Water Wars

Lesson Map: http://esriaustralia.com.au/education/SpatialActivity32

Engage

Water, water, everywhere

→ "The wars of the 21st century will be fought over water." Former World Bank Vice President, Ismail Serageldin, warned more than 20 years ago about the potential for water scarcity to divide our world.

Water scarcity: lack of available water resources to meet demands

→ The World Health Organization predicts that by 2050, half of the world's population will be living in water scarce areas.

? What factors contribute to water scarcity?
  Some possible answers include:
  - Increase population
  - Increase living standards
  - Increase food production
  - Increase of agriculture in emerging economies
  - Increased temperature (climate change)
  - Different weather patterns (climate change)

Explore

Make it rain (on countries evenly)

→ Click on the Lesson Map URL above to open the map. In the 'Details' pane, under 'Content', tick the first checkbox to turn on the layer 'Average precipitation per year, mm'. Turn off all other layers.

Remember: you can see the Legend by clicking 'Details'> 'Legend'

? What areas experience the highest level of rainfall? Near the equator, in the tropics. These areas receive large amounts of rainfall.

? There are some regions away from the equator who receive high amounts of precipitation. This includes countries such as: Norway, Iceland, and New Zealand. Why? Precipitation can include snow, hail or sleet. These countries have a very cold climate, where these forms of precipitation are very common.

? Turn off the layer 'Average precipitation per year, mm' and turn on 'Renewable

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Download student worksheet here.

Time
30 minutes

Activity
Investigate the state of water around the world.

Learning Outcome
Students will be able to:

- Define water scarcity
- Identify factors leading to water scarcity
- Observe spatial relationships of precipitation
- Analyse areas predicted to experience water stress

ACARA Curriculum Link

Year 7 Geography: Water in the World

ACHGK039 | ACHGK040

Year 11 Geography: Sustainable Places

ACHGE044 | ACHGE045

Teacher Feedback:

To share your feedback on this, or any Spatial Activity, please contact education@esriaustralia.com.au

water resources, mm/year'. Which countries have high renewable water resources? *Iceland, Guyana, Suriname, Congo, Papua New Guinea, Bhutan, Gabon and Canada.*

> *Renewable water resource: a country's surface and groundwater that is generated by the water cycle.*

? These countries do not really have a spatial distribution. What do you think provides them with high renewable water resources? Match the country to the scenario.

Canada	High rainfall
Gabon	Lakes and glaciers
New Zealand	Rivers, lakes and aquifers

Canada: Lakes and glaciers; Gabon: High rainfall; New Zealand: Rivers, lakes and aquifers.

Explain

Rough waters

→ Turn on the layer 'Access to safe drinking water, percent' and turn off all other layers.

→ Even though a country may experience high levels of precipitation, in low income economies they cannot afford the infrastructure to filter and store it.

? Which countries have below 60 percent access? Please note some countries are blank as they did not have data available. *Papua New Guinea, Equatorial Guinea, Angola, Chad, Mozambique, Madagascar, DR of Congo, Afghanistan, Sudan, Tanzania, Ethiopia, Haiti, Eritrea, Mauritania, and Niger.*

? What do most of these countries have in common? *They are mostly low income countries, located within Africa or war torn areas.*

Extend

Should we be scared of scarcity?

→ Turn on the layer '2040 Baseline Water Stress Predictions'.

→ This layer represents the baseline predictions: meaning in between the most optimistic and pessimistic predictions. See the score scale below:

[0-1) Low (<10%)
[1-2) Low to medium (10-20%)
[2-3) Medium to high (20-40%)
[3-4) High (40-80%)
[4-5] Extremely high (>80%)

? What regions are most concerning? The Arab World and West Europe.

? How did Australia score? Australia scored a 3.55, which is a high risk.

? What is the problem with using entire country predictions? Use Australia as an example. Australia is an enormous country, so what is happening on one side might not reflect the other. Different areas may not experience drought and vice versa.

→ Turn on the layer 'Water stress, world basins' and turn off all other layers. It may take a few seconds to load due to the size. This layer splits future predictions down to river basins and gives us a better picture of areas at risk. Zoom in on Australia.

? The legend remains the same, but this time we have the added value of arid and low water use. This means areas of sparse or uninhabitable population. Which areas of Australia are going to experience the highest water stress? The east coast of Australia, especially in the south, is going to be the most at risk.

? Do you agree with Ismail Serageldin? Should we be worried about water scarcity? Students own answer.

Next Steps:

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Learn more about ArcGIS Online, and apply for your ArcGIS Online School subscription at http://esriaustralia.com.au/education