Harnessing education's power for positive climate action



Scientists are observing changes in the Earth's climate in every region and across the whole climate system, according to the latest Intergovernmental Panel on Climate Change (IPCC) Report.

The IPCC is the UN body for assessing the science related to climate change.

Many of the changes observed in the climate are unprecedented in thousands, if not hundreds of thousands of years, and some of the changes already set in motion – such as continued sea level rise – are irreversible over hundreds to thousands of years.

However, strong and sustained reductions in emissions of carbon dioxide (CO_2) and other greenhouse gases would limit climate change.

While benefits for air quality would come quickly, it could take 20-30 years to see global temperatures stabilise, according to the IPCC Working Group I report, Climate Change 2021: the Physical Science Basis.

The Working Group I report is the first instalment of the IPCC's Sixth Assessment Report (AR6), which will be completed in 2022.

"This report reflects extraordinary efforts under exceptional circumstances," said IPCC Chair Hoesung Lee.

“The innovations in this report, and advances in climate science that it reflects, provide an invaluable input into climate negotiations and decision-making.”

Faster warming

The report provides new estimates of the chances of crossing the global warming level of 1.5°C in the next decades, and finds that unless there are immediate, rapid and large-scale reductions in greenhouse gas emissions, limiting warming to close to 1.5°C or even 2°C will be beyond reach.

The report shows that emissions of greenhouse gases from human activities are responsible for approximately 1.1°C of warming since 1850-1900, and finds that averaged over the next 20 years, global temperature is expected to reach or exceed 1.5°C of warming.

This assessment is based on improved observational datasets to assess historical warming, as well as progress in scientific understanding of the response of the climate system to human-caused greenhouse gas emissions.

“This report is a reality check,” said IPCC Working Group I Co-Chair Valérie Masson-Delmotte.

“We now have a much clearer picture of the past, present and future climate, which is essential for understanding where we are headed, what can be done and how we can prepare.”

Every region facing increasing changes

Many characteristics of climate change directly depend on the level of global warming, but what people experience is often very different to the global average.

For example, warming over land is larger than the global average, and it is more than twice as high in the Arctic.

“Climate change is already affecting every region on Earth, in multiple ways. The changes we experience will increase with additional warming,” said IPCC Working Group I Co-Chair Panmao Zhai.

The report projects that in the coming decades climate changes will increase in all regions. For 1.5°C of global warming, there will be increasing heat waves, longer warm seasons and shorter cold seasons.

At 2°C of global warming, heat extremes would more often reach critical tolerance thresholds for agriculture and health, the report shows.

But it is not just about temperature. Climate change is bringing multiple different changes in different regions – which will all increase with further warming.

These include changes to wetness and dryness, to winds, snow and ice, coastal areas and oceans. For example:

- Climate change is intensifying the water cycle. This brings more intense rainfall and associated flooding, as well as more intense drought in many regions.
- Climate change is affecting rainfall patterns. In high latitudes, precipitation is likely to increase, while it is projected to decrease over large parts of the subtropics. Changes to monsoon precipitation are expected, which will vary by region.
- Coastal areas will see continued sea level rise throughout the 21st century, contributing to more frequent and severe coastal flooding in low-lying areas and coastal erosion. Extreme sea level events that previously occurred once in 100 years could happen every year by the end of this century.
- Further warming will amplify permafrost thawing, and the loss of seasonal snow cover, melting of glaciers and ice sheets, and loss of summer Arctic sea ice.
- Changes to the ocean, including warming, more frequent marine heatwaves, ocean acidification and reduced oxygen levels have been clearly linked to human influence. These changes affect both ocean ecosystems and the people that rely on them, and they will continue throughout at least the rest of this century.
- For cities, some aspects of climate change may be amplified, including heat (since urban areas are usually warmer than their surroundings), flooding from heavy precipitation events and sea level rise in coastal cities.

For the first time, the Sixth Assessment Report provides a more detailed regional assessment of climate change, including a focus on useful information that can inform risk assessment, adaptation and other decision-making, and a new framework that helps translate physical changes in the climate – heat, cold, rain, drought, snow, wind, coastal flooding and more – into what they mean for society and ecosystems.

This regional information can be explored in detail in the newly developed Interactive Atlas (interactive-atlas.ipcc.ch) as well

as regional fact sheets, the technical summary, and underlying report.

Human influence on the past and future climate

“It has been clear for decades that the Earth’s climate is changing, and the role of human influence on the climate system is undisputed,” said Dr Masson-Delmotte.

Yet the new report also reflects major advances in the science of attribution – understanding the role of climate change in intensifying specific weather and climate events such as extreme heat waves and heavy rainfall events.

The report also shows that human actions still have the potential to determine the future course of climate. The evidence is clear that carbon dioxide is the main driver of climate change, even as other greenhouse gases and air pollutants also affect the climate.

“Stabilising the climate will require strong, rapid and sustained reductions in greenhouse gas emissions, and reaching net zero CO2 emissions. Limiting other greenhouse gases and air pollutants, especially methane, could have benefits both for health and the climate,” said Professor Zhai.

Read more on page 18 about what you can do as an educator do to help tackle the climate change crisis.



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