

opportunities. One example is a strategy known as reducing emissions from deforestation and forest degradation (REDD). According to estimates by the Intergovernmental Panel on Climate Change, the clearing of forests accounts for approximately one-fifth of greenhouse-gas emissions by humans. Thus, stopping deforestation could be a relatively cheap and effective way to reduce emissions and slow the rate of global warming. At the same time, argue Will Turner and his colleagues in an Opinion piece on page 278, efforts to preserve natural ecosystems can help to ameliorate some of the effects of climate change. The international climate treaty currently under negotiation is likely to include a REDD mechanism that would provide funds to tropical countries to save their forests, a move that would help to mitigate climate change and sustain biodiversity.

Although ecosystem degradation looks set to increase in the future

as a result of climate change, the biggest threat to biodiversity today is the rapid disappearance of habitats. At present, only around 14% of land surface and less than 6% of territorial seas are protected worldwide. Yet such areas help to support nearly one-sixth of the world's population, according to the TEEB study. As nations look beyond the likely failure of the 2010 biodiversity target, they should commit to placing more areas under protection. It will be crucial to select valuable sites that harbour the species that are most threatened. The wealthiest sectors of society tend to be the most removed from nature, whereas the world's poorest people rely heavily on the fruits of diverse ecosystems. As a result, care must be taken to ensure that conservation initiatives do not come at the expense of people, particularly indigenous communities that can be indirectly harmed when land is suddenly set aside. ■

## Access denied?

Information-sharing resources are essential to biologists and deserve international support.

Every weekday, thousands of researchers around the world access the Arabidopsis Information Resource (TAIR), which contains the most reliable and up-to-date genomic information available on the most widely used model organism in the plant kingdom. But now, to those users' horror, TAIR faces collapse: the US National Science Foundation (NSF) is phasing out funding after 10 years as the data resource's sole supporter (see page 258).

TAIR's plight is emblematic of a broader crisis facing many of the world's biological databases and repositories. Research funding agencies recognize that such infrastructures are crucial to the ongoing conduct of science, yet few are willing to finance them indefinitely. Such agencies tend to support these resources during the development phase, but then expect them to find sustainable funding elsewhere.

Unfortunately, that is not easy. Other funding agencies are no more likely to provide long-term support than the agency that launched the resource in the first place. Moreover, any government agency's long-term plans are vulnerable to short-term political expediency. Witness, for example, Japan, where the new government has slashed the budget of the RIKEN BioResource Centre by one-third (see page 258).

Private firms are equally poor bets. Advertising and sponsorship are unlikely to bring in enough money to pay the experts needed to maintain such resources. And the superficially plausible idea of charging subscription fees is effectively unworkable for facilities such as TAIR, because the producers and consumers of data are essentially the same community. Scientists provide data and resources for free, because sharing benefits everyone. However, they would be considerably less likely to deposit the fruits of their labour if this synergy was removed from the equation. Subscription-based databases and resources would then enter a downward spiral, becoming less and less complete and so less and less valuable.

The problem is acute even for modest resources. Two examples are the kidney database EuReGene and the mouse-embryo database

EUReGene, both of which were launched with funds from the European Commission that have run out in recent months. The databases are currently being maintained on a hand-to-mouth basis, and the scientists who built them don't know where to turn for maintenance money. Yet the European Commission's investment will have been wasted if the databases disappear.

It is time for a whole new approach. Front-line biology cannot function without these resources, so solutions must be found at both national and international levels.

Governments must ensure that at least one of their national funding agencies has money specifically set aside for the long-term support of bioresource infrastructures. A good model to emulate would be the United Kingdom's Biotechnology and Biological Sciences Research Council, which allows databases and other such resources to apply for ring-fenced funding, saving them from having to compete with hypothesis-driven grants, which are the agencies' mainstay.

But action is also needed on the international front. The sharing of bioresources does not and should not stop at national borders. For example, only about a quarter of TAIR users are based in the United States. China is the second biggest user at around 12%, followed by Japan at around 10%. This is not atypical. Yet it is difficult for a single national agency to justify maintaining a resource for the rest of the world. What is required is an international cost-sharing organization that could fund competitively selected infrastructures, large and small.

The European Commission has made a good start with projects such as ELIXIR (European Life Sciences Infrastructure for Biological Information), which is studying ways of steering national agencies towards the joint funding of bioresources. A global, ELIXIR-like initiative is urgently needed, run perhaps by an international, relatively unbureaucratic organization such as the Human Frontier Science Program.

But an international solution may be a long time coming. In the meantime, bioresource infrastructures might be wise to invest some time in public relations, giving paymasters a greater understanding of the consequences of their decisions. ■

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