

Science Skills Station

Objective

Identify where natural resources, such as crude oil and copper, are distributed on Earth. Discuss the natural processes that contribute to the distribution of resources and what can infer about Earth's history due to the distribution.

Skills Utilized

- Infer and/or Predict
- Analyze & interpret data
- Determine relationships or patterns
- Illustrate a concept
- Graph data

Overview

There are 3 major fossil fuels: coal, oil and natural gas. Fossil fuels are found deep within Earth. They often accumulate in large pools or reserves. Coal reserves are found where ancient swamps used to be located on Earth. Oil reserves are found where the remains of marine organisms were buried. Natural gas reserves are often found near oil reserves.

Activity #1

Directions: The table below describes where oil is found on Earth. Create a circle graph using the data. Then answer the questions.

Region	% of Total Oil on Earth
North America	13%
Central & South America	20%
Africa	8%
Asia & Oceania	3%
Europe	1%
Middle East	48%
Eurasia	7%

Source: Energy Information Administration, 2014

Questions

1. Where is the majority of crude oil found in the world?
2. How does the distribution of oil impact regions of the world where it is abundant?
3. What do you think Earth was like in the past in the region of the world where oil is most abundant?
4. Can you predict where natural gas reserves might be abundant on Earth, based on the data above? Explain.

Activity #2

Copper has been used by humans for at least 10,000. It is mined and extracted from Earth for many reasons. It is used for electrical wiring, roofing, plumbing and industrial machinery. It is also used to make jewelry, coins and alloys such as brass and bronze.

According to the USGS, most copper is found in igneous rock in Earth's crust. Igneous rock forms when molten rock (magma) escapes through ruptures in Earth's crust, cools and solidifies. Copper is also deposited near deep-sea hydrothermal vents where gas and other substances escape from Earth in fissures near tectonic plate boundaries.

Directions: Below is a map that shows where copper reserves are found on Earth. Use this map to answer the questions below. *The color represent the region where the copper is the deposited and the deposit type (which is not important to this activity).*

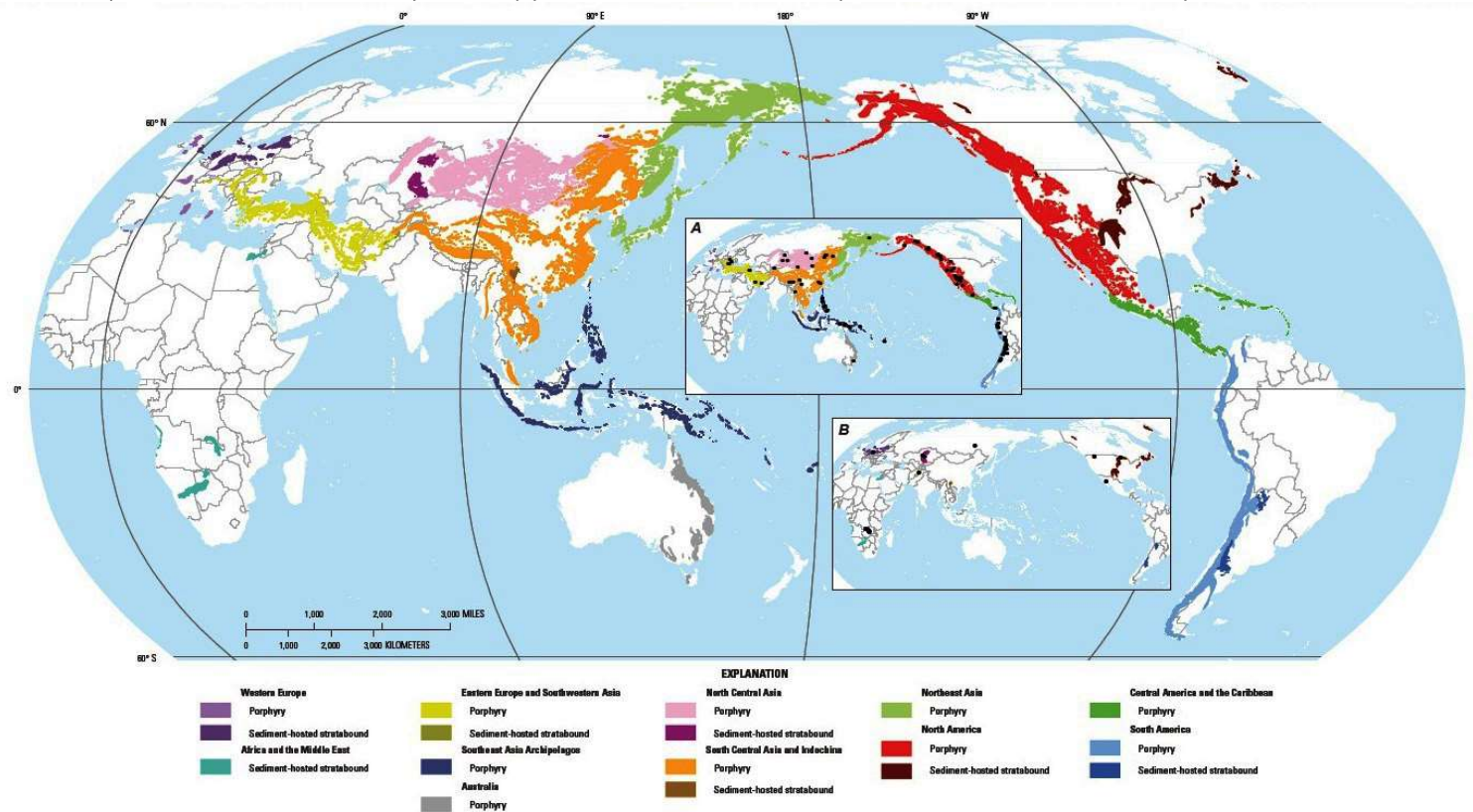


Figure 1. Locations of tracts assessed for this study, grouped by region and deposit type. Inset maps show identified deposits containing more than 2 million metric tons copper (black dots); A, porphyry copper; B, sediment-hosted stratabound copper.

Questions:

1. Describe where copper reserves are found on Earth.
2. What can you infer about volcanic activity based on the location of copper deposits?
3. Use the tectonic plate map on your answer sheet to determine relationships or patterns (if present) between copper deposits and tectonic plate boundaries.
4. The map above shows copper deposits in parts of Earth's crust above sea level. Where might you find copper deposits in the ocean? Use the tectonic plates map to help you.

Narrative Station

Objective

Identify geoscience processes responsible for the uneven distribution of natural resources, such as metals and minerals, fossil fuels, biodiversity and fertile soil on Earth.

Skills Utilized

- Answer questions relating to a text
- Cite textual information
- Summarize information
- Make connections
- Make a visualization of info

Activity #1

Directions: Read the following informational text. Then answer the questions.

WHY ARE RESOURCES DISTRIBUTED UNEVENLY?

Earth's natural resources are not distributed evenly across the planet. They are unevenly distributed for three important reasons:

1. **Climate.** Plants and animals require certain environmental conditions to survive. Latitude, ocean currents, wind currents and other factors determine the temperature and precipitation (climate) of a region. Plants and animals are found in regions where temperature is just right and there's enough precipitation to survive.
2. **Earth's History.** Some of Earth's resources, such as fossil fuels, formed from the remains of ancient plants and animals. Where these plants and animals lived in the past determines where reserves of these resources are found today. For example, coal reserves are found where ancient swamps used to be located on Earth. Oil reserves are found where the remains of marine organisms were buried.
3. **Geological Processes.** Many metals and minerals are found where new crust is being formed and/or destroyed. This occurs at tectonic plate boundaries or where volcanic activity is taking place or took place in the past. Metals are deposited on Earth's crust when molten rock (magma) escapes through ruptures in Earth crust. Magma is rich in metals such as copper, aluminum, nickel and iron.

Questions

1. How does Earth's *current* climate impact the distribution of resources, such as plants and animals?
2. How does Earth's *past* climate impact the distribution of resources, such as fossil fuels?
3. How might a map that shows where large metal deposits of copper, iron and nickel help you predict the location of tectonic plate boundaries?

Activity #2

Directions: Read the following informational text. Then answer the questions.

DISTRIBUTION OF EARTH'S RESOURCES

There are many resources unevenly distributed on Earth due to past and current processes and conditions on Earth. Five of those resources are described below.

- 1. Fertile Soil.** Humans depend on fertile soil for agricultural purposes. Fertile soil is most often found in temperate climates, where temperature is relatively mild and precipitation is relatively high. The most fertile soil is found in the US, India and Europe.
- 2. Biodiversity.** Biodiversity is the diversity of life. It is one of Earth's greatest resources because it maintains equilibrium or balance in ecosystems. It is also considered a source of new medications and promotes water and soil quality. Biodiversity is richest in the tropical rainforests. We call these regions "biodiversity hotspots." The largest biodiversity hotspots are found in South America, Africa and Southeast Asia.
- 3. Fossil Fuels.** There are three major fossil fuels: coal, oil and natural gas. Fossil fuels are found deep within Earth. They accumulate in large pools or reserves. Coal reserves are found where ancient swamps used to be located on Earth. The largest coal reserves are found in the United States, Russia and China. Oil reserves are found where the remains of marine organisms were buried. The largest oil reserves are found in the Middle East, Canada and Mexico. Natural gas reserves are often found near oil reserves. The largest natural gas reserves are found in Russia and the Middle East.
- 4. Uranium.** Uranium is a naturally radioactive metal found in Earth's crust. It is important to nuclear power. The largest uranium reserves are found in Australia. Large uranium reserves are also found in Kazakhstan, Russia and Canada.
- 5. Metals and Minerals.** Many of Earth's metals and minerals are found near tectonic plate boundaries or faults. Gold is a precious metal most often found near faults and inactive volcanoes. The largest gold reserves are found in the United States and Europe. Diamonds are minerals. They are often found near ancient volcanoes, specifically in old volcanic pipes that carried magma from inside Earth to Earth's surface. The largest diamond reserves are found in Australia and Africa.

Questions

1. Summarize the past and/or current processes that lead to the uneven distribution of these resources.
2. On the map on your answer sheet, illustrate where these resources are most abundant. Use a geographic map to help you locate countries if needed.

Assessment Station

Objective

Recall concepts, terms and ideas relating to the uneven distribution of resources on Earth.

Skills Utilized

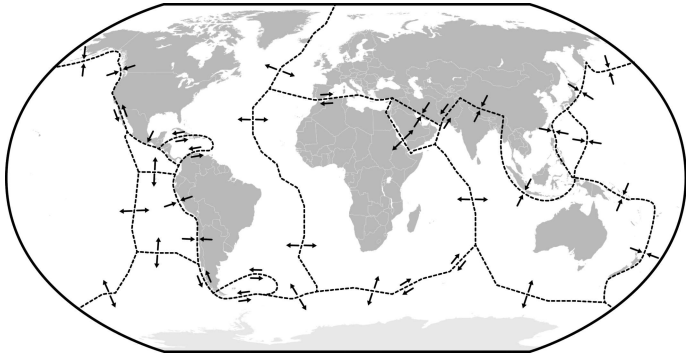
- Explain or summarize a concept
- Determine relationships
- Determine cause & effect
- List pros and cons
- Interpret data
- Compare and contrast
- Make predictions

Assessment Direction

1. Answer the following questions. Write down your answers on the recording sheet.
2. There are two bonus questions. If time allows, try to answer these questions.

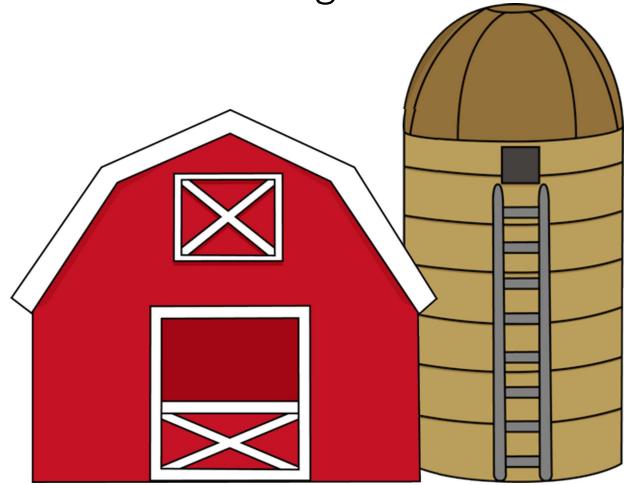
Question #1

What natural resource(s) is/are often found near tectonic plate boundaries or in areas of current or past volcanic activity?



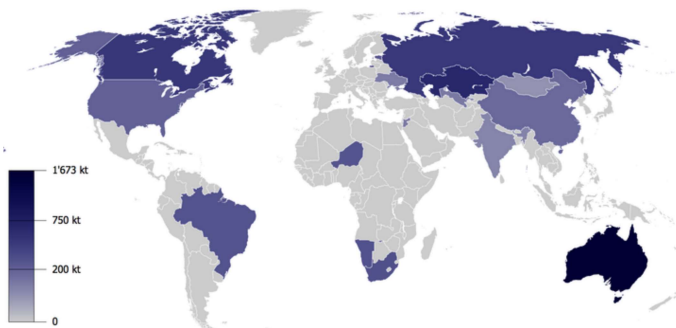
Question #2

What natural resource(s) is/are concentrated in temperate climates, where temperatures are mild and precipitation is relatively high?



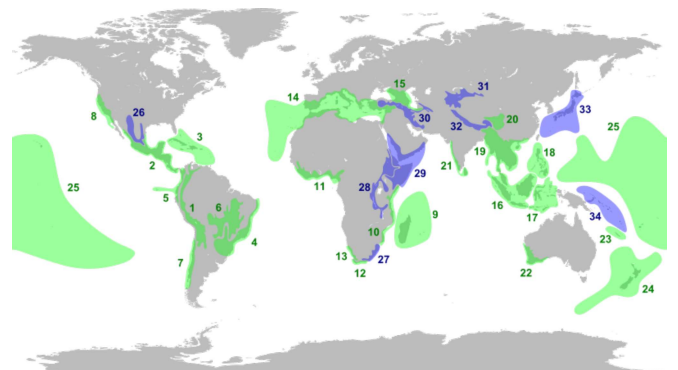
Question #3

The map below shows the location of large uranium deposits in the world. Identify three regions where uranium is most abundant.



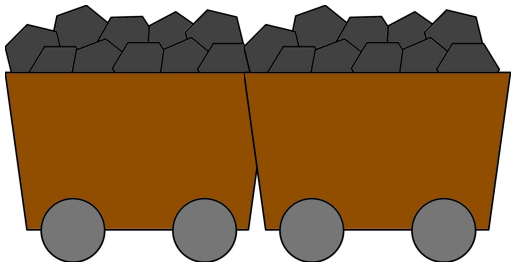
Question #4

The map below shows the location of biodiversity “hotspots” in the world. Is there a pattern to the location of these regions? Explain.



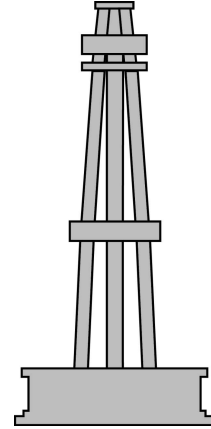
Question #5

Some of the largest coal reserves are found in the United States. What can we infer about Earth's climate in the United States in the past based on the abundance of this natural resource?



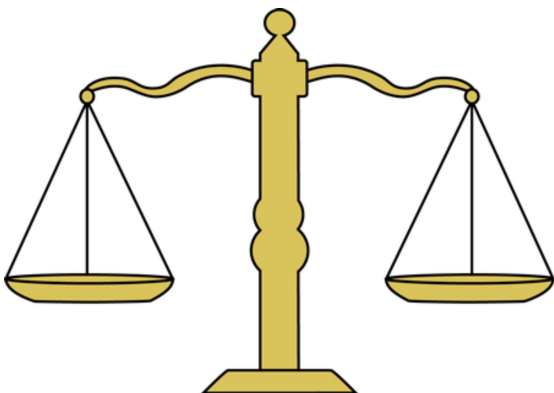
Question #6

The Middle East is the region of the world richest in oil deposits. In fact, nearly 50% of the world's oil is concentrated in the region. What other natural resource is likely abundant here as well? Explain.



BONUS Question #7

How is trade related to uneven distribution of resources? How is it important to countries who lack certain resources? How is it important to countries abundant in certain resources?



BONUS Question #8

Fossil fuels are a major source of energy for humans on Earth. How do you think the uneven distribution of fossil fuels positively and negatively impacts countries where fossil fuels are abundant?



Problem Solving Station

Objective

Identify and discuss problems that occur as a result of uneven distribution of Earth's resources.

Skills Utilized

- Identify problems
- Define constraints of a problem

Background Information

Natural resources are unevenly distributed on Earth. Some places are rich in certain resources whereas other places are void of them. This has consequences which impact multiple facets of human society.

Directions

1. Read the passage on the following page.
2. Use information in the passage to identify current and past problems due to uneven distribution of resources on Earth.
3. What constraints limit solutions to these problems? In other words, what restricts how we deal with these problems?
4. Answer the summary questions.

Summary Questions

1. How do these problems positively and negatively impact people?
2. How do these problems impact the environment, including other living things?

EFFECTS OF UNEVEN DISTRIBUTION OF EARTH'S RESOURCES

There are five important consequences to uneven distribution of resources:

1. **Human Settlement.** People tend to settle and cluster in regions that have resources they need to survive. Most important to survival is water and fertile land, which is used for cultivating crops and animals. Furthermore, humans thrive in temperate climates with relatively mild conditions and high precipitation. This explains why countries with the high populations are in North America, Europe and Asia.
2. **Jobs.** The economic activities of a country often depend on the resources in that country. In other words, people tend to have jobs that involve harvesting or using the resources abundant in that country. Countries abundant in fossil fuels will have more jobs related to oil and gas production or coal mining. Countries with fertile land will have more jobs related to farming and ranching.
3. **Trade.** If a country does not have certain natural resources, the country can trade with other countries that have those resources in order to obtain what it wants or needs. The country can exchange resources it has for the resources it wants.
4. **Conflict and War.** Countries sometimes fight with each other over control of resource-rich regions. Countries have fought with each other over gold, diamonds and fertile land. More recently, countries have fought over oil. Imperialism during the 1800s and early 1900s was in part due to an increased demand for natural resources. With imperialism, larger and stronger countries would take over and exploit smaller and weaker countries for natural resources.
5. **Wealth and Quality of Life.** The wealth of a country and the quality of life of people that live in that country are determined by the country's economic activities. Economic activities often depend on the abundance of natural resources in that country. Therefore, the wealth of a country and quality of life often depend on the abundance of natural resources in that country. More specifically, quality of life and wealth depend on what resources a country has and what the country does with them. *However*, the abundance of natural resources is not the *only* factor that determines whether a country and its people are prosperous. In fact, many wealthy countries rely on manufacturing products and technology to make up for lack of resources. For example, Japan has limited resources but manufactures highly desired products, such as cars and electronics. Japan trades these products and in return, obtains resources it needs and great wealth.