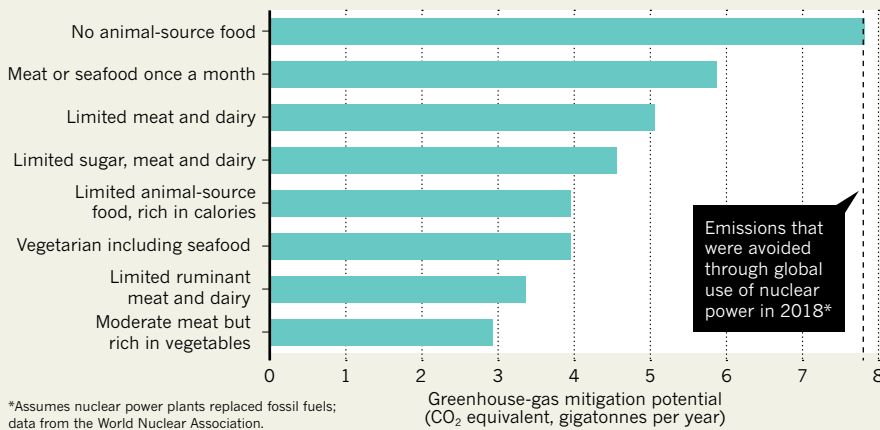


WHAT IF PEOPLE ATE LESS MEAT?

The Intergovernmental Panel on Climate Change examined the estimated impact on greenhouse-gas emissions of the world's population adopting a variety of diets.



► “Unfortunately, some countries don’t seem to understand the dire need of stopping deforestation in the tropics,” says Pörtner. “We cannot force any government to interfere. But we hope that our report will sufficiently influence public opinion to that effect.”

Although the burning of fossil fuels garners the most attention, activities relating to land management produce almost one-quarter of heat-trapping gases resulting from human activities. The race to limit global warming to 1.5 °C above pre-industrial levels — the goal of the international Paris climate agreement made in 2015 — might be a lost cause unless land is used in a more climate-friendly way, the latest IPCC report says.

Cattle are often raised on pastures created by clearing woodland, and produce methane, a potent greenhouse gas, as they digest their food. The report states with high confidence

that balanced diets featuring plant-based and sustainably produced animal-sourced food “present major opportunities for adaptation and mitigation while generating significant co-benefits in terms of human health”.

By 2050, dietary changes could free up several million square kilometres of land, and reduce global carbon dioxide emissions by up to eight billion tonnes per year, relative to business as usual, the scientists estimate (see “What if people ate less meat?”).

“It’s really exciting that the IPCC is getting such a strong message across,” says Ruth Richardson in Toronto, Canada, who is the executive director at the Global Alliance for the Future of Food, a coalition of philanthropic foundations.

The report cautions that land must remain productive to feed a growing world population. Warming enhances plant growth in some regions, but in others — including

northern Eurasia, parts of North America, Central Asia and tropical Africa — increasing water stress seems to reduce vegetation. So the use of biofuel crops and the creation of new forests — measures that could mitigate global warming — must be carefully managed to avoid food shortages and biodiversity loss, the report says.

FLOODS AND DROUGHTS

Farmers and communities around the world must also grapple with more-intense rainfall, floods and droughts resulting from climate change, warns the IPCC. Land degradation and expanding deserts threaten to affect food security, increase poverty and drive migration.

About one-quarter of Earth’s ice-free land area seems to be suffering from human-induced soil degradation already — and climate change is expected to make things worse.

The report might provide a much-needed, authoritative call to action, says André Laperrière, the executive director of Global Open Data for Agriculture and Nutrition in Wallingford, UK. Nobre hopes that the IPCC’s voice will give greater prominence to land-use issues in upcoming climate talks. “I think that the policy implications of the report will be positive in terms of pushing all tropical countries to aim at reducing deforestation rates,” he says.

Governments from around the world will consider the IPCC’s findings at a UN climate summit next month in New York City. The next round of climate talks of parties to the Paris agreement will take place in December in Santiago. “We need to mainstream climate-change risks across all decisions,” said António Guterres, the UN secretary-general. “That is why I am telling leaders don’t come to the summit with beautiful speeches.” ■

SOURCE: IPCC/WORLD NUCLEAR ASSOCIATION

ASTRONOMY

What’s next for the embattled Thirty Meter Telescope?

Protesters on Hawaii’s Big Island have prevented construction for a month.

BY ALEXANDRA WITZE

A stand-off over plans to build a mega-telescope on Hawaii’s tallest mountain has entered its fifth week and shows no signs of stopping. Hundreds of protesters are blocking access to Mauna Kea, the mountain on Hawaii’s Big Island where construction of the Thirty Meter Telescope (TMT) was set to begin on 15 July.

The US\$1.4-billion telescope’s enormous light-gathering mirror — nine times the area of

those in today’s biggest telescopes — will allow it to peer at stars and galaxies with unprecedented sharpness. That will allow scientists to explore fundamental questions such as how galaxies arose in the early Universe and what planets around distant stars look like.

Here, *Nature* examines how the fight over the telescope could evolve.

Who are the protesters, and what do they want?

The activists who oppose the TMT encompass a broad swathe of the Hawaiian community,

including university professors, local leaders and students. Most are Native Hawaiians. Their protests have garnered widespread support from people in and beyond Hawaii, including celebrities of Asian-Pacific ancestry such as actor Jason Momoa, who visited the encampment on 31 July.

The protesters do not want the TMT to be built on Mauna Kea. They say they are protecting the site, which is sacred to Native Hawaiians and already hosts 13 observatories (5 of which are supposed to be dismantled



Protesters in Hawaii have blocked access to the mountain of Mauna Kea.

RONIT FAHL/ZUMA

before the TMT begins operations).

“We have always been here and we will always be here,” said Kealoha Pisciotta, a protest leader, during a press conference on 18 July. “The TMT will never be built.”

Many other Native Hawaiians do support the project. And a poll of 1,367 state residents, released on 7 August by the *Honolulu Civil Beat* newspaper, found that 64% supported the project, whereas 31% opposed it.

Hasn't this been going on for a while?

Months-long protests in 2015 scuttled the TMT project's first attempt to build on Mauna Kea. In 2018, after further legal challenges to the TMT's right to proceed, Hawaii's supreme court ruled that the telescope's construction permit was valid. That move set the stage for the attempt last month to start construction.

The current stand-off has been more intense than the 2015 protests in two important ways: it has drawn more activists to the mountain, and it shut down activity at the telescopes already on Mauna Kea for more than three weeks.

How have scientists reacted?

Many scientists have spoken out against building the TMT in Hawaii, citing the need to listen to indigenous voices. They include a number of students and researchers affiliated with institutions working on the TMT. The president of the University of British Columbia in Vancouver, which is participating in the TMT project as a member of the Association of Canadian Universities for Research in Astronomy, has called for a 60-day moratorium on the project.

Other researchers, including two officials with the Canadian Astronomical Society, say that the TMT project should work towards building in Hawaii. The project should pursue a site on Mauna Kea “for as long as there remains a realistic possibility to peacefully negotiate a route for this to happen, and to do so in a way that means the project is broadly welcomed and viable in Hawaii”, astronomers Michael Balogh at the University of Waterloo in Ontario and Rob Thacker at Saint Mary's University in Halifax, both in Canada, wrote to society members on 1 August.

TMT officials say they are hopeful that the project can move forwards.

“We've been through a ten-year process, and it's urgent for us to get started,” says Gordon Squires, vice-president of external affairs for the Thirty Meter Telescope International Observatory, the formal name for the telescope project. “We have a lot of respect for everybody — those who oppose us and those who support us — and are looking forward to a safe resolution to this.”

What about the telescopes that are already on Mauna Kea?

They were shuttered on 16 July, the second day of protests, when it became clear that workers would not be able to regularly go up and down the mountain. On 9 August, observatory leaders announced that they had reached an agreement with the activists to allow limited operations to resume. The telescopes are slowly coming back online, and it could be weeks before they are back to observing as normal.

The interruption to scientific activity on Mauna Kea was the longest in the five decades of astronomy on the mountain.

How have officials in Hawaii responded?

David Ige, Hawaii's governor, issued an emergency proclamation on 17 July that gave police greater power to restrict access to Mauna Kea and deploy additional officers, among other things. On that day, law-enforcement officials arrested and released 38 protesters, most of them Native Hawaiian elders.

On 30 July, Ige rescinded the proclamation, saying that conditions on the mountain had changed and it was no longer necessary. He also extended the window in which the TMT's construction could start by two years, to September 2021. That gives the project more time to negotiate a solution to the impasse.

Ige has put Harry Kim, the mayor of Hawaii County, in charge of figuring out what to do next. Kim has been holding meetings with a broad swathe of community leaders to discuss possible future steps.

Can the TMT be built somewhere else?

The project does have a backup site: the Roque de los Muchachos Observatory on La Palma, one of Spain's Canary Islands. The community in La Palma has mostly been supportive, and Spain's minister of science, the former astronaut Pedro Duque, said last month that the TMT is welcome there. But the environmental group Ecologists in Action has been speaking out against the idea of building the telescope on La Palma, saying that it would harm a natural area of great value.

There are some drawbacks to the La Palma site. Because it is lower in elevation than Mauna Kea — 2,250 metres as opposed to 4,050 metres — the TMT would need to peer through more of Earth's atmosphere. Having more water vapour between the TMT and the stars would reduce the quality of the telescope's observations.

And the TMT project has not yet finalized all the agreements with the local government that would allow construction of the telescope on La Palma. On 5 August, TMT executive director Ed Stone confirmed that the project has applied for a building permit at La Palma, to help keep that option open.

What would need to happen for the project to relocate there?

The TMT board, which includes representatives from two California universities and the governments of Canada, China, India and Japan, would need to approve the move.

One complicating factor is that the project will probably need hundreds of millions of dollars from the US National Science Foundation to finish its construction. US legislators might be less willing to fund the TMT if it is not built on US soil. For Japan, China and India, the Canary Islands site is farther away and less desirable than Hawaii. ■