plains.
11. A meander is a series of broad curves in a river.
12. An old river often has meanders, swamps, and a wide valley.
13. Sand bars are created from deposits of sediments moved by rivers.
14. A Delta is the mouth of a river where sediments are deposited in a fan-shaped pattern.
15. Alluvial Fans are deposits caused by water erosion in dry areas.

Chapter 3: Ground Water

16. In the zone of aeration water bonds with soil although air is still present.
17. In the zone of saturation water has expelled all the air from the soil.

18. Lakes, ponds and swamps are formed when the land surface dips below the water table.
19. An aquifer is a band of permeable rock between two impermeable layers of rock. The permeable rock contains water.
20. An artesian well is created when an aquifer is drilled and the pressure brings water to the surface without a pump.
21. A spring forms when an aquifer comes to the surface.
22. Limestone caves form from the movement of underground water.
23. A sink hole is a collapsed cave.

Chapter 4: Water Erosion

24. Rainwater is slightly acidic and this reacts with the sandstone.
 25. Flash floods can follow when there has been lots of rain in one place.
 26. Water's power can be used to generate electricity.
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