

Subject: Political Science
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Course: 203, Unit V

What is global warming? How has global warming affected the world so far? What impacts will global warming have in the future?

Marks: 5+8+7

Details can be found from this link:
<https://www.vox.com/science-and-health/2017/6/1/15724164/9-questions-climate-change-too-embarrassed-to-ask>

Introduction:

The planet's temperature has changed before, but it's the rise in average temperature of the Earth's climate system since the late 19th century, the dawn of the Industrial Revolution, that's important here. Temperatures over land and ocean **have gone up** 0.8° to 1° Celsius (1.4° to 1.8° Fahrenheit), on average, in that

Many people use the term “climate change” to describe this rise in temperatures and the associated effects on the Earth's climate. Global warming refers to what scientists think will happen in the future if humans *keep* adding greenhouse gases to the atmosphere.

Though there is a steady stream of new studies on climate change, one of the most robust aggregations of the science remains the Intergovernmental Panel on Climate Change's **fifth assessment report** from 2013. The IPCC is convened by the United Nations, and the report draws on more than 800 expert authors. It **projects** that temperatures could rise at least 2°C (3.6°F) by the end of the century under many plausible scenarios — and possibly 4°C or more. A more recent **study** by scientists in the United Kingdom found a narrower range of expected temperatures if atmospheric carbon dioxide doubled, rising between 2.2°C and 3.4°C.

Many experts consider 2°C of warming to be **unacceptably high**, increasing the risk of deadly heat waves, droughts, flooding, and extinctions. Rising temperatures will drive up global sea levels as the world's glaciers and ice sheets melt. Further global warming **could affect** everything from our ability to grow food to the spread of disease.

How has global warming affected the world so far?

Here's a list of ongoing changes that climate scientists have concluded are likely linked to global warming, as detailed as follows

1. **Higher temperatures:** Every continent has warmed substantially since the 1950s. There are **more hot days** and fewer cold days, on average, and the hot days are hotter.
2. **Heavier storms and floods:** The world's atmosphere can hold more moisture as it warms. As a result, the overall number of heavier storms has **increased** since the mid-

20th century, particularly in North America and Europe (though there's plenty of regional variation).

- 3. Heat waves:** Heat waves have become **longer and more frequent** around the world over the past 50 years, particularly in Europe, Asia, and Australia.
- 4. Shrinking sea ice:** The extent of sea ice in the Arctic, always at its maximum in winter, has shrunk since 1979, by **3.3 percent** per decade. Summer sea ice has dwindled even more rapidly, by **13.2 percent** per decade. Antarctica has seen recent years with **record growth** in sea ice, but it's a very different environment than the Arctic, and the losses in the north far exceed any gains at the South Pole, so total global sea ice is on the decline:
- 5. Shrinking glaciers and ice sheets:** Glaciers around the world have, on average, been losing ice since the 1970s. In some areas, that **is reducing** the amount of available freshwater. The ice sheet on Greenland, which would raise global sea levels by 25 feet if it all melted, is declining, with some sections experiencing a **sudden surge** in the melt rate. The Antarctic ice sheet is also getting smaller, but at a much **slower rate**.
- 6. Sea level rise:** Global sea levels rose 9.8 inches (25 centimeters) in the 19th and 20th centuries, after 2,000 years **of relatively little change**, and the pace is **speeding up**. Sea level rise is caused by both the thermal expansion of the oceans — as water warms up, it expands — and the melting of glaciers and ice sheets (but not sea ice).
- 7. Food supply:** A hotter climate can be both good for crops (it lengthens the growing season, and more carbon dioxide can increase photosynthesis) and bad for crops (excess heat can damage plants). The IPCC **found** that global warming was currently benefiting crops in some high-latitude areas but that negative effects are becoming increasingly common worldwide. In areas like California, crop yields are estimated to decline **40 percent** by 2050.
- 8. Shifting species:** Many land and marine species **have had to shift** their geographic ranges in response to warmer temperatures. So far, several extinctions **have been linked** to global warming, such as certain frog species in Central America.
- 9. Warmer winters:** In general, **winters are warming faster than summers**. Average low temperatures are rising all over the world. In some cases, these temperatures are climbing above the freezing point of water. We're already seeing massive declines in snow accumulation in the United States, which can paradoxically increase flood, drought, and wildfire risk — as water that would ordinarily dispatch slowly over the course of a season instead flows through a region all at once.

What impacts will global warming have in the future?

Here's a basic rundown of big impacts we can expect if global warming continues:

- 1. Hotter temperatures:** If emissions keep rising unchecked, then global average surface temperatures will be at least 2°C higher than preindustrial levels by 2100 — and possibly 3°C or 4°C or more.
- 2. Higher sea level rise:** The expert consensus is that global sea levels will rise somewhere between **0.2 and 2 meters** by the end of the century if global warming continues unchecked.
- 3. Heat waves:** A hotter planet will mean more frequent and severe **heat waves**.
- 4. Droughts and floods:** Across the globe, wet seasons are expected to become wetter, and dry seasons drier.

5. **Heavier storm surges:** Higher sea levels will increase the risk of storm surges and flooding when storms do hit.
6. **Agriculture:** In many parts of the world, the mix of increased heat and drought is expected to make food production more difficult.
7. **Extinctions:** As the world warms, many plant and animal species will need to shift habitats at a rapid rate to maintain their current conditions.
8. **Long-term changes:** Most of the projected changes above will occur in the 21st century. But temperatures will keep rising after that if greenhouse gas levels aren't stabilized. That increases the risk of more drastic longer-term shifts..

Conclusion

How do we stop global warming?

The world's nations would need to cut their greenhouse gas emissions by a lot. And even that wouldn't stop all global warming.

Cutting emissions that sharply is a daunting task. Right now, the world gets 87 percent of its primary energy from fossil fuels: oil, gas, and coal. By contrast, just 13 percent of the world's primary energy is "low carbon": a little bit of wind and solar power, some nuclear power plants, a bunch of hydroelectric dams. That's one reason global emissions keep rising each year.

To stay below 2°C, that would all need to change radically. By 2050, the world would need to triple or even quadruple the share of clean energy it uses — and keep scaling it up thereafter. Second, we'd have to get dramatically more efficient at using energy in our homes, buildings, and cars. And stop cutting down forests. And reduce emissions from agriculture and from industrial processes like cement manufacturing.
