



Water world

from the Esri GeoInquiries™ collection for World Geography

Target audience – World geography learners

Time required – 15 minutes

Activity

Investigate changes that might occur to the surface of the earth if the major ice sheets of Antarctica melted.

Social studies standards

C3:D2.Geo.3.6-8. Use paper-based & electronic mapping & graphing techniques to represent & analyze spatial patterns of different environmental & cultural characteristics.
C3:D2.Geo.9.6-8. Evaluate the influences of long-term human-induced environmental change on spatial patterns of conflict & cooperation.

Learning Outcomes

- Analyze the impact on major human systems (such as transportation networks) that would be caused by the melting of various parts of the Antarctic ice sheet, causing a significant rise in sea level.
- Predict how such a catastrophe might change the nature of cities and societies around the world, and propose ways to minimize danger and hardship.

Map URL: <http://esriurl.com/worldGeoInquiry14>

? Ask

What did the landmasses look like 20,000 years ago?

- Click the link above to launch the map.
- The current layer shows an elevation map of Earth as scientists believe it looked 20,000 years ago. At that time, sea level was 400 feet lower than it is today.
- With the Details button underlined, click the button, Show Contents.
- Zoom and pan the map as needed to answer the following question.
- ? What significant differences do you see between current landmass outlines and those of 20,000 years ago?
[Possible answers: Alaska was connected to Russia; Florida was much larger; Australia was connected to the islands of Indonesia.]

! Acquire

What would the continents look like if sea levels started to rise?

- If the western ice sheet melted, scientists predict that the oceans would rise about 5 meters. If the eastern ice sheet melted, sea level would rise about 50 meters. If all the ice at the South Pole melted, including all the ice shelves and glaciers, sea level would increase by 73 meters.
- One by one, check the boxes next to each Sea Level Increase layer to turn them on.
- ? Record an observation about each continent as sea levels rise. *[Plus 5 meters: Some southern United States coastal cities (like Miami) will be under water. Plus 50 meters: Dramatic; most of Florida under water, large gap in Amazon Basin in South America, Netherlands almost entirely gone. Total thaw, plus 73 meters: Large portions of South America, Australia, and the southeast United States are gone.]*

🔍 Explore

How would rivers and lakes be affected by sea level rise?

- Turn on all layers except Antarctica Plus 50, Country Outlines, Rivers, and Lakes.
- Zoom to the South America bookmark. (See the ToolTip on the next page for details.)
- ? What changes do you see in the rivers? *[Possible answers: A large lake in the north-central area is the result of the increased water level of the Amazon River. The Paraná River in Argentina and the Amazon River are significantly shorter.]*
- ? With a sea level increase of 50 meters, what kinds of consequences do you foresee for the major river ecosystems of South America? Provide a specific example. *[Possible answer: The Amazon River may flood the rainforests of central South America.]*

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Analyze

How would a 50-meter rise affect coastlines and political boundaries?

- Zoom to the Southwest Asia bookmark.
- Turn on the layer, Major Cities data.
- Toggle between a 50-meter and 5-meter rise in sea level.
- ? Taking note of significant changes in the amounts of land remaining in Southwest Asia, which country might be affected by land loss. *[Answers may vary, but Iraq has substantial land loss.]*
- In the upper-left corner of the map, click the Full Extent button (house).
- Repeat the process of zooming and identifying potential consequences of the rising sea level for the other major regions.

Act

What would you predict could be the political consequences of a 50-meter sea level rise?

- ? Predict possible consequences of the 50-meter rise in sea level to the populations living in different areas of the globe. *[Possible answers: Political disputes, trade and economic issues, and transportation problems.]*

ZOOM TO A BOOKMARK

- Click Bookmarks.
- Click a bookmark name to zoom to a map location and scale.

TURN A MAP LAYER ON AND OFF

- Make sure that the Details pane is selected, and then click Contents.
- To show individual map layers, check the boxes next to the layer names.
- Hint: If a map layer name is light gray, zoom in or out on the map until the layer name is black. The layer can now be turned on.

Next Steps

DID YOU KNOW? ArcGIS Online is a mapping platform freely available to public, private, and home schools. A school subscription provides additional security, privacy, and content features. Learn more about ArcGIS Online and how to get a school subscription at <http://www.esri.com/schools>. **THEN TRY THIS...**

- Click the Elevation Tinted Hillshade, and then click the More Options button (three dots) and choose Transparency.
- Adjust the transparency until you can see the country boundaries.
- Evaluate which countries have mountains and where they are in relation to country borders.

TEXT REFERENCES

This GIS map has been cross-referenced to material in sections of chapters from these middle school texts.

- *World Cultures and Geography* by McDougal Littell
- *My World Geography* by Pearson