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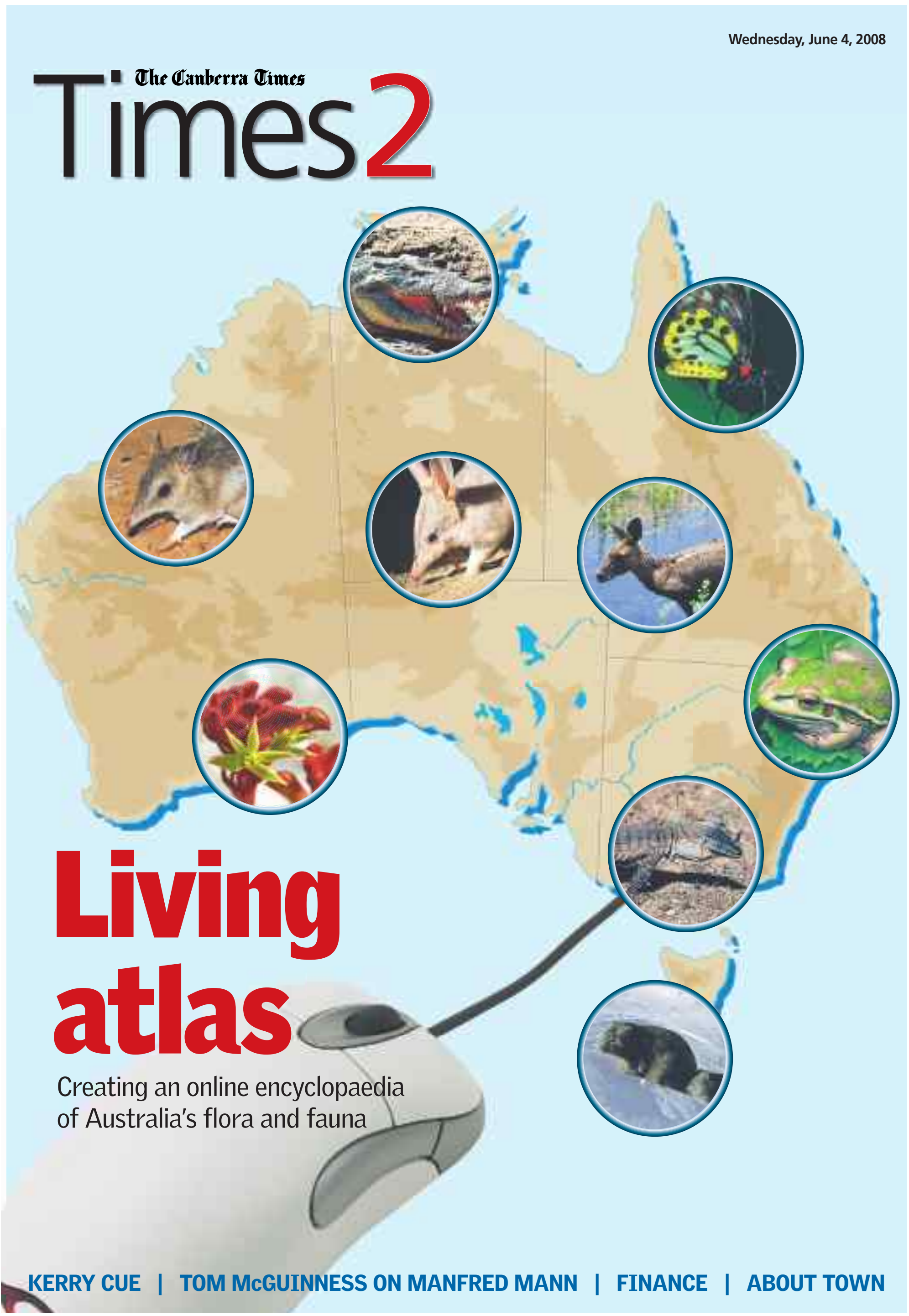


Living atlas

Creating an online encyclopaedia of Australia's flora and fauna

Mapping biodiversity

CSIRO's Donald Hobern is designing and building an online encyclopaedia of Australia's flora and fauna, **Rosslyn Beeby** reports

As a beetle and tadpole-collecting kid growing up in rural Britain, Donald Hobern dreamed of being a natural history adventurer like his hero, marine biologist Jacques Costeau.

Instead, for a short while, he became an honours classics scholar at Oxford University, also majoring in modern philosophy and Indo-European linguistics.

It was a background that built ''an interest in the way systems organise things'' which, combined with a keen interest in the natural world, has enabled Hobern to build a global reputation in the emerging science of bioinformatics – using mathematical and computer systems to manage and analyse biological data.

''Latin was compulsory at secondary school, and I found it was a subject I really enjoyed. I think I liked the structure and the way it could categorise information and ideas,'' he says.

When Hobern graduated from Oxford with a masters degree in classics, his career path took off in an unexpected direction when he landed a job with a global computer company as a systems analyst and software developer.

''I loved classics, but I knew I didn't want to be a Latin teacher, so I applied for a job with IBM to learn computer programming. It was a new field, and they were keen to train people. Something about it just appealed to me, but I had no ideas what it would lead to, or whether I'd even get an interview.''

He did, and spent a few days leafing through ''one of those books with a title like 'Systems Analysis for Beginners' to pick up the language and basic concepts, so I'd at least stand a chance of not making an idiot of myself during the interview.''

Hobern got the job, and just as he'd instinctively taken to Latin in high school, he ''quickly fell into the fun and the challenge of programming, which allowed you to build things inside things, inside more things''.

Creating a software program was like being an architect, building ''elegant plumbing systems to channel streams of information in all sorts of directions,'' he says.

Hobern recently moved from Copenhagen (where he was deputy director for informatics at the Global Biodiversity Information Facility) to CSIRO Entomology in Canberra to take on the challenge of designing and building an online encyclopaedia of Australia's flora and fauna – the *Living Atlas of Australia*.

When the elegant plumbing created by Hobern and his cyber-systems wizards is finally in place later this year, the atlas will be a ''constantly evolving and updated'' library of information on Australia's unique biodiversity.

''It's won't be structured like a series of specifically written dictionary-style pages that run through general information on a species. It will be a much more dynamic model, with intelligent search tools that perform a Google-like role, opening up an entire ecosystem of websites on any given topic,'' he says

''Hopefully, you can dig as deep as you like for detail with the atlas, or just use it to identify an interesting moth you've found in your backyard.''

The project will allow users to ''text-mine'' at whatever depth they choose, whether it's in-depth excavation for high-end research like genomics or evolutionary biology or a quick zoom about to cherry-pick accurate information for a school project. This vast cyber-library will be built to deliver easily-accessible, accurate sources of information to scientists, conservation policy wonks, amateur ecologists, students or anyone whose curiosity has been piqued by the plants and animals in their neighborhood.

Donald Hobern's atlas will be a "constantly evolving and updated" library of information on Australia's unique biodiversity.

''Basically, you start with a big bucket of information like databases, spreadsheets and web-pages, and work out ways to sort it out, link it up and make it more useful. It's about mapping new routes that will make all this information accessible and easy to discover,'' says Hobern.

The *Living Atlas of Australia* will offer scientists an updated list of scientific publications, links to relevant specialist research sites, details of the conservation status, geographic distribution and ecosystem role of a species. They can also register an interest in a particular species, or a field of species-specific research, and receive email updates, alerting them to publication of new journal papers. Quarantine officers finding a beetle in a shipment of timber will be able to check the specimen against a gallery of online images, quickly establishing if it's a biosecurity risk.

Amateur ornithologists or lepidopterists will be able to use the atlas to register deta from their field surveys or specimen records, adding their local knowledge to build a more finely detailed picture of Australia's biodiversity.

The encyclopaedia will also link to digitised historic records and heritage specimen collections of Australian plants, insects and animals in museums across the world.

''It's like a hologram – you'll be able to look at information through different lenses,'' Hobern says.

The biodiversity atlas could also be a valuable tool in tracking geographic impacts of climate change, enabling scientists to assess how quickly a species could spread through a landscape, colonising new areas.

''We could use a sophisticated modelling system to pull together all the data we have on a particular species to see how much scope it has to move from the area where it was born or, in the case plants, germinated.

''We can also track the movements of other organisms it depends on, establishing whether it can migrate and find suitable food sources. That means we can roll forwards 10 years, assess its chances of survival and adjust conservation measures accordingly, rather than waiting for climate change to catch us out, unprepared.''

As a keen bird-watcher and moth enthusiast, Hobern's excited about the possibilities the online atlas could open up for amateur naturalists to contribute to scientific research.

''Every summer people are posting lists of moths they've caught in light traps, sending the information to other groups of amateurs who share their interests. But this wealth of potentiality useful information remains largely hidden, and under-used or, worse still, not used at all.

''It would be very easy to design a simple way all this information could be stored and accessed via the atlas portal.''

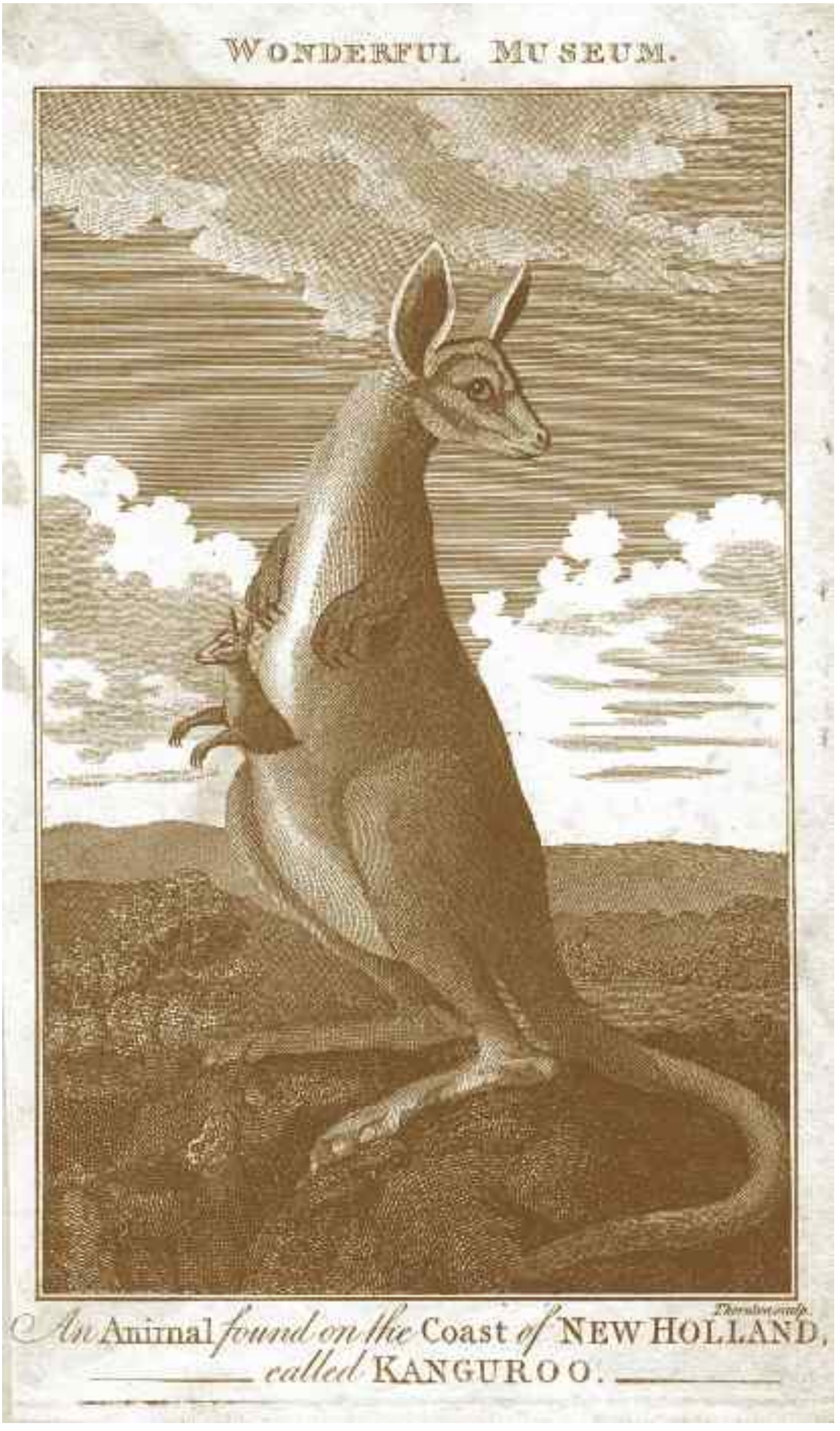
Even better, it could be linked to new online publishing tools that allow users to upload images – or choose from an online image gallery – that can then be linked to Google Earth maps. Add text, follow the prompts and it's possible to publish a guide to the plants, insects, birds and mammals found in your region, town, street, study site or suburban backyard.

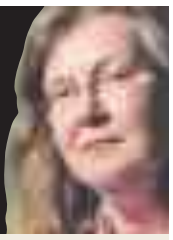
''You can have a print run of one, ten or one hundred, or produce a field guide on the fly to back up a talk you might be giving.''

Amateur scientists played a major role in scientific debate and discoveries in previous centuries, and the sophisticated cyber-tools of the 21st century are poised to give amateur enthusiasts a chance to make new, important contributions to science.

''I think we've had an unfortunate parting of the ways, with experts elevated to a kind of holy priesthood of science that's excluded the amateur naturalist. But online information systems like the biodiversity atlas will allow enthusiasts to play an important, meaningful and hopefully an exciting role in gathering data and making discoveries.

''I'm all for restoring the dignity of amateur science, because if more people are involved in studying the world around them, it can only be a good thing for future conservation of the world's species.''





ROSSLYN BEEBY

ENVIRONMENT

It seems the pace of national water reform has slowed to the lumbering gait of a giant Galapagos tortoise. National water broker Waterfind says the Rudd government's $12.9 billion rescue package for the Murray-Darling Basin is too small, too cheap and will take too long. In a report issued earlier this week, Waterfind claims it will take 47 years for the government to reach its target of buying back 1500 gigalitres of water licences from irrigators. Its analysis of the Federal Government's water buy-back plans estimates that, based on the market value of water entitlements growing at 15 per cent a year, a government allocation of $3.29 billion in public funds will buy 540 gigalitres over 17 years – well short of the volume of water needed (1500gl) to restore river health. The short and punchy report also questions recent Rudd Government claims that its first round of water purchases has acquired 35,000 megalitres of water. Waterfind estimates the true figure is likely to be around 5480 megalitres. It thoughtfully points out to the Rudd Government's water wonks that environmental water holdings will be eroded at the same rate as new water entitlements are acquired, unless policies are introduced to control "unmetered or untitled water usage" such as interception from forestry plantations, farm dams and the collective impacts of climate change. What was that about spending money like water?

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There's been hugs, games and bundles of bamboo on hand to calm distressed pandas after last month's earthquake in Sichuan, China. Wolong Nature Reserve, one of the last protected tracts of habitat for the giant panda, was close to the epicentre of the shock, and badly hit by the disaster. Officials say the earthquake killed four staff members at the reserve, and seriously injured a fifth. According to reports from Chinese news agencies, workers at the research centre risked their lives to fetch cubs from the Wolong breeding centre and carry them to safety. "When we saw the rock slides we were really worried," said Lu Yong, who has helped care for the panda cubs from birth. "In a disaster the first thing we think of is the pandas and how to get them to safety. They were very scared and disturbed when the earthquake happened. They needed support from their keepers before they would eat again." Wang Pengyan, deputy chief of the reserve, says the pandas' appetites are back to normal – 10 to 18kg of bamboo a day, plus milk, carrots, apples and steamed buns. Hugs from the panda keepers may offer temporary stress relief, but experts say it will take up to 20 years to rebuild Wolong's research capacity. Six pandas escaped during the (sorry, the pun's irresistible) pandemonium of the earthquake, and two are still missing. A spokesman for China's Wildlife Conservation Association, said several Sichuan panda reserves were affected by the quake, and habitat destruction would make preserving the species more difficult.