SPEAK UP & ACT NOW: SHORT GUIDES TO ADDRESS CLIMATE CHANGE[i]

SEA LEVEL RISE

QUESTION: How is climate change causing sea level rise and how is it harmful?

ANSWER: Global average air and ocean temperatures are markedly increasing. This is due to the rapid buildup of greenhouse gases in the atmosphere from human activity, particularly the burning of fossil fuels. There are three primary causes of sea level rise:

- **Thermal Expansion.** Warmer ocean water expands (called "thermal expansion"), leading to higher sea levels.
- **Melting Ice Sheets.** Higher temperatures are causing large sheets of land ice to melt in places like Antarctica and Greenland. This meltwater flows into the oceans, adding to the total volume of water.
- **Storm Surge.** The more severe storms that are forming over oceans as a result of warmer temperatures are also causing sea level rise on an episodic basis. This is because of "storm surge," which is the rise in sea level during a storm due to the storm's strong winds pushing water onshore.

According to the National Oceanic and Atmospheric Administration (NOAA), the current rate of sea level rise is unprecedented; it has doubled since 1993, and it set a new record high in 2023.

WHY IS SEA LEVEL RISE HARMFUL?

Risk to People. According to the Intergovernmental Panel on Climate Change (IPCC), 600 million people live in coastal areas that are at risk from sea level rise. Places like Bangladesh, the Maldives, and major cities like Miami and New York are especially vulnerable. Many people have already been displaced as a result of severe coastal storms and the resulting storm surges, and many more will likely be displaced due to long-term sea level rise. This is leading to "climate migration" where communities, especially in island nations and coastal areas, are forced to relocate. This displacement creates humanitarian, social, and political challenges.

Risk to Infrastructure and Water Supplies. Large coastal population centers are supported by extensive infrastructure like roads, bridges, and local utilities, which are at risk of severe flooding due to sea level rise. Sea level rise is also causing increased saltwater intrusion into fresh groundwater, rendering the water unusable for drinking or crop irrigation without treatment.

Risk to Ecosystems. Sea level rise threatens coastal habitats like wetlands, mangroves, and shorelines. Many biodiversity hotspots are located in these coastal habitats. Sea level rise will impact these ecosystems through greater tidal ranges, changes in salinity, and erosion, which can be deadly for fish, bird, and plant species.

ACTIONS – WHAT CAN WE DO?

Addressing sea level rise requires a combination of strategies that focus on mitigating climate change while also adapting to the effects of sea level rise. These strategies will require individual lifestyle changes, urban planning and policy reforms, and national and global policy initiatives.

1. **MITIGATE CLIMATE CHANGE.** We need to reduce greenhouse gases released into the atmosphere to slow global warming. Key ways to do this are to use renewable sources of energy instead of fossil fuels (e.g., green the electrical grid); stop deforestation and promote reforestation; electrify transportation, heating, and cooling; and utilize carbon capture and storage technologies.

2. **ADVOCATE FOR CLIMATE-CONSCIOUS POLICY AT THE LOCAL, STATE, AND NATIONAL LEVEL.** Advocate for laws and policies that address climate change and sea level rise, such as setting emissions reduction targets; holding fossil fuel companies accountable for their pollution (like the Make Polluters Pay movement, for example); and promoting sustainable development and coastal resiliency.

3. **IMPLEMENT STRATEGIES IN COASTAL AREAS TO ADAPT TO RISING SEA LEVELS.** Coastal adaptation includes short-term and long-term strategies. **Short-term strategies** may include improving drainage in anticipation of increased storm surges and flooding and implementing other safeguards to protect critical infrastructure near the coast. **More sustainable, permanent strategies** include managed retreat from areas at risk from sea level rise and restoration of coral reefs, mangroves and other coastal wetlands, and coastal dunes—all of which act as buffers during high tides and storm surges.

4. **TAKE PERSONAL ACTIONS.**
   - **Reduce your carbon footprint.** Minimize energy use, switch to renewable energy, electrify your home and personal vehicle, and reduce meat and dairy consumption to lower greenhouse gas emissions.
   - **Prepare your property.** If you live in a vulnerable coastal area, explore ways to safeguard your home, such as improving drainage or elevating your house.
   - **Participate in local environmental efforts.** Get involved in coastal restoration projects.

RESOURCES – WHERE CAN I LEARN MORE?

- Sea Level Rise 101 by Caroline Craig and Brian Palmer, Natural Resources Defense Council (NRDC)
- Understanding Sea Level, NASA
- What Is Storm Surge?, National Ocean Service website, National Oceanic and Atmospheric Administration (NOAA)
- The Facts About Sea Level Rise, Surging Seas website, Climate Central
- Sea Level Rise and Coastal Cities (video featuring Jack Black), National Geographic

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[i] Prepared by members of the University of Richmond Osher Special Interest Group on addressing climate change (2024-25)