ACS Climate Change Advocacy Workshop

Societal and environmental impacts accessibility text

Higher land temperatures
Land and ocean surface temperatures are increasing and lasting longer. Some of the impacts from higher land temperatures are:

- Rise in energy demands (and costs)
- Greater risk for diseases in humans and in marine life
- Additional and more intense heat waves
- Increased likelihood of droughts
- Less snow overall
- Reduced ice cover of oceans, which causes more energy to be absorbed from the sun, leading to even more ice melting and reduction in ice cover.

Ocean Acidification
Our oceans are absorbing more carbon dioxide, causing the pH of the waters to drop. Its impacts are seen as follows:

- Setting conditions that eat away at minerals used by shellfish, reef-building corals, and pteropods (tiny snails) to build their shells and skeletons
- Has potential to negatively alter marine food chains
- Threatens $1 billion U.S. shellfish industry
- Can destroy an important source of food for humans, potentially triggering migration and conflict.
- Allows for harmful algal species to thrive and bloom faster, producing more toxins and threatening human health.

Sea Levels
Increases in average global temperatures have and will continue to result in rising sea levels primarily caused by melting ice sheets and glaciers, as well as the expansion of seawater due to its warming.
According to NOAA, sea level along the U.S. coastline is projected to rise 10 - 12 inches on average in the next 30 years (2020 - 2050). For context, this is equivalent to the rise measured from 1920 - 2020. Importantly, failure to curb future greenhouse gas emissions could cause an additional rise of 1.5 - 5 feet by 2100.

This has the propensity to:

- Damage infrastructure (homes, roads, bridges, water supplies, power plants, etc.)
- Cause flooding and loss of human life
- Contaminate freshwater aquifers
- Harm coastal ecosystems
- Harm inland systems due to tide and storm surges
- Impact U.S. and world life (40% of U.S. population lives in coastal areas and 8 out of the world's 10 largest cities are near a coast)

This map by the 4th National Climate Assessment shows coastal sea level change projections for the U.S. under two different scenarios, a low and high sea level rise. The colors indicate relative sea level change in feet. Blue indicates sea level drop down to -6 feet, and red indicates up to 6 feet of sea level rise. In some areas, land is sinking, and in other areas like Alaska, land is rising, which impacts the overall sea level change in each regional area.

The maps of Miami, FL and Shanghai, China show what the cities are projected to look like with sea level rise.

Heavy Precipitation
High precipitation refers to singular instances when snow or rain greatly exceeds normal levels. Climate change has and will continue to affect the intensity and frequency of these events, which in turn can impact:

- Flood risk to communities
- Crop damage
- Soil Erosion
- Infrastructure
- Drinking water quality

Drought
With average temperatures rising due to climate change, historically drier areas in the United States and world are likely to experience less precipitation and increased risk of drought. This in turn has and can result in:

- Lowered reservoir levels and water availability for daily human use
- Impact energy production resources
- Increased risk of wildfires
- Slowed plant growth used by humans and wildlife

Tornadoes
Tornadoes require humid air and unstable conditions to form. Climate change is shifting atmospheric conditions, altering the intensity and location of storms.

It remains difficult to show that a specific tornado is linked to climate change, but by changing conditions the formation of tornadoes can become more likely to happen. This can:

- Damage infrastructure (homes, roads, bridges, water supplies, power plants, etc.)
- Create newly vulnerable communities, impact their preparedness
- Cause human and potentially crop loss

Microbes
Microorganisms, or microbes, are the most abundant and diverse group of organisms on Earth, and include bacteria, archaea, algae, fungi, protozoa, and more

They live almost everywhere on Earth -- from soils, lakes, and deserts, to cities, the ocean floor, hot springs, and on snow-packed mountains. In every habitable environment, they interact with their surroundings and influence processes.

Some microbes naturally produce methane and other GHG's, whereas others naturally help to mitigate climate change by consuming methane, carbon dioxide, and other GHG's to live.

Human-induced climate change will affect microbial communities and how they function, which leads to more unknowns when trying to understand future climate change scenarios. For example:

- In the Arctic, thawing permafrost will allow for more methane-producing microbes to grow and thrive.
- In agriculture, climate change will impact microbes that are critical to plant productivity.

It's important for scientists to continue studying the role these tiny organisms play in the global carbon cycle, and ways they could help to inform and address climate change.

For more information: https://asm.org/ASM/media/Academy/Academy%20Reports/Microbes-Climate-Change-Science,-People-Impacts-Report.pdf