

## F o c u s

# Celebrating 35 years covering environmental issues

This year, *Ecos* celebrates 35 years of publication and 150 issues, making it one of the longest running environment and sustainability magazines in Australia. We take a retrospective look at the magazine through the eyes of its editors – and a subscriber who has been reading it for 34 of those 35 years.

CSIRO first published *Ecos* in 1974, a time when the Whitlam Government was in power and issues such as environmentalism, Aboriginal land rights, workplace equality for women, the abolition of conscription, free tertiary education and multiculturalism made the transition from fringe to mainstream.

It was the year Australian banks launched Bankcard, Cyclone Tracy hit Darwin, Mungo Man was discovered, and President Richard Nixon resigned over the Watergate scandal.

However, while environmental activism was ramping up in the '70s, the level of environmental literacy was still low. Environmental rounds on daily newspapers were non-existent.

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Against this background, *Ecos* was launched. In a foreword to the first issue, then Chairman of CSIRO, J.R. Price, wrote: 'CSIRO does not make the decisions on how environmental matters should be managed. This is the role of governments, private industries, and people in many walks of life. However, to do this effectively they need ready access to existing scientific knowledge. I believe CSIRO should let them have the facts it has to offer, in a lucid and balanced way.'

That first issue of *Ecos* carried a story on a CSIRO project to measure CO<sub>2</sub> levels in the atmosphere. The writer, Bob Lehane, noted that CO<sub>2</sub> levels in 1974 were 320 ppm (parts per million), up from 280 ppm in 1880 (they are currently around 385 ppm).

'On re-reading that story, what struck me was the sense of struggle the scientists



## Bushfire mapping by infra-red scanner

This picture was taken last summer, 3 days after the Ash Wednesday disaster. Recorded by an infra-red scanner aboard the CSIRO Fokker F-27, it clearly shows the front of a big fire still burning strongly near Warburton, in Victoria's heavily timbered Upper Yarra Valley.

The Natural Disasters Organisation requested use of the airborne scanner – which the day before was flown from Perth, where it and the Fokker were being used in Project Aquarius (a study of fire behaviour, and the role that water bombers may have in control of fires). In the event, the scanner was worth while, and the Natural Disasters Organisation credits the scanner with helping to bring the fires to an early end.

The scanner can see through dense smoke (but not cloud) to clearly show the position and extent of a fire. The Warburton fire front could not be mapped by spotter aircraft because of dense smoke, and the rugged terrain made ground access difficult.

Images from the scanner allowed officers of the Forests Commission of Victoria to map the fire's extent, as shown in the accompanying illustration. Later, fire-fighters in the field made use of the maps to draw up control lines and bring the fire to an end.

Infra-red surveillance of forest fires is routine in the surveillance of forest fires in North America. However, the instance here was the first time Australians have used the technique to help control a dangerous bushfire.

It has very real advantages. Infra-red radiation is only slightly blocked by dense

smoke. Furthermore, fires emit infra-red strongly, and show up clearly by this means.

The CSIRO instrument, a modified commercial unit, works in the 8- to 14-μm band. This displays details of the terrain well, thereby making map-making easy; temperature differences of 0.5°C can be discerned, revealing the locations of roads, rivers, and cleared areas. However, ambiguity can arise between what is a very small fire and what is merely warm (such as a sun-warmed bare patch).

Some overseas instruments get around the problem by using an additional detector in the 3- to 5-μm band. Only a fire will register in this band, so superimposing the two responses (in two different colours) gives a definitive picture. Dr Andy Green of the CSIRO Division of Mineral Physics, who worked on the development of the Fokker-mounted instrument, is adding this capability to it.

**Improved resolution**  
His expertise comes from working on the analysis of Landsat images, and indeed both systems use a line-scanning technique to build up a picture. Dr Green has improved the resolution of the original instrument tenfold, and now it can pick out details on the ground as small as 5 m across from a height of 3000 m.

involved had in coming to grips with complicated atmospheric processes,' said the first Editor of *Ecos*, Brian Woodruff.

Bob Lehane, who succeeded Woodruff as Editor in 1980, says he saw the editor's role as packaging together 'an inviting mix of stories – detailed, brief, sometimes quirky'.

'Apart from that report on the latest atmospheric CO<sub>2</sub> measurements, issue 1 included a lengthy article on pollution in the Derwent River and a short piece on prospects for replacing exotic grass lawns with native grasses. Subsequent issues

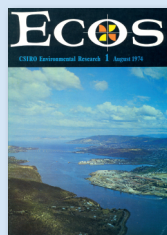
## MILESTONES IN SUSTAINABILITY SCIENCE

Browsing through back issues of *Ecos* is a rewarding activity for anyone interested in the evolution of environmental and sustainability issues over the past 35 years.

Here are some highlights from the past 149 issues.

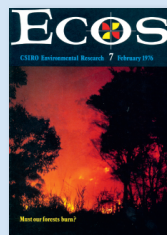
### *Ecos* 1 (1974)

'Toxic metals in Tasmanian rivers', also potential impacts of uranium mining in the Top End.



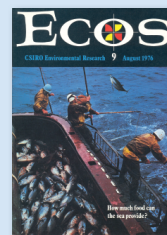
### *Ecos* 7 (1976)

'Carbon dioxide and climate change': An early warning about the prospect of rising CO<sub>2</sub> levels in the 20th century. Researchers stressed the need for more data and more on feedback effects, e.g. from melting of polar ice caps. Managing prescribed burns and optimal fuel loads in forests was the focus of another feature.



### *Ecos* 9 (1976)

'Can we grow our fuel?' explored a suggestion that Australia could produce half its annual requirements of liquid fuels from vegetation by 2000 – producing ethanol from eucalypts, fuel from plant waste pyrolysis (leaving biochar), and methane from anaerobic fermentation. The issue also covered research linking the Southern Oscillation index with droughts and 'oil from algae'.



\* This online version has been altered from the original.



‘One hopes *Ecos* had, and continues to have, an incremental impact for good on the nation’s scientific and environmental literacy,’ he says.

### The ‘90s: environment missing in public debate

From 1993 to 2003, under the editorship of Bryony Bennett, *Ecos* began to slowly broaden its focus from CSIRO to include other areas of national environmental research. This was also the decade when the environment was not high on the agendas of either business or government.

In her editorial for *Ecos* 100, published in 1999, Bryony noted that ‘many of the problems covered in the 1970s are still being studied today’, pointing to the problem of heavy metal pollution in Hobart’s Derwent estuary, which featured in issues 1, 50 and 100.

Issue 100 also featured analyses by senior CSIRO scientists on the status of the environment at the time. CSIRO Wildlife and Ecology Divisional Fellow, Doug Cocks, wrote: ‘The environment has come and gone as an issue in recent years ... it is not high on any political agendas. This is illustrated by the fact that both main parties fought the last federal election with barely a mention of the environment.’

Dr Wayne Meyer, Sustainable Agriculture Program Leader at CSIRO Land & Water at the time, wrote an article entitled ‘The water eaters’ in which he pointed to the problems with flood irrigation agriculture in the world’s driest inhabited continent. ‘We are one of the few countries in the world that can still afford, or allow, water to be applied to large areas of pastures in what are often little better than transient floods,’ he wrote.

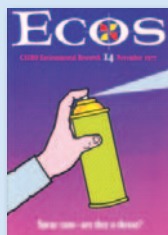
***Ecos* 38 (1983) documented CSIRO’s fire research, including bushfire control by aerial water bombardment, and use of infra-red technology to track fire fronts from the 1983 Ash Wednesday fires.**

led with stories on remote mining towns, sulphur dioxide pollution, and salinity in Western Australia.’

Bob recalls that when CSIRO commissioned an external review of *Ecos* in 1986, it found ‘a universal appreciation of the high quality and high standard of publication’ among readers.

### ***Ecos* 14 (1977)**

‘Spray cans and the ozone layer’: Fluorocarbons in the form of spray-on deodorants, hair sprays, etc. were being investigated as the main cause of ozone depletion in the upper atmosphere.



***Ecos* 23 (1980) included a story on carbon dioxide levels and crop yields.**

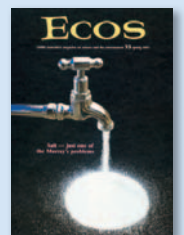
### ***Ecos* 49 (1986)**

‘El Nino and prospects for drought prediction’: Scientists investigate use of the link between the El Nino Southern Oscillation index (ENSO) and weather to predict drought and floods. As the Cold War was drawing to a close, national insecurity was still evident in the story ‘Nuclear winter down under’.



### ***Ecos* 53 (1987)**

The formation of the Murray–Darling Basin Commission brought optimism about the basin’s future – salinity was of greatest concern. ‘New strategies in the rabbit war’ highlighted the role of dingoes, feral cats, foxes and eagles in keeping rabbit numbers down.



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In the same issue, then Chief of CSIRO Forestry and Forest Products, Dr Glen Kile, wrote about the prospects of using forestry residues for biofuels and of using forest plantations as carbon sinks.

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‘One of the more memorable features I worked on, due to the enormity of the task and the important concepts it put forward, was the Wentworth Group blueprint for change, which championed Australian approaches to sustainable land use, rather than European models.’

‘The feature was a fitting addition to a new-look *Ecos* that heralded a broader focus on the increasing importance of research into economic, social and environmental sustainability.’

Thanks to Bryony’s efforts, *Ecos* won a Banksia Environmental Foundation award for communication in 2000.



## F o c u s

## Prepare now for climate change, scientists warn

Scientists have been talking for many years about the possibility of global climate change wrought by the warming effects of extra carbon dioxide and other 'greenhouse-effect' gases. But, until recently, they have heavily qualified their predictions by statements about the uncertainties in forecasting future atmospheric composition, and about how inadequately computers could model the effects on the earth's climate.

Now, however, a general warming trend has been firmly established, and laboratories around the world have become more confident about the reliability of their predictions of associated climate changes. It has become a matter of how to predict the regional details of these changes, rather than determining whether or not they will occur.

We are now certain that fossil fuel combustion is the prime cause of the carbon dioxide increase, while the destruction of forests is, at most, a secondary contributor. Each year, combustion of gas, oil, and coal releases 16 billion tonnes of carbon dioxide directly into the atmosphere. About 90% of this remains in the atmosphere and most of the rest dissolves in the oceans. Carbon dioxide concentration is now rising at the rate of about 0.4% a year throughout the atmosphere.

Moreover, high precision measurements of atmospheric constituents from a global network of observatories (including the Australian Boundary Monitoring Station at Cape Grim, Tas.) have identified increasing concentrations of a variety of other trace gases — methane, nitrous oxide, ozone (in the lower part of the atmosphere), and chlorofluorocarbons — that also behave as greenhouse gases. Scientists meeting at Cape Grim (from 1990) and the Department of Science) are continuing their watch on these gases. At present it appears that, taken together, these trace substances will have an effect on climate of about the same magnitude as that of carbon dioxide alone.

Significant climate change now appears inevitable within 30-50 years, well within the time-scale of current planning and the working lives of present scientists and undertakers.

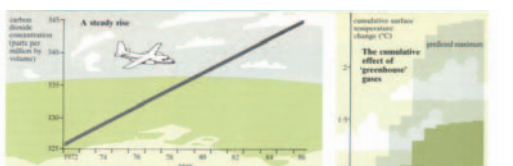
The most advanced experiments with computer models of the earth's climate

system suggest a doubling of atmospheric carbon dioxide (in its equivalent for greenhouse gases) will raise the globe's mean surface temperature by 1.5-4.5°C. This is expected to occur within about 50 years, despite the 'thermal lag' of one or two decades resulting from the oceans' heat-storing capacity of the oceans.

A rise of, at most, a few degrees may not sound much, but it will bring about substantial changes in regional climate, and will, through thermal expansion, increase sea levels by 30-140 cm, according to oceanographers. There is little doubt that the climate changes will profoundly affect ecosystems, agriculture, water resources and sea ice. The expected sea-level rises, although they appear small, are of major concern.



The head of the United Nations Environment Program's centre for ocean and coastal areas, Dr Stephen Kickett, warns that rising sea levels could threaten the Sydney Opera House within 30 years. Kickett, a nation occupying low Pacific islands, could disappear entirely, and in Bangladesh 15



Samples of air collected by aircraft flying high over south-western Australia show a steady rise in the amount of carbon dioxide in the atmosphere.

surface people may be forced to move inland.

### A message to planners

Dr Graeme Pearman and Dr Bruce Pincock, of the Centre for Climate Change Research, are two scientists long involved in studies of the greenhouse effect, and they are urging planners and design engineers to take heed of the forecast changes. They have organised a forthcoming conference, supported by the Commission for the Future, to equip these people with many of the calculations of a warmer planet (see the box). The urgency of the matter relates to the long lead times required for planning appropriate social, economic, and environmental responses, and as the scientists contend so, overcoming human inertia requires much dedicated work.

The groupings of Dr Pearman and Dr Pincock who took place in October 1990, when more than 100 scientists from all over the world gathered in Vilnius, Austria, to assess the role of greenhouse gases in influencing future climate. In their consensus statement (known as the Vilnius statement), the participants urged that decision-makers review their planning processes to take account of the expected changes, and to develop firm policies aimed at decreasing the emission of greenhouse gases.

They wrote: 'As a result of the increasing concentrations of greenhouse gases, it is now believed that in the first half of the next century a rise of global mean temperature could occur which is greater than any in man's history. Many important economic and social decisions are being made today on long-term projects — major water resource management activities such

as irrigation and hydro-power, drought relief, agricultural land use, mineral design and coastal engineering projects, and energy planning — all based on the assumption that past climate data, without modification, are a reliable guide to the future. This is no longer a good assumption.'

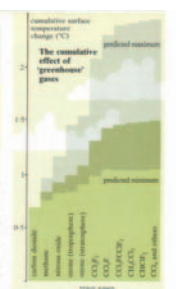
Participants accepted the estimate of 1.5-4.5°C for the magnitude of the global warming over the next 80-90 years. The range of uncertainty reflects the complexity of the climate system and imperfections in computer models, particularly in details of ocean-atmosphere interaction and the dynamics of clouds.

Nevertheless, a warning within the range quoted must be regarded as highly probable. Two recent experimental findings give added credence to the prediction.

Firstly, delicate techniques have been developed for recovering the air trapped as bubbles in polar ice and analysing its carbon dioxide content. Ice cores drilled to hundreds of metres below the surface provide a record of atmospheric constituents extending back hundreds of years, and show that the rising trend in carbon dioxide concentration began with the beginning of large-scale industrialisation last century (see *Ecos* 47).

These findings confirm the dominant role of fossil fuel combustion in raising carbon dioxide levels. The analysis also shows that another greenhouse gas, methane, has doubled over the same period.

As the oceans warm up, their waters expand, and sea levels rise. A further warming of 2°C could be accompanied by a rise of about 30 cm.

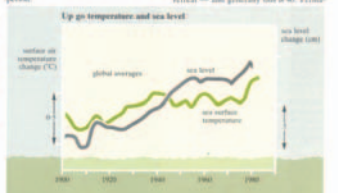


Our computer model predicts that, if concentrations of carbon dioxide and other greenhouse gases keep rising at present rates until the year 2100, then the globe's average temperature will ultimately rise by 1.5°C. Carbon dioxide will be responsible for half of that rise.

Secondly, we have learnt recently from a number of different analyses of past weather records that during the past 100 years the average temperature at the earth's surface has risen by close to 0.5°C (see the graph above). According to calculations, this is just about the order of warming that carbon dioxide accumulated over that period should have caused. Of course, the rise could be due to other factors, such as a higher energy output from the sun itself, but the coincidence with the carbon dioxide increase is very suggestive.

### Higher sea levels

If the world is indeed a warmer place than it was a century ago, then we ought to see secondary effects. Glacier should be in retreat — and generally this is so. Pro-



of environmental science with economics, governance, technology and social development.

'The time was right to broaden the platform from which *Ecos* could do its job as a publicly funded magazine — encourage greater understanding and debate by providing the Australian community with reliable background on emerging environment-related issues from a research perspective,' James says.

'In 2009, when a range of central issues are pressing — such as energy use, waste volumes and water scarcity — it is more important than ever before that individuals are informed and engaged in the range of related issues so they can be personally responsible for effecting change.'

'The research community, too, needs to identify developments and where it can work together. *Ecos* helps facilitate that, so its role is valuable.'

From that point of view, it is also important that *Ecos* has a positive solutions-based stance — showing where challenges are being met with innovation. 'There's plenty of gloom and doom out there — reading about progress and solutions is much more motivating. Even dire situations can have fantastic positive angles,' James says.

Taking into account *Ecos* is publishing its 150th issue after 35 years of coverage, the magazine's archive represents a valuable historical register of the evolution of key issues. The most prominent of these in today's context would be the human contribution to climate change, but also includes biodiversity loss, fire management, logging, the uranium debate, fisheries and marine conservation, the evolution

*Ecos* has revisited key environmental issues over the years, including climate change. Issue 53 (1987) included this story reporting on consolidation of scientific evidence pointing to a general global warming trend. 'It has become a matter of how to predict the regional details of these changes, rather than determining whether or not they will occur,' the story suggested.

## Embracing sustainable development

In 2002 James Porteous was appointed as Managing Editor to re-design, re-launch and re-position *Ecos* as a sustainability magazine, rather than a title focused predominantly on CSIRO's environmental science research. The aim was both to enhance the opportunity the magazine had to promote advances and solutions to

environmental and social challenges being achieved by a wider range of organisations, and to engage a more general audience.

'Eight years ago, CSIRO, to its credit, saw that the environmental agenda had moved into the mainstream and was going to have much more general engagement. "Sustainable development" had matured as a concept, drawing in under it the overlap

## MILESTONES IN SUSTAINABILITY SCIENCE

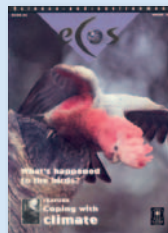
### *Ecos* 68 (1991)

'How high could the sea rise?' discussed the uncertainties involved in predicting the extent of sea-level rise in coming decades. The issue also featured the CSIRO's Plascon plasma arc furnace that could completely break down toxic substances such as PCBs in temperatures of 10 to 15 000°C — hotter than the surface of the sun.



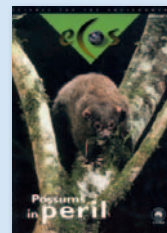
### *Ecos* 84 (1995)

'Ceasefire at Kapalga': Two decades of ecological research drew to an end with the closing down of CSIRO's Kapalga tropical science site in the Northern Territory. Also, scientists assisted in conserving the 200 000 tonne-a-year hilsa fishery in Bangladesh — which employed 2.5 million, and was the single most important food fishery for the country's 200 million people.



### *Ecos* 99 (1999)

'Greenhouse effects' feature section — threats to Australia's unique arboreal mammal species, to coral reefs and to agriculture, and the likely southward migration of cyclones. How Melbourne could recycle its wastewater, the sensitive issue of koala conservation, and the science behind shark tagging.



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of renewable energy technology and agricultural science innovation.

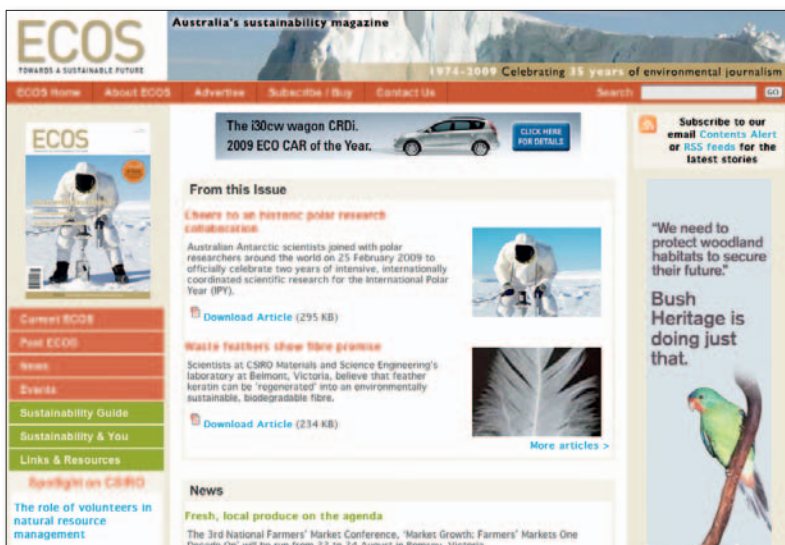
'I've had the privilege of seeing some significant evolution in the environmental agenda over the last seven years,' James highlights. 'The most significant would have to be that climate change has become a critical issue. Associated with that is the fact that carbon has acquired a price, which is being factored into every economic level. More broadly that means the economy has made a major transition, in now accounting for environmental impacts. By implication, water, waste and issues such as land clearing now have wider costs.'

'That this has forced an awakening, albeit slow, to the importance of corporate social responsibility is another significant milestone. The unexpected financial benefits that organisations realise through commitment to positive environmental and social contributions are an inspiration,' James says.

'The rise of private land conservation and social change movements, the rapid evolution of solar and renewable technology, the central role that IT is playing in facilitating "live" international conservation and research efforts, and most recently, the arrival of mainstream electric vehicle sales, have been some highlights.'

From here, *Ecos* plans to keep evolving with the times, tracking the fast-moving spectrum on sustainability issues. 'There are some challenges in the tensions between print and internet publishing out there in the market – but I see them as great opportunities for viability,' James points out.

'After all, the internet immediately takes important content to the world.'



The *Ecos* website provides valuable resources for readers and those browsing the web, including online copies of issues dating back to 1984–85, a regular news service, an events guide, a 'guide to sustainability', and subscription and RSS feed options.

### Loyal subscriber community

Results from a 2007 reader survey suggest that many in the *Ecos* readership have been subscribing to the magazine for years, and even decades.

We contacted a subscriber who has been with us since 1975. Kevin Bott lives in the small town of Durham Lead, near Ballarat, Victoria.

Kevin grew up on a farm in Gippsland before training as an outdoor education teacher, travelling around Australia, then working in Aboriginal communities in the Northern Territory and aid programs in the Pacific, as well as in mining, mud-brick house construction and beekeeping.

He discovered *Ecos* at issue 6 and has been an 'avid reader' ever since. 'I like *Ecos*

because it gives the facts, and publishes ongoing research,' he says.

'There is so much information on the environment around in print or on the computer. To get a balanced picture you've got to read so much, from so many points of view in one area. To get to the "truth" you have to research things.'

'With *Ecos* you can take what is there as having been well researched. I feel I can quote it. I've kept every issue – and I'm very careful about loaning them out.'

*Thank you Kevin and all our subscribers, readers and supporters. Ecos will continue its record of providing compelling, credible and in-depth perspectives on current issues in sustainability – in print, online or wherever the next 35 years takes us.*

### *Ecos* 117 (2003)

As 'peak oil' announced itself as a legitimate issue, 'Towards the forever fuel' was a stock-take of the relative promise of alternative fuels, including hydrogen. The debate about whether the high country should be grazed returned, and in a major research report CSIRO reinforced that our business-as-usual lifestyles and thinking were 'unsustainable'.



### *Ecos* 130 (2006)

*Ecos* led the main media with a prescient story on the imminent 'Clean tech' boom that had ignited overseas, and showed how Australia could miss catching the wave. There was also an early report on the probable dangerous elements of climate change arising sooner than had been previously expected by climate researchers.



### *Ecos* 147 (2009)

'Global CO<sub>2</sub> drawdown' examined the limited options available to rapidly withdraw carbon dioxide from the atmosphere to halt global warming, and the dingo shifted from foe to friend again for its role in 'sheltering' native mammal populations from cat and fox predation. There was also a review of mainstream 'green beers', organic and 'low carbon' to boot – who would've thought!



\* This online version has been altered from the original.