

EXPLAINED

Relevant for: Environment | Topic: Environmental Degradation - GHGs, Ozone Depletion and Climate Change

The IPCC's Sixth Assessment Report asserts that the contribution of greenhouse gas emissions from various activities is the scientific basis for global warming and climate change. | Photo Credit: [AFP](#)

The story so far: In one of the most categorical statements from a scientific body in the U.N. system, [a working group of the Intergovernmental Panel on Climate Change \(IPCC\) said in a report](#) released on August 9 that human activities were unequivocally the principal driver of changes in the atmosphere, ocean, cryosphere and biosphere, in other words, of climate change. Man-made emissions of greenhouse gases (GHGs), led by carbon dioxide, methane and nitrous oxide since the industrial era, were altering the climate system, raising average surface temperature globally. The contribution of Working Group I to the IPCC Sixth Assessment Report is one of the three such technical reports, the other two being on impacts, adaptation and vulnerability (WG II) and mitigation (WG III) expected later this year, ahead of a synthesis report next year.

Editorial | [Code red: On IPCC's warning on climate points](#)

The WG I report asserts, leaving nothing to doubt, that the contribution of GHG emissions from various activities is the scientific basis for global warming and climate change. These actions include the burning of fossil fuels for energy and transport, emissions from agriculture and waste, and energy profiles of buildings. Compared with the period 1850-1900, the increase in global surface temperature for the decade 2011-2020 is estimated to be 1.09°C, an indication of how much the world has warmed. This must be viewed against the consensus under the [Paris Agreement of the U.N. Framework Convention on Climate Change \(UNFCCC\)](#) that the world should act to limit warming compared to levels that existed before the industrial revolution to well below 2°C, and preferably 1.5°C. The WG I report devotes itself to assessing what impacts would accrue to various dimensions of the planet, such as land, oceans, mountains, polar regions, glaciers and water cycle, under different emissions scenarios. Even in the best case scenario, the global surface temperature increase averaged between 2081 and 2100 could be 1.0°C to 1.8°C, while in a high emissions scenario, it could go to a searing 3.3°C to 5.7°C. Since the original pledges of the Paris Agreement are insufficient to keep warming to well below 2°C, deep and early cuts to greenhouse gas emissions are necessary.

IPCC report forecasts a future of severe weather

A warmer world is estimated to have a big impact on extremes of temperature and rainfall with implications for human health, ecosystem survival and sustainable economic activity. The report says it is “virtually certain that hot extremes (including heatwaves) have become more frequent and more intense across most land regions” as witnessed since the 1950s, while cold extremes (including cold waves) “have become less frequent and less severe”. Scientific confidence is now high that human-induced climate change is the main driver of these changes. There are other impacts too. Climate change has contributed to increases in agricultural and ecological droughts in some regions due to increased land evapotranspiration, the report says. Enhanced warming is expected to amplify thawing of permafrost (subsurface soil in the polar regions that remains below freezing point year-round), and loss of seasonal snow cover, of land ice and of Arctic sea ice. Under scenarios of rising CO₂ emissions, two of the big carbon sinks on the planet — the oceans and land — may become less effective at slowing the accumulation of CO₂ in the atmosphere. Continued warming would influence the global water cycle, further

intensifying it, with consequences for “its variability, global monsoon precipitation and the severity of wet and dry events”, the WG I report adds.

India’s major concerns are centred around the health of the annual monsoon, the fate of Himalayan glaciers, heating over land, floods, droughts and overall impact on people’s well-being, agriculture and food production. Here, the report says with medium confidence that “heatwaves and humid heat stress will be more intense and frequent during the 21st century” and both annual and summer monsoon rainfall will rise, with a higher degree of variability between years. Such a situation creates a lot of uncertainty. It is important to note that over South Asia, among other regions, aerosol emissions notably from human activity had a cooling influence during the 20th century, which in turn counteracted increases in monsoon rainfall produced by warming. That aerosol effect could be overcome by persistent warming, leading to future high levels of rainfall. For the snow-covered areas, the outlook is, again, alarming. Snow volumes are forecast to decrease in most regions of the Hindu Kush Himalaya during the 21st century and the snowline elevations to go up while glacier volumes are likely to decline, with greater mass loss in scenarios of higher CO2 emissions.

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National Geographic photographer Ami Vitale’s latest film is on Retiti’s famed matriarch and the self-sustaining Samburu community

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