Learning Objective: Natural Resources

NGSS Standard: MS-ESS3.A - Humans depend on Earth's land, ocean, atmosphere, and biosphere for many different resources. Minerals, fresh water, and biosphere resources are limited, and many are not renewable or replaceable over human lifetimes. These resources are distributed unevenly around the planet as a result of past geologic processes.

Objective:
Students will be able to:

1. Use evidence to explain that humans depend on many limited natural resources that may not be renewed over human lifetimes.
2. Define natural resources and identify the main mineral, energy and groundwater resources distributed around Earth.
3. Describe past and current geologic processes that have resulted in the uneven distribution of natural resources around the globe.

Time Required: 90 minutes

Materials Needed:

- Teacher computer with internet access and projector
- Student computers/laptop/tablet with internet access (preferably one per student but at least enough for small groups of 3 -4 students)
- World Water Scarcity and Resource Handout

Teacher Preparation:

- Create Playlist 1, a 20-minute playlist in Legends of Learning with the following game found in the Natural Resources learning objective:
  - *The Story of Natural Resources*
- Create Playlist 2, a 20-minute playlist in Legends of Learning with the following game found in the Natural Resources learning objective:
  - *Natural*
- Copy of World Water Scarcity and Resource Handout

Engage: 10 minutes

1) The teacher will play the videos "ESS3A: Natural Resources" on YouTube https://www.youtube.com/watch?v=LxHdUd_Q12Y
2) The students will take notes on the information described in the video
   a. Describe the difference between renewable and nonrenewable resources
      a. ***A renewable resource is one that can be reused/used again and naturally replaced. A nonrenewable resource is one that cannot be reused/used again and cannot be naturally replaced.***
   b. List three examples of each
      a. ***Renewable Resources: Solar energy/power, wind energy/power, hydropower/energy, biofuel (algae/bacterial based fuels), geothermal energy/power. Nonrenewable Resources: oil, coal, natural gas, fossil fuels, Earth's minerals.***

Explore: 20 minutes

1) Students will sign in to Legends of Learning and enter your teacher code.
2) Launch Playlist 1 to your students.
3) Students will complete *The Story of Natural Resources* as the teacher assists students as needed. Stopping game play to address the questions asked in the game may be needed.

Explain: 20 minutes

1) Students will be given the World Water Scarcity and Resource Handout. The teacher will also project the maps for students on the Smartboard/projector so that students can see the colors on the maps.
2) Students will go to the Introduction to Global Water Scarcity website at http://www.eschooltoday.com/global-water-scarcity/global-water-shortage-for-kids.html
3) Using the maps and the information on the website, students will answer the following questions:
   a. Which regions (and/or specific countries) are most at risk for not having enough freshwater?
      a. ***Northern Africa, Saharan Africa, Southern Africa, Central Asia, Southwestern United States***
   b. How does the presence or absence of freshwater affect a region's economic development and position?
      a. ***The presence of fresh water can positively affect a region's economic development, while a lack of freshwater can negatively affect a region's economic development.***
   c. What other crises may arise from the unequal distribution of freshwater on Earth? List and describe at least three.
      a. ***1) In many developing countries, people are forced to drink low quality water from flowing streams, many of which are contaminated. There are many water-borne diseases that people die off. 2) Less water also means sewage does not flow, and mosquitoes are other insects breed on still (stagnant) dirty water. The result is deadly malaria and other infections. 3) Lack of water or quality water causes huge sanitation issues. Clinics, local restaurants, public places of convenience and many other places are forced to use very little water for cleaning. This compromises the health of the staff and people who use the facilities. 4) Without water, crops cannot be grown, and livestock cannot be maintained. Without a food source, famine can negatively affect the region's population. (http://www.eschooltoday.com/global-water-scarcity/effects-of-water-shortage.html)***

Elaborate: 20 minutes

1) Teacher will project the World Mineral Maps (Appendix B) on the Smartboard/projector for students to see.
2) Students will brainstorm ten objects they interacted with that day. Teacher will ask for objects and ask students if the objects involved parts that needed to be mined from the earth, grown naturally, or both.

3) Teacher will then lead a discussion with the students centered around the following questions:
    a. Describe what each map is communicating.
        a. ***Both maps are showing the locations of different minerals/mineral deposits around the world.***
    b. Describe what you see on each map. What do you notice first? What place or places does the map show?
        a. ***Subjective. Look for the following: shows a map of the world, minerals/mineral deposits all seem to be on land, minerals/mineral deposits are found all over the world, a lot of oil is in Northern Africa and the Middle East, etc.***
    c. Identify patterns. Do you notice mining sites on the edges of continents or in the middle? Are any in the water? Why or why not?
        a. ***Yes, there are mining sites/mineral deposits/minerals all over the map. No, there are none listed on/in the water. Presumably, the minerals/mineral deposits are inaccessible in the water (too far down, etc.).***
    d. Compare the two maps. What do you notice about the location of the active copper mining sites?
        a. ***The first map contains fewer minerals; however it also includes oil and coal, as well as a distance legend, which the second map does not include. Both maps include a map of the world. Copper miner deposits and active mining sites are very numerous/abundant.***
4) The teacher will explain that certain minerals such as copper are often the result of volcanic activities. This would account for the prevalence of copper mines near plate boundaries with known volcanic disturbances.
5) The teacher will ask students to make a correlation with another type of mineral using the maps.

Evaluate: 20 minutes

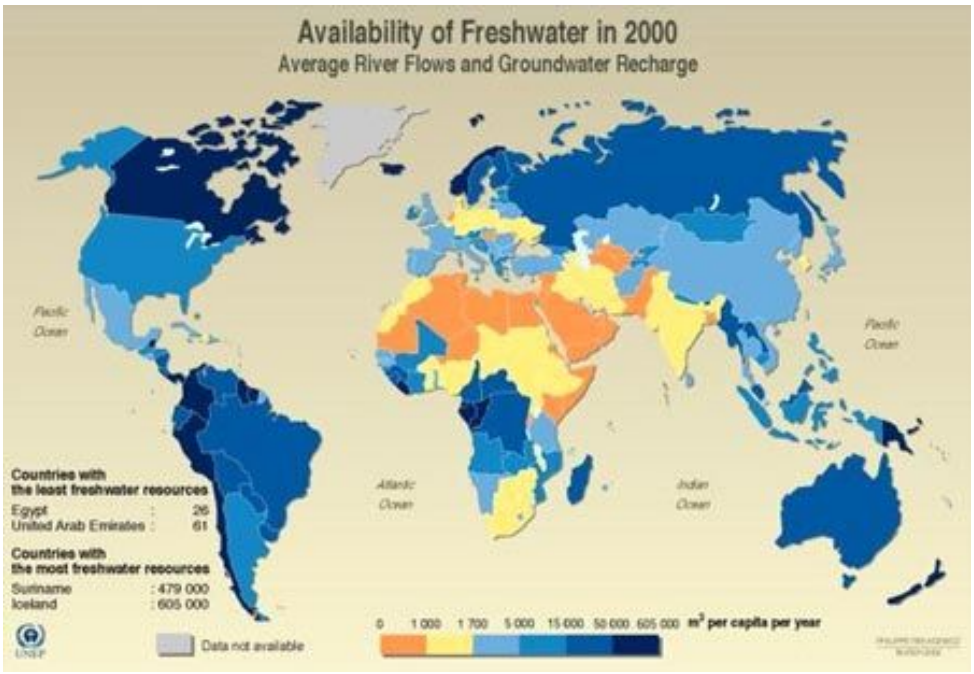
1) Launch Playlist 2 for students.
2) Students will play *Natural* and be assessed on their ability to answer the questions provided in the game correctly.
3) Teacher will analyze student results to determine what concepts need to be a focus for reteaching.

Additional Lesson Strategies:

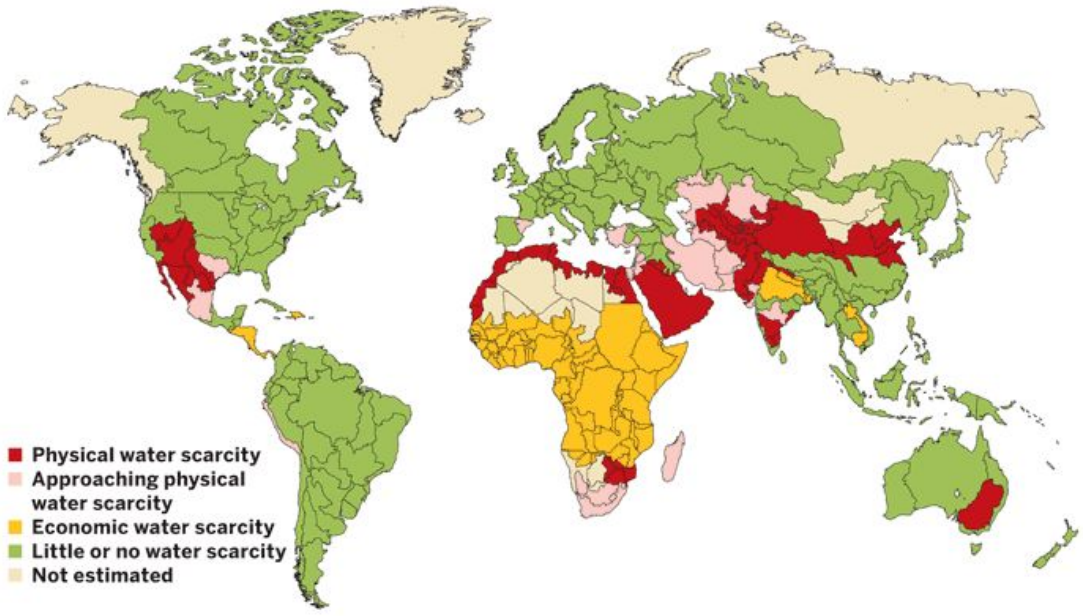
- To use Legends for additional instruction, create a custom playlist with an instructional game and pre and post assessment.
- To use Legends for a quick formative assessment, create a 5-question assessment in a playlist.
- To use Legends for a student-directed experience, create a targeted freeplay playlist.
- Encourage students to play on their own at home in Legends of Learning: Awakening for a student-driven experience including avatars, battling, and quests all centered around topics they are covering in class.

Name: _____ Date: _____

World Water Scarcity and Resource Handout



WATERWORLD Areas of physical and economic water scarcity



NOTE: When more than 75% of a region's river flows are withdrawn for agriculture, industry, and domestic purposes, it suffers from physical water scarcity. Economic water scarcity is when human, institutional, and financial capital limit access to water, even where water is available locally. **SOURCE:** Comprehensive Assessment of Water Management in Agriculture, 2007

Directions: Use the maps above to answer the following questions

1. Which regions (and/or specific countries) are most at risk for not having enough freshwater?

   _____
   _____
   _____
   _____

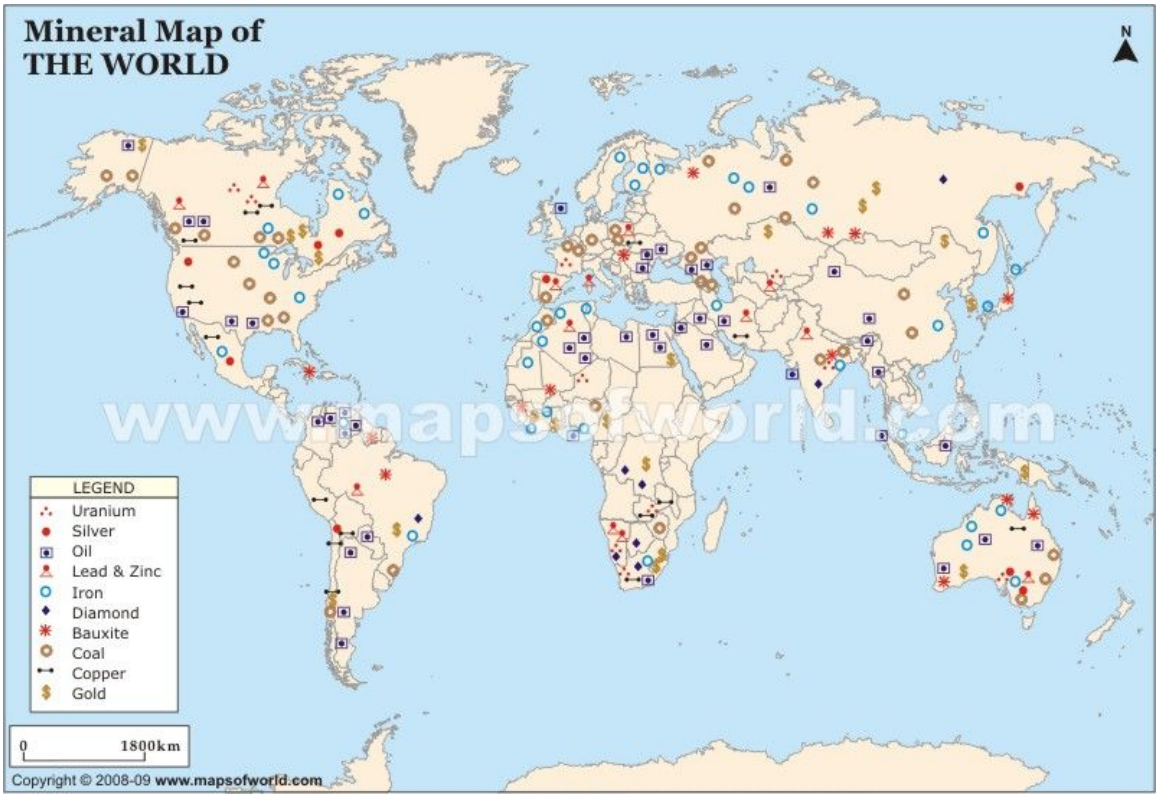
2. How does the presence or absence of freshwater affect a region's economic development and position?

   _____
   _____
   _____
   _____

3. What other crises may arise from the unequal distribution of freshwater on Earth? List and describe at least three.

   _____
   _____
   _____
   _____

Appendix B.


Mineral Map of
THE WORLD
N
LEGEND
Uranium
Silver
Oil
Lead & Zinc
Iron
Diamond
Bauxite
Coal
Copper
Gold
0
1800km
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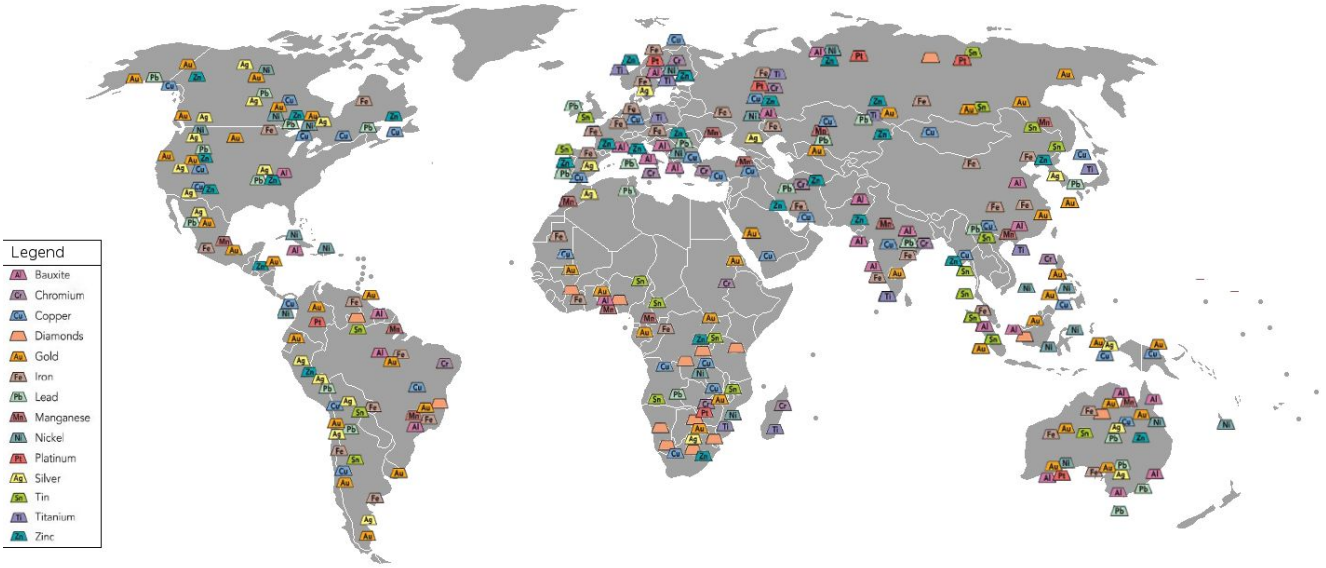
Legend
Bauxite
Chromium
Copper
Diamonds
Gold
Iron
Lead
Manganese
Nickel
Platinum
Silver
Tin
Titanium
Zinc