

THIS WEEK

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Plan for the future

The White House urgently needs to set out a clear plan for how it intends to monitor the state of Earth.

President Barack Obama's administration released its first national strategy for civil Earth observations on 19 April. The report comes six years after the US National Research Council (NRC) warned that inadequate funding and mismanagement had put 'at great risk' the United States' ability to monitor Earth from space. The strategy does little to reassure.

The 60-page document, written by a federal task force, lays out a process to determine the types of observations that deserve government support. But it does not provide what is most urgently needed: clear and specific guidance from the White House on what the government considers to be the most important Earth-science satellite missions — or when they should be launched.

That type of plan, long overdue, grows more important as the fiscal crisis deepens and the demand for such observations rises (see page 13). Meanwhile, the country's ageing collection of Earth-observing satellites continues its long decline. The number of US probes is likely to dwindle from 23 to just 6 by 2020, threatening to degrade scientists' ability to track climate change, forecast weather and monitor natural disasters.

Obama is one of many to blame for the brewing crisis. The lack of leadership at the White House is matched by the intransigence of Congress, which set in motion the across-the-board sequestration spending cuts that took effect on 1 March, slashing about 5% from the budgets of NASA, the National Oceanic and Atmospheric Administration and other key science agencies.

Lawmakers also approved steep cuts to NASA's Earth-science budget beginning in 2002, as then-President George W. Bush foolishly directed the space agency to focus instead on manned missions to the Moon and Mars. Obama has pushed Congress to reverse that decline, but the programme's budget — US\$1.8 billion this year — still falls well below the \$2 billion-per-year target that the NRC says is necessary to launch 17 'high-priority' missions by 2020. That makes a blunt discussion about what level of future spending is reasonable and achievable all the more urgent.

The situation is little better in Europe. Member states approved a budget last year that gives the European Space Agency about 80% of what it is seeking to develop research satellites over the next five years. Scientists are worried that the shortfall could delay the planned launch of a climate-change mission, called Earth Explorer 8, in 2018.

The US government has also been forced to cope with plain bad luck. The Orbiting Carbon Observatory, a much-anticipated satellite designed to track the level of carbon dioxide in the atmosphere, crashed shortly after launch in 2009. Two years later, a similar failure claimed Glory, a mission to monitor Earth's energy balance, before it could reach orbit. The two incidents cost NASA more than \$700 million — not including the \$470 million or so the space agency is spending to launch a copy of the observatory in 2014.

To its credit, the Obama administration has made some progress

to improve the nation's eyes in the sky. NASA successfully launched the polar-orbiting climate and weather satellite Suomi National Polar-orbiting Partnership in October 2011 and the ocean-salinity mission Aquarius in June of that year. Last month, Landsat-8 reached orbit, ensuring that the world's longest-running global-change data set will continue.

Yet the long-term forecast for US Earth observations remains grim. The US government plans to launch just six satellites between 2014 and 2020, including only two of the four missions that the NRC panels deemed the most important. The other two — designed to measure long-term changes in solar radiation, ice-sheet velocities and terrestrial biomass — have been shelved indefinitely by the White House.

Researchers who warned for years of this slow-moving disaster are now left to watch it unfold. And it comes at a time when concern is growing about the pace of climate change and the pressure that the world's burgeoning population is placing on limited natural resources.

Obama's science adviser, John Holdren, says that the administration will release a detailed national plan for Earth-observing missions as supplement to the White House budget request delivered to Congress on 10 April. It cannot come soon enough. Progress depends on the United States making hard decisions about what Earth observations it needs and how best to provide them. For scientists, and society, the dilemma is clear: we cannot manage what we cannot measure. ■

“The long-term forecast for US Earth observations remains grim.”

Fields of gold

Research on transgenic crops must be done outside industry if it is to fulfil its early promise.

It was 30 years ago this month that scientists first published the news that they could place functional foreign genes into plant cells. The feat promised to launch an exciting phase in biotechnology, in which desired traits and abilities could be coaxed into plants used for food, fibres and even fuel. Genetically modified (GM) crops promised to make life easier and nature's bounty even more desirable.

As a series of articles in this week's *Nature* explores, things have not worked out that way (see page 21). The future matters more than the past, but when it comes to GM crops, the past is instructive.

Soon after the 1983 breakthrough, biotechnology companies developing GM crops became hugely attractive to investors. Calgene in Davis, California, for example, developed the Flavr Savr tomato — engineered

to remain firm after ripening — which captured attention, especially when the iconic Campbell Soup Company invested in its development. Like many at the time, Campbell's was fascinated by the promise that tomatoes could be ripened on the vine to accentuate their flavour and still make the trip to the supermarket and the dinner table without turning to mush.

In early 1992, analysts predicted regulatory approval for the GM tomato within a month, and a market of at least US\$500 million a year. But less than a decade after their birth, GM crops were already facing a difficult adolescence. What was once deemed biological wizardry was increasingly being labelled Frankenfood. Consumers in Europe were bristling at the aggressive marketing of GM giant Monsanto, based in St Louis, Missouri. The Flavr Savr suffered more than a year of delays at the US Food and Drug Administration, and Campbell's began to state that it had no intention of putting the tomatoes in its soups without approval from the public. What had gone wrong? According to one analyst quoted at the time, the biotech sector had failed to prepare consumers appropriately: "Now, they realize that they have to be articulate and educate an uninformed public."

The Flavr Savr was approved in 1994 but never took off commercially. In the meantime, the biotech industry had shifted much of its attention to traits that aimed not to delight consumers, but rather to increase farm yields. Herbicide-tolerant and pest-resistant crops proliferated in the United States and more than two dozen other countries. GM organisms were to become agricultural tools.

In many places where they are planted, these GM crops have replaced conventional planting almost entirely. Yields and profits have increased, farmers have been generally happy to adopt the transgenic seeds and the technology has even made good on some of its promises to help the environment by reducing the amount and variety of pesticides needed.

GM crops, of course, still face a public-relations problem. Fears of the unfamiliar and 'unnatural', and concerns about health or environmental



GM CROPS: PROMISE & REALITY

A *Nature* special issue
nature.com/gmcrops

impacts, have frequently prevented approval and adoption of the crops, especially in Europe, where protesters have destroyed experiments. The United States, the world's most active user of GM crops, has seen renewed backlash as

calls grow for foods with GM ingredients to be clearly labelled.

The analyst who spoke of an uninformed public may have been correct in 1993, but such a claim no longer applies. People are positively swimming in information about GM technologies. Much of it is wrong — on both sides of the debate. But a lot of this incorrect information is sophisticated, backed by legitimate-sounding research and written with certitude. (With GM crops, a good gauge of a statement's fallacy is the conviction with which it is delivered.)

Armed with misinformation, debaters have taken to the streets, the supermarkets and social media. With a topic as sensitive and dear to people as the food they eat and give to their children, those who play to the fears, concerns and uncertainty surrounding GM crops often seem to have the upper hand. And the fears are entwined with mistrust of the seed companies. Supporting GM crops can seem a thankless job: it is worthwhile to stand up for good science and the promise that it holds, but defending profit-hungry corporations feels less rewarding.

Still, there is reason to stand up for the continued use and development of GM crops. Genetic modification is a nascent technology for which development has moved very quickly to commercialization. That has forced most research into the for-profit sector. Without broader research programmes outside the seed industry, developments will continue to be profit-driven, limiting the chance for many of the advances that were promised 30 years ago — such as feeding the planet's burgeoning population sustainably, reducing the environmental footprint of farming and delivering products that amaze and delight. Transgenic technologies are by no means the only way to achieve these aims, but the speed and precision that they offer over traditional breeding techniques made them indispensable 30 years ago. They still are today. ■

Freed speech

The reform of English libel law is a victory, even if it doesn't achieve everything that was hoped.

In a typically British piece of formal pomp, the speaker of the UK House of Commons, John Bercow, last week declared: "I have to acquaint the House that the House has been to the House of Peers, where a Commission under the Great Seal was read, authorizing the Royal Assent to the following Acts."

In the list of new legislation that followed, alongside the 'Marine Navigation (No. 2) Act' and the 'Groceries Code Adjudicator Act', Bercow announced the Queen's formal approval of a long-awaited reform to libel laws in England and Wales.

Nature was taken to court under the previous version of these laws, which were widely regarded as skewed in favour of those who claim libel, and we were among the many supporters of the Libel Reform Campaign, which drove the fight for change. Cases such as that of science writer Simon Singh, who was forced to defend himself against a claim by the British Chiropractic Association over an article published in the *Guardian* newspaper in 2008, galvanized the public and raised concern about the laws' chilling effects on the free expression of scientific opinion.

Those cases ended in victories for Singh, for *Nature* and for scientific debate and free speech. But it was rightly feared that those without the resources of *Nature* or the tenacity of Singh would back down rather than face the costs of going to court, or might even shy away from making statements that might attract attention from

litigious parties in the first place.

The new law will require that bodies that trade for profit show "serious financial loss" if they wish to sue someone for defamation. It also includes formalized defences for journalists publishing on matters of public interest, and further protections for the reporting of statements made in peer-reviewed journals and at international conferences.

'Libel tourism' — in which those with no real link to Britain come to use the unfair laws in London courts — will be restricted by the new act. It sets bars for action against people who do not live in the United Kingdom or the rest of Europe, unless the claimant can show that England is truly the most appropriate venue for legal action.

These are all real gains that should improve the communication of science by making it easier to speak truths that some may not wish to hear.

The rewriting of the law led to celebration among the scientists, journalists, lawyers and others who have pushed for reform. But there were cautionary voices. It is not yet clear how the new law will work in practice for much of the Internet. And it may not reduce the cost of litigation. If defending an action is still financially crippling, concerns that the law can be used to threaten people into silence will persist.

Robert Dougans, solicitor-advocate at the litigation firm Bryan Cave in London, who represented Simon Singh in his fight with the British Chiropractic Association, said, "Frankly, I cannot see this having made any difference in any case I have been involved in, and I wish an opportunity had been taken to re-think defamation law *ab initio*." (See *Nature* <http://doi.org/mc6>; 2013.)

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Dougans may be too pessimistic. There is good reason for those who have fought hard to rejoice. But it remains to be tested whether the culture of suppression has truly been swept away. If it has not, the fight will have to begin again. ■