

Global Warming and Sea Level Worksheet

Most authorities suggest that global warming will cause the sea level to rise as polar regions warm and polar ice melts. However, others assert that warming the poles will result in more snow, thus a greater accumulation of ice, and not melting. But there is one effect that can be easily evaluated arithmetically: the impact on sea level resulting from warming the water. The coefficient of thermal expansion (c.t.e.; also referred to as coefficient of cubic expansion) of seawater is approximately 0.00019 per degree Celsius. This simply means that for each °C increase in the temperature of a given amount of seawater, the volume of the water will expand by this fraction. Since ocean basins are constrained by their bottoms and “sides” the only way to go is up. Up means onto land that is presently above sea level, and this could result in extensive coastal flooding.

To calculate how an increase in seawater temperature would affect the sea level, simply multiply the average ocean depth (3,850 m) in centimeters by the c.t.e., multiplied by the number of degrees of temperature increase. The resulting number is the expansion in 3 directions, but the ocean can only expand in one direction, so multiply the answer by 3 to determine the rise of sea level.

1. How much would each °C increase in seawater temperature cause the sea level to rise? Express your answer in centimeters and feet.(30 cm = 1 ft). **SHOW WORK**

2. Evaluate the impact of a 1°C and a 4 °C increase in seawater temperature on coastal communities such as Virginia Beach, Virginia, where 400,000 people live in an area that is at 4 feet above sea level.

3. The U.S. has 5% of the world’s population but emits about 22% of the total greenhouse gases released. Do you think Americans have a responsibility to prevent a rise in sea level or to address the effects caused by the build-up of these gases? In a paragraph, state your reasons and discuss. If you think that Americans do have a responsibility, describe what we could do to either decrease the effect or assist people

affected by the increase in sea level. Be specific and explain your choices.-(use the back of this sheet to answer.)