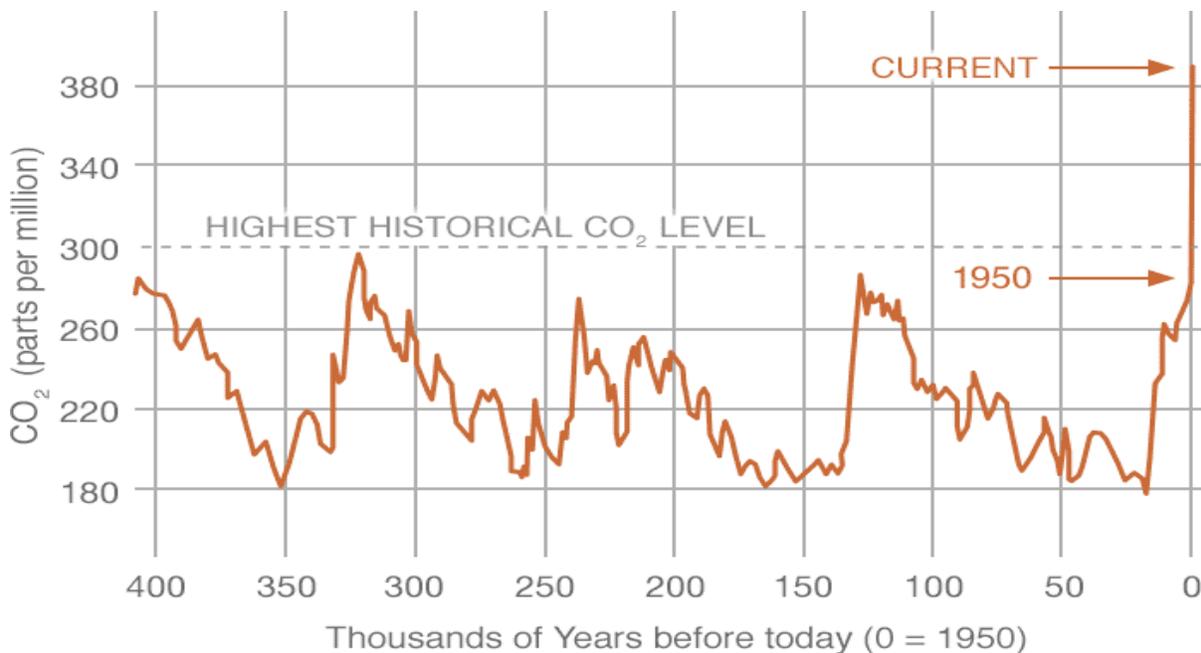


Climate Change Overview

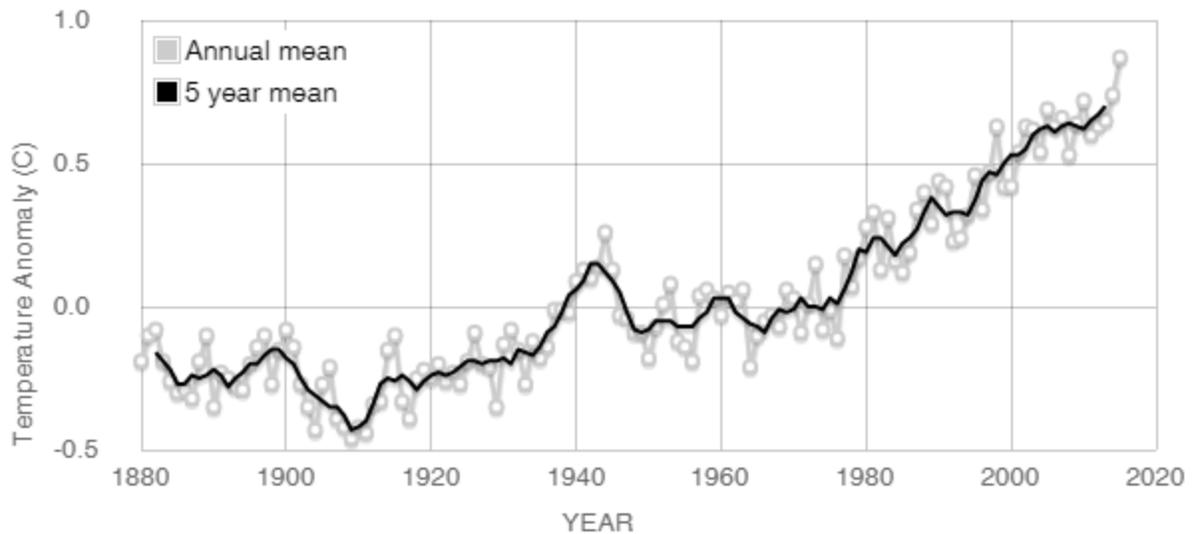
The Greenhouse Effect: Solar radiation gets captured by greenhouse gases like water vapor, carbon dioxide, methane, and nitrous oxide and is retained as heat in our atmosphere. The combustion of fossil fuels like coal, oil, and natural gas emits high concentrations of greenhouse gases into the atmosphere, where they would have normally been buried deep underground. Compounded with the impacts of deforestation, this uneven shift in the carbon cycle poses many risks, some of which are already visible today.

Atmospheric Carbon: Earth's carbon dioxide content in the atmosphere is currently 403 ppm (Feb. 2016), over 100 ppm higher than it was in 1950.



Global Warming: As a result of human activities causing this heat entrapment, the earth has warmed by 0.87 degrees Celsius (1.57 degrees F) since pre-industrial levels (1880). 2015 was the warmest year on record. The UN Intergovernmental Panel on Climate Change (IPCC) which includes over 1,300 scientists from across the world forecasts a global temperature increase from 2.5 to 10 degrees Fahrenheit over the next 100 year.

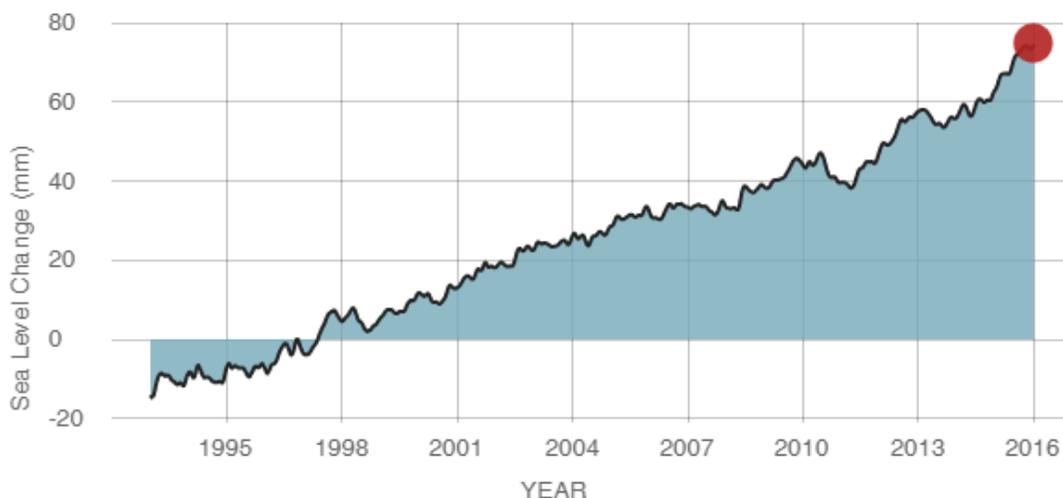
Did you know? In Paris, November 2015, 195 countries, including the U.S. signed an agreement to reduce greenhouse gas emissions in order to prevent global temperatures rising beyond a 1.5 degree Celsius threshold that scientists target as the limit for preventing irreversible, catastrophic damage due to climate change.



Ocean Acidification: Carbon in the atmosphere is also transferred to the ocean in the form of carbonic acid (H_2CO_3). Since carbon is slightly acidic in water, increasing carbon concentrations in our oceans is leading to ocean acidification. Since many sea organisms produce calcium carbonate shells and exoskeletons, increasingly acidic oceans pose a significant risk to the ocean ecosystem. Shellfish, coral, and pteropods (which are a major food source for krill whales and salmon) are most at risk. Disrupting the marine food web could have catastrophic effects on fishing communities and those reliant upon the ocean as a food source.

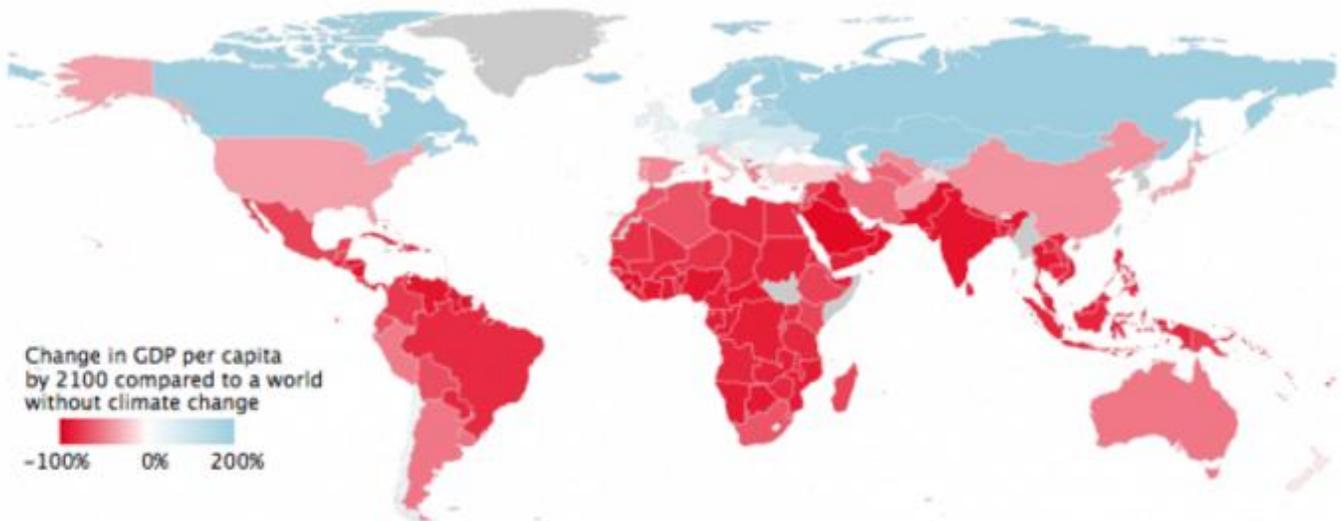
Polar Ice Melt: Arctic sea ice is declining at a rate of 13.4% per decade since 1979. Antarctica is losing 134 billion metric tons of ice per year, while Greenland is losing 287 billion metric tons of ice per year. Adding more freshwater into our oceans causes sea levels to rise and thawing permafrost is attributed to methane release from previously frozen microbes springing back to life. The loss of the reflective ice and snow cover increases the thermal absorption of Earth, further compounding the issue.

Sea Level Rise: Sea levels are rising not only due to added water from melting land ice but also the expansion of sea water as it warms. Sea levels have risen by approximately 8 inches since 1880. It is projected to rise another 1 to 4 feet by 2100. Over 200 million people live within coastal flood plains. Coastal cities like New York City, New Orleans, Miami, Shanghai, London, Mumbai, and Rio de Janeiro are anticipated to be under water if a 2-4 degree Celsius increase in global temperatures is reached, as projected. Some smaller island countries like Fiji and the Maldives may even disappear.



Increased Extreme Weather Events: Due to the relative size of the oceans vs. land on earth, the oceans have absorbed 84% of the increased heat due to global warming. This heat allows for hurricanes and tropical weather to develop to catastrophic strengths and strike areas much further from the tropics than ever before. With increased water vapor in the atmosphere due to higher evaporation rates, wet weather events like floods and blizzards will become more frequent and extreme in some regions but draught and famine due to temperature increase will occur in others.

Economic Impacts: The economic impacts of not acting on climate change are estimated at \$44 trillion by the year 2060. In the short term, climate change will likely worsen existing global inequalities, with the richest 20 percent of countries experiencing slight gains as the world warms due to longer growing seasons. The poorest 40 percent of countries will likely see a 75 percent reduction in average income in 2100.



Change in GDP per capita by 2100 compared to a world without climate change. CREDIT: BURKE, HSIANG, & MIGUEL (NATURE, 2015)

Social Impacts: Competition over resources may lead to political instability and conflict. Rural communities and the urban poor will be most impacted because disadvantaged groups do not have the resources to adjust to such events as flooding or droughts that may force them to relocate or change their way of life. Small farmers will struggle to compete further with large-scale monoculture farms due to shifts in precipitation patterns and the growing season. Developing countries who are less to blame for the increase in greenhouse gases in our atmosphere will have more difficulty adapting than first world countries.

How Can We Limit the Impact? We must reduce our carbon footprint. From passing legislation restricting, or taxing carbon emissions to cutting federal subsidies to fossil fuel industries, governments play a pivotal role in setting the precedent for limiting climate change. Supporting the growth and development of clean renewable energy technologies is also paramount. Individuals also have the ability to reduce their own carbon footprint in many ways:

- **Be Energy Efficient:** Buildings consume 40% of the energy generated in the U.S. Reduce your electric and heating bills at home by employing some quick and easy energy efficiency techniques. You can start by evaluating your energy usage behaviors. Do you always turn the lights off when you leave the room? Do you leave electronics plugged in when not in use? Do you take unnecessarily long showers? After making some habit changes, switching out old incandescent bulbs in favor of new energy efficient LEDs is another step in the right direction. Dialing back thermostats or installing a programmable one that adjusts around your life schedule can also help you save money and energy. Check out this [guide](http://energy.gov/sites/prod/files/2014/09/f18/61628_BK_EERE-EnergySavers_w150.pdf) for more tips on saving energy at home: http://energy.gov/sites/prod/files/2014/09/f18/61628_BK_EERE-EnergySavers_w150.pdf

- **Green Your Commute:** The average American household spends nearly \$2,000 on gasoline and motor oil each year. By carpooling you could save a significant amount of money and cut your personal carbon footprint. The *EKU Rides* ridesharing program is a great way to find other people who share the same commute as you. Register for free at <https://www.zimride.com/eku/>.
- **Reduce Your Waste:** Americans throw away 4.4 pounds of waste on average per person per day. About one third of that gets recycled, however the energy used in the resource extraction, production, collection, and reprocessing of materials is substantial. This is a primary reason to follow the “reduce, reuse, recycle” hierarchy rather than simply assume recycling is good enough. Not to mention landfills emit methane, a potent greenhouse gas, as materials begin to naturally break down over time. ECU is reducing its carbon footprint associated with waste by considering product sustainability in all new purchases, reducing waste when possible, reusing and repurposing materials such as office furniture, and recycling paper, cardboard, plastics, aluminum cans, metals, batteries, electronics, and other materials.
- **Eat Smarter:** Low impact dining is another great way to reduce your carbon footprint as well as support the local economy. A diet consisting primarily of local fruits and vegetables is far less energy intensive than one consisting heavily of animal products and imported and processed foods. Not only is eating local better for the environment, the food is generally fresher and healthier for you! Be sure to also choose organic, ethically raised, and sustainably sourced foods as possible. ECU has a local farmers’ market each week during the growing season as well as a community garden where employees and students can grow their own food on campus. For more about these programs visit: <http://wellness.ecu.edu>
- **Choose Renewable Power:** Renewable energy options are becoming increasingly affordable in many energy markets. Technologies such as wind power and solar photovoltaic offer carbon free, sustainable energy that can even help offset your long term energy costs. Be sure to evaluate your energy source options from time to time as market variabilities fluctuate frequently.
- **Get Involved:** Be an agent for change in your community. Support leaders who prioritize local, national, and global climate action in their campaigns. Join community groups focused on environmental issues and stay plugged into environmental news. Climate change impacts everyone!

Sources:

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