

# Nature & Society

The Journal of the Nature and Society Forum

April–May 2007

## Editorial

For years the Australian Government has said we must not do anything to rock the boat of the economy. In particular they have said that if we did anything to cut emissions of greenhouse gases it would damage our national interest (the economy).

However, as many observers have noted, quite a large shift in public opinion has occurred recently – another ‘tipping point’ somewhat comparable to the ones that occur in climate change itself. Now that it is obvious that the electorate is seriously worried by the problem of critical changes in climate, the Government has taken notice. They feel forced to act, but action without understanding is not going to lead to satisfactory results.

What don't they understand? For starters, they do not understand that the economy does not stand alone. It is totally dependent on the world remaining habitable, with all its life support systems in place: clean air, clean water, fertile soils, a climate that supports a great diversity of life on land and in the ocean, a diversity which includes but is not restricted to the plants and animals we need as food. In other words the economy is just a small part of the bigger picture; the economy will collapse without a healthy environment.

Furthermore the environment is stressed, past breaking point in places, by the demands being made on it. We are pushing the limits by our demands for growth. The planet is finite; therefore our demands must be finite. Continuing growth in population, in consumption and in generation of waste (including gases and radiation) will end in turning Earth into a wasteland, inhabited by scavengers. Life would continue and evolve into new forms, without the species that have been suited to the world that nurtured the human species.

Not understanding the interconnectedness of life and its environment, and not understanding that we must accept limits, means that governments seek ways to keep increasing our demands on the Earth. This leads to ‘solutions’ such as nuclear energy, geosequestration technology, and biofuels such as ethanol, none of which is actually a solution.

A common position until now has tended to be that it will cost too much to do anything about climate change. It is thought that it will harm the economy, cost jobs, damage some industries and impose large burdens on others. Some of this is true: much of it is not. Some businessmen have recognised that the cost of not acting is far higher; they have also recognised that acting now can give their company an advantage.

Interface Carpets, for instance, has gone from strength to strength since it started on the path of recycling, reducing waste and emissions and moving from traditional practices to an unheard of level of environmental responsibility. There are others who are managing the same transformation and finding that they actually increase their profits.

*We need to tackle social aspects of the problem such as over-population and why people are now so smitten with the idea of becoming rich. Why do we now prefer wealth over wellbeing?*

*Frank Fenner, NSF patron, at the opening of ANU's Fenner School  
March 2007*

## Contents

NSF news	2-4
Lungs of the Earth	5
Comment on <i>The biology of global warming</i>	7
Twenty inescapable facts about the inconvenient truth	9
Ockham's razor and global warming	12
Book review: Response Ability	14
The Chinese new year - an Australian visitor's view	16
Farrago	18-19

Of course there are particular trades and employment groups that need to change, but they are not alone. Many farmers have been forced off the land by lack of water, increasing salinity, climate change or market forces. New technologies often succeed old trades.

Rather than asking what it will cost to change, it is better to ask what it will cost not to change. The answer is more than anyone should want to pay – the end of a habitable world.

Anyway, it is important to recognise that as one industry or way of life ends, other opportunities open up. It is surprising that our Government has not recognised the great opportunities that technologies combating climate change offer Australia, opportunities that are being lost as time passes. Scientists in Australia have developed excellent solar thermal and photovoltaic technology, amongst others, that would enable Australia to have a world class industry and sell these technologies on the world market. All too often these technologies move off shore and will be developed overseas, because of the lack of government support. We will have to buy the products back.

Alternative energy systems and energy efficiency are new industries that will benefit any country that takes them up. They will offer new jobs, greater local self-sufficiency and community strength, and security in the event of climate disasters or terrorist acts.

Workers displaced from industries that suffer from the change over to sustainability will need retraining, but even this can be an opportunity. There is a constant cry of 'skills shortage'. Given sufficient motivation and training people who lose their jobs can move into the alternative energy systems, which will provide lots of jobs. There forebears, after all, crossed the globe for a better life. We could even have an all out effort to provide our own childcare and aged care workers, health care professionals, teachers, engineers and others, instead of poaching from African and Asian

countries, which desperately need their own skilled workers.

It is a lack of knowledge and understanding of the physical and biological constraints of the planet that has got us into the current mess. This lack of understanding enables politicians and others to think that growth must continue, that a balance should be struck between the needs of the environment and the needs of the economy. They do not understand what being sustainable means. If something is not sustainable, it will collapse. That is it. Finish. Kaput. No economy, no healthy people, maybe no people.

**Jenny Wanless**

This issue of *Nature & Society* concentrates on climate change, with the report on Andrew Glikson's talk, and a further article by him plus more comment on Walter Jehne's article, and Walter's summary of his position. Bryan Furnass has used Ockham's Razor to cut to the point; the actions humanity should take to achieve a sustainable future. The April panel discussion on fire and its management will provide a change of scene and could generate as much discussion.

**Jenny Wanless**

### **The Fenner School of Environment and Society**

The Australian National University has announced a

new research school combining the former Centre for Resources and Environmental Sciences (of which Frank Fenner was the founding director in 1975) and the School of Resources, Environment and Society. The school is headed by international earth sciences and climate change scientist Prof Will Steffen.

The school will be the only centre of its kind in the southern hemisphere. It will bring together ANU staff, high-level people from government departments, and other research institutions, and will also have links with the University of Canberra.

*The Canberra Times*, 6 March 2007

*We have made an appalling mess of this planet and mostly with liberal good intentions. Even now, when the bell has started tolling to mark our ending, we still talk of sustainable development and renewable energy as if these feeble offerings would be accepted by Gaia as an appropriate and affordable sacrifice. We are like a careless and thoughtless family member whose presence is destructive and who seems to think an apology is enough. We are part of the Gaian family, and valued as such, but until we stop acting as if human welfare was all that mattered, and was the excuse for our bad behaviour, all talk of further development of any kind is unacceptable.*

*James Lovelock  
The Revenge of Gaia, 2006, p147*

# Nature and Society

ISSN: 1038-5665

Editor: Jenny Wanless

Publisher: Nature and Society Forum 2007

**Nature and Society**© is the journal of the Nature and Society Forum, GPO Box 11, Canberra ACT 2601, and is published six times a year.

Tel: +61 (2) 6288 0760

Fax: +61 (2) 6287 4489

E-mail: [office@natsoc.org.au](mailto:office@natsoc.org.au)

Website: [www.natsoc.org.au](http://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 126 bus route from Central Canberra and walk 200m.

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

The tenth in NSF's Occasional Paper series was published in March. *A biorenaissance - the hope for the future* was written by Stephen Boyden to meet the questions he received following a lecture he gave last year. Copies are available on the NSF website (follow the link to Publications) and are also free to members on request to the NSF office.

## Forthcoming NSF meetings

For the latest information visit our website [www.natsoc.org.au](http://www.natsoc.org.au) and click on "What's On". There you will also find a link to maps showing the respective venues.

**28 March 2007** – This year we are trying a variant on the monthly discussion meetings. In February, and then in every second month, we are having a guest speaker as usual. In the alternate months we shall have a roundtable discussion on a predetermined aspect of with what NSF does, how it might do better and what new directions we might take. These meetings will help guide the NSF board. The first of these, in March, will be on the proposed strategic plan for NSF. A copy of the interim plan has been sent to members, together with a copy of the Earth Charter, as the Charter's principles are endorsed in the proposed plan.

Venue – NSF rooms (see left), 7:30pm.

**18 April 2007 – Bushfires in Australia** - a panel discussion with Paul Collins (author of the recently published *Burn*), Nick Gellie (an experienced firefighter and PhD candidate) and one other.

Venue – The Emeritus Faculty, ANU, 7:30pm.

### **16 May 2007 – NSF's sponsorship of the ACT's nomination as a UNESCO Biosphere Reserve**

Following two NSF public meetings in 2003 and 2005, the ACT government is now holding an Inquiry into the nomination and the Conservation Council have received a grant to conduct soundings and consultation with the community and stakeholders. These will be taking place over April and May this year. Our May meeting will update NSF members on progress with the nomination and seek their ideas and support for its futherance. The people conducting the consultations and their advisory group will join us on this evening. For further information follow the link to Projects on the NSF website.

Venue – NSF rooms (see left), 7:30pm.

**20 June 2007 – Water recycling in Australia** - a panel discussion with Greens MLA Deb Foskey, Paul Perkins and one other.

Venue – The Emeritus Faculty, ANU, 7:30pm.

## NSF project reports

### People and Nature – Social Change

The project steering group has been working with the authors of the Part 1 papers (see December-January *Nature and Society*) to ready their papers for publication on the Social Change website.

We have sent to 30 Canberra web design firms copies of NSF's user specifications for the Social Change website – which will be part of the NSF website. Potential providers met with members of NSF's Social Change steering committee on 23 March and questioned NSF on its plans before we go to a tender process.

### SEE-Change

Two SEE-Change steering group meetings, one face-to-face and the other a teleconference, have been held in March. At the group level there have been a number of meetings, one highlight being the number of people joining for the first time – 'concerned interested persons' – bringing with them a range of skills and interests and being so attracted to the SEE-Change idea that they are also joining the steering group.

SEE-Change has been invited to participate in the Climate Change Tent at the National Folk Festival to be held in Canberra over Easter. SEE-Change convenor Bob Douglas has arranged for Will Steffan and NSF member Tony McMichael to speak at the tent and SEE-Change members will participate in debates and other interactive events in the tent for the duration of the festival.

The SEE-Change website is now running. ([www.see-change.org.au](http://www.see-change.org.au)). SEE-Change is employing Tom Sloan, a 2006 year 12 leaver, as an intern for the next few months. Tom's special interest is in motivating young Canberrans and he has been speaking to student and teacher groups, conducting focus groups and doing lots of letter-boxing to publicise SEE-Change community meetings such as that in the Canberra suburb of Aranda mid-March.

For more information about NSF's present and past projects, visit the NSF website and click on "Activities".

## Report of February NSF meeting

As it happened, Andrew Glikson's talk on climate change coincided with one of the severe storms which seem to be breaking our prolonged drought, or at least softening its impact. Andrew had a difficult job making himself heard through thunder and heavy rain.

Fortunately the audience was interested and knowledgeable enough to be able to follow Andrew as he expounded on the themes that were included in his paper *Spaceship Earth in Trouble*, printed in our last issue.

He described the physical history of the Earth and compared it with our distinctly inhospitable neighbours, Mars and Venus. He concentrated on the relationship between life and climate,

pointing out that whenever the atmosphere was seriously disturbed a mass extinction occurred.

Early humans had to migrate to cope with climate change, but later they developed technologies to help them survive in different climates.

The earliest human burials,

dated to about 70,000 years ago, show the development of the consciousness of death, and the desire to conquer death. Sometimes this took the form of war, or human sacrifice, apparently buying immortality by killing others. Inventiveness bloomed, changing from tools for survival to tools of destruction. Unfortunately we have not outgrown this legacy of consciousness.

Human ingenuity led to the industrial developments of recent centuries and thus to the massive use of fossil fuels. Since 1750 about 305 billion tonnes of carbon, previously largely stored underground by natural processes, have been released to the atmosphere.

Ice cores reveal a correlation between rising atmospheric carbon dioxide and temperature. Some people maintain that the temperature rise is a result of solar activity, but recent records show that solar irradiance has decreased slightly, while temperatures continue to rise.

Many people have so far been in denial, but now they canvass options such as nuclear power. This gives us the choice between greenhouse heating or a nuclear winter. Another option could be geo-engineering; humans could

*In times of change, learners inherit the Earth while the learned find themselves beautifully equipped to deal with a world that no longer exists.*

*Eric Hoffer  
Reflections on the human  
condition, 1973, p. 32*



spray sulphur dioxide into the upper atmosphere to provide shading, to buy us time to reduce our carbon dioxide emissions.

There are better options, but getting the government to act is the problem. Without this, the situation is critical. How indeed can we get governments to realise the need for rapid, effective and major action? That is the question no one has so far answered.

Andrew has provided another article, *Lungs of the Earth*, included in this issue.

**Jenny Wanless**

## **Lungs of the Earth: the urgency of post-IPCC 2007 time scales and the effects of climate change “scepticism”**

The atmosphere constitutes a lung-like membrane of the Earth which, through a delicate balance of its physical parameters, geochemical cycles (carbon, oxygen, nitrogen) and aerosol levels, is closely intertwined with the evolution or demise of plant and animal species, including human life.

Through geological history orbital/solar forcing, volcanic eruptions, tectonic control of continent, ocean and mountain chain patterns, asteroid and comet impacts, methane eruptions and ice albedo changes have triggered mass extinction events (mid-Cambrian, end-Ordovician, end-Devonian, end-Permian, end-Cretaceous), to a large extent the consequence of atmospheric disturbances associated with these events. Orbital/solar-triggered interglacial global warming events display distinct abrupt onsets which represent the amplification of solar maxima through feedback effects from CO<sub>2</sub> and CH<sub>4</sub> gases released from warming oceans, drying land vegetation and defrosted bogs. A recent paper by James Hansen (chief climate scientist, NASA's Goddard Institute of Space Science) et al., 2007, elaborates the nature of the interglacial peaks, in particular the albedo flip effects of disintegration and reforming ice sheets (Climate change and trace gases, Royal Society of London, 2007).

Hansen et al. 2007 state: “The imminent peril is initiation of dynamical and thermodynamical

*Until we can persuade people that they are going to have to make some serious adjustments to their lifestyles, then we won't get near to solving climate change, even if we have the best scientists in the world working on the problem.*

*Frank Fenner, NSF patron, at the opening of ANU's Fenner School March 2007*

processes on the West Antarctic and Greenland ice sheets that produce a situation out of humanity's control, such that devastating sea level rise will inevitably occur. Climate forcing this century under ‘business as usual’ would dwarf natural forcings of the past million years, indeed it would probably exceed climate forcing of the Middle Pliocene, when the planet was 2-3 degrees C warmer and sea level 25+/-10 metres higher (Dowsett et al. 1994). The climate sensitivities we have inferred from paleoclimate data assure that a ‘business as usual’ greenhouse gas emission scenario would produce global warming of several degrees Celsius this century, with amplification at high latitudes. Such warming would assuredly activate the ‘albedo-flip’ trigger mechanism over large portions of these ice sheets. In combination with warming of the nearby ocean

and atmosphere, the increased surface melt would bring into play multiple positive feedbacks leading to eventual non-linear ice sheet disintegration, as discussed by Hansen (2005).”

An analogous global warming process has been underway since the mid-1970s, superimposed on the 11 year sun spot cycle, which has

shown a decline since 2002. The rise in temperatures is directly related to the infrared scatter effect of an atmosphere enriched in greenhouse gases through the emission of more than 300 billion tonnes of carbon since the dawn of the industrial age, where 1 ppm CO<sub>2</sub> induces a rise in greenhouse radiation forcing of 0.019 watt per square metre, and 1 ppb CH<sub>4</sub> induces a rise of 0.0007 watt per square metre.

For over 10 years a group of climate change ‘sceptics’ rejected concerns over global warming. For example, as stated by the US Competitive Enterprise Institute: “Alarm over the prospect of the Earth warming is not warranted by the agreed science or economics of the issue. Global warming is happening and man is responsible for at least some of it. Yet this does not mean that global warming will cause enough damage to the Earth and humanity to require drastic cuts in energy use, a policy that would have damaging consequences of its own ... Moreover, science can not answer questions that are at heart economic or political, such as whether the Kyoto Protocol is worthwhile”.

Originally some 'sceptics' suggested no global climate change is taking place, or that such changes are unrelated to human activities. With growing scientific evidence for global warming, and following publication of the third and fourth IPCC reports, some 'sceptics' claimed economic objectives justify ongoing carbon emissions or climate changes are, at least in part, beneficial, promoting a 'business as usual' approach. In part due to such widely publicised objections, little has been done over a period of at least ten years to reduce carbon emissions, a critical time window during which effective mitigation could have been undertaken.

Some of the arguments by 'sceptics' include:

(A) "Earth is not warming": Until the 3rd IPCC assessment in 2001 many 'sceptics' denied global warming was occurring, invoking local cold snaps, snow storms and frosts as contradictory to global warming. Some 'sceptics' refer to the weak signature of global warming in tropical regions, where long term temperature trends are in part masked by the El-Nino and volcanic events. The argument ignored the observed increase in temperature anomalies with higher latitudes due to decreased albedo with the melting of ice and snow. Some 'sceptics' point to the lack of warming of the stratosphere where, however, temperatures are in part related to the decline of ozone, an infrared-radiative gas. Others pointed out the declining temperatures in parts of eastern Antarctica, which could be related to an increase in evaporation and precipitation with global warming.

(B) "Earth is warming, but warming is due to natural factors": Following the demonstration of mean troposphere (+0.5 C), ocean (+0.3 C) and land (+0.9 C) temperature rises through the twentieth century, 'sceptics' attempted to attribute global warming to a variety of natural factors, ignoring the CO<sub>2</sub> emissions arising from combustion to date of over 300 billion tonnes of coal. Most commonly they attribute global warming to solar irradiance, for example 'Climate change made easy – it's the sun' (Foster, The Australian Geologist, 2005). The argument ignores the decoupling from the mid-1970s of solar irradiance-related temperature trend from the total temperature trend due to

greenhouse forcing (Solanki, 2002; Bard and Frank, 2006).

(C) "Anthropogenic warming is beneficial": Global warming-induced increase in precipitation in tropical regions, for example north western Australia, and the migration of temperate climatic zones northward in Siberia and North America, have been referred to as 'benefits' from global warming. Such 'benefits', however, pale into insignificance compared with the drying up of mid-latitudes (southern Australia, India, Eastern Africa), projected retardation of the gulf stream and freezing of Europe and northeast America, hurricanes generated over warming seas, flooding of islands and densely populated coastal and delta regions (i.e. Netherlands, northwest Germany, Italy's Po Valley, China, Vietnam, Florida, Egypt, Pakistan, Bangladesh) and of port cities around the world, with consequent forced migration of hundreds of millions to billions of people world-wide.

(D) "Mitigation of carbon emissions is uneconomic": In the wake of the Stern Report, which demonstrates the catastrophic economic and social consequences of droughts, heat waves, hurricanes and sea level

rises, the costs of extensive tree replanting campaigns, carbon sequestration, application of clean energy utilities (solar-thermal, photovoltaic, hydrogen, wind, geothermal, fusion), and other climate mitigation techniques are minor compared to the alternative.

(E) "Shooting the messenger": Rarely was there a group of scientists as maligned as climate scientists and environmentalists, referred to by 'sceptics' in terms such as 'alarmists', 'scaremongers', 'Chicken Little', 'eco-fascists' etc. The principal method some 'sceptics' use is to sow doubt, requesting 'sound science', implying that thousands of climate scientists, biologists, physicists and chemists on whose research IPCC reports, are practising less than 'sound' scientific practices. Emerging through published expressions by some 'sceptics' are fundamental doubts in scientific methodology, at times reminiscent of the 'god in the gap' type arguments used by creationists in their critiques of Darwinian evolution.

*The chess-board is the world; the pieces are the phenomena of the universe; the rules of the game are what we call the laws of Nature. The player on the other side is hidden from us. We know that his play is always fair, just and patient. But we also know, to our cost, that he never overlooks a mistake, or makes the smallest allowance for ignorance.*

*Thomas Henry Huxley*

The scientific method hinges on accumulation of data, calculations, testing and continuous refinement of working hypotheses, leading to theories. Once a theory is formulated the onus is on critics to come up with a better explanation of the body of evidence on which it is founded. This mere 'scepticism' does not do.

In the roots of some of the arguments used by 'sceptics' are views of humanity's sovereignty over nature, theological notions of Earth as a corridor to heaven, or its latter day equivalent in space colonisation, and short term economic gains. Some even claim that, no matter how great the damage humans perpetrate on terrestrial nature, they will – god-like – be able to re-engineer new forms of life, or their cybernetic equivalents.

International and national authorities are a long way behind schedule for climate change mitigation.

Societies spend \$billions on insurance against low-probability accidents, such as house burglaries and car theft, and \$trillions on military armaments for wars against human enemies. Ongoing vertical and lateral nuclear proliferation endangers the species with yet another kind of climate change, i.e. injection of carbon soot to the stratosphere, replacing the 'Greenhouse Summer' scenario with a 'Nuclear Winter' scenario. The world's fast dwindling resources are needed to protect the biosphere from catastrophic climate change. Trillions of trees need to be planted and irrigated by solar-powered desalination plants and wind-powered condensation channels. NASA can be transformed into an environmental mitigation agency. In the race against the accelerating clock of climate change, it is not yet clear how the melting of Greenland and west Antarctica ice and inevitable large sea level rises can be slowed down? Who or what will protect Homo 'sapiens' from its own Faustian bargain?

**Andrew Glikson**

*The external reality of ecological scarcity has cut the ground out from under our own political system, making merely reformist policies of ecological management all but useless. At best, reforms can postpone the inevitable for a few decades at the probable cost of increasing the severity of the eventual day of reckoning. In brief, liberal democracy as we know it — that is, our theory or 'paradigm' of politics — is doomed by ecological scarcity; we need a completely new political philosophy and set of political institutions. Moreover, it appears that the basic principles of modern industrial civilisation are also incompatible with ecological scarcity and that the whole ideology of modernity growing out of the Enlightenment, especially such central tenets as individualism, may no longer be viable.*

*William Ophuls and Stephen Boyan, Ecology and the Politics of Scarcity Revisited, 1992, p2*

## **Further comment on The biology of global warming in the December 2006-January 2007 Nature and Society**

Walter Jehne has raised a number of interesting issues, chief of which is whether increased levels of CO<sub>2</sub> in the atmosphere are the effect of global warming or the cause. Questions of cause and effect are made no easier to resolve by the fact that in meteorology (as in other complex sciences where interactive feedbacks are the norm), effects often influence their cause<sup>1</sup>. The current debate on this subject in this journal could be due in part to the fact that man-made global warming is not clearly distinguished from the natural global warming that occurred during the ice ages. For the last few hundred thousand

years or so, the carbon dioxide level in the atmosphere has tracked the temperature cycle, as the orbit and tilt of the earth varied in relation to the sun<sup>2, 3</sup>. It is clear enough from Stephen Boyden's analysis in the February-March journal and the recent IPCC Report<sup>4</sup>, that man-made emissions are the most likely cause of current global warming, but why the remarkably close correlation between global temperature and carbon dioxide in ice-age sediment and polar ice records?

To clear that matter up, one has to draw on the elements of meteorology and oceanography for guidance. The most likely scenario is as follows: As cold epochs alternated with warm, atmosphere and ocean

reversed their roles as source and sink in response to such factors as the advance and retreat of snow and ice, the carbon dioxide flux across the sea-air interface, the pace of deep sea circulation and the solubility of carbon dioxide in seawater.

The advance of an ice age (as a consequence of prolonged polar winters) covered high-latitude vegetation with snow cutting off the light. Deprived of light, land vegetation lost more carbon dioxide in respiration than it could



produce in photosynthesis and this carbon dioxide of respiration began to flow through the atmosphere into the freezing ocean where by now it was more soluble. Salt-enriched by the formation of sea-ice, cold waters at the sea-ice edge became so dense and heavy that they sank like a gigantic waterfall in slow motion, sliding gradually with their dissolved carbon dioxide load into the ocean deeps and across the ocean floor, a journey that took one thousand years or so. This 'pump' drew more carbon dioxide into the ocean across the air-sea interface, depleting the carbon dioxide level of the global greenhouse and amplifying the pace of ice age advance.

The retreat of an ice age (as a consequence of prolonged polar summers) put the carbon dioxide flow into reverse. Now freed of snow, land vegetation began to take up more carbon dioxide in photosynthesis than it lost in respiration, the deep-sea circulation weakened and, as carbon dioxide became less soluble in the warming ocean, it began to flow back into the atmosphere across the sea-air interface increasing the level in the atmosphere and amplifying the pace of global warming. Although the details are less well-known, methane (another inorganic carbon gas) followed a similar trend.

Over the past 5000 years or so, two wild cards have been introduced into this finely-balanced, mirror-image, positive feedback deal, namely clearing and burning of forests for agriculture and combustion of fossil fuels for energy. These have increased the levels of carbon dioxide and methane in the atmosphere beyond their previous natural limits, amplifying the pace of global warming. Where temperature was once the driver and carbon dioxide the driven, now carbon dioxide is the driver and temperature the driven. Those interested in the nature of feedback will recognize this new wild card as a man-made feedback loop and may be reminded of others lurking in the background, such as the effect of global warming on the melting of the permafrost<sup>4</sup> and the effect of global warming on the intensity of the thermocline, the main barrier to nutrient enrichment of the euphotic zone and normally an important sink for atmospheric carbon dioxide.

How many of these potentially vicious feedbacks will it take to tip the historic ice age cycle over the edge to the point of no return?

**David Tranter**

1. Duncan Brown 2003, *Feed or feedback*, International Books
2. William F. Ruddiman 2005, *Plows, plagues and petroleum*, Princeton University Press
3. Stuart Godfrey, 2007, *Why Al Gore has it right on global warming*.  
[www.nowwethepeople.org.8000/tasmania/sources/Seminar%20paper%20-%](http://www.nowwethepeople.org.8000/tasmania/sources/Seminar%20paper%20-%)
4. IPCC 2007 *Climate change 2007: The physical science basis*

... These stark conclusions about the threat posed by global climate change and implications for fossil fuel use are not yet

appreciated by essential governing bodies, as evidenced by ongoing plans to build coal-fired power plants without CO<sub>2</sub> capture and sequestration. In our view, there is an acute need for science to inform society about the costs of failure to address global warming, because of a fundamental difference between the threat posed by climate change and most prior global threats. In the nuclear standoff between the Soviet Union and United

*Nuclear has problems. If we adopt the same technology we've got now, it runs out of fuel before we've even started practically in about fifty years. We can operate at the same rate, and in fifty years all the fuel, even the warhead fuel, if you were convert it back into fuel, has gone. So that's not really an option, that's not serious. That's just trying to support a local industry that wants to be supported at the moment, but it's not really looking at the problem.*

*David Noone*

*ABC Science Show, 10 February 2006*

States, a crisis could be precipitated only by action of one of the parties. In contrast, the present threat to the planet and civilisation, with the United States and China now the principal players, requires only inaction in the face of clear scientific evidence of the danger of increased greenhouse gas emissions. Thus scientists are faced with difficult choices between communication of scientific information to the public and focus on basic research, as there are inherent compromises in any specific balance.

Leading US climate scientist, James Hansen, February 2007, the concluding paragraph of his latest paper

"I drive a V8 because I reckon Canberra needs a beach."

Comment on the Canberra blog website [www.the-riotact.com](http://www.the-riotact.com) in March 2007



## Global warming: Twenty inescapable facts about the inconvenient truth

Belatedly the wider community is realising the 'inconvenient truth' about global warming; its significance, urgency and projected impacts. However, much misinformation remains on its causes, consequences and our response options to try to mitigate it, hopefully in time. To help overcome this misinformation many community organisations, such as the Nature and Society Forum, have been leading public debate on this issue. Significantly this debate has been able to consider wider views and options than that within academic or government forums which generally appear to need to maintain consistency with their previous statements and assumptions.

For such a debate to be most valuable, the issues raised need to be questioned critically. The recent debate on *The biology of global warming* within the NSF and following its republication through the CSIRO Sustainability Network has been valuable and welcome in this regard. The feedback received, including recent international contributions, have in fact highlighted the following 'inescapable facts' about global warming.

1. The concentration of CO<sub>2</sub> in the earth's atmosphere reached 382 ppm in 2006, up some 35% from the pre-industrial and natural interglacial maximum of 280 ppm (1). However when the effects from associated greenhouse gases, particularly methane and nitrous oxide, are included then we are already at a level equivalent to 430 ppm CO<sub>2</sub> (2).

2. If the global CO<sub>2</sub> level increases much above 550 ppm (450 ppm on NASA's estimate, Hansen) there is a very high likelihood that this will increase mean global temperatures from 2-6 degrees C (2), which in turn will risk triggering dangerous climate changes (3). We also risk further accelerating temperatures as we reduce emissions of polluting aerosols which currently offset some 75% of the CO<sub>2</sub> greenhouse effect via global dimming and cooling (4).

3. If we trigger such dangerous climate changes any of ten or more positive multiplier effects, such as the melting of ice caps or the tundra, can be expected to create severe climate chaos grossly disrupting economic, social and environmental normality (2). Extensive physical evidence confirms that many of

these high risk multiplier effects are real and accelerating (5).

4. Based on the increases in CO<sub>2</sub> levels, which are accelerating, currently at 2.5 ppm/an (1) and increasing faster than our CO<sub>2</sub> emissions, levels may be at 550 ppm CO<sub>2</sub> equivalent by 2025-30 as models predict, not the distant 2100 often referred to in policy responses (6).

5. These accelerating CO<sub>2</sub> levels are unavoidable as they reflect previous high CO<sub>2</sub> releases from the 1970s onwards which have not yet been fully expressed in the atmosphere due to the natural lag effect of oceans in equilibrating CO<sub>2</sub> levels, but will be over the coming decades (7).

6. The reality is that the earth and human societies can not now avoid CO<sub>2</sub> levels equivalent to 550 ppm as early as 2025-30 due to these locked in lag

effects (8). No level of reduction in future CO<sub>2</sub> emissions can now avoid the resultant 2-6 degrees mean temperature increases nor the risk that this will trigger dangerous climate change. No amount of talk or

research on hoped for future 'clean coal' technology, carbon geo-sequestration or nuclear power can now avoid these already locked in dangerous imminent climate consequences.

7. Effectively James Lovelock is right. We may have left it twenty years too late to avoid dangerous climate change by reducing the greenhouse effect through lowering our carbon emissions (9). Although we had the warnings, we ignored them in order to protect lifestyles and the status quo on the deception that 'the science was not yet clear enough'.

We now have to face the reality that global warming and its impacts are real, inescapable and imminent and cannot be prevented by hoped for agreements to lower future CO<sub>2</sub> emissions. So what can humanity do?

As Einstein advised; we may not be able to solve problems with the thinking that created them. We need to be prepared to think laterally to look for more effective systems solutions.

Fortunately, if we are prepared to do this, we may have one last chance, hopefully in time.

However, to do so we need to critically review our current assumptions about global warming and the following facts about the processes that have created and govern the earth's climate.

*If Rome had nukes are we really to believe they would have stayed in the silos for the last 2,000 years?*

*A comment posted to the internet  
November 2006*

8. For over 4.2 billion of its 4.6 billion years, the 'blue planet', because of its location in the solar system, has been able to retain liquid surface water. This has created and buffered the earth's relatively stable climate enabling the evolution of life. It is this water and its unique capacity to absorb, retain, transfer and dissipate heat, via absorption, evaporation, clouds, condensation and precipitation, plus some 60-80% of the natural greenhouse effect, that governs over 90% of the earth's natural heat dynamics and heat balance (10). Can these water and heat processes help us in mitigating global warming?

9. By contrast CO<sub>2</sub> influences less than 4% of the earth's total heat retention as it provides some 20% of the natural greenhouse effect which contributes some 18% of the earth's net heat retention (11). It follows that the 35% increase in CO<sub>2</sub> levels from 280 to 382 ppm over the past 250 years may have increased the global retention of heat by perhaps 1%. This 1% change in the global heat retention has been assumed in conventional climate models to be the cause of global warming.

10. Whatever the cause of global warming we can accept the reality that (12):

- CO<sub>2</sub> levels have risen abnormally,
- temperatures have increased variably in different regions,
- tundra, ice caps and glaciers are melting at abnormal accelerating rates, and that
- biological systems indicators suggest that the climate is warming rapidly.

As this is reality we must face it and promptly restore the earth's natural heat processes and balance. To do so we must understand these processes, not just accept prior conventional dominant assumptions and explanations about the cause and consequence of global warming. If we do so it becomes clear that:

11. The increase of CO<sub>2</sub> levels indicating the onset of global warming, occurred from 1750. Based on its low C<sup>13</sup> ratio the CO<sub>2</sub> must have come from old stored carbon (13). Contrary to assumptions the initial emissions could not have come from human use of fossil fuels as this increased substantially only from 1900, some 150 years later (14). Consequently the initial rise in CO<sub>2</sub> levels and onset of global warming

could only have been caused by the extensive deforestation and the associated loss of soil carbon over the preceding centuries.

12. Only the deforestation of 6.3 of the earth's 8 billion hectares of primary closed forest prior to 1750 plus the associated degradation of soils and soil organic matters could readily account for the initial CO<sub>2</sub> increase (15). The deforestation could also readily account for the inability of the earth to adequately bio-sequester and stabilize the CO<sub>2</sub> levels as the Vostok ice cores data confirms such processes had done in previous inter-glacial cycles (16). It is this impairment of the natural bio-sequestration capacity that is likely to have caused the CO<sub>2</sub> increase and global warming. Consequently the CO<sub>2</sub> increase needs to be seen as a symptom of, as well as masking, this impaired bio-sequestration capacity and cause of global warming.

*As for pointing to our mental failures with scorn or dismay, we might as well profess disappointment with the mechanics of gravity or the laws of thermodynamics. In other words, the degree of disillusionment we feel in response to any particular human behaviour is the precise measure of our ignorance of its evolutionary and genetic origins.*

*Reg Morrison  
Plague Species*

13. The critical causal role played by this impaired bio-sequestration ability is demonstrated by the seasonal variation of CO<sub>2</sub> observed in the Hawaiian and Cape Grim data. Whereas CO<sub>2</sub> is emitted constantly throughout the year and readily equilibrates in the atmosphere, the annual 'sawtooth' variations in CO<sub>2</sub> confirm that it is the difference

in bio-sequestration rates in the northern and southern hemisphere summers that govern the CO<sub>2</sub> levels, not their emission per se (17). Large emissions of CO<sub>2</sub> have also previously resulted from forest fires, volcanoes or methane releases. These did not trigger climate chaos while bio-sequestration was adequate (1). It is only now that deforestation has impaired this bio-sequestration capacity that CO<sub>2</sub> emissions, including from recent fossil fuel use, can not be sequestered adequately thereby increasing atmospheric CO<sub>2</sub> levels and the risk of climate chaos.

14. To date we have released some 300 GTC (billions tonnes of carbon) from burning fossil fuel. Comparatively over 2000 GTC may have been released by deforestation and soil degradation. Historically these forests may have bio-sequestered some 300 GTC/an (15). Restoring just 5% of this prior bio-sequestration capacity (ie 15 GTC/an) should enable us to balance the 7 GTC/an we are currently emitting plus sequester some past emissions to re-balance the global climate. Practical and profitable options exist for doing this.

15. However we may now not have enough time for just relying on this carbon component of the bio-sequestration process (6). We now may have no choice but to rely on other, much more important, processes integral to forests to restore the earth's prior heat balance.

16. In addition to changing the global carbon cycle, the extensive deforestation would also have greatly reduced global transpiration and through that cloud formation and rainfall. This reduced transpiration invariably reduced the transfer of water and heat from the earth's surface to form clouds thereby lowering the reflectance of incident heat and the transmission of latent heat back out into space. As these processes can govern over 50 per cent of the earth's heat balance, their impairment due to deforestation can directly increase surface temperatures (18). Temperature differences of 10 degrees C can occur in adjacent forested and cleared areas because of such cooling water effects (19). Consequently extensive past deforestation, by reducing water and heat transfers, may have had a much more significant effect in triggering regional and global warming than the CO<sub>2</sub> component of the greenhouse effect.

17. Deforestation may also be reducing the natural cooling capacity of large parts of the earth. Forests, because of their leaf area index, are often far more effective per unit area in transferring water into the troposphere and heat back out to space than areas of open water.

This is consistent with evidence that the earth is warming differentially depending largely on how local natural water and heat dynamics may have been altered. For example temperature increases are higher in the more deforested land based northern hemisphere than in tropical regions or the southern hemisphere where deforestation has been less and oceans dominate (17). The dry centre of Antarctica may be cooling while coastal regions are warming. Cleared urban 'heat islands' also have higher temperatures than nearby forested areas with natural water and cooling heat fluxes (17). Such variations in

regional temperature effects are inconsistent with the assumption that CO<sub>2</sub>, which rapidly equilibrates and would be similar over these regions, could be the primary factor governing this variable warming.

18. Consequently we need to question assumptions in climate models that changes in water dynamics are not important in global warming and that humans could not have influenced global water and heat balances. Through their extensive deforestation humans could have significantly reduced global water dynamics and through that the transfer and dissipation of heat that previously cooled the planet. Indeed, the changes that deforestation caused to global water dynamics may have been the dominant factor in disrupting key processes in the earth's heat balance and in increasing global temperatures. Accepting and counteracting these realities may

now be our only option for mitigating global warming, hopefully in time.

19. Restoration of the earth's natural water and heat dynamics may not only be our only option to avoid dangerous climate chaos but also the most feasible, effective and beneficial. Whereas reductions in CO<sub>2</sub> levels may take decades to have an effect, the restoration of global water dynamics can be effective within days in restoring natural clouds and cooling processes. Reforestation should enable us to safely restore these natural water and heat processes. For example, by enhancing global cloud densities by 3 per cent, reforestation could increase albedo reflectance of solar radiation back to space by some 1 per cent. Theoretically

this would have an equivalent global cooling effect to reducing CO<sub>2</sub> levels back to pre-industrial levels (20).

20. Although there are details that we do not yet understand fully, we have sufficient knowledge of how forests influence terrestrial water dynamics, cloud nucleation, cloud albedos, rainfalls and the re-radiation of surface heat back out to space to safely use reforestation strategies to rapidly re-balance the natural water and heat dynamics of the planet. We

*All government – indeed, every human benefit and enjoyment, every virtue and every prudent act – is founded on compromise and barter.*

*Edmund Burke 1729 - 1797*

*We have made this appalling mess of the planet and mostly with rampant liberal good intentions. Even now, when the bell has started tolling to mark our ending, we still talk of sustainable development and renewable energy as if these feeble offerings would be ... an appropriate and affordable sacrifice. We are like a careless and thoughtless family member whose presence is destructive and who seems to think that an apology is enough. ...until we stop acting as if human welfare was all that mattered, and was an excuse for our bad behaviour, all talk of further development of any kind is unacceptable.*

*James Lovelock*

*The Revenge of Gaia, p148*

*Showing that, while Burke can bargain with other humans, we cannot bargain with nature; nature does not compromise one iota*



also have sufficient knowledge of reforestation and forest management options. However first we need to accept that reducing future CO<sub>2</sub> emission is now no longer adequate to mitigate global warming. We need to recognise that the above inescapable facts now provide us with our only chance to mitigate dangerous climate chaos, hopefully in time.

Being natural such reforestation represents a no risk win-win strategy, particularly as the forests will also deliver major synergistic benefits in enhancing carbon bio-sequestration, soil restoration, soil water retention, the resilience and bio-diversity of bio-systems as well as in providing material and energy feedstock for sustainable industries. The reforestation can be integrated with and enhance sustainable grazing and food agro-ecosystems and be profitable.

Such reforestation can also be initiated regionally with minimal capital or infrastructure pre-requisites. The benefits from such reforestation should be able to be captured locally by the responsible communities through improved material, fuel and fibre and eco-system services, particularly the development of more resilient, buffered and still livable regional climates.

The challenge is to look critically beyond the status quo, face the realities of global warming and its imminent consequences and consider more effective response options.

The above inescapable facts may help in this regard. Either Homo sapiens uses its intelligence to urgently restore these natural climatic processes or nature will do it for – but without – us.

**Walter Jehne**

## References

1. Metz, B. et al, 2001: *Climate change 2001: Mitigation*, IPCC
2. Stern, N. 2006: *The Economics of Climate Change*, HM Treasury UK
3. Tirpak, D. et al 2005: *Proceedings: Conference on Dangerous Climate Change*, UK Met. Office
4. Real Climate Website Feb 2007: *Aerosols, The last frontier*
5. Pearman, G. I. 2006: *Recent advances in climate change science*, ANZAAS Symposium
6. Gribben, J. 1978: *Climate Change*, Cambridge University Press

7. Hansen, J. et al 2005: *Earth's Energy Imbalance: Confirmation and Implications*, Science 308
8. Hansen, J. et al 2006: *Dangerous human made interference with climate: A GISS modelE study*. Atmospheric Chemistry and Physics (in press)
9. Lovelock, J. 2006: *The Revenge of Gaia*, Allen Lane, also *Environment in Crisis we are past the point of no return*, The Independent 16 January 2006.
10. Budyco, M. I. 1978: *The heat balance of the earth*. In Gribben J. *Climate change*, CUP
11. Schneider, S.H. 1989: *Global warming*, Sierra Club Books San Francisco
12. IPCC 2007: *Fourth assessment report: Impacts*. Preview in *Der Spiegel* Germany, March 2007.
13. UK Antarctic Survey 2006: pers. comm. through Nature and Society Forum
14. Roberts, L et al ed 1989: *World resources: a guide to the global environment*. WRI, UNEP
15. Perlin, J. 1991: *A forest journey*. Harvard University Press

*It's no wonder we don't defend the land where we live. We don't live here. We live in television programs and movies and books and with celebrities and in heaven and by rules and laws and abstractions created by people far away in space and time; and we live anywhere and everywhere except in our particular bodies on this particular land at this particular moment in these particular circumstances.*

*Derrick Jensen  
Endgame, 2006, p. 761*

16. Petit, et al. 1999: *Climate and atmospheric history of the past 420,000 years from the Vostok ice core Antarctica*. Nature 399, 429-36
17. Barry R.G. Chorley R. J. 1998: *Atmosphere weather and climate*, Routledge
18. Linacre, E. Hobbs, J 1977: *The Australian climate and environment*, Wiley
19. Tzonis, A. et al ed 1986: *Tropical architecture*, Wiley, UNESCO
20. Lindzen, R. 2006: MIT, Sunday Telegraph UK, 29 October 2006.

## Ockham's Razor and Global Warming

The Venerable William of Ockham (1285-1349) argued that 'entities are not to be multiplied beyond necessity', thereby advocating the principle of economy in seeking the simplest hypothesis.

The February - March 2007 edition of *Nature and Society* describes three apparently incompatible hypotheses on the causes of climate change. Stephen Boyden argues the case advocated by the Intergovernmental Panel on Climate Change (IPCC) that increase in atmospheric carbon dioxide levels is the principle cause of global warming, while Walter Jehne maintains that the increase in atmospheric CO<sub>2</sub> levels is a symptom rather than a cause of global warming. Taking a different tack, Duncan



Brown maintains that the heat of combustion of carbon compounds makes a significant contribution to global warming, the Earth acting as a sort of radiating hotplate.

It could be argued that all three hypotheses have an important bearing on climate change, in synergistic rather than incompatible ways. For example, the IPCC accepts that global warming increases the release of CO<sub>2</sub> from forests and oceans, and of methane from Arctic tundra (later oxidised into CO<sub>2</sub> and water), which can accelerate the greenhouse effect by feedback to a disastrous tipping point. Moreover, it cannot be disputed that *local* radiant heat is greater in deserts and cities denuded of vegetation than in pastures and forests, and that rainfall is greater over forested than deforested areas.

Attempting to attribute one or other *causative* hypothesis exclusively may have no more value than the debate by medieval schoolmen on how many angels can dance on the head of a pin. On the other hand, Ockham's Razor might usefully be applied to recommendations for the *mitigation* of climate change which are compatible with the three points of view. Such recommendations might include the following:

1. In Australia, to cease land clearing and forest clear-felling, making suitable arrangements to give farmers in marginal areas and foresters stewardship of the earth to promote the sustainable growth of indigenous vegetation. Internationally, to bring pressure to bear to reduce massive forest clearing and conflagration, particularly in Southeast Asia and South America.

2. Advocacy of steep reductions in fossil fuel combustion through carbon pricing, reduction of domestic energy hyper-consumption (including travel) and war-like activities, improvements in building design and operation, promotion of public and rail freight transport, walking and cycling, more efficient and low carbon emission cars, and more

effective re-cycling (e.g. of aluminium, tyres and building materials).

3. Progressive displacement of fossil fuel use by carbon neutral technologies such as centralised round-the-clock steam turbines driven by concentrated solar, wind, geothermal and tidal power, biofuels from algal ponds and localised solar hot water systems and photovoltaics using silver cells and nanotechnology.

Such adaptations for mitigation of climate change, which have long been advocated by Nature and Society Forum, constitute support for a holistic approach to a sustainable energy future which is consistent with William of Ockham's principle of economy in seeking the simplest hypothesis. It entails a revolution from linear fossilised industrial capitalism to cyclical environmentalism. Can

anything less lead to anywhere except disaster?

**Bryan Furnass**

---

### Human domination - some numbers

Consider the extent of our domination. Modern humans, now numbering six billion and predicted to go to ten billion, have left not one ecosystem on the surface of the earth free of pervasive human influence, transforming more than half the land on the planet for their own use (a quarter for forestry, a quarter for pasture, 3 per cent for industry, housing and transport), consuming more than 40 per cent of the total photosynthetic productivity of the sun, using 55 per cent of the world's fresh water,

controlling and regulating two-thirds of all rivers and streams, consuming a vast variety of plant, animal, and mineral resources, often to depletion, at a pace that is estimated not to be sustainable for more than fifty years.

Kirkpatrick Sale, *After Eden*, 2006 p. 3

---

If a little knowledge is dangerous, where is the man who has so much as to be out of danger?

Thomas Henry Huxley (1825–1895)

---

*We tell lies to each other. If Bill Clinton and the timber industry can frame the debate over deforestation as 'jobs versus owls', the deforesters have already won before we can start. If they can frame the debate such that people believe forests need to be cut down so they won't be killed by beetles, they've already won. If George Bush and the timber industry can frame the debate over deforestation such that people believe forests need to be cut down to keep them from burning, they've already won.*

*If those in power can frame the 'debate' over the murder of the planet into the question of how to implement 'sustainable development' (look how they've already framed it by calling industrialization 'development') they've already won: we are fighting over techniques to salvage industrial civilisation with its burgeoning population, not ways to save the planet.*

*Derrick Jensen  
Endgame, 2006, p. 756*

## Book Review

### Frank Fisher: *Response Ability* Vista Publications, Melbourne 2006

A few years ago while at the ANU studying Human Ecology, one of my favourite procrastination pastimes was reading a website called 'The living room'. This website was put together by a wide range of researchers, community practitioners, and artists of various ilks, but the main themes were clear: sustainability from a community perspective, bicycling, localism, and a healthy respect for what the creators called the resulting 'new civility'. This website has been through a number of changes, but has recently had a delightful breath of fresh air breathed into it and it can now be found, with all the old site stuff and resources and more at [www.bicyclefixation.com](http://www.bicyclefixation.com). This new civility was being brought about through a fantastic array of resources devoted to understanding, appreciating and advocating what it was like to attempt to live more sustainably in an urban environment of cities built for cars, emergent disconnected communities, and increasingly fragmented natural landscapes.

All of these themes, and a great deal more, can be found in Frank Fisher's new book, *Response Ability: Environment, society and everyday transcendence*. This book has been well edited by Frank McDonald, and catalogues a wide selection of Frank's

personal and professional writings on social activism and environmental science. *Response Ability* is without a doubt one of the most insightful books on these themes to have come out in Australia, and there is far too much in the book to give a full flavour in a single review. For instance, the book traverses such interesting topics and issues as educating for energy, environment and economics, liberating energy and myths of renewable energies, sustainable transport and public policy, living with chronic illness, and taking action.

In 'From being precious to precious being' Frank deftly examines some very large, and not very easy to understand issues such as why we as humans

seem to have created a fixation on treating ourselves as 'precious' (as epitomized by the Volvo style car with so many protective measures) yet we do not have many ways to socially understand why we need the protective measures in the first place (the inherent danger to one another of driving). In Frank's words:

*Being precious ... involves developing and maintaining special conditions which set one apart ... [it] is a necessary consequence of seeing ourselves as separate from nature and requiring protection from it.*

Cars provide a good illustrative example of this throughout the book, but many other examples are used: stamp collecting, books, waste management, and even the raising of children. In all these examples Frank is illustrating that there are so many

aspects of our lives which give us 'security' in a purchase-able, consumable package (such as mobile phones, insurance, or roadside assistance for cars), but only in a very limited (an ultimately irrelevant) way. Instead, Frank posits the value of what I would call 'softer' networks of relationships and ties with nature that let us understand and enjoy the environment in which we live, rather than needing to be protected from it.

Energy has long been a strong professional focus of Frank Fisher's work, and the pieces in *Response Ability* dealing with energy and energy-environment issues reflect this

professional experience very readably. Important questions addressing conservation and renewable energy, solar energy and environmental impacts are presented. For example, in 'Liberating Energy' Frank discusses a very subtle, yet powerful approach to understanding our relationship with energy use, the environment, and our sense of 'security' in the modern urban context. Frank uses a personal experience of his when the Victorian electricity authority proposed to build a powerful overhead transmission line for reasons of energy supply security to the CBD. Not surprisingly, many people opposed the line on aesthetic reasons and fear of electromagnetic radiation. However, Frank (on behalf of a community health centre) opposed the line

*The third and most interesting claim is that we need a bigger population in order to make Canberra more cosmopolitan. This is an opinion about how Canberrans should live usually expressed by those who live elsewhere. The belief that it is not sufficiently cosmopolitan is based on a crude stereotype of life in Canberra. For these commentators 'cosmopolitan' seems to mean more cafe strips and inner city grunge. In reality there is no community in Australia that is more worldly than that of Canberra, with a high proportion having lived abroad for extended periods. It also enjoys more poets, artists and intellectuals per hectare than any other place in Australia.*

Clive Hamilton  
*Canberra Times*, 30 May 2005

because *for security reasons the line should not be built at all* – his grounds being that *not* building the line would give the opportunity to learn to live with blackouts (which are a risk no matter how powerful the line) and in turn, as a community, develop social mechanisms to recognise and deal with reliance on the grid.

Speaking from over forty years' experience, Frank's writings on the chronically ill in the modern urban context are invaluable, and carry meaning which is hard to imagine anyone would not be better off with. With little space to do justice in this article, the titles of some of these writings indicate the variety and value; 'the silent majority' (the non-visibly disabled – chronic disease sufferers and a wide and significant variety of institutional and social discrimination), 'The social genius of the chronically ill' (in which we learn of the myriad ways chronic disease suffers live with, and manage such discriminations), and 'A discriminating Act' (a brief, terse piece outlining the discrimination explicit in the Federal Government's 1992 Disability Discrimination Act).

At times this book is very academic, and a number of heavy intellectual concepts are used with little warming up or context. Nevertheless the nexus of issues of sustainability, health, public policy, local and personal activism is a rare find, and combined with Frank's subtle, but infectious determination to see the meeting of many of these challenges as fun, as a journey, and as a reward in and of itself, make this a remarkable book which can be re-read, or read in an ad-hoc style.

**Rory Eames**

---

### Christmas beetles

The dehydrated, depleted state of the soils across the country [in the 2006 drought] was making it very difficult for the Christmas Beetle (*Anoplognathus*) to breed. The larvae live in the soil ... after they pupate the ground needs to be moist for them to burrow up to the surface. If the soil is too dry and hard for them to break through they die during this pupal stage.

Tom Weir, Curator of the National Insect Collection  
Canberra Times 21 January 2007

---

### Management weaknesses

In the *Australian Financial Review* of 9 February 2007, Henry Ergas asked "Why is it that costs and times are usually underestimated, rather than being underestimated in some cases and overestimated in others?" He was writing in the light of research which showed that 84 per cent of all software projects do not finish on time, on budget and with all features installed. Other research showed that for projects not cancelled, costs exceeded expectations by an average 189 per cent; and for technically complex software projects, over 50 per cent failed completely and were abandoned.

He suggests three factors that seem to be involved – factors which we are also seeing in government responses to climate change and the reluctance to embrace change.

*Even today money is a language for translating the work of the farmer into the work of the barber, doctor, engineer, or plumber. As a vast social metaphor, bridge, or translator, money – like writing – speeds up exchange and tightens the bonds of interdependence in any community. It gives great spatial extension and control to political organisation.*

*Marshall McLuhan  
Understanding Media, 1964*

"First, overconfidence, which manifests in unduly optimistic forecasts, appearing to be an inherent feature of managerial decision making. While 'gilding the lily' can arise from the self-interest that proponents of projects have in getting things under way, that is not the whole story. Equally important, though more subtle, is the fact

individuals with high levels of self-confidence (not only relative to others, but compared to their own abilities) tend to do better in organizations, including in terms of rising to positions of authority. This embeds as an 'optimism bias' into even the most stringent commercial decision-making processes.

"Second, as previously ignored difficulties emerge, the 'tyranny of sunk costs' comes into play. Projects which would not have been undertaken if their total costs had been known at the outset, are not cancelled because the benefits of completing the project are thought to be greater than the marginal cost of completion. Total costs mount as each evaluation concludes spending a (relatively) little bit more will make the exercise worthwhile.

"Third and last, as the time taken to resolve problems causes project timetables to stretch out, pressures arise to adapt systems being developed to take advantage of new technologies and to provide expanded functionality. This rework inevitably increases total project costs, especially in systems that rely on large numbers of closely integrated subsystems."

## A work in progress

China's Spring Festival: a history of millennia and evolving. I'm a bamboozled foreigner. And the Chinese? The young have no idea what it used to mean, their parents and grandparents are confused by what it has become and who knows what their kids and grandkids will dream up in the future? All I know is it's huge, powerful and mysterious. And I'm locked out.

**The travel nightmare.** The most populous nation on earth boards planes, ships, trains, buses, cars...for every destination outside/inside China. A war zone. Queues of refugees clutch haphazard bundles: paper/cloth/plastic, tied with string/rope and slung over shoulders/bamboo poles, bulging with DVD players, rice cookers, rice bags and oil bottles. Do young people realize *why* they are going home?

They resent it: "It's boring! I go because I have to. The oldies talk and play cards/mahjong. I can't phone, surf the net or play computer games." Are TV soapies facing this widening generation gap with episodes on successful, doomed family reunions realistic?

**Let's decorate!** Perhaps a village elder penned the red paper rhyming couplets and lintel text. Maybe change last year's door gods. Glue a diamond with "Fu" (abundance/wealth) inverted, tipping beneficence into the house/family. How to choose from the cornucopia of paper and plastic, lanterns, embroidered cotton fish, jade peaches, pigs of every material, and a host of tacky objects with little relation to Spring Festival themes of loving families and wishing everyone you do/don't know a happy new year? Where will the unwanted packaging be discarded? In rivers? By roadsides?

**What's for dinner?** In a country of terrible famine and entrenched rural poverty, maybe 'a chicken in the pot' and a fish on the table for each family was once enough. Not now. Bags of snacks (tofu, jerky, sugared plums, salted turnip), then as much beef, lamb, pork, chicken, duck, goose, fish, rabbit, frog, turtle as possible, and despite burgeoning environmental and animal welfare consciousness millions will feast on wild animals, even endangered species ... I can hear a rooster crowing in my apartment block. Crow while you can! Mind you, one boy is volunteering to prepare meals for old folk and the poor. Good on him!

**How much did I get?** How will it be spent? The first red packet I got from the Chinese-Australian Association contained 10c (about 6 jiao). "Don't open it until next year or you'll lose your good luck." A teenager said he was getting thousands of RMB and an open plane ticket. Do parents think they can buy a child's love? A girl is returning hers so her parents can pay for the festivities, while she dutifully buys furniture, cleans the house and cares for siblings.

**Fireworks: smoke and noise.** Outskirts of the worst-polluted cities in the world. Congested air and jangling traffic. Add the relentless scream, splutter and pall of exploding firecrackers, day and night. Warnings about ear/eye damage and mutilation from carelessness go unheeded.

**Cultural performances.** We expected traditional Chinese costumes, singing, dancing, acrobatics and martial arts, lion/dragon dances, perhaps opera. We were served Russian folk dancing, Thai men in pink feathers and a girl smearing herself all over a pole.

Chinese Spring Festival: quo vadis? Into the abyss of traffic chaos, rubbish, over-indulgence/indigestion,

commercial excess and lost values. Join the club – with Western Christmas!

**Jaye Allan**

an Australian NSF member in China

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

*O.H. Pilkey and Linda Pilkey-Jarvis, Useless Arithmetic: why environmental scientists can't predict the future*

---

## Bogong moths

Drought may be a cause of depleted numbers of bogong moths (*Agrotis infusa*). Although technically acknowledged as a pest, the bogong moth is an important food source for the endangered mountain pygmy possum. For some reason, mountain pygmy possums don't breed in years when they don't eat bogong moths. We don't know why this is. In fact, bogong moths are the second biggest energy input onto the NSW mountains, after sunlight. They also provide essential protein to ravens, pippets, robins, many reptiles, fish and the marsupial rat antechinus.

Ted Edwards, National Insect Collection moth expert, Canberra Times, 21 January 2007

---



## Flow batteries

Flow batteries can solve the problem of storing electricity from variable sources such as wind generators. They are very different from the familiar lead-acid ones. In a flow battery there are two electrolytes with different redox potential (essentially a measure of the molecules' affinity for electrons). These electrolytes are stored in tanks outside the battery and are pumped into the separate halves of the battery only when electricity is required. Inside the battery, they are separated by a membrane.

One of the weaknesses in this system is that molecules tend to leak through the membranes contaminating the electrolyte and reducing the battery's output. In the 1980s Maria Skyllas-Kazacos, a chemical engineer at the University of New South Wales, undertook research on this problem. Her solution was to use the same chemical element for both electrolytes. She chose the metal vanadium, which can exist in four different charge states – from V(ii), vanadium with two positive charges, up to V(v) with five. Dissolving vanadium pentoxide in dilute sulphuric acid creates a sulphate solution containing almost equal numbers of V(iii) and V(iv) ions.

In the battery the electrolytes produce V(v) at the positive electrode and V(ii) at the negative electrode. Any leakage across the membrane dilutes the electrolyte, but after recharge the electrolyte on either side is as good as new.

When the wind is blowing and electricity demand is low, electricity from a wind farm is used to convert vanadium ions in the flow cell to the energetic V(v) and V(ii) forms which are then held in storage tanks. When wind power alone cannot generate sufficient energy to satisfy demand, the pumps in the flow cell switch on to send the two vanadium solutions through the cell. This generates electricity which is fed into the grid.

To increase peak power output you can add more battery cells, and the amount of energy they store can be increased by installing bigger storage tanks and filling them with chemicals. So flow batteries can serve small or very large systems.

A flow battery installed in 2003 on King Island in Bass Strait has halved the island's dependence on

diesel generators, by evening out the power supply from its small wind farm.

Small vanadium flow batteries are already in use in Japan. A Canadian company has a deal to construct a large battery in Ireland, while dozens of batteries are being evaluated by customers including the National Research Council Canada, and one of North America's biggest cell phone companies.

Units have been tested in electric golf carts but at present the batteries are not compact or light enough to be used in cars, Skyllas-Kazacos and her team want to replace vanadium sulphate with vanadium bromide which they think will enable lighter and more compact units that could be suitable for cars.

*New Scientist* 13 January 2007

*In the words of the Atlas of Population and the Environment, compiled by the American Academy of Science in 2000, "Like volcanoes and earthquakes, humans have become a force in nature." Only more so—humans now produce about three thousand times more heat energy on average than the world's volcanoes—and on a worldwide scale without precedence.*

*Kirkpatrick Sale  
After Eden, 2006, p. 3*

## Organic cotton

The average 100% cotton T-shirt contains only 73% cotton. The rest is made up of chemicals and resins that were used to grow and make it. The same goes pretty much for jeans too. A whole bunch of cotton goes into making a pair of jeans. And a whole bunch of chemicals too. In America last year farmers

applied 53 million pounds of toxic pesticides to cotton fields. Out of the world's total insecticide usage, 25% is used to farm cotton.

Kinda scary, huh. Yet, we all think cotton is one of the most natural things around. The truth is its not as nice as we'd all like to think. Indeed, cotton is the world's most sprayed crop. It uses over a quarter of all insecticides used today. The way they grow it isn't good for the farmer's health, the water table's health, the factory worker's health, the river's health and eventually the sea's health.

That's why we use organic cotton. It costs us 30% more than normal cotton. It means our stuff costs a little more, but we think its worth it. After all you wear your jeans next to your skin for ten hours a day. Commonsense would say that can't be too good for you. We all know how nicorettes work.

From a label in a pair of Howies jeans.

---

The only dumb questions are the ones not asked.

---

## Farrago

### Cassava

Cassava flour is a staple food for a thousand million people in Africa, South America, Asia and the Pacific. This food is often a poison, as the plant is one of many that produce cyanide compounds to deter predators. As it is a very hardy plant and grows where little else does, in many places people have no option; they eat cassava or starve.

In small doses the cyanide causes headaches, nausea and dizziness. Eaten over a prolonged period it leads to irreversible paralysis of the legs. In central and southern Africa over 100,000 people suffer from this paralysis, which they call konzo.

Some years ago Australian chemist Howard Bradbury developed a kit that enables local people to measure the level of cyanide in their cassava flour. Now he has shown that a simple process can reduce the level of poison. The flour is mixed with water and the paste spread in a thin layer over a basket. This is then left in the shade for five hours. During this time an enzyme in the flour breaks down the cyanide compound, producing hydrogen cyanide gas which escapes into the atmosphere, leaving behind just a safe level of the poison.

Local people have accepted the process in a trial run in Mozambique. Now the challenge is to spread the knowledge throughout the affected areas.

*The Canberra Times* 19 February 2007

### Barriers to renewable energy

Norfolk Island and Lord Howe Island depend mainly on diesel generators for their electricity supply.

Economists expect that if there is a cheaper option, people will automatically switch to it. In that case, given that their diesel-generated electricity is five times more expensive than the electricity from the grid on the mainland, and the islands are suitable for wind and solar generators, why haven't the islanders switched to alternative energy?

Research by ANU PhD student David Barton has shown that people do not operate as individuals, but rather as part of a social network. People are comfortable with what they are used to, and know they have the skills to deal with it, but are uncertain about change. New technologies are unknowns and people want to know how they will affect their lives and their community.

Barton compared these islanders with small communities in Scandinavia which have successfully implemented alternative energy systems. He found that in the latter people tended to have a history of collective activity, such as a common dairy milking facility. They were used to community

facilities and were able to see the financial benefits of alternative energy.

To get change in communities Barton suggests targeting community leaders identified through social network analysis.

*ANU Reporter* Summer 2006-07

*Changing the management of farmland to use organic and permaculture strategies and techniques can rebuild the storage of soil carbon, fertility and water to close to those of natural grasslands and forests. It is arguably the greatest single contribution we could make to ensure the future survival of humanity.*

*David Holmgren  
Permaculture principles and pathways  
beyond sustainability, 2002, p. 37*

---

### Krill Crisis

Antarctic krill are essential food for baleen whales, penguins and some species of seals. In addition, humans have been harvesting krill in commercial quantities since the 1970s for use in pharmaceuticals and as feed for aquaculture.

Active monitoring in the Australian Antarctic Territory has revealed that krill density has dropped by eighty per cent. Fishing and climate change could be responsible for this decline, but there are other possibilities.

At the National Research Centre for Environmental Toxicology, University of Queensland, researchers have started to examine the possibility that persistent organic pollutants (POPs) could be involved.

It is known that certain POPs move towards the cold polar regions: such pollution has been well documented in the Arctic. The first phase of the research has been to determine the types and levels of POPs that have accumulated in Antarctic krill. Next it will be necessary to assess the sensitivity of krill to these pollutants.

*Australasian Science* March 2007

---

## Whale research

You can learn a lot about any animal from its faeces. Wild life researchers collect scats for research purposes, and often use dogs to sniff them out.

Detector dogs have been used in research on a wide range of animals in Canada, the USA and Brazil. Now there are even seagoing research teams that use sniffer dogs to monitor whales.

Teams studying right whales in the Atlantic off Maine go out in six metre open boats. When whales are sighted the sniffer dog, wearing an orange life jacket, or Fido float, goes up on the prow of the boat. An experienced handler can tell when the dog has picked up the scent of a scat, and by reading the body language – lots of nose pointing, tail wagging and posturing – can guide the boat to the find.

With a human only team they may pick up only one or two scats per day, but the dog increases the catch to about one an hour. Samples from the retrieved scat are sent to laboratories all over North America. From these it is possible to tell the sex of the whale, and even which individual provided the sample.

Measurement of hormones reveals reproductive status and stress levels; parasites, toxins and nutrition levels all help to show the health and vitality of the whale. With the dogs' help enough samples are collected for statistical analysis, and for the distribution and abundance of whales to be estimated.

*New Scientist* 23/30 December 2006

*Freud, in Totem and Taboo, wrote of the earliest attempts to 'subject the processes of nature to the will of man'... you can do this only when you have a deep-seated conviction that humans have not only the power effectively to intervene in nature ... but the legitimacy of doing so, to achieve what J G Frazer called 'a sovereignty over nature' Freud remarked that this principle, standing behind all magic, was 'the omnipotence of thought', the notion that the world was governed not by independent physical laws, but by human mental constructs, and he noted that this delusional view in contemporary terms would be evidence of neurosis.*

*Kirkpatrick Sale  
After Eden, 2006, p.44*

soil and enable effective use of other control measures.

*Australasian Science* Jan/Feb 2007

## Borneo's forests

Since 1996 Borneo has lost two million hectares of forest each year to loggers, forest fires or plantations. Now only half of the original forest remains.

In January the three governments that share the island, Brunei, Indonesia and Malaysia, attended a summit hosted by the Philippines. There they agreed to conserve twenty-two million hectares of rainforest in the heart of Borneo, the last large block of forest in the island's interior. It is the only place in the world, apart from Sumatra, where orang-utans, elephants and rhinos still coexist.

*New Scientist* 20 January 2007

## Pest v pest

Feral camels are a major pest in the outback, but they can help to control an invasive weed. *Parkinsonia aculeata*, a prolific weed from Central America, is considered a threat to three quarters of the Australian mainland, but camels eat it.

As camels prefer to eat the new growth of leaves and flowers, they greatly reduce the plants' production of seeds. It has been suggested that introducing camels to affected properties, for a period of at least three years, will drastically cut down the *Parkinsonia* seed bank in the

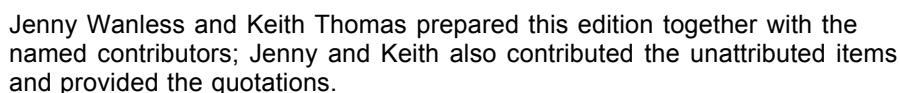
## The wisdom in old children's stories

In response to an e-mail sent through an NSF interest group about recycling plastic bottles into plastic clothing, member Colin Samundsett wrote:

Nevertheless, [such recycling] emerges from the world of fantasy. It has some parallel in children's stories from old Russia – such as the one where a family travelling on a horse-drawn sled become the target of a pursuing wolf-pack.

The wolves are delayed (not stopped) by throwing scraps off the sled.

In our real world, society is being pulled along by exponential growth rates of both individual consumption and human numbers. At the expense of the environment which powers it all; and the environment is tiring. Recycling scraps of plastic might delay the inevitable for an instant.



## Canberra ACT 2601

## April–May 2007