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IPCC report: Sea levels could be a metre higher by 2100

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By [Adam Vaughan](#)



Sea level is rising faster than we had thought

Aaron Parsons / EyeEm/Getty Images

Extreme sea level events that used to happen once a century will occur every year in many parts of the world by the middle of the century because of global warming, the [UN climate science panel](#) has warned.

In a wide-ranging report on how oceans, glaciers and ice sheets will react to a warming world, the Intergovernmental Panel on Climate Change hiked upwards its future projections for how much the seas could rise. Ko Barrett of US government agency NOAA says: “Sea level rise and associated impacts threatens the lives and livelihoods of large segments of our population.”

The IPCC report, by more than 100 scientists from over 80 countries, examines the state of climate change science on the oceans that cover 71 per cent of the Earth and the 10 per cent of the planet’s land covered by glaciers and ice sheets. “From the tops of high mountains into the depths of the oceans and the polar regions, these parts of our planet are already changing,” says Nerilie Abram of the Australian National University.

Arriving just days after the [UN climate summit in New York and huge global climate protests](#), the launch of the report in Monaco should add pressure on world leaders to take stronger action on emissions.

Two futures

Abram says: “We see two very different futures ahead of us. If we are able to take action to dramatically reduce greenhouse gas emissions we can limit how much these parts of the climate system will change in the future, and the impacts on people and ecosystems.” But failure to cut emissions will make it “very difficult” for humans and other species to adapt, she says.

In a worst case emissions scenario, a sea level rise of between 0.61m and 1.1m is now likely by 2100 – [10 centimetres higher than the IPCC’s last big assessment just six years ago](#) – due to a better understanding of how the Antarctic ice sheet is melting. The rise could be “substantially higher” if Antarctic ice disappears faster, the report says, echoing recent [research suggesting a rise of as much as 2m](#).

While 10cm extra may not sound like much, Michael Meredith of the British Antarctic Survey says even for a developed country it is serious and will require more coastal defences. For poorer countries, it could be much more challenging.

Serious storm surges that occur when tropical cyclones combine with higher sea levels will take place once a year by 2050 in some parts of the world, particularly in the tropics, rather than once a century as they have in the past. The IPCC notes one billion people will live in low-lying coastal areas by 2050, up from 680 million today.

Food and water

Another big impact will be on food. The oceans have absorbed 90 per cent of the heat from climate change so far, and will take 5-7 times more heat by 2100 if carbon emissions are unchecked. More warming limits the mixing of the layers of water in the ocean, and so reduces the oxygen and nutrients that marine life rely on. The report also projects an

increase in marine heatwaves, which Abram says are already affecting fisheries and aquaculture today.

Worryingly, the IPCC outlines how the Arctic could turbocharge climate change.

“Permafrost, frozen soil and rock, is thawing with the potential of adding more greenhouse gases to the atmosphere,” says Valerie Masson-Delmotte of the French Alternative Energies and Atomic Energy Commission. If emissions are high, permafrost area globally could fall as much as 69 per cent by 2100, releasing tens or even hundreds of gigatonnes of carbon by 2100, the IPCC said. By comparison, humanity [emitted 37.1 gigatonnes of carbon dioxide in 2018](#).

The IPCC says changes to Arctic sea ice in September, when the ice reaches its minimum extent each year, are “likely unprecedented” for at least a millennium. This year is the second lowest extent on record, the US National Snow and Ice Data Center [said on Monday](#). Even if the world manages to limit future temperature rises to 2°C, as countries have promised under the Paris climate deal, the IPCC says there is still up to a 35 per cent chance that the Arctic will be ice-free in summer by 2100.

The IPCC sees glaciers continuing to decline around the world, losing more than a third of their mass by 2100 under worst case emissions scenarios, with [some disappearing entirely](#). Such losses pose “unavoidable consequences for river runoff and local hazards”, and will cause problems for the billions who rely on the water for drinking supplies and irrigation.

The EU environment chief, Karmenu Vella, [called](#) the report “a wake-up call for the global community to tackle climate change.” The work on the oceans and cryosphere is the third special report by the IPCC in the past year, following [one on land use this summer](#), and an influential [one last year on limiting temperature rises to 1.5°C](#).

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