

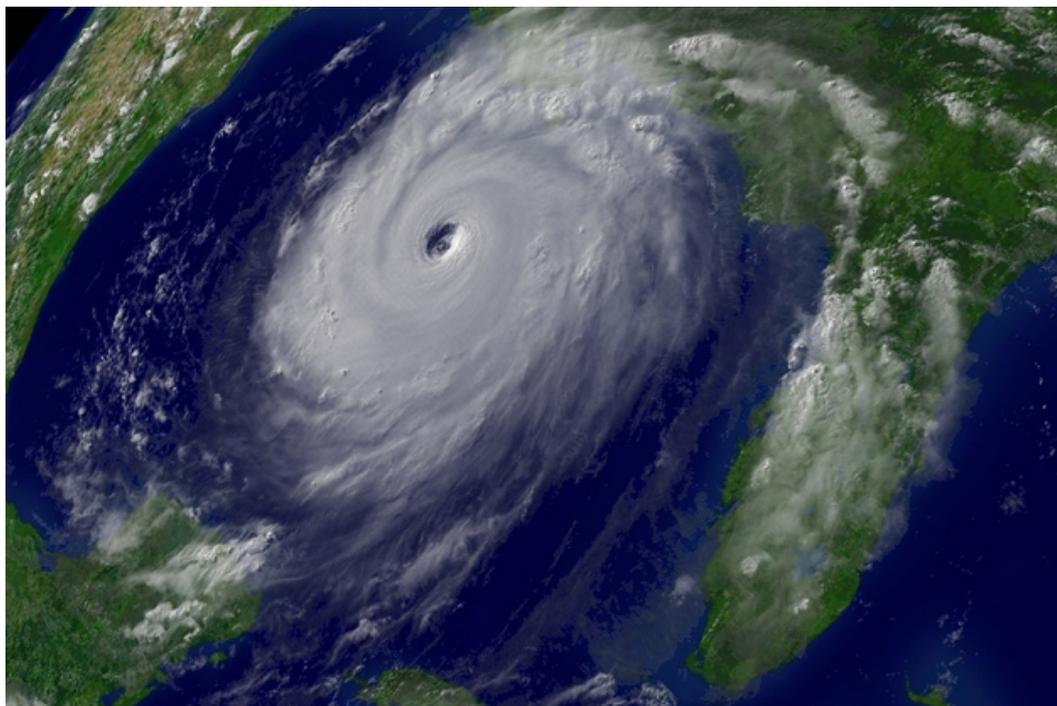
NATURE | NEWS

US science agencies face deep cuts in Trump budget

The Environmental Protection Agency and the National Institutes of Health are big losers — but planetary science at NASA stands to gain.

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16 March 2017 Updated: 16 March 2017 Corrected: 16 March 2017



NOAA

Funding for the National Oceanic and Atmospheric Administration's weather satellites, which track hurricanes, would be maintained under the Trump plan.

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When it comes to science, there are few winners in US President Donald Trump's first budget proposal. The plan, released on 16 March, calls for double-digit cuts for the Environmental Protection Agency (EPA) and the National Institutes of Health (NIH). It also lays the foundation for a broad shift in the United States' research priorities, including a retreat from environmental and climate programmes.

Rumours of the White House proposal have swirled for weeks, alarming many researchers who depend on government funding — and science advocates who worry that the Trump administration's stance will jeopardize US leadership in fields ranging from climate science to cancer biology. It is not clear, however, how much of the plan will survive negotiations in Congress over the coming months.

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"Cutting [research and development] funding from our budget is the same as cutting the engines off an airplane that's too heavy for take-off," says Jason Rao, director of international affairs at the American Society for Microbiology in Washington DC. The greatest threats to the United States, he says, are those presented by infectious diseases, climate change and energy production — none of which can be addressed effectively without scientific research.

The White House proposal is also notable for what it does not mention. The barebones document omits detail about many programmes and even entire agencies, including the National Science Foundation (NSF). The president is expected to release a fuller budget request in May.

Call for NIH reorganization

The Trump budget would cut funding for the NIH by 18%, to \$25.9 billion, making it one of the hardest-hit research agencies. The document also calls for a reorganization of the NIH's 27 institutes — including the elimination of the smallest, the Fogarty International Center — but offers no further detail beyond a pledge to “rebalance Federal contributions to research funding”.

Mick Mulvaney, the director of the White House Office of Management and Budget, expanded slightly on the matter during a 16 March press briefing. “We think there’s been mission creep” at the NIH, he said. “We think they do things that are outside their core functions.”

That did not sit well with biomedical research advocates. “We’re pretty upset,” says Jennifer Zeitzer, director of legislative relations at the Federation of American Societies for Experimental Biology in Rockville, Maryland. But she is sceptical that Congress, which generally supports biomedical research, will embrace Trump’s vision for the NIH.

Fear over potential spending cuts has been pervasive at the NIH’s National Cancer Institute, according to a scientist contractor there. That is especially true among researchers who work on epidemiological studies that require continued funding to collect data without interruption over many years. “Everyone is worried, but everybody has to work,” says the contractor, who is not authorized to speak about the agency.

The Trump proposal would also create a fund within the Department of Health and Human Services, the NIH’s parent, to respond to public health emergencies such as the spread of the Zika virus. Scientists and public health experts have called for such a fund for years, but advocates say that starting one while cutting research and prevention programmes would be counterproductive. “It’s cheaper to prevent a public health crisis than to treat one after the fact,” says Keith Martin, executive director of the Consortium of Universities for Global Health in Washington DC.



Trump faces backlash on health-agency cuts

Shrinking the EPA

The biggest swing of the budget axe — across the entire budget plan — is aimed at the EPA. The White House hopes to slash the agency’s US\$8.2-billion budget by 31%, and lay off about 3,200 of the agency’s 15,000 staff. The EPA’s Office of Research and Development would have its funding reduced by half, from \$483 million to \$250 million.

The proposed cuts, combined with the Trump administration’s hostility toward climate and environmental regulations, have sparked fear throughout the agency. “President Trump is always talking about creating jobs, but he is talking about cutting 3,000 people at the EPA,” says one EPA biologist who is not authorized to talk to the press. “He doesn’t even blink an eye.”

The biologist, who studies chemicals that affect the endocrine system in fish and potentially in people, is part of a programme that Trump wants to eliminate. To her, the reason for this seems clear: if there’s no science to point out potential problems, there won’t be any more regulations.

But Jonathan Adler, who heads the Center for Business Law and Regulation at Case Western Reserve University School of Law in Cleveland, Ohio, says that drastically reducing the EPA’s budget would undercut the Trump administration’s efforts to overhaul environmental policy. Because the agency’s decisions can be overruled or modified by federal courts, the only way to fundamentally reorient programmes is to work with Congress to change the law or rewrite regulations. And that requires staff and money, he says.

“If you cut an agency too much, all you’ve really done is hand the agency’s priorities over to the courts and litigants,” Adler says. “And I’m not really sure that’s what the Trump administration wants.”

Trimming energy and environment programmes

The White House wants to cut 5.6%, or \$1.7 billion, from the Department of Energy (DOE). The plan would eliminate the Advanced Research



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Projects Agency-Energy, which funds ‘high-risk, high-reward’ research. And it would slash \$900 million, or about 20%, from the energy department’s Office of Science, which supports research on topics such as high-energy physics, energy, climate change and biology.

“Cutting the NIH and the DOE this dramatically is surprising,” says Matthew Hourihan, director of research-and-development budget and policy programme at the American Association for the Advancement of Science in Washington DC. “These are basic science agencies, and there tends to be bipartisan agreement on their value.”

The Trump plan does not include an overall funding target for the National Oceanic and Atmospheric Administration (NOAA). But it would eliminate the agency’s long-running, \$73-million Sea Grant programme, which supports 33 US colleges and universities that conduct research, education and training about ocean and coastal topics.

The budget expresses support for the agency’s “current generation” of weather-satellite programmes, but it offers almost no detail on funding levels. It also pledges to expand the use of commercial data in NOAA weather models and mentions “savings” that could be achieved by delaying the launch of at least one environmental satellite. An earlier, leaked White House budget document proposed a \$510 million cut to the agency’s \$2.3 billion satellite division, as part of a broader 17% drop in NOAA’s overall funding.

“While the details are hard to find in this budget, it appears that climate research and climate observing systems are being cut by at least 20%” across the government, says David Titley, NOAA’s chief operating officer from 2012–2013 and the former oceanographer of the Navy. “Although we don’t know the exact extent of the cut, if you are being led to the gallows and no one is making eye contact with you, it is not a good sign.”

NOAA officials are looking at how to restructure the satellite programme in line with such cuts, but those efforts are hampered by the fact that the Trump administration has yet to appoint any senior leaders at the agency. “It’s not yet clear what trajectory we are taking,” says one senior NOAA official, who declined to be named because he was not authorized to speak publicly.

To Europa — and beyond?

In contrast, the White House proposed a cut of just under 1% for NASA. But the Trump plan appears poised to shift the agency’s research priorities, calling for NASA to focus on “deep-space exploration rather than Earth-centric research”.

Within the agency’s science directorate — which encompasses astrophysics, Earth science, heliophysics and planetary sciences — the planetary division is expected to gain the most. Its budget would grow from \$1.6 billion to \$1.9 billion. And the White House proposal would accelerate NASA’s plans to explore Jupiter’s moon Europa.

For years, lawmakers led by Representative John Culberson (Republican, Texas) inserted money into NASA’s budget for a Europa mission — overriding the judgment of the space agency during the administration of president Barack Obama. NASA is now developing a spacecraft called the Europa Clipper to launch in the 2020s. Its goal is to fly by Europa multiple times, mapping its surface and looking for any signs that life might exist in an ocean beneath the moon’s icy shell.

The White House plan would also explicitly cancel the Obama-era plans to drag an asteroid into lunar orbit for astronauts to study up-close.

And it would cut spending on Earth-science research from \$1.9 billion this year to \$1.8 billion, eliminating funding for four missions — including the Orbiting Carbon Observatory-3, which is intended to continue NASA’s efforts to monitor carbon dioxide concentrations in the atmosphere from space. Also on the chopping block are the Earth-observing instruments aboard the Deep Space Climate Observatory, or DSCOVR. The primary purpose of the satellite, which launched in 2015, is to track space weather — but it was first proposed as an Earth-monitoring mission in the late 1990s by former vice-president Al Gore.

Mulvaney, the White House budget director, was blunt when asked about the cuts to climate research in Trump’s plan. “We’re not spending money on that any more,” he said. “We consider that to be a waste of your money to go out and do that.”

But planetary science’s gain does not necessarily come at the expense of other NASA science divisions, argues Casey Dreier, director of

space policy for the Planetary Society, an advocacy group in Pasadena, California. “On a certain level you have limited resources and you have to make priorities,” he says. “Some divisions growing while others shrink is common among different administrations.”

Dreier is not a fan of trimming NASA's overall budget, however. “NASA is given tasks by the nation,” he says. “We need to give NASA the resources that will allow them to be successful.” Last month, Trump told Congress that American footprints on distant worlds are not too big a dream — but those footprints cannot be made without funds, Dreier notes.

In the dark at the NSF

In a surprising omission, the NSF is not mentioned anywhere in the Trump budget document. Although the \$7.5-billion agency has traditionally attracted bipartisan support in Congress, Republican lawmakers have sought in recent years to limit the NSF's geoscience and social-science divisions.

The Trump plan adds more uncertainty for the agency, which is already struggling to cope with the federal hiring freeze that the president instituted in January. The NSF is scheduled to move its headquarters later this year, and an internal survey suggests that 17% of its 2,000 staff plan to leave within the next two years because of this. The hiring freeze would prevent the agency from replacing many of these employees if they do leave.

“I know two individuals who have put off retirement to help out during the hiring freeze,” says a programme director, who asked for anonymity to prevent retaliation. “We don't know if they'll stay past the move, or if some of the people who plan on retiring will put it off.” Overall, the programme director says, “morale is low”.

Next stop: Capitol Hill

It is not clear how Congress, which must approve any federal spending plan, will react to the budget proposal. Although the president's fellow Republicans hold majorities in the House of Representatives and the Senate, some have indicated that they will oppose aspects of the Trump budget. Senator Lisa Murkowski, a Republican from Alaska, told Alaska Public Radio on 13 March that she would fight rumoured cuts to NOAA's satellite programmes.

Other Republican lawmakers have expressed scepticism about the Trump administration's plan for drastic cuts at the EPA. “They are proposing nothing less than a dismantlement of several decades of bipartisan support for foundational environmental protections,” says Elgie Holstein, a former budget official under president Bill Clinton who works for the Environmental Defense Fund, an advocacy group in New York City. “There are going to be a lot of Republicans, as well as Democrats, on Capitol Hill scratching their heads.”

So far, the non-political ‘career’ employees at the agency are trying to remain calm and take a conciliatory approach with Trump's political appointees. “We've got four years with this administration, so we are trying to educate rather than confront,” says one senior career official.

Waleed Abdalati, a former chief scientist at NASA, offers similar advice to researchers who are worried about potential cuts to Earth-science programmes at NOAA and NASA. “Rumors are counterproductive,” he says. “Rather than complain about what hasn't happened, we should advocate for what should happen.”

Nature doi:10.1038/nature.2017.21652

Updates & Corrections

Updated: Added comments from Mick Mulvaney, the director of the White House budget office.

Corrected: The story mistakenly stated that the current budget for NASA's planetary science division is \$1.5 billion; it is \$1.6 billion. It also misstated the current budget for NASA's Earth science division, which is \$1.9 billion, not \$2 billion.

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Nature ISSN 0028-0836 EISSN 1476-4687

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