

Nature & Society

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August-September 2007

Editorial

Recently Australia's population reached twenty one million. The next week *Australasian Science* published a report on a study by the academy of Technological Science and Engineering (ATSE) into how Australia would cope with a population of thirty million by 2050 (called 30/50 for brevity).

The study was commissioned by the Scanlon Foundation "which believes that the future prosperity of Australia, underpinned by population growth, will depend on our ability to maintain social cohesion in a society with even more cultural diversity than we have already accommodated."

The study findings conclude, amongst other things, that there are no inherent physical, resource or technological barriers to achieving an increasingly prosperous society of that size.

In this study, as in many others, there seems to be no limit to technological optimism. Apparently Australians will be twice as wealthy as they are now, with a high level of car and private plane ownership. We will find new fuels to run cars and fly planes!

Undoubtedly a great deal of thought and modelling went into this study, by people who are highly intelligent and mathematically competent. However all modelling is only as good as the inputs into it, and the assumptions that form its base.

In a book called *Useless Arithmetic: why environmental scientists can't predict the future*, by geologist father and daughter OH Pilkey and Linda Pilkey-Jarvis, the authors show how signally we have been unable to model coastal erosion and our efforts to remediate the problem, amongst other things.

Fisheries modelling has likewise failed. A fisheries expert on *The Science Show* (7 July),

discussing the ongoing collapse of many of the world's fisheries, commented that the models were good at describing what had happened in the past, but not good at prediction, maybe because we are making the wrong assumptions.

One of the rules that had been expected to preserve fisheries had actually proved to be damaging. Establishing a minimum legal size for fish caught was expected to preserve the stock, by giving juveniles time to grow up. What

it did was to remove most of the large fish. It happens that the largest and oldest fish are the most fertile, so the practice removed the best breeding stock.

The truth is that our knowledge of natural systems is not complete enough for us to 'manage' them in any sustainable way. The best

response we have devised to date for managing fisheries is to establish large enough no-take areas to permit the fish to manage themselves. Scientists are now calling for thirty per cent of the oceans to be protected in reserves, in the hope that this will prevent the devastation of all fisheries.

The 30/50 study found no apparent insurmountable engineering, health, scientific, economic or environmental barriers in meeting

If we want to stay within the bounds of reality we must look to a more qualitative future, a future where there are no certain answers to many of the important questions we have about the future of human interactions with the earth.

OH Pilkey and
Linda Pilkey-Jarvis

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the water needs of their scenario. It focussed on urban water, since population growth will probably be concentrated in existing cities.

Producing food requires a lot of water, and is usually done in the country, even for urban populations, so it seems strange to ignore this. Australia has been seriously worried about production of food in our ongoing drought-affected areas. Suggestions have even been made of flying in cabbages from China. The USA is already importing a wide range of foods from China; Europe flies in fresh vegetables from Africa. Yet both China and Africa have their own water problems. Australians already expect our farmers to provide a lot of food and textiles for export, and in the future will also require them to produce more of these, possibly along with crops to produce fuel and plastics.

ATSE's report was predicated on the necessity for populations to continue growing, so it is not surprising that the nasty fact has been overlooked that the earth is finite, that populations cannot continue to grow. Of all the mathematical facts that modellers, politicians and all others need to be aware the most important is that continuing growth in population and consumption in a finite world is impossible. Sometime growth must stop, either because it causes its own collapse, or because we have the sense to put an end to it.

It is fairly generally recognised now that we must reduce greenhouse gas emissions by a very large percentage, very soon. This will only be done by increasing efficiency and by a change to non-polluting technologies. What seems to have escaped notice is that all the gains in efficiency will be cancelled out by having increasing numbers of people, increasing numbers of buildings and consumer goods.

Sometimes it is said that the more affluent we are, the better we can afford to look after the environment. This seems to have been given the lie by a new report showing that the most

affluent suburbs are the worst emitters. Certainly as countries work their way up the economic ladder, their emissions increase.

No matter what technological wonders our clever brains devise the environment will have the final say. It is our choice; vastly unpleasant collapse through disease, starvation and war, or a realisation that growth in numbers and consumption is unsustainable.

The longer we go on thinking that prosperity depends on the growth of population, the harder it will be to bring that growth to a gentle halt.

Jenny Wanless

Population growth and decline

... instead of seeing economic growth as the supreme measure of political success, we will have to start seeing it as a sign of failure. We will have to acknowledge that so-called ecologically sustainable development was actually a sustained exercise in self-delusion. The development must fit the ecology, rather than the other way around. The transition will not be easy, not least because the steady state requires a stable population, in which births and deaths balance each other at low levels. Unfortunately, to an extent that no one is prepared to acknowledge, prosperity even in developed countries is based on continued population growth.

Jenny Stewart
Canberra Times, 4 June 2007

People who believe that a stable population can live in balance with the productive capacity of the environment may see a slowdown in the growth of population and energy consumption as evidence of approaching equilibrium. But when one understands the process that has been responsible for population growth, it becomes clear that an end to growth is the beginning of collapse.

All species expand as much as resources allow and predators, parasites, and physical conditions permit. When a species is introduced into a new habitat with abundant resources that accumulated before its arrival, the population expands

rapidly until all the resources are used up.

David Price, Energy and Human Evolution
in Population and Environment, 1995

Today you can live exactly as you please as long as you give your [money] to one of the companies selling indulgences. By selling us a clean conscience, the carbon offset companies are undermining the necessary political battle to tackle climate change at home.

George Monbiot 2007

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Tel: +61 (2) 6288 0760

Fax: +61 (2) 6287 4489

E-mail: office@natsoc.org.au

Website: www.natsoc.org.au

Where we are:

Our rooms are in the South West Wing of Weston Creek Primary School, Minns Place, Weston, ACT.

By car: from Civic, follow the signs to Weston from the Tuggeranong Parkway and continue to Weston by veering left from the traffic lights at the Cotter Road turnoff. This takes you along Streeton Drive for one kilometre, then turn left into Hilder Street (there is a small signpost pointing along Hilder Street). Drive around behind the school into Minns Place and then into the car park. Our rooms are down the slope to the left of the school building – about 40m from where you'll park your car. Follow the sign to 'Sustainability Groups'.

There is space for three or four cars for disabled access close to the entry. There are ramps over the kerb from this small parking space and entry to our building is without steps.

By bus: The 25 bus route from Woden bus interchange and walk 200m.

By bicycle: The office is adjacent to the western trunk cycle path running between Civic and Tuggeranong.

Dan Welch summed up the almost Monty Pythonesque underpinning of the industry in an article recently in *Ethical Consumer* magazine: "Offsets are an imaginary commodity created by deducting what you hope happens from what you guess would have happened."

Crikey.com.au, 9 July 2007

Forthcoming NSF meetings

For the latest information visit our website www.natsoc.org.au and click on "What's On". There you will also find a link to a map showing the venue.

Wednesday 15 August 2007, 7:30pm - Healthy places: an essential linkage between *healthy people* and a *healthy planet*? Professor Tony Capon

Wednesday 19 September 2007, 7:30pm - Annual General Meeting.

Notice of the meeting and nomination forms for positions on the NSF board are included with this edition of the journal.

Venue: the ANU Emeritus Faculty. A map showing the venue can be found on the ANU website. The building is called the Fellows Lane Cottage and is building 3T on this map. It is to the immediate north of the Law Faculty buildings and east of the South Oval.

Wednesday 17 October 2007, 7:30pm - Climate refugees - a panel will look forward into the future, when rising sea levels begin to flood the heavily populated deltas of Asia and low-lying nearby islands, when some monsoons are diminished and others cause massive floods, when the rivers that sustain hundreds of millions of people in south and south-east Asia lose their dry-season flows from receding Himalayan glaciers and when China diverts their waters north. Australia's responsibilities as a neighbour, as a contributor to climate change, as possessor of a well-watered north with low human population densities will be debated in the context of Australia's own limited human carrying capacity and the implications of peak oil.

Venue: the ANU Emeritus Faculty.

Wednesday 21 November 2007, 7:30pm - A community forum on the need for more sustainable housing developments and the respective roles of government regulators, urban planners, architects and designers (and their educators) and developers, estate agents and house buyers in achieving more self-reliant housing that is also affordable. Nature and Society Forum began in August 2007 a project to enable the community to become more aware of the issues and empowered to respond effectively to the challenges.

Venue: the ANU Emeritus Faculty.

You can go from virtual reality to real stupidity very fast.

David Lindenmayer, 2007

Reports from NSF

NSF Strategic Plan

The 28 March meeting to discuss our strategic plan was well attended and lively. It showed that many members are very interested in our work. There has been a subsequent board meeting to consider amendments, and the revised strategic plan is now on our website.

Nature and Society Forum members' meeting 18 July 2007

Raising NSF's profile

The NSF chair, Brendan Mackey, introduced the session saying that as issues like climate change are being more widely discussed by individuals, institutions, the media and government, this provides opportunities for the work of NSF to be heard about the causes of unsustainability and its implications as well as global warming which is itself associated with carbon emissions. The risk is that just reducing greenhouse gas emissions will not on its own lead to humans living more sustainably. In fact, a switch to low-carbon energy production would likely lead to far more unsustainable human activity. Global warming is but one symptom of unsustainable human activity.

A second risk is that of perverse outcomes. For example, the carbon trading market places a value on the biomass of palm oil and sugar cane but not on the biomass of native forests, so that there is widespread clearing of native forests in developing countries for palm oil and sugar cane for biofuel. Money from Europe is being used to offset European carbon emissions by investing in tropical native forest destruction. There is a need to understand the lack of sustainability in our society and a failure to implement eco-systemic thinking. These are educational challenges which NSF is designed to meet.

The discussion from the NSF members present covered:

- The six current NSF projects which are educational in nature.
- NSF members writing opinion pieces for newspapers, mentioning their NSF affiliation in their by-line. The pieces would be without overt party political criticism and would be referred to

an editing group. About 6-10 pieces could be compiled, including articles from the NSF journal.

- NSF is comparatively quiet compared with other more activist advocacy groups like the Wilderness Society. Could it be more responsive to daily events, providing same-day commentary for the press, radio and television on major issues as they arise? The chair responded that NSF does not critique policy directly. As well, resource and funding implications tend to rule out such an activist role for the time being (see below).
- When NSF's Social Change website is ready, there could be a launch, to which various connected groups could be invited, like representatives of the ACT Sustainable Schools' Initiative, the Australian Institute for Sustainable Communities and the Youth Leadership for Sustainable Consumption. Canberra Times journalists could be invited to write an article about the launch and website as journalists prefer to write their own stories in their own style rather than publishing pieces from members of the public.
- NSF could use MySpace, Facebook and YouTube.
- Outreach could be expanded through Doctors for the Environment Australia, which has 300 members around Australia (and similar aims to NSF), who have had success in directly lobbying politicians. They may also be able to draw on the Social Change website in their work. The ANU medical students could be invited to give a presentation at an NSF meeting.
- Reciprocity and partnering with other organisations, like Sustainable Population Australia, which has about 1000 members with branches in State Capitals.
- Other partnerships could be with ANU Centre for Continuing Education and other community education groups such as the University of the Third Age.
- The Social Change website could be promoted to a wide range of groups like the Australian Conservation Foundation, Wilderness Society, etc.

The unrecognised and repulsive truth of our time is that individuals in 'democratic' societies have lost control of their governments. Compassion in the individual doesn't 'fail'...it becomes irrelevant.

*Letter writer to New Scientist
12 May 2007*

- NSF members are encouraged to suggest links with other like-minded organisations they know about, to encourage more people to join us to support 'healthy people on a healthy planet'.

Increasing NSF funding

Kylie Vandenberg and Catherine Gross spoke about NSF funding and the need to diversify and secure funding to continue to pay for the office administration (wages, phone, insurance, postage, statutory reporting requirements etc.) which enables all our activities to continue with a focus on their substance rather than being distracted by administria.

NSF needs about \$30,000 annually to continue this work; it needs more to initiate and run its projects.

Four main options were discussed:

1. Philanthropic organisations
2. Grants
3. Sponsorships by associations and clubs
4. Membership and member donations.

Discussion

As Canberra clubs like the Hellenic Club, the Burns Club and the Irish Club have a social purpose, and are used by thousands of Canberrans in that way, NSF could write to all, explaining NSF's philosophy, vision and objectives, and how its projects assist community development, and seeking funding or sponsorship.

For example, they could fund the publication of the NSF Journal, covering paid preparation time, printing, postage, and perhaps also a colour version of the NSF brochure.

A list of benefactors could go on NSF's website.

ACT business associations could also be approached.

Frank Fenner pointed out that although there are Melbourne-based philanthropic organisations, like the Potter and Myer foundations, they prefer to fund organisations active in Victoria. NSF could, therefore, run workshops or other activities in that state.

Kylie spoke about four grant applications submitted by NSF to Environment ACT:

1. Update of the NSF website
2. 'Community Caring for Catchments'
3. Workshops associated with Derek Wrigley's 'House Buyers' Guide'
4. SEE-Change's suburban ecological footprint project.

Most of these ideas will be taken up by the board and also by individual members who have already stepped up to help us expand our activities, our influence and our sustainability. With more volunteers, we can take up all the ideas.

Wendy Rainbird and Keith Thomas

Reports of NSF meetings

Australian Bushfires

Paul Collins and Nic Gellie proved an interesting duo talking about bushfires at our April meeting. Paul Collins had many stories to tell from the historical research he did for his new book, *Burn*. His experience is not only historical, however, as he had bought a block of land in the Snowy Mountains in 2002, only to have it burnt out in 2003. He was pleased to report that

the bush has regenerated, and it is prime quoll habitat.

Paul compared the 2003 fires with the Black Friday fire in 1939, in Victoria. That notorious fire destroyed a township and killed over seventy people, but was over in just a few days, whereas the 2003 fires lasted for months.

Reading the Streeton Royal Commission into Black Friday, Paul was impressed at how prosaic all the accounts were. There was no hype or hysteria like the recriminations we have experienced. Mrs Robinson, one of Paul's favourite witnesses, just commented that things had 'looked bad all round', although she lost several children to the fires.

Although aborigines had certainly lit fires we have no way of knowing how much or how often. European settlement certainly brought an extraordinary increase in both the frequency and intensity of fire in south-eastern Australia. People lit fires everywhere, at any time, to burn off or to clear land. Rural manhood was forged in fighting fires.

People ridicule ideas which they are sure are wrong. When you are sure I am deeply and irrationally wrong in my opinions, you will either pity me or laugh at me. Strong feelings of revulsion are likely to be a cover-up for weak convictions. We detest stuff when it rattles our cage - bringing up doubts and fears about which we would rather not think.

Pondurenga Das, Yahoo Group (internet, 2 July 2007)"

The Streeton Royal Commission introduced the idea of studying the dynamics of fire. Then, after World War II, volunteer fire brigades were formed to protect communities. The idea of fighting fire with fire began at that time.

In the 1980s environmental groups started to object to the frequency of controlled burning, and now there are strong differences of opinion about controlled burning, and the practice of back burning to contain fires.

Nic Gellie started working as a fire ecologist in Tasmania, and has since worked in several places on the mainland. In the dense forest areas of Tasmania he thinks the aborigines had to burn, to maintain access to various parts of their land.

Nic's research here in Canberra is investigating the temporal, rather than the spatial, potential for severe fire occurrences. He pointed out that fire is episodic, rather like rainfall in Australia. Fire occurs infrequently, and we take notice of it when it is severe. Somehow we have become worse at fighting fires. Rather than putting them out early, we let them build up, so they burn for much longer. We have not learnt from our own history.

My apologies for the delay in publishing this report. At least now we can add Nic's own summary of his work.

Jenny Wanless

The point of thinking about the future is to help us think about the present. This population forecast is a vivid reminder of the assumptions that make meaningful change so hard. We can't help believing in growth. We can't help believing that the way to create change is simply to buy different stuff, so growth doesn't stop. And we refuse to think seriously about the number of human beings on this planet, a kind of growth that somehow seems "natural" to us.

Verlyn Klinkenborg
New York Times,
18 July 2007

Following the meeting on bushfires, Nic Gellie provided the following summary of his research at the ANU

The effect of seasonal dryness on landscape susceptibility fire in the ACT Region.

The aim of my thesis is to investigate the temporal variation of historical landscape susceptibility to fire, based on seasonal dryness and fire weather, using a run of 65 years of weather data at Canberra airport, and 136 years of rainfall records at Queanbeyan. My interest in this topic stems from my desire to improve historical and local knowledge of these factors to forecast any peak occurrences of landscape susceptibility in impending fire seasons well before the peak period of susceptibility is reached. This knowledge is gained from time series analysis, using classification of these two factors at

different time scales. The approach is to follow the trajectory of the seasonal dryness factor, and then use established relationships between it and fire weather to forecast likely coincidences of seasonal dryness and fire weather in the lead up to critical fire periods during any upcoming fire season.

A principal driver of landscape susceptibility to fire is landscape dryness. The state of landscape dryness is tracked using an index of soil dryness, which reflects the state of moisture in both the vegetation and soil. Based on an index of soil dryness derived by Tony Mount, a Tasmanian forest scientist, a new version of a seasonal dryness index (RSDI) was derived from thermodynamic principles, using net radiation and rainfall as the two main factors. This new model was based on the heat and water balance concepts of Budyko, a Russian climatologist, as well as concepts of transpiration

and water use from studies by Dr. Sandy Berry at the A.N.U. This new model can be made adaptable to a range of forest conditions.

The next part of this study focused on time series analysis techniques, such as time series decomposition, classification, and generalisation of time series of the seasonal dryness factor to classify the past fire seasons into categories of dryness, based on duration and seasonality of dryness. Having determined stable and recognisable classes of fire seasons based on the dryness

factor, the coincidence of fire weather was examined in relation to the seasonal dryness factor. This analysis found increased severity in fire weather and increased coincidence of multiple lightning ignitions during fire seasons of severe to extreme seasonal dryness coinciding with the peak net radiation in the ACT region, which occurs in the second or third week of January during the solar year. The risk of these coincidences is relatively small over the 65 year period, amounting to about three critical weeks over that period.

Finally, my study has the potential to identify recognisable patterns in the interactions between sea surface temperatures and air pressures at the sub-hemispheric scale that give rise to the increased coincidences of high landscape susceptibility and the occasional extreme fire weather conditions in this region.

Meeting report 20 June 2007

Recycling Canberra's water

Three guests gave us much appreciated perspectives which will be useful background for our own submission to the House of Assembly inquiry.

Paul Perkins

Paul Perkins reminded us of two things. First, that recycling water from sewage is an emotional issue and is subject to 'spin', politics and adversarial debate; secondly that the ACT already recycles its sewage for discharge into the Murrumbidgee and that this recycled water feeds into the natural environment, irrigation and urban water supplies downstream.

He said that European settlement had brought European ideas and assumptions about the environment to Australia and it was on these that we developed inadequate 'hydrographics' (see review of Default Country in the xxxx edition Nature and Society).

Global climate change contributed to a 'flip-flop' about 30 years ago below the 30° parallel. This worked its way into the public consciousness in Perth about a decade ago but we are still largely in denial on the east coast, largely because the change is beyond the past experience of most Australians.

He predicted famines in the northern hemisphere within the next decade, saying that it is now apparent that from 1999 the Iberian peninsula, Turkey and the North China plain had entered prolonged drought and that the high plains aquifers in the US were being seriously depleted. All four of these areas were experiencing their worst drought for a century. In some of these areas more frugal use of water has been accepted; we have not accepted the need for frugality.

Paul counselled us not to be distracted by the present rainy *weather* but to plan on the basis of *climate* trends and forecasts.

He said we must increase the effectiveness of our limited and diminishing water supply and that recycling our waste water was one way to do this. Although there was not a high level of trust that either the government or the private sector could recycle with sufficient safety, he pointed out that it was technically feasible in a number of ways and that the community needed to specify the level of

assurances it required rather than rejecting it out of hand.

All alternatives include a waiting period while the design and engineering is completed and this implies the continuation of stage 4 water restrictions for the next four summers (at least). The main alternatives under consideration include:

- building a new dam (which would take four or five years) or expanding the Cotter dam from its present 4.5 to 70 gigalitres and waiting for it to fill. An expanded Cotter dam is the cheapest way of increasing our storage capacity. It would also provide a purifying storage for a water recycling scheme
- pumping water from the Cotter through Canberra's mains up into the Googong reservoir and pumping directly from the Murrumbidgee into the Cotter
- recycling waste water – at the level of the individual house and business as well as at the city level.

Domestic rainwater tanks are admirable but inadequate of themselves; using less water, too, will be inadequate, but both

approaches should be part of an organised strategy.

Paul finished by pointing to Canberra's status as the nation's capital with a population of 370,000 which will rise to 450,000 in the current planning period as reasons why we have special needs and must progress. He urged Canberrans to avoid blaming the actions of past planners and engineers who did their best in their time. We have to move forward together. Without an effective strategy, Canberra will gradually die.

Deb Foskey

Deb Foskey, Greens MLA, has recently successfully proposed a House of Assembly inquiry into water recycling in the ACT. Submissions are being invited from the public until October and the inquiry is due to finish in March 2008. She said that other parts of Australia have more vulnerable supplies than the ACT and we need to learn from their experiences.

Deb endorsed Paul Perkins' observations about denial, saying that the recent ACT budget was based on the assumption that rainfall would return to the pattern seen as normal 20-30 years ago. Although there was general agreement that there should be some reduction in water use, so far every class of

By its nature, the future is difficult to know, and when changes in the present arise from punctuated equilibria in relentlessly complex non-linear systems, the future becomes even more difficult to plan for.

*Alexander Carpenter
on the internet 3 June 2007*

user has objected strongly when it is suggested that they should be a leader in reduction.

She added to Paul's list of water options by reminding us that the government was looking into desalinating seawater and pumping it from the coast – just a more extreme example of official preference for centralised, high technology engineering-based solutions. All pumping options are expensive and have high greenhouse costs.

Deb also referred to Actew's brief to supply water to a Canberra population of 500,000 by 2030 with no thought being given to capping the population at that figure. Housing developments, however, are handled by a separate authority whose plans exclude managing demand for water and assume Actew's supplies will meet the demand.

She said this was the wrong way to approach the problem. It would be preferable to look at our water resources as a guide to the size of the population Canberra could sustain.

She also mentioned the "Water Smart Tune-up" which she thought should be free to households and taken up by real estate agents. Unfortunately, there is no incentive for landlords to improve the water efficiency of their properties as tenants pick up the bill. She discussed the need for flexibility in water restrictions to enable our landscape – particularly street trees – and suburban vegetable gardens to survive. Deb said the Assembly's committee process is one of its strengths and she encouraged us to make a submission to their inquiry.

Peter Collignon

Peter Collignon, a professor at the ANU medical school as well as a clinician at the Canberra Hospital, told us he was involved in the water debate because of his passion about risk minimization and for avoiding unnecessary risks.

He ranked clean water along with vaccination as the two main features of contemporary public health. Clean water has been possible primarily through chlorination and by establishing clean catchments. Recycling water is directly opposed to the principle of clean catchments. He said he was in favour of recycling Canberra's water but not for human consumption.

Putting the quantities of water into perspective he said that about 800 GL falls in or flows through the

ACT each year, with 300 of those entering the ACT in the Murrumbidgee. We draw about 65 GL from our dams and put about 35 GL back into the Murrumbidgee through the Lower Molonglo treatment plant, which is still one of the best in the world. That is, Canberra extracts 30 GL a year. The recycling proposal is to treat 9 GL annually.

The water flowing from the ACT is held in Burrunjuck Dam and most eventually finds its way to Riverina rice farms that use 2,000 GL – more than all Australia's capital cities combined. Canberra's 30 GL is similar to the annual water use of one large rice farm. He made the point strongly that Canberrans should not be exposed to the risks from recycled water just so the extravagant irrigation of rice farms could continue.

Canberra's Lake Burley Griffin is filled with 5-6 GL of drinking water from Googong, but it could be filled with recycled water from the Molonglo plant.

The reverse osmosis technology proposed for Canberra was, he told us, good—though expensive and requires a lot of energy—and he would accept it if there was no alternative; but there are

alternatives. The reverse osmosis technology uses a one-micron membrane to exclude the bacteria, then a finer one in the reverse osmosis. This is supposed to leave only water molecules. In fact it lets through about 2 per cent of the salt and also misses about 2% of viruses, but the data are scarce because other cities generally check for bacteria, but not for viruses. Their tests themselves do not measure water at the consumers' taps, but in laboratories and using computer models for viral surrogates, rather than measures of viruses themselves. In Brisbane reverse osmosis removes all but about 6% of antibiotics (this is odd because their particle size is much larger than a water molecule), but he would prefer to see that figure below 1% in Canberra's situation. For nitrates, the figure is between 10% and 50%; this is not especially serious in itself, but it does demonstrate that reverse osmosis does not clean the water as thoroughly as the publicity claims.

If you get rid of 99 per cent of drugs and you heavily dilute the result, is the risk significant? Probably not. But removing just 99 per cent of viruses is a different matter, depending on their initial density.

The human mind is a product of the Pleistocene age, shaped by wildness that has all but disappeared. If we complete the destruction of nature, we will have succeeded in cutting ourselves off from the source of sanity itself.

David Orr, environmental philosopher, in Adbusters, September 2002

Technological fixes are not, by their nature, failsafe.

The reverse osmosis process is 'high risk' because the low probability of a serious problem has to be weighed against the huge consequences – 'catastrophic' – that would follow a significant malfunction, no matter how infrequent a malfunction was. He repeated that it would be 'high risk' and added that this risk was additional to all the existing risks.

The financial cost of the proposed scheme is very high: \$150m to build the dam and \$10-\$20m a year, much of it going on electricity, to run the pumps (to elevate the water 268 m), electricity which would, over a year, emit 50,000 tons of carbon in its generation.

About 210 GL a year enters our dams in an average year. In 2006 only about 25 GL came in. This range is typical for Australia and has led to the relatively large storage dams we use in our environment with its extremes of floods and droughts. In other counties they draw water from reliable nearby rivers. These large storage dams give us high quality water as they serve to dilute contaminants and provide time for disease organisms to die off or settle. This system also makes us vulnerable when run-off from heavy rain flows into our reservoirs, stirring up the water and pushing it through the reservoirs relatively quickly. In Canberra's case water from heavy rains would be pumped through the urban water mains from Cotter to Googong (there is no other route), putting disturbed water into our supply.

It is claimed that Singapore and Orange County in California have systems based on reverse osmosis, but the former's recycled water is used mainly by industry and the latter's is stored for a year before being drawn on for general domestic use (Canberra's plan means there will be occasions when the holding period is down to two days). In Windhoek (South Africa) they use the system, but they have a very low rainfall and no alternative.

For water recycling to be safe in Canberra we need a large dam in which to store the water and we need careful testing of water so it can be kept off-line until we know it is safe.

Question time

In the question time following the talks the following points were made:

- Actew is a good engineering organization, but this means there is a corporate momentum to move from one big, centralised engineering project to another
- Water for recycling should exclude water from Fyshwick, Hume and Mitchell industrial areas
- Actew has ruled out a dual system across the city; however dual systems should be installed in new suburbs
- 50% of Canberra's waste water is already recycled now, in 2007, but it is discharged into the Murrumbidgee from where it flows into the large Burrumbidgee dam and then flows on to farms and for human consumption in cities downstream
- There needs to be more involvement in the debate by people who are well-informed—in contrast to the situation in Toowoomba, when the debate became emotional, political and informed by prejudice. One way through this is for the basic data to be in the public arena in a form where it can be the basis for informed discussion and decision-making
- people latch on to slogans like "I'm not drinking that sh*t" and some journalists sensationalize the story by selecting the facts that make the best story or which set up oppositions that would not otherwise exist
- The need for a new urban aesthetic so that our urban landscape matches our environmental parameters rather than struggling to meet an ideal imported from Europe. Demand reductions up to 20% have been achieved overseas with up to 40% if all gardens are adjusted to meet local conditions
- There is a push for a high-tech takeover of demand management by relying on sophisticated metering rather than fundamental landscape and systemic changes
- Demand management is not attractive and difficult to sell politically, yet Canberra is presently unsustainable
- Some people are committed to a single solution (demand management or more dams) and will not give due consideration to all the possibilities; this tends to harden opposition in those who have more inclusive approaches

Corporations may be seen as abstract machines designed to convert natural resources into industrial garbage.

*Jay Hanson
on the internet, 10 June 2007*

- The government encouraged farmers to grow rice so there is a case for government compensation to enable them to withdraw from this out-dated water-intensive industry. The rice farming debate is very political, with powerful interest groups rigidly protecting their positions.
- Daniel Connell's book *The Politics of the Murray-Darling Basin* shows that water allocations were made on the assumption that the unusually high rainfall of the 1950s and 1960s was typical
- The viral risks come from a wide range of viruses; enteroviruses (polio, coxsackie virus which causes heart disease), rotaviruses (diarrhoea and vomiting). If stored in healthy dam water for long enough, natural bacteria and fungi will destroy them
- Non-biodegradable oestrogens should not be sold
- Domestic reprocessing/ recycling is increasing, but small-scale distributed systems still need regular informed maintenance and testing to ensure water quality is maintained.

Keith Thomas

There are groups of modern people still living in the Pacific basin who demonstrate that technology is one of the least important ingredients to successful existence – that the things we have been clever enough to invent have been much less important to our survival than our capacity to live together in groups, to cooperate with one another. They are proof that it is what is in our heads that is more important than what we carry in our hands.

Alan Thorne

ANU palaeoanthropologist, 2007

to call for serious short-term targets as well as long-term ones. Mark's longer term target is for a reduction in GHG by 80% on 1990 levels by 2050. His shorter term targets begin for 2010.

He reminded us that only one of the main political parties has committed to a long-term target, but neither of them would propose shorter-term, intermediate targets before the coming general election.

He had recently completed a study for Greenpeace showing how Australia could reduce its emissions by 30% by 2020. This is not easy to do and requires massive and prompt action on energy, transport and agriculture and also requires an effective population policy for Australia.

Mark reminded us of the argument by politicians (and others who are unwilling to change) who tell us

that Australia's GHG emissions are only 1.5% of the global total so we can make no significant global impact and, therefore, it is futile even to begin. He said that this perspective shows a remarkable lack of political understanding by politicians. He said the argument for Australian action is not so much about absolute emissions; it is about a two rich developed countries holding up the global Kyoto

process. China, India and others will look to what the US and countries like Australia (we are the world's biggest per capita emitter of GHGs) do before they will make significant changes.

The present Australian government's climate change policy is centred on burning coal to produce electricity with the capture and burial of CO₂. The government's name for this is 'clean coal', but this is just a marketing term, and we must not be seduced by the marketing term and must understand that there is no such thing as 'clean coal'. He did not object to research on capture and burial, but agreed with a recent MIT report (*The Future of Coal*) which said the technology – if it works - would not be commercially implemented globally before 2025 and would not match renewables until 2045.

Mark said he supported the burial of CO₂, particularly that produced in the process of natural gas extraction off Australia's NW Shelf. This will enable gas to play a valuable role in the transition from coal to renewables.

Meeting report 27 June 2007

Mark Diesendorf book launch

On 27 June 2007 NSF hosted the Canberra launch of Mark Diesendorf's new book *Greenhouse Solutions with Sustainable Energy*. Mark himself and Dr Hugh Saddler of Energy Strategies spoke at the launch. This is the first book, Mark told us, that he had written as the sole author and it distills decades of experience, learning and thought in a careful, yet broad view of the range of associated topics.

Mark spoke about renewable energy, pointing out that the science and the technologies were ready for political and commercial will to provide them with a level playing field.

He focused on the role of renewable technology in reducing greenhouse gas (GHG) emissions, warning us that the prognosis for the planet was worse than official accounts (including the 2007 IPCC reports) indicate, particularly the rate of acceleration through complex, interacting positive feedbacks. This led him

Nuclear power is the other preferred option of the politicians. Recently nuclear power has been repackaged as 'clean and green' – but this, too, is merely marketing. Their message is that there is a new generation of nuclear power technologies; the truth is that nuclear power technologies are fundamentally those introduced in the 1970s. He told us that the inevitable associated problems of nuclear proliferation (which is now a greater problem as is shown by the number of countries which have used civil nuclear power facilities to begin arming themselves with nuclear weapons), high cost, waste treatment, disposal and terrorism had not been resolved. He said that terrorism was now a greater risk than in the 1970s and scoffed at high-tech safeguards to prevent aircraft crashing into facilities, when all that would be required would be a few armed terrorists with technical know-how to cause mayhem.

Even if a nuclear power station were to be built in Australia, the minimum time it would take to produce electricity would be 15 years.

He reported on work he has been doing with Gavin Mudd from Monash on the decline in the grade of uranium ore. There are a few decades of rich

uranium ore. Beyond that, the fossil fuel inputs required to recover and process the ore rise steeply. Even now, to get a kilogram of yellowcake, some ten tonnes of rock has to be shifted, crushed and transported to disposal sites.

Mark described the anti-windpower lobbying, much of which originates in the UK from the group 'Country Guardian'. The vice-president of this group is Bernard Ingham, once Margaret Thatcher's press secretary, and now secretary of the 'Friends of Nuclear Power'. Mark was critical of the misinformation being spread by Country Guardian which is picked up uncritically by people in other countries including Australia.

Mark also addressed reliability of windpower compared with coal power for 'baseload' power. He explained that wind farms would be dispersed across the country and that the electricity generated is far more sustained and could be supplemented by gas turbines which can go from stationary to full capacity in nine minutes. Gas turbines could be biofuelled.

Mark reminded us that moving to renewables required a period of transition. Natural gas should see us through this transition, but because we are

exporting so much of our reserves, our gas supplies will be exhausted this century.

Mark then went on to review the different renewable energy sources, all of which can play their part in a mix: bio-electricity, wind power, solar electricity, solar thermal, geo-thermal, energy-efficiency. These are described in detail in his book, together with discussions of the associated externalities and a transition program.

Keith Thomas

Healthy human emotions

Emotion is what we experience during gaps in our thinking. If there are no gaps there is no emotion.

Today people are thinking all the time and are mistaking thought (words/ language) for emotion.

When society switches-over from physical work (agriculture) to mental work (scientific/ industrial/ financial/ fast visuals/ fast words) the speed of thinking keeps on accelerating and the gaps between thinking go on decreasing.

There comes a time when there are almost no gaps. People become incapable of experiencing or tolerating

gaps.

Emotion ends. Man becomes machine.

Sushil Yadev, 2006.

The End of Poverty

A Melbourne NSF member, Kate Phillips, has written recommending a book by Jeffrey Sachs, *The End of Poverty: how we can make it happen in our lifetime*. She said "I think it is an inspiring book because it explains the reasons why countries are poor, from a holistic view, bringing together geography, history, politics, and social factors. The other reason I think it is a good book to read is that it puts together coherent plans for ways out of poverty – grinding poverty is *not* inevitable and rich countries can and should do something now – both from a moral perspective and out of self-interest.

The only thing I'm not sure about in Jeffrey Sachs' argument is how this meshes with reducing greenhouse emissions and sustainable living. Perhaps that is the next book.

Jeffrey Sachs recently gave the BBC Reith Lectures.

For more than 50 years sane voices have called for an end to the debate. Nature versus nurture has been declared everything from dead and finished to futile and wrong—a false dichotomy. Everybody with an ounce of common sense knows that human beings are a product of a transaction between the two.

Matt Ridley, *Nature via Nurture*

Canberra could be the solar capital

One of the barriers to people installing photovoltaic (PV) cells on their roof-tops, has been the cost (a 20-30 year payback time), despite such electricity being non-greenhouse gas emitting. A real change could occur in Canberra with a proposal to reward people for producing PV cell electricity. Legislation is being drafted by the Labor member for Brindabella, Mick Gentleman, for a "Feed-in Law", similar to the successful German scheme for a higher tariff paid to people who generate electricity via photovoltaic cells on their roof tops to feed into the electricity grid.

Mick Gentleman spoke at a recent community meeting about his proposal, which has support from the Greens as well as the ACT Labor Party. He visited Germany and spoke to the experts, like Hermann Scheer (see book review in our last edition).

Mick reported that in Germany, the take-up rate is into hundreds of thousands, with 30,000 people employed, and contributing to their 6.8 billion invested in PV systems.

People who install the PV systems in the ACT would be paid a rate, possibly four times the general electricity rate, for what they feed in to the grid. So, with a government rebate for installation together with such a "Feed-in" tariff, it is estimated that most people would have their system paid off in eight years. The rate is spread over all consumers.

There is further potential beyond domestic solar-cell power generation. I have proposed that community groups, like a SEE-Change group, form a company in association with premises having suitable roof or land space to produce significant quantities of electricity. For example, my local primary school in the Canberra suburb of Farrer has north facing roof-tops over 100 metres long, and PV cells would generate more electricity than the school would use, so what is fed back into the grid would pay a dividend for those who choose to invest in such a company. Such a scheme would need to be negotiated with such premises, but as many ACT schools are joining the ACT Sustainable Schools Initiative, the main barrier would be in initial costs. Mick Gentleman's proposed "Feed-in Law" would make the idea more financially viable.

It's quite a simple theory and one that any beer drinker understands. The glass starts full and ends empty and the faster you drink it the quicker it's gone.

*Colin Campbell
referring to oil supplies, 2007*

Wendy Rainbird

Fishy Oil

Humans are already putting unprecedented demands on the world's fish stocks, and some estimates are that all commercial fish and seafood species may collapse by 2050. Aquaculture has been promoted as a way to continue to provide fish for the market, but as aquaculture relies on wild fish as food for some farmed fish, it can actually increase pressure on wild stocks.

Eating fish, especially oily ones such as salmon, several times per week is considered important for human health. Instead, or as well, many people take fish oil capsules daily for the sake of their hearts, or to treat their arthritis.

Atlantic salmon are considered an excellent source of the desirable omega-3 oils, but in fact they do not make this oil themselves. They are bio-

accumulators, concentrating the oil they get from eating smaller fish, which in turn eat the microalgae, microbes and other tiny organisms that actually make the oil.

Although it is possible to make a satisfactory feed

incorporating plant oils such as canola, farmed salmon fed on this diet are healthy but have low levels of omega-3 oils. Surprisingly, feeding Paterson's Curse to salmon has proved to produce fish with high levels of the desirable oil. This weed, which can poison horses and other farm animals, actually contains a unique biosynthetic precursor to omega-3 oils. As shown by tests run by the University of Tasmania in Launceston the salmon can use this to produce the oil.

Further trials are needed, with both salmon and other species of fish. If these are successful, then a good supply of Paterson's Curse oil would need to be established to provide enough for the aquaculture industry. An alternative would be genetic modification of other land plants, to give them the genes to produce omega-3 oil.

Australasian Science, July 2007

Popular theology is a massive inconsistency derived from ignorance. The Gods exist because nature herself has imprinted a conception of them on the minds of men.

Cicero, De Natura Deorum, I, 16

The rise of depression

There is something to be said about the word “depression”, which has almost entirely eliminated the word and even the concept of unhappiness from modern life. Of the thousands of patients I have seen, only two or three have ever claimed to be unhappy: all the rest have said they were depressed. This semantic shift is deeply significant, for it implies that dissatisfaction with life is itself pathological, a medical condition, which it is the responsibility of the doctor to alleviate by medical means. Everyone has a right to health; depression is unhealthy; therefore everyone has a right to be happy (the opposite to being depressed). this idea in turn implies that one’s state of mind, or one’s mood, is or should be independent of the way that one lives one’s life, a belief that must deprive human existence of all meaning, radically disconnecting reward from conduct.

Theodore Dalrymple
Our Culture, What’s Left of It,
2005 (p9)

Injustice

Injustice is the primary enemy. It is doubtful if any major reform of the past two hundred years has succeeded without a calculated reference to injustice. For Darwinians, extinction is more disturbing than simple injustice.

Garrett Hardin
The Feast of Malthus, 1998

But what most anti-Malthusians do not realise is that our kindness, our cries of injustice, is really the unkindest cut of all. All our kindness will eventually lead to massive starvation of literally billions of people. And all that after we have destroyed, with our kindness, a huge percentage of the world’s flora and fauna. Beautiful animals and beautiful forest will be gone forever, replaced by billions of starving people who, in the final analysis, will have no recourse but to prey upon each other. To survive they will be able to show no mercy to their starving fellow man.

Ron Patterson, commenting on Hardin
12 July 2007, internet

Toxic denims

Originally made out of *serge de Nimes*, jeans have created a strong demand for cotton fabric. This has meant the enormous increase in the use of pesticides, fungicides and herbicides and in Australia, particularly in northern NSW and southern Queensland, irrigation has created enormous problems of leaching into river systems as well as the control of the river. The blue dye used in the production of jeans is a synthetically produced indigo. The darker the dye, the more toxic it is.

Colin Bateman, *Smith’s Hill High School, NSW*
in HSC course material published by Charles Sturt University

Denim may be stylish, but there’s an unexpected downside: Blue dye may pollute the planet. In 2002, manufacturers produced 17,000 tons of synthetic

indigo (chemically produced blue dye), mostly to colour jeans. Historically, indigo was naturally extracted from the woad plant. Today the dye is usually produced from coal or oil—a process that can release toxic byproducts like cyanide into rivers and streams.

Science World, 7 February 2003

China can produce synthetic indigo for \$0.50 per pound compared to the \$40.00 per pound that *Indigofera guatemalensis* sells for in El Salvador.

From a UNESCO/Crafts Council of India
symposium, November 2006

Wildlife conservation is the preservation of wildlife forms and groups of forms in perpetuity, for their own sakes, irrespective of any connotation of present or future human use.

In essence, wildlife conservation is the preservation of nonhuman beings in their natural settings, unaffected by human use or activity, uncontaminated by human antibiotics, emancipated from human serfdom.

John Livingston
Canadian naturalist 1923-2006



Farrago

Bees Worth Billions

Bees are often unnoticed and certainly under appreciated members of the Australian workforce. Their honey alone is worth about sixty five million dollars a year. If their pollination services to agriculture ceased it would cost us two billion dollars per year in lost production, and 11,000 jobs.

Crops that depend on honeybee pollination include almonds, cherries, pumpkins, apples, avocados and sunflowers. Field crops such as canola and cotton also benefit from their services.

Honeybees are under threat from a devastating mite called *Varroa destructor* that has spread around the world, but is not yet in Australia. Bees around the world are also threatened by a mysterious outbreak of unidentified origin that causes colonies to collapse.

To protect our bees we need good quarantine services, and publicly funded research, including an emphasis on correct taxonomical identification. Misidentification of the small hive beetle *Aethina tumida* permitted this pest to get established in Australia.

Public good CRCs in production-based agriculture and the environment have suffered from the push to make research bodies produce commercially saleable products to justify their existence. This approach endangers agriculture. What we need are publicly funded, public good, research bodies such as the Weeds CRC. An Australian Honeybee Pollination and Training network could help to protect the honeybee's huge input into Australian agriculture.

Max Whitten in *Australasian Science*, May 2007

Of course, you can argue with the proposition that all we are is knobs and turnings, genes and environment. You can insist that there's something...something MORE. But if you try to visualize the form this something would take, or articulate it clearly, you'll find the task impossible, for any force that is not in the genes or the environment is outside of physical reality as we perceive it. It's beyond scientific discourse.

Robert Wright, The Moral Animal, 1996

Gene Banks

There are about 1500 gene banks around the world, helping to maintain the biodiversity of our food sources.

The International Potato Centre, based in Lima, Peru, was founded in 1971. It is a non-profit, internationally funded service. It has a collection of 4500 tubers, including 3000 different varieties from Peru. They are kept as tiny plants in test tubes, or in cold chambers.

In their annual harvest the villagers of Aymara, high in the Andes, can gather more than 2000 types of potatoes from a one hectare field. The potatoes come in a wide variety of colours and shapes, with different characteristics for storage and use. Back in the 1990s the Aymara crops were not very good. The Lima centre provided new seed and reinvigorated the crop.

Potatoes have been eaten for at least 8000 years. They originated near Lake Titicaca, 3810 metres above sea level. Over the last five hundred years they have spread around the globe.

The US Department of Agriculture stores more than 2500 apple varieties in a seed bank in Geneva, New York.

They keep adding more varieties, many of them new

types of wild apples from Kazakhstan's forests, the area where apples probably originated.

The Philippines are home to the world's rice bank. Farmers whose paddies were inundated with salt water during the 2004 tsunami were supplied with seeds of salt-tolerant varieties of rice from this bank.

Botanists and other collectors who comb the world looking for varieties of food crops to help maintain this important biodiversity, often have to risk their lives in war-torn and/or rebel held areas.

The Canberra Times, 2 July 2007

Feed-Back

An international study has found that the Southern Ocean's ability to absorb carbon dioxide from the atmosphere has decreased by 15 per cent per decade since 1981. This ocean is one of the world's major carbon sinks; it has been absorbing almost one sixth of the carbon dioxide produced by human activities.

It is probable that an increase in wind speeds over the ocean has led to the release of carbon dioxide from upwelling waters, putting the gas back into the atmosphere. This looks like another positive feed-back mechanism – winds caused by global warming leading to the release of more carbon.

Australasian Science, July 2007

Stone-age Diet

Scientists at Lund University in Sweden have compared a hunter-gatherer style diet with the popular Mediterranean diet.

The stone-age diet, consisting of fruit, nuts, vegetables and lean meat, provided better control of blood sugar than the modern-day Mediterranean diet of whole-grain cereals, low-fat dairy products, fruit, vegetables and unsaturated fats. After twelve weeks on the respective diets, carbohydrate-linked blood sugar rises had fallen twenty six per cent on the stone-age one, compared with only seven per cent on the other.

The Canberra Times, 3 July 2007

Recycling Paper

Four billion trees are chopped down every year to make paper. Every tonne of paper we recycle stops [the equivalent of] two tonnes of carbon dioxide going into the atmosphere, so says Anthony Pratt, of Pratt Industries USA, the American arm of Visy. He experienced something of an environmental epiphany, especially from seeing Al Gore's film *An Inconvenient Truth*, and is adamant that recycling is the way of the future.

"In America we recycle 720,000 tonnes of paper a year, so that is like taking 720,000 cars off the road. With corporate environmentalism the bottom line is still the focus. Being green can mean profits. We can't wait for governments to lead the way. Industry must do that."

G, May/June 2007

Congestion Charge

Ken Livingstone, Lord Mayor of London, has reported that the city's congestion charge has won wide support. The charge of five pounds per day was introduced four years ago, and has since risen to eight pounds. Now the public is three to one in favour of SUVs being charged 25 pounds.

A result of the congestion charge has been an improvement in bus services, with the number of trips per day rising from four million to six million. Many people cycle in the city, and businesses are thriving.

Googling the Amazon

The Surui tribe want to save their precious patch of the Amazon rainforest from exploitation. With the help of the US-based non-profit Amazon Conservation Team, the tribe's chief met with Google Earth's executives to urge their help in preventing further devastation.

The chief is lobbying for donations of computers and other equipment from companies and non-profit groups. He is also trying to persuade the Brazilian Government to include his tribe in a new program to provide satellite connections.

For its part Google Earth will try to buy better satellite images of the Surui reservation, and has committed itself to provide photos and other information about the tribe's struggle to preserve their land and culture. It is hoped that loggers and

others will be deterred from their destructive practices by public exposure on the internet.

Last year Google joined up with the United Nations Environmental Program to show areas of environmental destruction in various places. Google has also teamed up with the Jane Goodall Institute to highlight its research on chimpanzees and African

deforestation. With the United States Holocaust Memorial Museum, Google is publicising the atrocities in the Darfur region of Sudan.

The Canberra Times, 4 July 2007

Soybeans v Forest

Clearing the Amazonian rainforest to grow soybeans has caused a marked decrease in rainfall in those areas. Fields of soybeans reflect more sunlight than forest does, so the soil surface stays cooler, decreasing convection. This decreases cloud cover and therefore precipitation.

If the forest is cleared for pasture for cattle rainfall decreases by 3.9% but growing soybeans decreases rainfall by 15.7%. Of the thirteen per cent of the Brazilian rainforest that has been cleared so far, about fifteen per cent has been put under soybeans, the rest is used for raising cattle.

New Scientist, 21 April 2007



Contributions for the next edition of *Nature and Society* are invited now from all members. They should be sent to the editor, Jenny Wanless, 22B Jensen St, Hughes ACT 2605, ph 02 6281 3892, by 15 September 2007.

Contributions may be sent on paper or electronically. This journal was prepared using Microsoft Word and PageMaker 7.0.2.

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