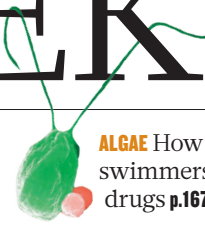


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A matter of (half) degrees

The latest IPCC assessment on a 1.5°C increase makes it clear that there is no safe level of global warming. But will people listen?

Readers who remember the 1960s and 1970s have already witnessed something remarkable in Earth's shared history: roughly half a degree's worth of global warming. And, yes, science now confirms the often-expressed sentiment that something feels different. More-intense heatwaves; more-powerful storms; more wildfires. And more on the way.

The likely changes associated with another half degree of warming over the next few decades are discussed in the latest assessment by the Intergovernmental Panel on Climate Change (IPCC). The picture is gloomy. Policymakers and others must take from it a sense of urgency, an understanding that climate change is a problem for the here and now, and a conviction that they can make a difference.

The special report on 1.5°C has its origins in the 2015 Paris climate agreement, in which 195 governments committed to limit global warming to "well below 2°C" while "pursuing efforts to limit the temperature increase to 1.5°C". Although their commitments to reduce emissions fall well short of either goal, governments still called on the IPCC to prepare a special report on the impacts that could be expected at 1.5°C — and how much worse things would get if the temperature rise reached 2°C (see page 172).

As the summary released on 8 October makes clear, 1.5°C is troubling enough — but there is a world of difference between 1.5 and 2°C. Yes, 1.5°C would bring increases in troublesome weather, such as the heatwaves, droughts, storms and flooding. Deeper issues lurk: the planet is undergoing rapid changes in how it looks and functions, and as greenhouse-gas emissions rise, so, too, does the risk of permanent damage.

The Arctic Ocean is projected to be completely free of ice once per century with a 1.5°C rise, or once per decade at 2°C. Sea levels are set to continue rising well beyond 2100. Many of today's ecosystems will shift or disappear: literature covering 105,000 species suggests that 6% of insects, 8% of plants and 4% of vertebrates could lose half of their territory with even 1.5 degrees of warming; those numbers increase by two or three times in the case of 2 degrees. The situation may be even worse in the oceans. At 1.5°C, the world could lose 70–90% of its coral reefs. They pretty much disappear entirely at 2°C — a threshold beyond which the risk of irreversible loss of marine ecosystems increases dramatically.

Governments also asked the IPCC for more information about what it would take to halt global warming at 1.5°C. Although earlier estimates suggested that the world could blow through its 1.5°C carbon budget within several years, the new budgets allow for a steady — but dramatic — downward trajectory that ends with zero carbon emissions in the middle of this century. Recent research does suggest the world has a bit more breathing space for reducing emissions to meet that goal.

But there is a danger that this signal — that we have more time than we thought — becomes the take-home message for policymakers. That would be a mistake. First, the carbon budgets are based on relatively recent and still-controversial research, and could yet be revised. Second, as the IPCC report makes clear, going carbon-neutral by mid-century is a terribly daunting challenge. Modelled scenarios that

maintain warming at 1.5°C assume that renewable energy sources such as wind and solar must account for 70–85% of global electricity production by 2050. Natural-gas-fired power plants equipped with carbon-capture and carbon-sequestration technology account for just 8% of the projected power needs, with coal close to zero.

This has dire implications for fossil-fuel infrastructure and investments, and will affect the price of energy, consumer products and jobs in many places. Governments — and businesses — will need to ensure that people who work in the fossil-fuel industries are not forgotten in the process. But the report also makes it clear that the benefits of aggressive action far outweigh the costs. Now in its 30th year, the IPCC has issued a valuable assessment based on a flurry of research conducted since 2015. It is just the latest in a long series of reports that now serve as both a scientific foundation and a warning about the perils of unchecked global warming. Unfortunately, the governments of the world have yet to take heed of this report's calls to spur new political momentum.

Projections based on current emissions commitments suggest that the world is on track for around 3°C of warming by the end of the century. On the basis of the cascade of changes now projected for 1.5°C, that is a frightening prospect indeed. If those days of the 1960s and 1970s seem as if they are from a different world, it's because they are. ■

"At 1.5°C, the world could lose 70–90% of its coral reefs. They pretty much disappear entirely at 2°C."

Crowd screen

Precision medicine relies on studies that track huge numbers of people.

Precision medicine aims to improve treatments for individuals, but to do so it needs information from crowds. Only by tracking the health of large numbers of people can the influence of genetics be teased out and incorporated into future tailored treatments. Scientists now report the success of such a project, the UK Biobank, which holds genetic, physical and clinical data from a large cohort of individuals in the United Kingdom. Many nations have launched biobank projects, including Estonia, Japan, Canada and Finland. Iceland was a pioneer, but the United Kingdom has gone much larger: by 2010, the UK Biobank had a prospective cohort of some 500,000 individuals, aged 40–69 at recruitment. Following this age group enables a focus on diseases of middle age and later.

In this week's *Nature*, researchers report the first descriptions of the full cohort, including genome-wide genetic data for all individuals