

THIS WEEK

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Divided by a common purpose

As political leaders on either side of the Atlantic set out contrasting positions on science funding, researchers everywhere need to ensure that their voices are heard.

It is the best and worst of political times for science. As the United Kingdom approaches its 8 June general election, all three major national political parties have pledged a huge increase in research investment. The governing Conservative Party, the main opposition Labour Party and the traditional 'third party', the Liberal Democrats, all promise to increase UK spending on research and development as a percentage of gross domestic product from the current 1.7% level. If — and it is a big if — their respective pledges for 2.4% in 10 years, 3% by 2030, or a 'long-term' doubling are met, billions more will flow to researchers (see page 16).

This cross-party consensus on the importance of science and the need to boost funding is welcome and relatively new. Gone are the days of the 1980s, when researchers felt the need to start a pressure group called Save British Science. (Although that group continues as the Campaign for Science and Engineering, and grass-roots groups such as Science is Vital also lobby for the importance of funding.)

This is not to say that UK researchers have had calm seas. Threats of cuts under a Conservative-led coalition government caused huge concerns, and inflation has whittled away the spending powers of the UK research councils. But the parties now vie to be seen as the best friend of science. Last year, the Conservative Party signalled its love with a promise to boost funding by £2 billion (US\$2.6 billion) a year by 2020. This year, all three national parties paid major lip service to science in their manifestos — above and beyond the commitment to even larger spending boosts ahead of the election.

A ghost remains at the feast, however. Brexit, the departure of the United Kingdom from the European Union, threatens carefully nurtured relationships between scientists on either side of the English Channel (or La Manche, depending where you stand). Nobody knows what will happen to EU scientists in Britain, nor to the EU funding that currently flows to UK labs. Whichever party wins the election (and the Conservatives are hot favourites) must transfer its commitment to science funding to protecting the interests of science in the negotiations to come. And researchers should push them to do so, and to deliver on their pledges.

Meanwhile, US scientists might look across the Atlantic with envy. British science may no longer need saving, but the battle for US science is just beginning. On 23 May, the administration of President Donald Trump proposed a 2018 budget that included steep reductions in funding across the full suite of science agencies. Given the administration's scepticism about climate science and its pro-industry position on nearly all things environmental, it comes as little surprise that the budget would slash funding for the Environmental Protection Agency (EPA) by more than 30% compared with 2017, and reduce its workforce by roughly 23%. Cuts to renewable-energy programmes at the Department of Energy were also to be expected. But the cuts don't stop there (see page 19).

The budget would slash funding for nearly all energy research and

development, including for fossil fuels. This kind of research helped to pave the way for the US shale-gas boom; it could be the only hope for the coal industry that Trump has vowed to revive. Nor would Trump spare biomedical and public-health research, which has conventionally been popular on both sides of the political aisle. Compared with 2017, the National Institutes of Health (NIH) would see its budget cut by 18%.

The US government has always been one of the largest and most reliable backers of basic science, but that would clearly change if Trump controlled the purse strings. Many scientists draw hope from the fact that he does not, and it's already quite clear that Congress — which allocates funding — takes a different view of things. The NIH saw its 2017 budget increase in the deal announced in late April, and the EPA saw a manageable 1% decrease.

Trump's 2018 budget proposal will not survive Congress in anything like its current form, but it could further poison the conversation, particularly among his most ardent supporters. Many groups are already mobilizing to save US science, and those efforts should continue. But the conversation needs to expand. As this publication has stated before, scientists need to talk not only to their elected officials about what they do, but also to their neighbours and communities. Science and innovation have historically been a source of pride, not division, in the United States. That must not change. ■

"Science and innovation have historically been a source of pride, not division."

A different brew

What a species does could be an important way to steer conservation.

The high-street coffee shop has long been used as a measure of urban gentrification. But are all coffee shops the same? Not so, claimed the London edition of *Time Out* in 2014. In fact, it said, there are eight types in London just in the independent sector, away from the global mega-chains. These separate species of capital brew house could be distinguished by the presence of table service, for instance, and whether the barista could remember your name and favourite order.

Time Out, then, would see a high street with one of each of these individual outlets as diverse. But most of us, especially tea drinkers, would probably prefer to swap a few of them for, say, a butcher, a baker and, if not a candlestick maker, then perhaps a newsagent. Despite their differences, all coffee shops provide essentially the same service. In those terms, a street of different types of coffee shop is anything but diverse. It doesn't offer as good a service, and so it's not such a great place to live.

What does the supply of caffeine have to do with this week's special issue of *Nature* that discusses biodiversity, the extinction of species and how to conserve them? Everything. For, as some biologists argue, too much current thinking on conservation agrees with *Time Out*. The standard definition of biodiversity focuses too heavily on counting the number of different species, when perhaps it should concentrate on what each of those species contributes to the ecosystem.

Carry your coffee to drink at the rocky seashore, for example. Within a square metre or so you might find four species — a mussel and three different species of barnacle. A bit farther along, in another square metre, you find another four species, but this time the mussel is joined by a starfish, an anemone and a seagrass (see go.nature.com/2qmbfah). Under current conservation measures, each community has equal biodiversity and deserves equal attention. That's because a thatched barnacle is considered to be as different from an acorn barnacle as it is from the seagrass. Just as a barista who remembers your name is as different from a forgetful one as he or she is from a librarian.

To see and designate the second seashore community as different from the first, some biologists argue that we should consider what these species do, individually and collectively. The idea is called functional diversity, and it's catching on. Many biologists have felt for decades that the starfish, anemone and seagrass make up a more diverse community than the barnacle trio. But as a News Feature explores (page 22), the concept is gaining ground in policy circles. And it's being used to set priorities and to determine how conservation resources are allocated.

Intuition is not evidence, and there are already concerns that proponents of functional diversity are trying to run before they have worked out if they want to walk. Which functional traits should be considered and how can they be compared? How can biologists ensure that all functions of a species are accounted for, and not just those that are the most obvious? Do we have sufficient data to link diversity of traits to the health of an ecosystem? What if table service at a coffee shop is the only reason

that a rich couple visit, and spend money in other shops while there?

“Functional diversity, properly applied, could be a pragmatic and necessary step.”

To consider the utility of creatures in a habitat and not just their number can certainly throw up counter-intuitive findings. Some measures of functional diversity, for example, judge degraded post-logging secondary forests in the tropics to be as healthy as the primary forests they replace (see C. A. Sayer *et al. Biol. Conserv.* **211** (A), 1–9; 2017). (That is not an argument to stop protecting primary forest, but it might be a reason to give the degraded areas equal status.)

What is clear — and laid out in much detail in a series of other articles this week (see page 47) — is that existing attitudes and measures are failing to halt the global loss of habitats, species and ecosystems. To address the decline and stem the damage to the natural world, new approaches and new thinking are needed. Functional diversity, properly applied, could be a pragmatic and necessary step. All species are equal. But perhaps some are more equal than others. ■

ANNOUNCEMENT

Towards greater reproducibility

Since 2013, *Nature* and the Nature research journals have asked authors of papers in the life sciences to complete a checklist when they submit a paper. This extra step — prompting authors to disclose important elements of experimental design and analysis — was part of a broader effort to improve the quality of reporting in our life-sciences articles.

This week we go further. Alongside every life-sciences manuscript, we will publish a new reporting-summary document, to which authors will now be expected to add details of experimental design, reagents and analysis. This is another step in encouraging transparency, in ensuring that papers contain sufficient methodological detail, and in improving statistics reviewing and reporting.

We expect that the new reporting summary will assist reviewers and editors in assessing experimental quality and help readers to locate crucial details on data collection and analysis. Those familiar with the original checklist will find similar elements in the new reporting summary. The summary also has a strong focus on points that are known to be sources of experimental variability and that tend to be poorly reported in the literature.

Nature has long been interested in promoting the reproducibility of published results (see go.nature.com/huhbyr). Although the issues that give rise to the 'reproducibility crisis' are multifaceted, and come into play long before a paper is submitted, our responsibility is to ensure that the research we publish is well planned, well executed and well reported.

It is not possible to capture the diversity of work across the life sciences in a single document. So this new general-reporting summary will be accompanied by more-specific and more-detailed accessory reporting summaries. These can cover

greater experimental detail for papers based on chromatin immunoprecipitation sequencing, flow cytometry and magnetic resonance imaging. Although our physical-sciences papers will not use a standard reporting summary, we are launching accessory summaries on lasers and solar cells to elevate reporting standards in these areas. In future, we will expand this set to cover other techniques. Like the core reporting summary, these accessory summaries will be published with the relevant paper.

We are happy for other journals and institutions to use the same approach, and so we have made all the reporting-summary templates available for use or adaptation under a CC-BY licence.

As with the initial checklist, these documents aim to improve reporting, rather than to enforce a defined set of standards. They should make apparent the details of how a study was designed, performed and analysed, to allow reviewers and readers to interpret the results and understand any limitations. There are, of course, separate experimental standards that must be met to comply with our editorial policies, and these are captured in our new editorial-policy checklist (see go.nature.com/2rnfbb).

As a complement to these new documents, we will now mandate greater transparency in data presentation. We will ask authors, where possible, not to use bar graphs, and instead to use approaches that present full data distribution. We've also expanded our data-deposition mandates to include proteomics data, and our policy on reporting of cell-line authentication is being extended to all papers with data from cell lines. And we have added a reporting table for cryo-electron microscopy, which joins those for nuclear magnetic resonance imaging and X-ray crystallography.

With these and other steps, we will continue to work to ensure the rigour of the work we publish, and to promote the ability of the community to build on this research. But journals can only do so much. Institutions must invest greater resources in training scientists in scientific rigour and statistics. Funders must enforce appropriate experimental design from the earliest stages of scientific projects. And the community must appreciate the importance of transparency and replication. Only by working together can we all improve research reproducibility. ■