Chain Reaction

Friends of the Earth Australia

Number 68 $4.00

Special Science Issue

Blinding us with science

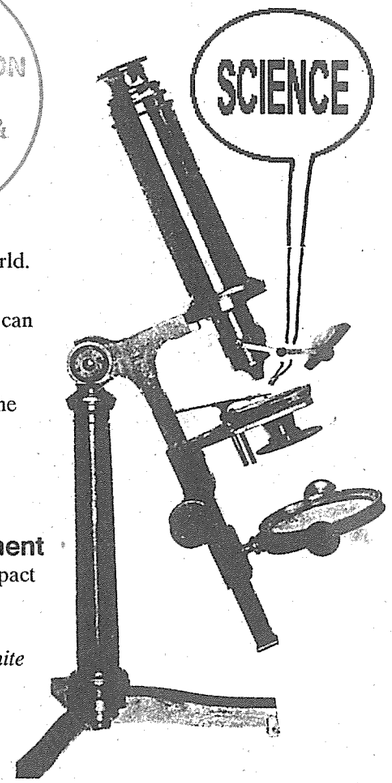
Science and the military

Scientists and the environmental movement

Chain Reaction

Number 68 February 1993

SPECIAL SCIENCE EDITION
Guest editors:
Sharon Beder &
Brian Martin



Publisher: Friends of the Earth, Chain Reaction Co-op Ltd **Editors**: Clare Henderson and Larry O'Loughlin **Front cover**: Design by Chain Reaction, typesetting and computer composition by Signature Jer 31:33 **Reprographics**: Linea Graphics; Canweb **Printing**: Canweb **Paper**: 80 gsm, 100 per cent recycled **Ink**: Soya bean-based

Chain Reaction, PO Box 45, O'Connor, ACT, 2601
Phone: (06)248 0289 **Electronic mail**: peg@chain
Registered as a periodical category 'B' by Australia Post
No VBQ 2034

Chain Reaction is indexed in the **Alternative Press Index.**

The opinions expressed in **Chain Reaction** are not necessarily those of the publishers or any Friends of the Earth group.

ISSN 0312-1372

Recommended retail price $4.00

Letters

ISO effective

M. Taylor really can't be allowed to have the last word on the International Socialist Organisation (ISO) and the AIDEX protest in Canberra in 1991. (Letters, *Chain Reaction* 67). The writer makes a number of unsubstantiated assertions that the ISO may be a 'CIA-sponsored group' and if it isn't it ought to be because of its 'sole purpose of disrupting' organisations and events which expound alternative views to the ISO, particularly by promoting 'a lot of violence' thus diverting attention from 'the genuine issues'.

I am not a member of the ISO but have been, and I was at AIDEX, so I hope I can shed some light, rather than more heat, on the above charges.

The CIA stuff is merely the continuation of the old Moscow Gold smear by other means and belongs with the other wacky esoterica of the paranoid conspiracy theorists.

Back in the land of reality, the ISO wanted to close AIDEX down not just bear passive witness. So did the large majority of the protesters. The ISO argued that the best way to do this was through mass actions to physically obstruct the operation of the arms fair. Unity in action around this aim was achieved despite, and without stifling, the diversity of political ideas among the demonstrators. Some alternative views, however, such as those supporting purely symbolic actions away from the arms fair site, were dismissed as ineffective by the majority of protesters at many meetings.

Nevertheless, when counterpoised to the larger direct actions, and when pursued in defiance of majority democratic decisions, these alternative proposals divided and weakened the protest. Disruption lay not with the ISO but with this undemocratic minority who pursued their anarchic view of diversity. The liberalism of 'doing you own thing' the moralism of 'Non Violent Action' ideologues and the conspiratorial elitism of some anarchists were found to be wanting when it came to political effectiveness and the basics of democracy.

Because of the protest's effectiveness, the political slime-monsters who own the media hammered out their lies about the protesters' violence – from the 'avocado cocktails' of the *Canberra Times* fantasy to the 'brutal terrorists' fulminations of the RSL's William Keys. Their hypocrisy was rank and it is a pity that M. Taylor adds to it. Their police viciously defended the technology of death at AIDEX. The role of the thin blue line was never more obvious. The role of the police was unavoidably raised as a 'genuine issue' in theory and practice.

It was the police who brought violence into the AIDEX protest; as Noam Chomsky once said of the CIA (and it is applicable to the police) "they are in the 'business of protection' which always turns out to be the 'protection of business' by the busting of heads when necessary.

M. Taylor's groundless charges rely on smear, and smear has no place on our side of the political fence. It can only legitimise the efforts of the state to repress all progressive movements. Smear usually masks disagreement about the basic politics of the target. Honest debate over substantive political issues such as the role of the police and the rest of the state as instruments of capitalist rule, and the most effective resistance strategies, is always welcome, not least by the ISO. It seems to me that the proof of the ISO's politics was in the political beating given to the organisers of AIDEX. More of the same might get rid of them for good.

Phil Shannon
Narrabundah, ACT.

Recycling actions

We read with interest your article by David Vincent 'Unwrapping packaging's public relations' (*Chain Reaction* 67) and thought your readers might be interested in the following.

The Green Party South Australia has been campaigning for several years against excess and inappropriate packaging and, in particular, we have focussed on the ubiquitous liquid paperboard cartons which displaced the refillable glass bottle in SA in the mid 1980s and which are rapidly displacing many other beverage containers, some of which carry a deposit in SA.

At different times we have targetted various organisations which have an interest in packaging: Farmers Union (the largest dairy food supplier in SA), KESAB (the SA section of the Keep Australia Beautiful Council), the SA Waste Management Commission and Tetrapak. Dumping used cartons outside the premises of these organisations has been a regular feature of our campaign.

In 1991, KESAB took exception to remarks made about them in Green Party press releases and media interviews and began trying to muzzle us threatening legal action. In March of that year their solicitors wrote demanding an apology and damages, and giving notice that legal proceedings would be served if an apology was not forthcoming.

In particular, KESAB objected to being called 'deceitful' and 'hypocritical' and an 'industry front'.

We declined to apologise and informed KESAB's solicitors that we believed the allegations could be substantiated and that, furthermore, we would welcome the opportunity to do so in court. That was over 18 months ago and we are still awaiting a reply!

The Green Party has continued its campaign and dumped several thousand cartons at Tetrapak's Adelaide offices just prior to Christmas 1992.

The publicity campaign in favour of the milk carton versus the milk bottle has been intense in SA, and included a lengthy pamphlet entitled, 'The Milk Carton. Its place in the Environment' being distributed to all SA primary schools. This leaflet was prepared by Farmers Union, KESAB and, to its shame, the SA Department of Education.

More recently the Association of Liquidpaperboard Carton Manufacturers (ALCM) and APPM launched a recycling scheme for used cartons whereby the cartons are collected at recycling depots and road transported to APPM's Shoalhaven Mill at Nowra in NSW for recycling into yet more throwaway paper products such as tissues.

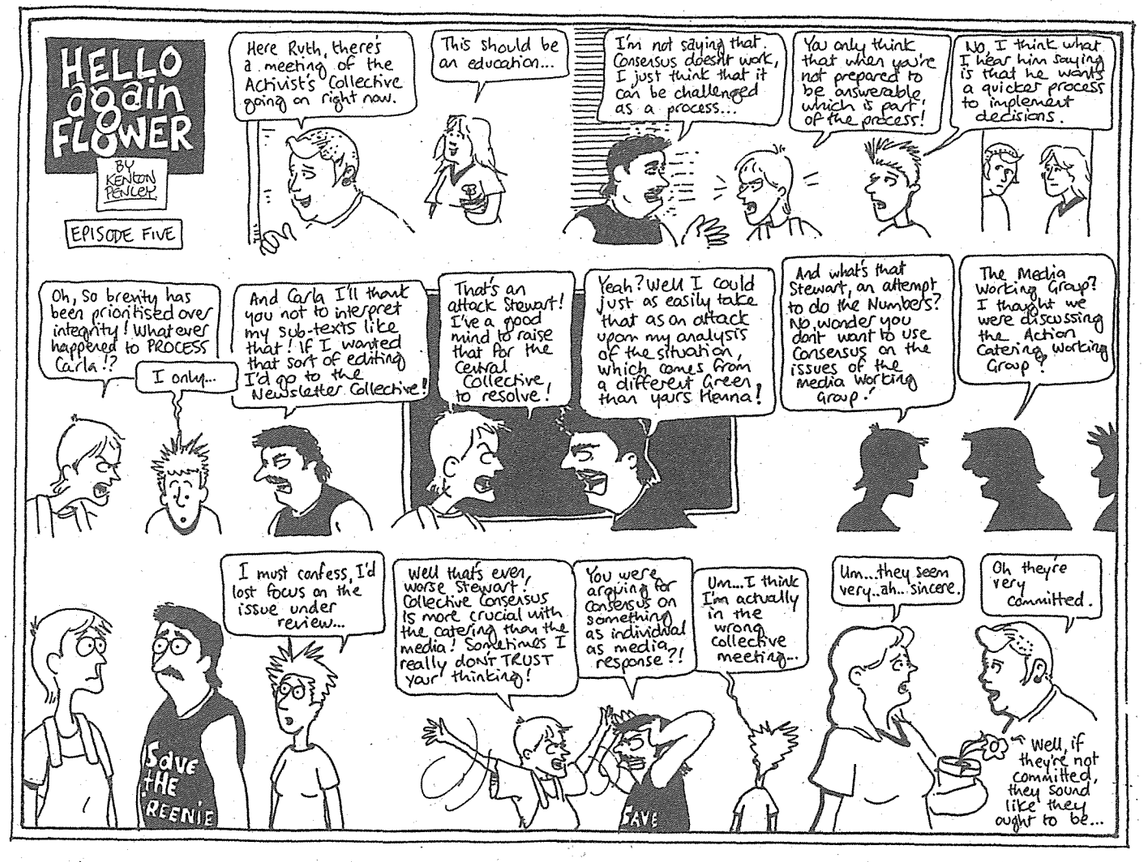
A telephone conversation with Shoalhaven's manager last year informed us that generally paper recycling reclaims 50 per cent of the original paper but that contaminants relating to the plastic liners in liquidpaperboard cartons would reduce this to, at best, (that is, in several years time when the process is perfected) to 25-30 per cent. The plastic component would still, of course, end up as muck in a landfill somewhere.

The scheme is hoping to recycle about 20 per cent of SA cartons. Therefore, in several years time, if all goes according to plan, about 5 per cent of the original paper in SA cartons would be reclaimed.

Not surprisingly, the then SA Minister for Environment and Planning, Susan Lenehan, endorsed the scheme enthusiastically while failing to take any steps that would result in a real reduction in wasteful and frivolous packaging items.

The Green Party has campaigned against this recycling scam and will continue to do so.

Ally Fricker
for The Greens SA.



You are invited to write to *Chain Reaction* with your comments on the magazine or any other issues of interest. Send to:
Chain Reaction
PO Box 45, O'Connor, ACT, 2601
Longer letters may be edited.

Letters

Off the track

I have just read 'Where there's a wheel there's a way' (*Chain Reaction* 66) and I'm writing about an idea I've thought about for a while: a tax on petrol to fund a national two-lane bicycle track from Adelaide through Melbourne and on to Cairns. The track would be away from the main road used by cars, just like those in Holland where I was born and brought up on bicycles. Bicycle paths were totally separated from motor cars so there was no need to wear helmets as most accidents occur where cars and bicycles mix. Along this track every 50 km or so there would be a type of youth hostel run by people who also plant fruit trees, native trees, vegie gardens etc. The youth hostels could consist of old trams, buses or trains converted into bunkhouses.

The tracks could also be reforested so that people ride in shady conditions with wind breaks.

Steep hills could have, for the not so fit and the elderly, wind powered hook-up systems for towing, for a fee.

What will this national track do? It will set free the youth so they can safely travel all up and down the east coast without having to spend money on train and bus fares etc. They will get to appreciate the countryside a lot better, they will meet lots of other people, and they will not have to depend on the adult population to take them anywhere. There could be school excursions, pensioner excursions etc. It would open up a whole new dimension of travel.

All bicycle shops should have a petition for customers to tell our politicians about this idea. We do not need a high speed train that does 300 km an hour and who is that for anyway – our politicians, real estate people and developers?

Let's start pushing for bicycle paths totally removed from cars, as bicycles do not pollute and do not take take up much room.

Peter J. Timmermans
Cooktown, Qld.

Greenword 67 solution

	1K	Y	2L	I	E			3L	4B	J	
	E		A			5E	6G		A		7S
	L		8T	I	9T	T	E	R	T	O	N
10S	L	U	R		11H	E	C		E		O
	Y		O		O				S		W
	S		12B	A	N	K	13S				Y
		14B	E		G		E			15M	
16C	17R	A				18B	A	T	19M	A	20N
21O	A	T			22O	I	L		23Y	O	U
24U	G		25L	A	N	G			A		K
R					A		26B	O	L	T	E
27T	E	N	N	A	N	T			L		M

The WISE idea

World Information Service on Energy (WISE) has been operating as an information service for over 14 years now. It was set up in 1978 by activists in the anti-nuclear and alternative energy movements to switchboard information.

There was, until the founding of WISE, a serious international gap in communication between groups. Although a lot of information had been collected, stored and passed on, by key figures in the movement, clearly more was needed. The WISE idea was to decentralize information and to provide a channel through which information became accessible to those wanting it. The *WISE News Communique* is its main tool for doing this.

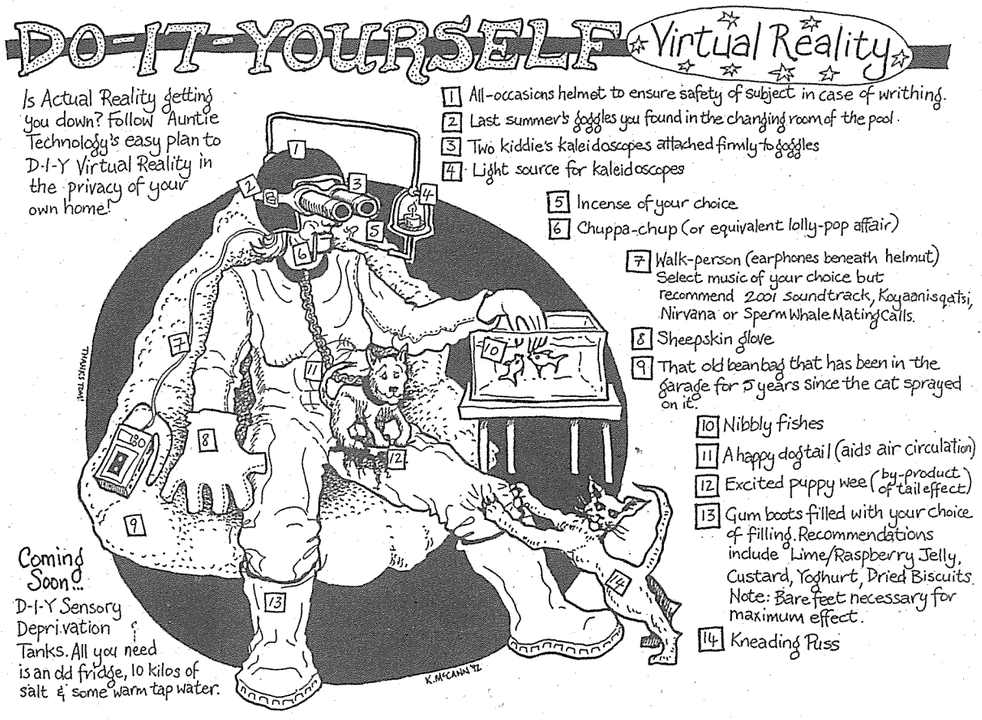
Over the last 14 years, international communication has improved. Movement journals are able to publish more on the movement in other countries, people fighting particular aspects of the nuclear chain have readier access to information, individual campaigns have benefitted from being able to draw more easily on international support. WISE has definitely played a part in all of this and hopes to continue to do so. Because as we look around we see there is still a definite role for WISE to play in the coming years.

But WISE is currently faced with a crisis which touches on our very survival. The WISE News Communique is facing financial problems. To be specific, if we are unable to raise at least *f*47,000 (approx. US$28,000) within the next two to four months, we face having to shut down. We have already been to several foundations for help, but in most cases we have been refused assistance because our type of service is outside their bounds: either because they cannot fund an international organisation, or their guidelines do not provide for funding publications.

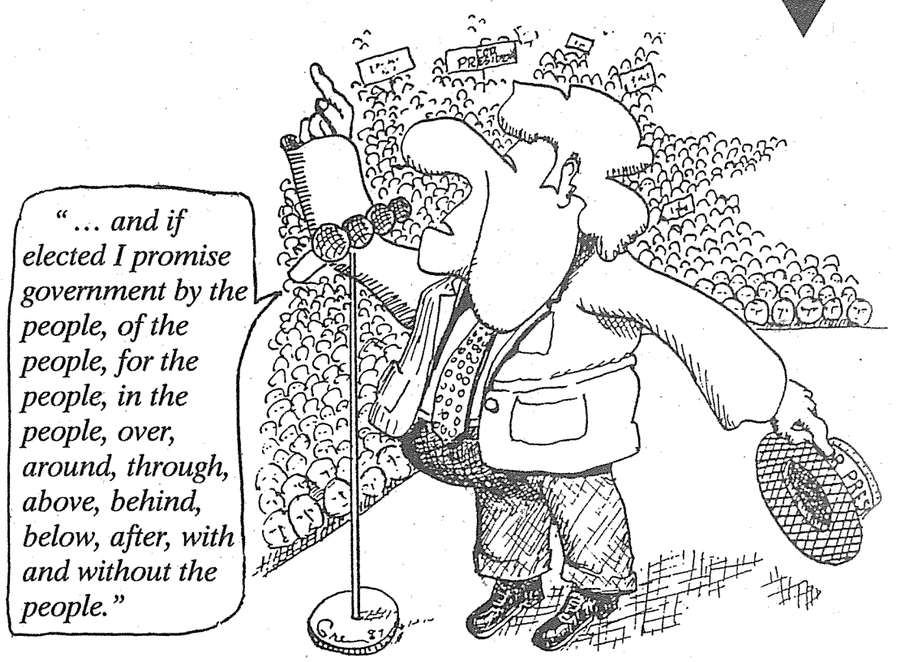
So, we are turning to you. If you want us to continue publication, and if you can, please send donations. If you cannot afford to support us financially, we would appreciate letters of support from you that we can show to possible funders, as we continue to look for foundations willing to grant us assistance.

Thanks and no nukes!

WISE-Amsterdam Collective
PO Box 18185, 1001 ZB
Amsterdam, The Netherlands.



Earth News



Election activities

The Federal election of 13 March 1993 provides something of interest for those concerned about the environment and the environment movement.

The Australian Labor Party and the Liberal/National Party Coalition have developed environment policies but there are other electoral aspirants with a higher priority on environmental issues for those seeking change through the ballot box.

The Greens were established as a confederation of state-based Green parties in late August 1992, and are registered for the election with the largest number of 'branches' at sixteen, ahead of the Australian Labor Party with eight.

There are other environmental and progressive groupings such as the Janet Powell Independents' Network and the Australia's Indigenous Peoples Party and there is also the Australian Democrats.

The Greens have 69 candidates for House of Representatives seats and 16 Senate candidates throughout Australia. The most prominent is Bob Brown, the longest serving Green member of Parliament in Australia, who has resigned from his State seat in Tasmania to contest the Federal seat of Denison based in Hobart. He admits that he has 'the odds tilted against' him – ALP candidate Duncan Kerr had a 6 per cent margin over the Liberal candidate at the last election. There are also Green candidates in every other Tasmanian seat, and the Senate team of Judy Henderson, Peter Jones and Marion Fry has a strong possibility of gaining one seat.

Janet Powell in Victoria will be probably vying for the sixth senate seat against Olive Zakharov of the ALP and Robert Wood, formerly short-term Senator for the Nuclear Disarmament Party in NSW and now running for the Democrats. There are also Green and independent candidates in a number of House of Representative seats.

The Greens in South Australia are contesting the Senate and the Representatives seat of Hindmarsh.

The WA Greens will also be contesting the Senate election with a fair chance of having a senator to accompany Christobel Chamarette to Canberra.

Greens will also be contesting the Senate in Queensland, with Drew Hutton at the top of the ticket, and in NSW with Steve Brigham at the number one position. In both cases there is an outside chance of their election.

The Australian Electoral Commission has provided for the use of 34,000 ballot boxes, 105,000 voting screens and 10,450 litter bins, made from cardboard and to be collected in the week after the election for recycling.

Source: *Australian Electoral Commission and various other sources.*

Earth News

World Uranium Hearing

The World Uranium Hearing took place 13-18 September 1992 in Salzburg, Austria. Organised primarily by a group of German anti-nuclear activists, its aim was to provide a voice to those who are often voiceless. It is often the case that indigenous populations experience a disproportionate share of the human, cultural and ecological costs of resource exploitation. The nuclear industry is no exception to this general rule.

Indigenous people from many tribal nations around the world gave testimonies which described their experiences in relation to the exploration and mining of uranium, weapons testing and the storage of radioactive waste on tribal land.

The commonalty of the stories was remarkable. Cree activists in Canada face problems similar to those facing the Kokotha in South Australia and hill tribes in northern India. The story of Maralinga finds echoes through the islands of the Pacific, the North American desert and the nations of the Commonwealth of Independent States. Just as many of the problems are similar, so too are the strategies being developed by people to oppose these. Legal actions, international solidarity work, direct action and the development of alternatives all featured highly as means by which indigenous communities can re-assert their control of their futures.

A further thread underpinning and uniting much was the importance of indigenous cultural and spiritual frames of reference and ways of being. The Hearings' structure acknowledged this with presentations, ceremony and song.

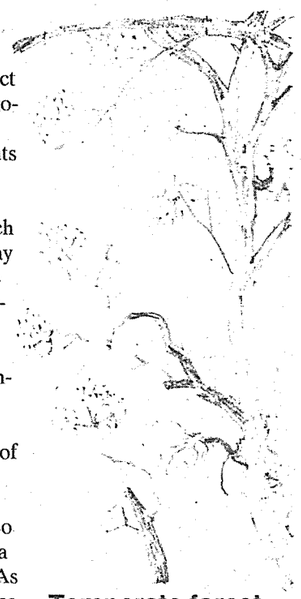
One of the strategies adopted by the Hearing organisers was an attempt to maximise awareness of the event in media circles, particularly in Europe. This was in large part successful, especially given the inherent interest of the stories themselves. The coverage the Hearing received was both wide and sympathetic resulting in a vitriolic series of media exercises conducted by the industry body, the Uranium Institute, during this time. If success is, in part, measured by the discomfort one causes to one's opponents the the World Uranium Hearing succeeded.

However success is also judged by more positive criteria and it was in this area that the long term value of the forum will continue to be felt. It is impossible to put several hundred indigenous and anti-nuclear activists in the one place without a frenzy of networking, address-swapping and story-telling taking place. It was clear that the value and importance of such direct contact is both enormous and ongoing and can only serve to strengthen such movements and networks around the world.

A further area in which the Salzburg gathering may well play a significant role is in the provision of information. The Hearing generated a large amount of documentation concerning both the effects on various aspects of the nuclear industry and also of popular resistance to this. Currently a number of people are preparing video and audio tape as well as a series of written reports. As these resources are progressively developed and circulated they may well be of use to ongoing campaigns and struggles.

The World Uranium Hearing was in many ways a unique gathering. The links that exist between those indigenous peoples who are organising to defend their cultural and physical existence and those non-indigenous people involved in the struggle against the nuclear industry and those who abuse the environment are natural ones. Whilst the aims and the means may often vary the shared concerns are many. The World Uranium Hearing was a valuable part of the process of building these links whilst recognising diversity. This process of listening to, and ideally working with indigenous groups is one that no doubt will and must continue.

Source: *Dave Sweeney, FOE Fitzroy.*



Temperate forest action

Strategies for the protection of the world's temperate forests have been developed by the working groups of the First International Temperate Forest Conference held in Tasmania in November 1992.

The conference adopted a Temperate Forest Action Plan and it will be pursued by the Native Forest Network which consists of forest activists, conservation biologists and non-government organisations throughout the world.

The next international Temperate Forest Conference will be held in 1994 in Montana, USA, with plans for the 1996 Conference to be held in Chile.

For further information and to offer support:
Native Forest Network, c/-112 Emu Bay Rd, Deloraine, Tasmania, 7304. Tel.: 003-62 2713.

Japan to resume commercial whaling

Greenpeace has condemned an announcement that Japan intends to resume commercial whaling in the Antarctic.

Officials from the Japanese Fisheries Agency said on 5 January 1993 that Japan would submit a set of proposals to the next meeting of the International Whaling Commission (IWC), in Kyoto in May.

'It is outrageous that Japan would put forward a proposal to resume Antarctic whaling when the meeting in Kyoto is due to discuss plans to make the whole Antarctic a whale sanctuary,' said campaigner Kieran Mulvaney, speaking from the *MV Greenpeace*, in Antarctic waters.

At its most recent meeting, the IWC agreed by consensus to give full consideration in Kyoto to a proposal by France to make all waters south of 40 degrees South a whale sanctuary. The French proposal states that it is intended to 'contribute to the rehabilitation of a marine ecosystem which has been severely, but hopefully not irretrievably, damaged by human exploitation in less than one century'.

'Japanese officials have made it clear that they expect to kill thousands of minke whales a year', said Mulvaney. 'They will justify the killings as part of a 'scientific' management scheme'.

Further information:
Kieran Mulvaney on board MV Greenpeace. Phone: 872 1300310 Fax: 872 1300311.

Landcare grants

Guidelines and application forms for community groups for the 1993-94 round of applications for the National Landcare Program are now available.

The Program was established in January 1992 to simplify the administration of support for community groups under natural resource management and nature conservation programs. These include the community-based elements of soil and water conservation programs, the One Billion Trees program, the Save the Bush program and the Murray-Darling Basin Natural Resources Management Strategy.

The Program aims to encourage an integrated, 'whole systems' approach to combating the degradation of Australia's land, water and vegetation resources. 1993-94 will be the second year of operation after $19.1 million was allocated in 1992-93 to 1078 community projects.

It is expected that the successful projects will be announced shortly after the 1993 Federal Budget.

For information: *David Hine, Community Landcare Section, Department of Primary Industries. Tel.: 06-272 4199.*

Real costs of US nuclear power

Greenpeace, in conjunction with Komanoff Energy Associates (KEA), released in December 1992 a study of the accumulated costs of nuclear power in the US in the years 1950-1990.

Fiscal Fission: the Economic Failure of Nuclear Power shows that commercial atomic power has thus far cost US$492 billion dollars, US$97 billion in the form of federal subsidies.

'Taxpayers and ratepayers have pumped at least half-a-trillion dollars into commercial atomic power since 1950 in exchange for a declining 8 per cent of our national energy supply,' said Peter Grinspoon, Director of Greenpeace's Nuclear Power Campaign.

According to co-author Cora Roelofs, 'The cost estimates in *Fiscal Fission* are very conservative. They take only those costs that could be fully documented and rigorously quantified. It shows that atomic-generated electricity has cost consumers an average of at least 9.0 cents a kilo-watt-hour, far more than other readily available fuels'.

'This report teaches us that without even counting liabilities such as accidents and waste, nuclear power has failed on economic grounds', said Grinspoon. 'Nuclear power is untenably expensive and at best will play a dwindling role in the future energy economy of this country. It simply can't compete.'

For more information:
Greenpeace, 1436 U St, NW Washington, DC 20009, USA.

Anti Racism Alliance formed in Adelaide

Representatives of many organisations have formed the Anti Racism Alliance to actively protest at the decision to allow Speakers' Corner at Old Parliament House Museum, South Australia, to be given over to National Action for a two month display.

National Action is one of Australia's major racist organisations, promoting its cause under the guise of 'Independence for Australia'.

That National Action should have the first display in the Speakers' Corner during the International Year for the World's Indigenous People has shocked many people, and that Government funds should be used to assist in the presentation of racist views is believed to be highly inappropriate in Australia's multicultural society.

When the display opened on 2 January 1993 more than 100 people demonstrated outside, and people have been urged to boycott the display and to contact MPs, unions, church and community groups to support evicting it.

Further information:
Anti-Racism Alliance, PO Box 10212, Gouger St, Adelaide, SA 5000.

Earth News

Year for indigenous people

The United Nations has declared that 1993 will be the International Year for the World's Indigenous People (IYWIP) following requests from indigenous organisations, and the UN's efforts will be co-ordinated through the Centre for Human Rights in Geneva, Switzerland. The Australian Government's activities for the International Year for the World's Indigenous People (IYWIP) will be co-ordinated by a small secretariat established within the Aboriginal and Torres Strait Islander Commission (ATSIC).

ATSIC has allocated $2.5 million to be used for supporting national and international conferences in Australia, promoting participation in non-government organisations, associations, community-based projects and activities, public information and promotional materials. These initiatives are aimed at ensuring that Aboriginal and Torres Strait Islander community organisations, including Regional Councils, are involved in and are able to initiate a range of IYWIP activities.

Government departments will also be undertaking activities with a focus on the IYWIP. Foreign Affairs and Trade, for example, will use the Year to raise the profile of indigenous issues on the agenda at forums such as the World Conference on Human Rights.

The Department will also make a major effort to raise the profile of Australia's indigenous peoples internationally through overseas information and cultural relations programs. Two specific projects are the support given to the Aboriginal band *Yothu Yindi* to appear at the international launch in New York, and a major North American promotion involving a lecture tour by an Aboriginal academic, a tour by an Aboriginal performance group, an exhibition by Aboriginal photographer, Leah King-Smith, and a tour of the Department's film festival *Cultural Focus, Cultural Futures*.

The IYWIP Secretariat has produced an information kit, available on a cost recovery basis for $12, which includes a booklet on selected Commonwealth departmental activities, suggested reading, information about Aboriginal and Torres Strait Islander flags, suggestions for things to do to help plan activities, a sample media release to help promote activities, a brochure form the United Nations, information on ATSIC, a list of contacts, a large poster, and a map of the world's indigenous peoples.

Further information: *ATSIC, IYWIP Secretariat, PO Box 17, Woden, ACT, 2606. Tel.: 06-289 3237.*

Greenhouse could help disease spread

CSIRO Chief Executive Dr. John Stocker warned in December 1992 that diseases such as Ross River Fever, Dengue, and Bluetongue could become widespread in Australia as the result of climate change.

Opening the Sixth Australian Arbovirus Symposium in Brisbane, Dr. Stocker said that diseases which are mainly confined to northern Australia could be affected by a number of factors. (*Arbovirus = Arthropod-borne virus*)

Dr. Stocker said that in November 1992, 'Dr. Barry Pittock of CSIRO's Division of Atmospheric Research released a scenario which suggested that most parts of Australia will be hotter and wetter within forty years.

'According to Dr. Pittock, the actual number of rainy days may not change, but there will be an increased intensity of rain', said Dr. Stocker. 'This will lead to more flooding, and more open water lying on the surface.

'If this scenario for Australia's weather is correct, there is a real threat of increased incidence of insect-borne diseases.'

Dr. Stocker said that the Arbovirus Symposium would be examining other ways in which the threat of insect-borne diseases may be increased, in particular due to increased movement of people throughout northern Australia.

'More and more tourists and travellers are visiting the north', said Dr. Stocker, 'and we are receiving an increasing number of overseas visitors through northern ports of entry. All this movement of population increases the risk of insect-borne diseases being spread throughout the general population'.

More information: *Anne Leitch, CSIRO Division of Animal Production, 07-377 0870; Nick Goldie, CSIRO Corporate Communication, 06-276 6478.*

The policy they have

The Shadow Minister for the Environment (Sustainable Development), Jim Carlton, spoke to *Chain Reaction* about the Coalition's policy, and emphasised that there was major agreement between the two major parties on environmental issues.

In particular, the Opposition supported the outcome of the Ecologically Sustainable Development process, agreed with the National Forestry Policy, had basically agreed with the Prime Minister's December 1992 environment statement and had committed itself to all financial measures in that statement.

A Liberal-National Party Coalition Government would make use of the Intergovernmental Agreement on the Environment (IGAE), signed in June 1992 by Federal, State and Local Government representatives, and the National Environment Protection Authority (NEPA), an inter-governmental Ministerial Council.

Carlton sees that the major difference between the Coalition and the ALP is on the petrol tax the Coalition would remove. He argues, however, that this will not lead to a major increase in greenhouse emissions, as petrol use is only a relatively small part of the overall human contribution to the greenhouse effect, and the emphasis should be on power stations and the energy efficiency of buildings. He also argues that, in any case, there would probably not be an increase in petrol use, as other Coalition policies would help lower the age of the Australian vehicle fleet, meaning that the cars on the road would be more fuel efficient, and that there had been a cultural change in Australia such that 'people are less likely to hoon around in V8s.'

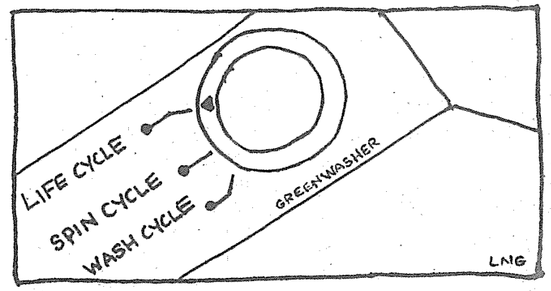
He does not see a major difference with the ALP on uranium mining. He recognises that nuclear power is not required for Australia, but says that we should allow others to have Australian uranium provided that there are strict safeguards. He points to media reports that the ALP is considering the licensing of the Jabiluka mine as an indication that the end result of the policies would be about the same.

Other parts of the Coalition policy are different, such as the establishment of a Department for Sustainable Development, which would take the environment parts of the Department of Arts, Sport, Environment and Territories and combine them with some resource access parts of other Government departments such as the forestry components of the Department of Primary Industries and Energy.

Carlton says that the Commonwealth will have a major role in environmental matters as a leader and facilitator of national plans and targets, rather than trying to bludgeon the States into action. He says that budget cuts will not affect funding for programs, but that staff in areas such as corporate services will be reduced. He believes that the Coalition will introduce more effective management of programs, and along with other Coalition policies to reform Parliament, there will be more transparency of Government decision making and greater public participation.

Jim Carlton expects to be the Minister in a Coalition Government, with the environment having a high priority, as it has a Cabinet position and it has received substantial support in the Shadow Cabinet.

Chain Reaction interview.



It all comes out in the wash

When does a washing machine have its biggest environmental impact – in the manufacture and assembly of the metals, concrete, felt, wood, a range of plastic types and other components or in the energy used and pollution generated in everyday use?

A new pilot study by the Australian Consumers' Association (ACA) shows that the latter is the case – that the use of the machine over its 14-year average life will have the bigger impact.

The study, revealed in ACA's *Consuming Interest* magazine, also proves front-loading machines have a far lower environmental impact than top-loaders, because of lower energy and water use, and less water pollution.

The ACA came to the opinion through pioneering work on life-cycle analysis (LCA). Also known as cradle-to-grave analysis, LCA looks at all the environmental impacts of a product from raw materials through to the end of its life.

Applied to washing machines, LCA means looking at production of materials used in the machine; packaging and transport of materials to manufacturers; manufacture; packaging and distribution of the machines; operation of the machines (including detergent); and their disposal.

ACA says the study proves life-cycle analysis can and should be done – by manufacturers (to help clean up production and minimise effects of use and disposal of their products), labelling authorities (to avoid misleading consumers) and environment protection authorities (to understand what is causing pollution and what can be done to change it).

Source: *Consuming Interest; David Vincent.*

John Renshaw

John Renshaw, a long-time environmental activist and poet, died in September 1992 of cancer.

John was renowned for his energy and enthusiasm, and even during his final illness he managed to publish a small volume of poetry.

He is sadly missed, and our condolences go to his family and friends. One of John's poems is on the inside back cover of this issue of *Chain Reaction*.

Earth News

Leigh Holloway

Leigh Holloway, former editor of *Chain Reaction* and long-time gay and environment activist died of an AIDS related illness in December 1992.

For two and a half years from April 1980 he and I co-edited the magazine.

His editing of *Chain Reaction* characterised his working life – seeing opportunities to build wider support for the issue at hand.

With enthusiasm and high expectations he encouraged the involvement of volunteers and co-workers in establishing goals; in doing work of quality; in avoiding parochialism; in open decision- making; in taking increasing responsibility as skills were acquired. To the extent where, with *Chain Reaction*, the volunteer collective in late 1982 indicated it could produce the magazine without us! Leigh was relentless, confronting, exasperating, able to identify opportunism and hypocrisy with breath-taking clarity but with little time for those who moved more slowly.

For the record, in 1981, we were both exasperated at our improvements in the magazine being frustrated and placed in jeopardy by the constraints and structures of a group who didn't have – as we saw it – the responsibilities we had to a wider national Friends of the Earth and environmentalist constituency. But it was more my urging (and that of the half dozen regular volunteers) than Leigh's that led to *Chain Reaction* moving office in the middle of the night in July that year. Leigh would have preferred a less devious, more upfront solution.

His professionalism was built over the previous decade, working in Tasmania (he grew up in Devonport), Canberra, Sydney, Melbourne and Europe, first at high school then as organiser with the Lake Pedder Action Committee and United Tasmania Group, the first manager of the NSW Environment Centre, and co-ordinator of the Community Research Action Centre at Monash University.

In the decade since *Chain Reaction* Leigh worked as Campaign Director for the Tasmanian Wilderness Society co-ordinating the state election campaign in 1982 – leading to the election of Bob Brown and Norm Sanders; then in fundraising – developing focus-group testing, direct mail marketing and bequest programs during the Franklin River blockade and 1983 federal election. In 1986 he was appointed Membership and Development Officer with the ACF.

Leigh was relentless, confronting, exasperating, able to identify opportunism and hypocrisy with breath-taking clarity

He said people are basically generous and, if approached in the right way, will give to worthy causes.

Most recently he worked as Development Program manager at the Victorian Aids Council where his fundraising work has given the Council greater financial independence than any other community based organisation. He has left half his estate to VAC for HIV/AIDS prevention work by young gay men for their peers.

His own exciting life continues to inspire many of us to strive for a better world – while enjoying the one we have.

Mark Carter

FOE news

FOE national gathering

The Friends of the Earth Australia national meeting was held at Camp Eureka, east of Melbourne, over the third weekend of January, 1993. Thirty three delegates attended and the following is a brief summary of major decisions and appointments:

- Dimity Hawkins, Cam Walker (FOE Fitzroy) – National Liaison Officers;
- Kathleen McCann and Dave Sweeney (FOE Fitzroy) – International Liaison. Diane Midas (FOE Sydney) is responsible for liaison with FOE groups in Portuguese and Spanish speaking countries;
- Clare Henderson, Larry O'Loughlin – *Chain Reaction* editors.

A number of FOE Australia spokespeople were appointed. The anti-genetic engineering collective at FOE Fitzroy is the FOE Australia 'spokesgroup' on **genetic engineering**, with Clive Rosewarne and Louise Macdonald as the nominated spokespeople. Roman Orszanski (FOE Nouveau) is spokesperson on **Eco Cities**. The FOE Fitzroy anti-uranium collective is the nominated group for **uranium** issues, and Dave Sweeney and Ila Marks (FOE Fitzroy) and John Hallam (FOE Sydney) are the first contacts for statements. Dave Vincent (FOE Sydney) will continue to speak on **waste minimisation** and Stuart White (Lismore) on **energy**. In addition, Stuart White will be the FOE Australia representative at meetings of the peak conservation organisations.

After hearing reports from office bearers, spokespeople and local groups, the meeting discussed campaign and funding proposals for 1993. FOE Australia adopted the anti-genetic engineering policy put forward by the Fitzroy anti-genetic engineering collective. The meeting issued a media release condemning threats to the Tjilbruke Dreaming Track (see separate article), and a spirited discussion saw the development of further plans for an Arid Lands Coalition that will help co-ordinate campaigning for the Lake Eyre Basin.

Other agreements included a decision to help Georgina Williams, a Kaurna from Adelaide, attend an Indigenous Women's Conference in Aotearoa (New Zealand), and the proposal for a special issue of *Chain Reaction* for the International Year for the World's Indigenous People. There were discussions about FOE Australia working more closely with FOE groups in other countries, especially in the Asia-Pacific region. FOE Sydney will work on submissions on the proposed new nuclear reactor at Lucas Heights in NSW, as well as preparing leaflets and kits on issues such as packaging, waste strategies and deposit legislation.

While a number of local FOE groups acknowledge Aboriginal sovereignty by Paying the Rent, the issue had never been discussed at a national meeting. FOE Australia made a commitment to Pay the Rent each year according to the following criteria:

- where possible, to a representative organisation of the Traditional People of the region where the national meeting is held;
- where this isn't possible, to pay to a local Pay the Rent group;
- where this isn't possible, to contribute to a specific Aboriginal-run project or campaign, to be decided by the national meeting.

The last day of the meeting included a speaker from the Upper Yarra Conservation Society, who talked about local environment issues. A series of lively workshops on green cities, Lake Eyre, a background briefing on East Timor, group processes and facilitation, and bioregionalism finished the gathering.

The 1994 meeting will be held in the Adelaide area and co-ordinated by FOE Nouveau and FOE Willunga.

Cam Walker is one of the Friends of the Earth National Liaison Officers.

Call for site protection

The Friends of the Earth national meeting called on the South Australian Government to ensure that the Tjilbruke Dreaming Track of the Kaurna Aboriginal people is protected from development. The call came in response to a protracted disagreement between the Brighton Council and descendants of the Kaurna Aboriginal People and the Aboriginal Heritage Branch. The Brighton Council has excavated one of the dreaming sites, a freshwater spring.

The Tjilbruke Dreaming track is the last complete dreaming track of the Kaurna people of the Adelaide Plains, with a complete song cycle, to survive European settlement, and consists of sites ranging from Marion to Cape Jervis and on to Brukunga.

Friends of the Earth sees that there is pressure on many of the sites from development and, besides the interference at Brighton, there had also been disturbances at Moana, and urbanisation in other areas is threatening the importance and usefulness of the sites to the Kaurna descendants.

Willunga delegate Dave Nurton said many of the sites are still used by Kaurna descendants and they had a right to ensure that these areas of cul-

tural, spiritual, archaeological and anthropological significance survived and were of use to future generations.

Further information: *Dave Nurton, FOE Willunga. Tel: 085-56 2252.*

Meeting with Minister

There was a palpable air of resignation about the latest (maybe last) meeting of 18 or so representatives of national and state conservation groups with the Federal Minister for the Environment, Ros Kelly, on 9 December 1992. Although the mood of the meeting, as measured by the quality of the humour, was better than previous meetings, there was an awareness that lobbying on environmental issues is a rearguard action and the heady days of Richo as Minister have well and truly passed.

The groups put this view frankly to the Minister – on the big ticket issues (forests, greenhouse, biodiversity) she has clearly failed to deliver. On the Monday before the meeting, the first Heads of Government (HOG) meeting had agreed to strategies on greenhouse and ESD and the new national Forest Policy. The first two still do not contain many of the proposed strategies agreed to by the various working groups comprising representatives of environment and union groups and business. In other words it was possible for various government officials to water down recommendations that were already the result of a consensus amongst these disparate interests. Talk about a lowest common denominator! A little bird tells me that, on the greenhouse strategy at least, NSW officials may have been responsible for heel dragging – thanks a heap.

On the Forest Policy, there was much groaning. Some believe it is little more than a resource security wolf in 'integrated and comprehensive assessment' sheep's clothing. At many times in the discussion, and in our meeting with Opposition spokesperson Jim Carlton the next day, the point was made that it makes good economic sense to develop the strategies the environment movement has been arguing for some time – plantation strategies, no logging in old growth forests, rapidly phasing out woodchip exports. The bargain basement royalties on woodchips in particular are part of a process that is bleeding state taxpayers, destroying our forest and shedding timber workers' jobs all at the one time. A triple whammy. For further information on this issue contact your neighbourhood forest campaigner.

Your loyal Friends of the Earth representative, while offering moral support on the forests, world heritage, state-based and many other issues raised, spoke up on two issues: greenhouse and waste. On greenhouse, we were privileged to have among us Professor Ian Lowe of Griffith University, the recently appointed Chairperson of Queensland Conservation Council. He raised the general problem of the lack of clear strategies to achieve the 20 per cent reduction in greenhouse gas emissions by 2005 and the fact that it makes good economic sense to implement the energy efficiency measures that can achieve this reduction.

I queried three specific items. Firstly, the national Electricity Grid proposals have touted the encouragement of private generators as a greenhouse-friendly initiative – when in fact with current surplus capacity and no program to encourage renewables it may be decidedly greenhouse-unfriendly. Secondly, there has been zero consultation with environment or consumer groups on the issue, and even the electricity distribution authorities have been kept in the background while the bosses of the main generating bodies (SECV, Pacific Power etc.) make the decisions. Some commentators have suggested that this is a clear conflict of interest. Thirdly, following Ian's comments on the lack of any fuel efficiency standards for motor vehicles (which emit 25 per cent of carbon dioxide) I suggested that a simple, revenue-neutral and potentially popular move would be to skew the sales tax on new vehicles in accordance with their fuel efficiency (sometimes called 'fee-bates' where the fees on petrol hogs pay for the rebates on efficient vehicles). This was apparently one of the greenhouse ESD recommendations that fell off the back of a bureaucrat's pick-up truck on the way to Perth.

On waste issues, I opined strongly to the Minister that the much touted national Waste Minimisation and Recycling Strategy would not meet its glorious target of reducing waste going to landfill by 50 per cent by 2000 unless it grew some teeth. A non-strategy of industry self-regulation has given us waste mountains that are still growing.

I raised the issue of the need for more action on compostables – which are the largest single component of the domestic waste stream at roughly 40 per cent by volume. I mentioned the leadership role that the Commonwealth could and should take and the valuable links it could forge with Local Government which has been carrying the yoke for the packaging industry's failure to meet the full lifecycle cost of their highly profitable products. The argument is complex, and I got the distinct impression that both the Minister and the senior officials do not grasp the point that the strategy they have adopted (working with industry to encourage maximum kerbside recycling) is inimical to the stated objective of moving up the waste management hierarchy (from disposal to recycling to re-use to reduction) and even to meeting the 50 per cent target.

As Whitlam would muse, 'What can you bloody say?'

Stuart White represents Friends of the Earth Australia at meetings with the Federal Minister for the Environment.

FOE International meets

The Friends of the Earth International (FOEI) meeting was held at Valsain, a small village outside Segovia, Spain, from 30 October to 6 November 1992. FOE Fitzroy members Dave Sweeney and Kathleen McCann represented FOE Australia. A one day 'pre-conference' was held in Madrid on 29 October focusing on the issue of 'Environment, Development and Trade'.

The business of the FOEI AGM ran smoothly enough with energetic healthy debate and limited discord amongst its participants even though many contentious (FOE-related) issues were discussed. Probably the most controversial was the location of the 1993 AGM in West Java, Indonesia, with much discussion on how best to resolve the twin aims of supporting the valuable ongoing work by FOE Indonesia without FOEI in any way being seen to condone the actions and policies of the Indonesian Government.

Full membership was granted to six groups – El Salvador, Grenada, the Philippines, Malta, Latvia and Norway. Associate memberships from Ukraine and Burkino Faso were extended. New Associate members were from Togo, Benin, Costa Rica, and Paraguay. This brings the total number of full and associate members of FOEI to fifty-one.

The election of a new Executive Committee (Excom), the administering body of FOEI, was held with a decision to increase its size from seven to nine: the Chairperson (elected in a personal capacity, as a member but *not* a representative of a national group), the host member group for the next AGM and seven member groups. A concerted effort was made to balance representation from the economic North and South as well as the proportion of women to men. The 1993 Excom consists of John Hontelez (of FOE Netherlands) Chair, FOE Indonesia (host group for the next AGM), FOE Poland, FOE Italy, FOE Philippines, FOE Uruguay, FOE EWNI (England, Wales and Northern Ireland) and FOE USA.

Workshops were held on many issues, including sustainable agriculture, nuclear energy, biodiversity, the tourism industry, protection of the Black Sea, 'Greenwash' – misleading environmentally friendly labelling and halting frogs' legs exports from Asia.

Most groups presented literature and other paraphenalia on their national campaigns and information on their organisations in 'stalls' during the week at a 'Campaigns and Projects Market' held continuously in the hallways and foyers of the Conference Centre.

Where time allowed videos were screened detailing campaigns such as FOE Netherlands' presentation on the Dutch model for sustainable society and FOE Italy's Radio Amazonia Project. FOE Portugal presented a special screening of a video describing the Indonesian Government's continuing human rights abuses in East Timor.

Apart from existing campaigns on ozone, forests and climate change, FOEI will include a campaign on sustainable agriculture in 1993, and will revive the Anti-nuclear and Energy Alternatives campaign.

Continuing FOEI projects for 1993 focus on issues surrounding Multilateral Development Banks, G7 economic summit meetings (co-ordinated by FOE Japan and FOE USA), wetlands (co-ordinated by FOE Spain and FOE Japan), rivers and dams (co-ordinated by the International Rivers Network) and marine issues. New projects brewing are on tourism, trade (co-ordinated by FOE Uruguay and FOE EWNI), and banning frogs' legs exports from Asia.

Loosely translated, a banner at the AGM proclaimed '... because we have a mission to be many things to save the planet ...'. This was very evident in the 1992 FOEI. Delegates came from many countries and cultures and national groups organise in different ways. What all these varied people and groups share is a strong commitment to conservation, restoration and rational use of the ecosphere. This yearly gathering of FOEI is an important part of supporting each other to meet this aim.

Kathleen McCann, FOE Fitzroy.

Friends of the Earth groups

National Liaison Officers
222 Brunswick St
Fitzroy, Vic, 3065
Ph: (03) 419 8700
Fax: (03) 416 2081

FOE Cessnock
c/- D. Rothwell
Littlewood Rd
North Rothbury, NSW, 2335
Ph: (049) 90 2256

FOE Adelaide University
c/- Clubs Association
GPO Box 498, Adelaide, SA, 5000

FOE Snowy Mountains
PO Box 31, Cooma, NSW, 2630

FOE Nouveau
PO Box 3231
Grenfell St, Adelaide, 5000

FOE Willunga
PO Box 438, Willunga, SA, 5172
Ph: (085) 56 2252

FOE Fitzroy
222 Brunswick St
Fitzroy, Vic, 3065
Ph: (03) 419 8700
Fax: (03) 416 2081

FOE Stanthorpe
PO Box 182, Stanthorpe, Qld, 4380
Ph: (076) 81 3135

Chain Reaction
PO Box 45
O'Connor, ACT, 2601
Ph & fax: (06) 248 0289

FOE Perth
PO Box 7375, Cloisters Square
Perth, WA, 6850

FOE Maitland
57A Burg St
East Maitland, NSW, 2322

FOE Sydney
PO Box A474, Sydney, NSW, 2001
Ph: (02) 281 4070
Fax: (02) 281 5216

FOE Maryborough
5 Clayton St, Maryborough, 4650
Ph: (071) 23 1895

The arrogance of scientists

Have you ever been put in your place by a scientist who claims to be an authoritative expert? Many environmentalists have to deal with scientists who believe no one else can understand the issues. ***Brian Martin*** *and* ***Sharon Beder*** *explain why this occurs.*

MOST SCIENTISTS are nice, decent people. Generally, they do their jobs adequately, are concerned about their families and support efforts to create a better world.

But there is one area where scientists have a strong tendency to be arrogant, and that concerns the understanding of science itself. Many natural scientists have a low opinion of the ability of non-scientists to make sense of the world.

Natural scientists, such as physicists, chemists and biologists, can be amazingly condescending towards social science. The natural sciences are called the 'hard sciences'. They are perceived as 'hard' both in being able to produce solid and precise facts about nature and in being difficult to understand. The social sciences are called (by natural scientists) the 'soft sciences'. It's not a compliment!

Barry Ninham, professor of applied mathematics at the Australian National University, gave a talk in 1992 in which he criticised the book *Life Among the Scientists*, a study by social scientists of a biological research institute. Ninham concluded:

> unless you are an active scientist you can never really understand science. Leave it to professionals.

This is like saying that the only people who can understand the various dimensions of air transport are pilots and aeronautical engineers, that the only people who can understand houses are architects and builders, or that the only people who can appreciate drama are playwrights and actors.

Scientists' contempt of social science is all the more amazing considering how little many of them know about it. Admittedly, social science contains some shonky research and practitioners; there are disagreements between so-called experts; and applications often are pointless or harmful. But these are all features of natural science too. The difference is that natural scientists have developed ways to hide their weaknesses better.

The arrogance of scientists is even more obvious when it comes to members of the 'general public', namely those who have no degrees, institutional positions or scholarly publications. For such individuals to comment about science – about what topics should be researched, how it should be done, the meaning of scientific results, or to propose a new theory – is commonly considered to be a joke.

In late 1992 Hilary Koprowski wrote in the magazine *Science*:

> As a scientist, I did not intend to debate Tom Curtis when he presented his hypothesis about the origin of AIDS in *Rolling Stone*. The publication of his letter in *Science* ..., however, transferred the debate from the lay press to a highly respected scientific journal.

Koprowski implies that something cannot be scientific unless it is published in a scientific journal. This is like saying religious experience only occurs in churches.

Why are scientists arrogant in this way? Scientists must undergo a lengthy training, involving years of course work and apprenticeship in research. Most of those who do not accept the standard ways of viewing the world are weeded out.

Within universities and research institutes the status of disciplines depends on them being opaque to the prying eyes of outsiders, both from other disciplines and from the general public. If no one else can understand the subject then, it is argued, only the trained professionals should be involved in choosing research topics, selecting staff and deciding the syllabus.

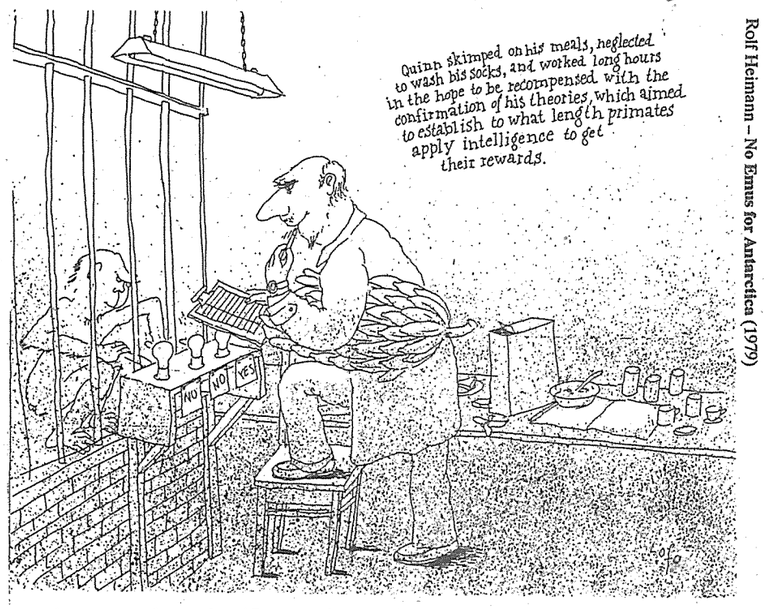
The result of this is that being arrogant is an occupational hazard for scientists.

Environmentalists come up against this quite often. 'Experts' dismiss comments by concerned citizens as uninformed. They dismiss key social dimensions to debates as irrelevant. They assert that the 'facts', as determined by scientists, have primacy. No matter that citizens may understand the issues better. No matter that social dimensions are central to most environmental disputes. No matter that scientists may have preconceived ideas, limited knowledge or be funded by vested interests, all of which can undermine the alleged objectivity of 'facts'. Scientists think they know best.

Policy-makers, including politicians and senior executives, are happy to go along with this view because it is they who have best access to the scientists. They employ their own scientists and have power over other scientists through funding and future career options. It suits them to juxtapose the supposed rationalism of science against what they call the emotionalism of public debate. Environmentalists are easily characterised as emotional because they so obviously care about what they are saying, because they often appeal to people's sense of moral values rather than their intellects. It is also because environmentalists are so often in a weaker position and are required to shout and demonstrate in order to be heard. It is easy to be cool and collected when you are in control of things.

At a Pricing Tribunal seminar in Sydney, Bob Wilson, General Manager of the Sydney Water Board, said that the Board's main problem was the 'emotionalism' of environmental issues. The media fanfare surrounding ocean pollution was based on emotion and had distorted the picture of what the Board considered were the real problems. 'Unless we get the science right' he said, 'emotion can take over.' What Wilson was concerned about was that the government might be swayed by public opinion to set different priorities to those held by him and his scientific advisers.

It is convenient for policy-makers to uphold the cry of 'scientific rationalism' and pretend that decisions which affect the environment are not political matters but are rather scientific questions that can be decided by scientists. Government bureaucrats and business people sometimes talk about politics distorting decisions. They try to avoid confrontation and controversy at all costs by hiding behind a façade of numbers and graphs and scientific reports which are supposed to be neutral, rational and objective. They are careful that any scientific data that goes out to the public is screened and interpreted to suit their own political ends.



Rolf Heimann – No Emus for Antarctica (1979)

This narrowing of environmental debates to scientific and technical issues requires those opposing a decision to deal head on with these issues, to demystify and critique the numbers and graphs and even use their own scientists to add credibility to their claims. This explains the need for organisations such as the Society for Social Responsibility in Science (SSRS); the Society for Social Responsibility in Engineering (SSRE) and United Scientists for Environmental Responsibility and Protection (USERP) to put alternative views and to help community and environmental groups oppose unwanted developments and fight for better, more appropriate technologies and scientific information. Unfortunately, such groups are usually poorly supported by the broader community of scientists and engineers. Indeed, the SSRE recently collapsed from lack of interest amongst engineers. In this issue Isla MacGregor describes the troubles USERP has faced.

A more radical approach, however, is that rather than going along with the assertion that only science can properly inform policy decisions because it is the only form of knowledge that is rational and objective, environmentalists should be taking a second look at science, itself. In this issue, various writers, some of them scientists, explore the shortcomings of Western science, the way it is socially shaped and directed for particular ends and used to advance powerful interest groups – the military, industry, patriarchy, often in the cause of death and environmental destruction. They point the way to alternative ways of knowing, alternative ways of being a scientist, alternative ways of addressing environmental problems and alternative ways of relating to science and scientists.

Brian Martin *and* ***Sharon Beder*** *are with the Department of Science and Technology Studies at the University of Wollongong and are guest editors of this issue of* ***Chain Reaction.***

Blinding us with science

*When scientists come out supporting the most nasty, environmentally destructive and scientifically weak positions, it is tempting to dismiss them as either stupid or corrupt. **Alan Roberts** suggests otherwise, and offers some advice on dealing with dubious scientific conclusions.*

IN RECENT TIMES the media has featured some surprising findings by qualified scientists, for example:

'There is no reason to fear the alleged greenhouse effect'

'Tobacco smoking does not cause lung cancer'

'Nuclear power is clean and safe'.

Surely, some environmentalists will think, the scientists involved must be so sincerely economic-rationalist that they are selling themselves to the highest bidder. But, while there have been some notorious cases of scientific fraud, the great majority of scientists are not to be bought like this; it is rather a case of:

> You cannot hope to bribe or twist
> – Thank God! – the average scientist.
> But seeing what the man will do
> Unbribed, there's no occasion to.[1]

Even this is a bit too harsh. Let's look at a couple of illuminating cases.

In 1962 Algeria gained its independence by the Treaty of Evian. As one result, France could no longer test its nuclear bombs in the Sahara, and turned to a remaining Polynesian colony in the Pacific, the Tuamotu archipelago. The actual atoll site is better known by the name of Mururoa.

The effects on Australia of each series of tests, which began in 1966, were reported on by the National Radiation Advisory Committee (NRAC), originally appointed by the Commonwealth Government in 1957. The Committee's conclusions changed little from its first report in 1968:

> fallout from both series of French nuclear weapons tests in the Pacific is of no significance as a hazard to the health of the Australian population.[2]

through to 1972:

> the external gamma-radiation dose ... presents no hazard to the population compared with the average annual background dose ... The other aspect ... is the dose to the thyroid ... [These] doses are small compared with the radiation protection guide and do not present a hazard to the population.[3]

Since the attitude now current, and widely advocated even then, is that any increase in radiation dose is a hazard, these conclusions were dubious, to say the least. Noting that the Committee included certain illustrious figures well-known to readers of *Nuclear Knights*[4], you might find their presence highly relevant. As for instance, Professor Sir Philip Baxter, KBE, CMG, FAA; Professor E.W. Titterton, CMG, FAA; Professor Sir Leslie Martin, CBE, FRS, FAA.

But the findings did not follow simply from these gentlemen's well-known desire to see that nuclear energy in any form had a good PR image. In calculating the radioactive dose at various centres in Australia before and after the explosions, the committee used the accepted data and methods of the day. The real lesson emerges only if later events are considered.

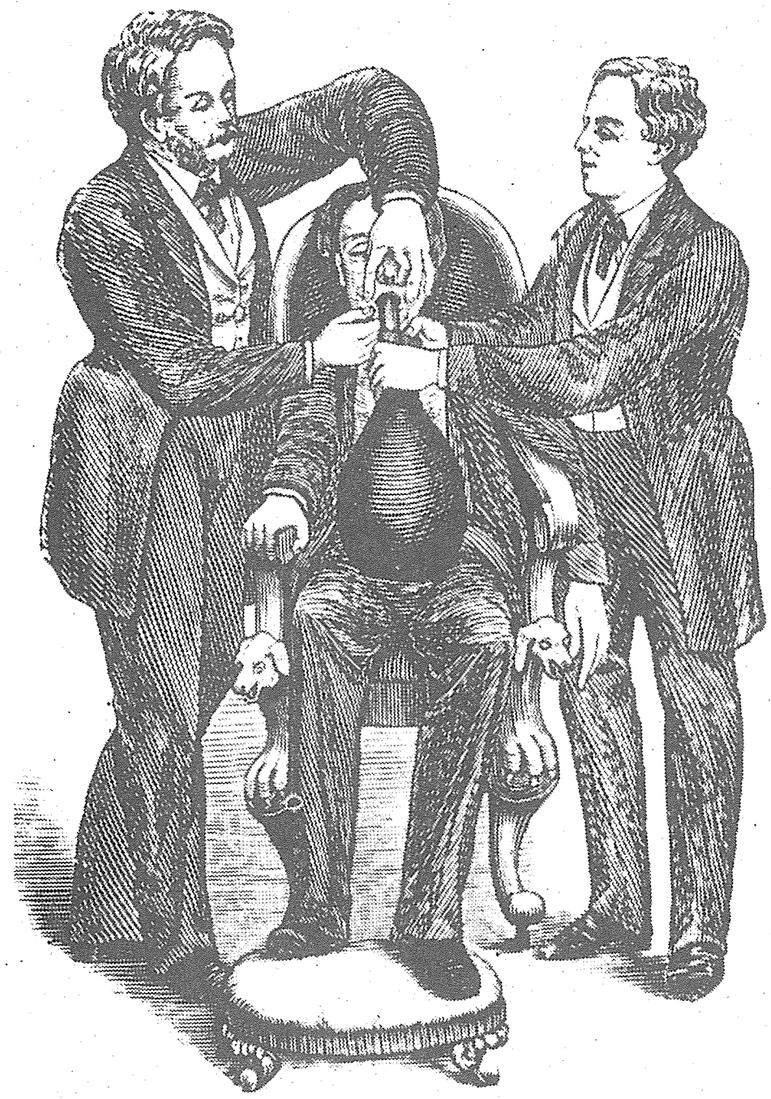
In 1972 the Whitlam Labor government was elected. Unlike the preceding Liberal-Country (now National) Party coalitions, it had no desire to keep open the option of polluting the Pacific with Australian nuclear stations or weapons, or of getting the help of France in doing so. (France had not then signed the Non-proliferation Treaty.)

On the contrary, it wanted to take a case to the International Court of Justice at the Hague against France's use of the Pacific as a nuclear testing ground. It therefore bypassed the NRAC and, through the Academy of Science, obtained a committee of equally reputable scientists whose report justified the legal case. Accordingly, in 1973 the Attorney General, Lionel Murphy, was able to approach the Court with sound scientific findings in his hand, that showed Australian citizens could be expected to die as a result of the French tests. A non-hazard was now, it appeared, a hazard.

The important thing to appreciate is that the two committees worked on exactly the same scientific data. Where they disagreed was on the conclusions to be drawn. Is a hazard to be regarded as 'significant' because a dozen or so extra deaths is only a small percentage of the number liable to get cancer anyway? If so, then the NRAC was right. Or are a dozen fatalities to be taken seriously anyway, regardless of any other deaths that might be occurring? The second committee thought they were.

(It is a pity Hannibal Lector, the cannibal serial killer from *Silence of the Lambs*, did not have the advantage of the NRAC's statistical approach. He could have pointed to the thousands who die each year in the USA from motor accidents, and what a minuscule percentage of this figure were the few dozen people he chose to kill and eat.)

Quite obviously, each committee brought in a report that was to the liking of the government it served. But this does not mean that scientists are a bunch of servile scoundrels; most of them are certainly not. The disagreement was over values. (A government will of course see to it that its scientific advisers share its relevant values.)



Is abstract Science, with a capital S, a value-free concept? Since abstract Science exists only in abstraction, this is not a very interesting question. Scientific activity, in the real world, is crammed full of value choices. What goals will be pursued? (a Moon landing, or the conquest of hunger?); what methods will be used? (should we test drugs on jailbird volunteers or inflict pain on experimental animals?); how will the findings be described? (with value-laden words like 'normal', 'deviant', 'functional'.

And when the question at issue is one with current social import, one's political views and moral values will always be decisive in the example above. Scientists have no particular authority or superior knowledge on such questions of values.[5] They can certainly be criticised when they pretend to possess any such expertise.

But there is another, and probably more important, way in which vested interests can use scientists to serve their ends.

When In Doubt ... Do What?

Because of the distorted values which have guided scientific research since at least the rise of industrial capitalism in the last century, our knowledge of the world is weirdly lopsided. The behaviour of subatomic particles of interest to weapons makers or the nuclear industry is known in minute detail, but there are big question marks over the vastly more important question of world climate and how it is determined. Human activity now takes place on such a scale that it alters basic parameters of the world as a biosphere, but this kind of lopsidedness means that we do not know what the effects of this activity will be.

The problems involved are, from a scientific viewpoint, much more difficult than those already solved in particle physics or industrial chemistry. The comparatively recent attention paid to them cannot magically turn up the complete answers; the problems are those of how complex systems behave, ones much more complex than the simplified arrangements of the physics or chemistry laboratory.

Thus there will often be, for quite some time, doubt and uncertainty attached to the answers found. Here again, value judgements enter. We might insist that rigorous proof be found for the harmful effects of a particular environmental disturbance, before steps are taken to curb it; while awaiting such proof, let us do business as usual. Or we might rather (as I believe we should) reverse the onus of proof and, once aware that a certain activity possibly has a large-scale environmental impact, suspend it until it is proved benign.

But vested interests can take advantage of these uncertainties – is it malignant? is it benign? – to further their ends. In a particular case, some scientists will incline to stress (for all sorts of reasons, sometimes honest, sometimes dubious) the evidence suggesting a benign impact. Even if they constitute a minority of responsible scientific opinion, they will be seized on by the interested corporation, industry or government, supported financially and/or made prominent in the media. (An example is the Bush administration's use of the Marshall Institute's minority opinions on the greenhouse effect.)

This kind of ploy is easily dealt with by pointing out how the publicised view is a minority one in the field concerned. But there is another and popular way for vested interests to use uncertainty for their own ends: they simply overlook the phrases in the scientists' reports which express this uncertainty.

Search (sometimes you will need a high-powered torch) for the explicit or implicit value judgements

For example, an environmental-impact firm prepares an EIS draft for the interested corporation. Usually it will not have 'in-house' experts to cover all the fields involved, and will sub-contract a consultant (often an academic) to cover a particular ecological concern. The consultants will usually report with complete honesty – for no other reason than that they would be foolish to jeopardise their scientific reputation for a consulting fee or two.

But, because an honest study will usually detect considerable areas of uncertainty, this report will often contain careful qualifications. For example: 'While no impact on species A, B and C is immediately apparent, a program of research needs to be undertaken before one can be sure of this.' In its summary report to the client, the firm 'translates' this as: 'There are no grounds for expecting harm to species A, B or C.'

Not exactly a lie. Not exactly the truth. But welcome news to the client...

We might put together a few rough rules-of-thumb to guide us in studying environmental statements and similar documents, when they appear to give their blessing to noxious practices.

- Don't assume the scientists concerned are conscious crooks. They usually aren't and you will find it hard to prove anyway.
- Search (sometimes you will need a high-powered torch) for the explicit or implicit value judgements the reports contain. See if you agree with them.
- Look for the fine print in the scientific work: where it is qualified, what uncertainties it expressed that somehow disappeared from the publicised version.

Sometimes, of course, a detailed study of the scientific work itself should be done; but this will take someone qualified in the field. The suggestions above deal with aspects on which you are as authoritative an expert as anyone in the world.

References

1 Apologies to Hilaire Belloc, in whose similar text the second line ended with 'British journalist'

2 National Radiation Advisory Committee, *Biological aspects of fallout in Australia from French nuclear weapons explosions in the Pacific, June-July 1967, Report to the Prime Minister,* December 1967, Commonwealth Government Printer, Canberra, 1968.

3 National Radiation Advisory Committee, *Biological aspects of fallout in Australia from French nuclear weapons explosions in the Pacific, June-August 1971*, Commonwealth Government Printing Office, Canberra, 1972.

4 Brian Martin, *Nuclear Knights*, Rupert Public Interest Movement, Canberra, 1980.

5 For a detailed study of a particular scientific dispute (the effect on the ozone layer of supersonic transport) and its content of values, see Brian Martin, *The Bias of Science* Society for Social Responsibility in Science, Canberra, 1979, and its catalogue of aspects in which science is not value-free.

***Alan Roberts**, a long-time analyst of environmental and peace issues, is attached to the Graduate School of Environmental Studies, Monash University.*

The public relations of science, the flying pig and the jet-propelled cane toad

*Science is now being sold in our shopping centres and supermarkets. **Rosaleen Love** takes a look at this new form of science communication and asks whether it adequately addresses environmental concerns.*

A COUPLE OF YEARS ago, while I was in a supermarket in front of the dairy cabinet, looking at a display of butter – butter salted, butter unsalted, butter softened, butter in plastic tubs, either salted or unsalted, softened or unsoftened – a news item was read over Tuckerbag News, broadcast through the shop on the PA system. An Australian woman had died under an anaesthetic while undergoing an IVF procedure. What made the item newsworthy was, presumably, that she was the first to die in this way, in the quest for the ultimate marketable product, the take-home human baby.

The setting: the market; the information medium: the news as a supermarket service to the public (or so it was advertised); the incongruity between the choice I faced and the tragic outcome of the choice the unnamed woman had made, all led to one of those feelings of weirdness, of just who is among the aliens here. Is there human life on earth, or are we all cloned members of species of producers, consumers, and the consumed?

How easily it has happened, over the past twenty years, that the biological sciences and technologies have begun to shape everyday life in ways that somehow seem perfectly 'natural'. In this new world, scientific information is no longer knowledge existing in some kind of abstract purity. It sometimes appears to be another commodity to be traded and manipulated by those who seek to control the outcome.

In March, in the shopping mall at Airport West in Melbourne, cute and cuddly flying pink plastic pigs crowned CSIRO's exhibition on genetic engineering. The same porco-avian icon appeared on National TV, above the head of Barry Jones as he launched the exhibition on its travels around the Westfield shopping centres of Australia. CSIRO is engaged in an exercise in explanation and accountability, bringing knowledge about what it is doing to the public, with the market audience upper secondary school pupils in search of project material. The science exhibit is in the market place, something to be experienced as part of the shopping life. It has been sponsored

by the biotechnology industry.

The exhibition is public relations for science, timed to coincide with the report of the House of Representatives Committee of Inquiry on the release of genetically modified organisms to the Australian environment. (The outcome of the inquiry was reported in *Chain Reaction* 66; it decided in favour of the promise of biotechnology, and recommended that the present guidelines on deliberate release be made mandatory.) The voices of scientists advocating release are assured, speaking the language of science with authority and certainty. It is science in search of the marketable product, science which increasingly incorporates the language of patent law, commercial acceptability and the promise of increased economic performance.

The flying pink pig was a poke at the critics of the new technology, biocritics such as ecologists, environmentalists, consumer advocates and concerned members of the public who made submissions to the inquiry on the broad ecological and social implications of the new technology. 'Of course pigs won't fly', the CSIRO was reassuring on that point, though it is more of a straw man, that pig. Biocritics are more concerned with the real-life transgenic pigs to the Adelaide market story, when in 1988 some fifty experimental pigs were slaughtered for human consumption without official approval.

The CSIRO exhibition gave space for some prominent biocritics to voice their concerns, including Robyn Rowland, Peter Garrett, and Peter Singer. They were shown on interactive skip video (a great new fun technology) responding to the question 'Is the risk to the environment too great?' Yes, there are risks, was the consensus, but the scientists – Merilyn Sleigh and Sir Gustav Nossal – argue that they are proceeding very cautiously, while the biocritics can't yet point to evidence of a genetically engineered environmental disaster. At the end of the video sequence, viewers were asked to record their vote, and the addition of their vote to the total was displayed in jazzy graphics. Leaving aside the question of who voted, and how often, back in March some 61 per cent of voters had agreed the risk to the environment was too great.

When asked 'Who should control genetic engineering?' 46 per cent replied 'the community' (well ahead of 28 per cent for the next group, the scientists). On the question of 'Should we use it on humans?' (in the context of making new drugs and treating genetic diseases) 51 per cent agreed. 'Should companies be allowed to exploit it?' 64 per cent, said no. What is of interest here is the greater public sympathy for use in relieving human suffering, and a different conception of what 'risk to the environment' might mean. No doubt those registering their concern recall the outcome of past *laissez-faire* attitudes to environmental impact. Instead of a pig with wings, the jet-propelled cane-toad might better serve as a wart-encrusted hi-tech symbol of ecological havoc.

Other exhibits explained genetic engineering techniques and theory. Potential economic and environmental benefits were stressed: environmentally friendly cotton, genetically engineered to resist the cotton bollworm and so reduce the need for chemical sprays; disease-free potatoes which carry an extra gene to fool the potato leaf roll virus; the control of blowflies, ticks, and lice in animals by transferring a plant gene to animals so that they secrete a natural insecticide in their sweat; genetically engineered human growth hormone and insulin, already in use.

The reservation the critics have is that, while all the above sounds very impressive, Australia is leading the world in releases of new organisms to the environment, and this rush to be first where others are more cautious may not prove wise. A laudable aim to reduce pesticide use may have unanticipated effects, just as the introduction of chemical pesticides led, among other things, to the increased fragility of penguin eggs in Antarctica.

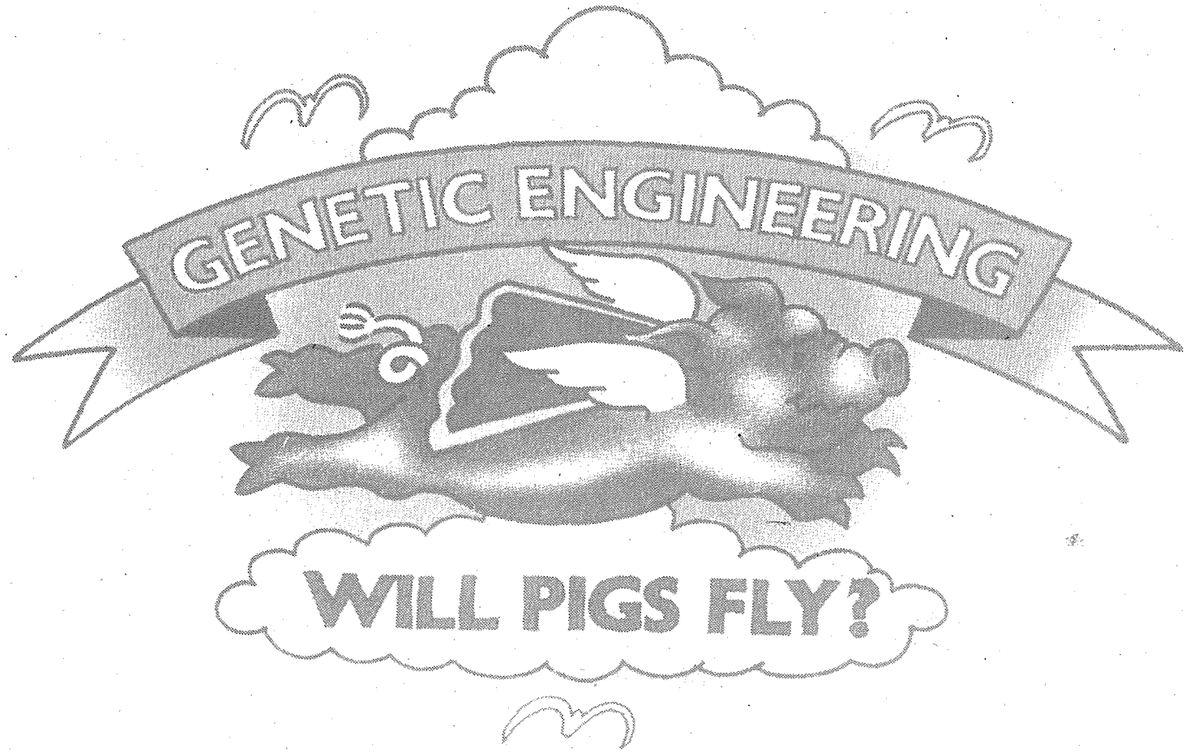
The word 'risk' conjures up for the environmentalist the notion of risk to the environment. In an industry context, it can also mean 'commercial risk'. One report to the Commonwealth inquiry described the risks involved in enhancing the activity of a naturally occurring virus specific for the Heliothis pest in cotton, where the project was described as a 'high risk' project in that it might not succeed. 'Risk' is the possible loss of R&D investment. Then again, as the CSIRO exhibit tells it, 50 per cent of the world's insecticides are used on cotton. Growing organic cotton is clearly a problem in search of a solution.

Biocritics raise questions about the commercialisation of basic research and the appropriation of genetic resources. In the new way of looking at things, patenting, a form of private appropriation, may be described (as it was in one submission to the inquiry) as 'a form of publication', as a way of informing the public about what is going on. The patent, i.e. the means of stopping others from doing something, is the publication, in the 'commercial-in-confidence' arena.

It is in this context that CSIRO is sending round its travelling exhibition. It is a form of public relations for the new science, a selling of science to the Australian public, the communication of science from the experts to the public, with some new fun technology to allow us to give them some feedback. However well-intentioned, though, the one-way science-centred process of science communication sometimes has that faint air of snake-oil salesmanship about it. It will provide the information that CSIRO wants the public to hear, but it may not provide an adequate response to the questions the public may be asking.

'What about the cane toad?' is a perfectly valid question from anyone in Australia expressing concern about the introduction of new exotic organisms, man-made or otherwise. It is not a question those who advocate the new releases to the environment want to hear. They regard it as unfair, the cane toad being 50,000 genes on the hop, while the genetic engineer plans only to modify one or two genes, and indeed, may one day manage to solve the cane-toad problem that way.

The biotechnologists feel they are being unfairly singled out for attention, not so much for what they are doing, as



for what other people have done in the past. (It was the CSIRO that introduced the cane toad for pest control in 1935.) In an interview in the *Australian*, Merilyn Sleigh said 'I think genetic engineering is like the cherry on top of the cake and what they (the environmentalists) are really worried about is the cake, the existing environmental problems'. True. Though the cake may be poisoned, the cherry may prove plastic. Another argument advanced to try to keep public concern within bounds is that recent discoveries show that genes frequently jump species boundaries in nature, and we're only just beginning to find the full extent of this. Dr Jim Peacock of CSIRO, in a public address a few years ago at ANZAAS, made the amazing statement that there's some evidence that some genes in human haemoglobin have been found in the growing tips of carrots. A modern St Francis of Assisi must add 'My sister, the carrot' to 'my brother, the ass'.

The problem is one of two-way communication. On one side, science is seen as something to be packaged and sold by the expert for the passive consumer. The promoters of public science events often implicitly adopt what the British researcher Brian Wynne calls a 'cognitive deficit' model of science communication. If the Australian public do not know that the new biotechnologies will be the salvation of the economy, then there must be something wrong with the public's collective brain, some hole which must be filled with information. It is a 'blame the recipient' model which has the same problem as other 'blame the victim' explanations.

Brian Wynne argues that scientific communication, if it is uncritically science-centred in this way, may send contradictory and unintended messages about science to the consumer of scientific information. The public response to the exhibition might well be a sceptical. 'They would say that, wouldn't they?' or 'Look who's talking'. Hostility to science may be a product of the best communication intentions.

The American technology writer Langdon Winner once described himself, when he wrote on the topic of risk, as entering thickets of scientific uncertainty, winding his way through labyrinths of risk/cost/benefit analysis, balancing skilfully along the fact/value gap, and stopping to gaze upon the colourful befuddlement of mass psychology. The science communication game is a thicket-labyrinth-gap-befuddlement situation, through which various well-intentioned people are currently feeling their way. No-one yet has the answers. Future knowledge is unforeseeable. The implications of technology are unknown. Single factors may lead to a multitude of consequences, and pigs may develop wings. After all, once pterodactyls flew in the sky, and what could be more ridiculous than a flying pig? A flying dinosaur, that's what.

***Rosaleen Love** is a writer and lecturer at the Swinburne Institute of Technology.*

Science and the military

Wars have devastating impacts on the environment, and even 'peacetime' military activities can be highly damaging. Yet military activity has had a low priority for environmentalists. ***Mary Cawte*** *looks at where military research and development are leading us.*

THE EFFECT OF WAR on the environment has changed markedly since World War II. And since World War II science and the military have been linked more closely than ever before. The scale and sophistication of military technology are almost impossible to realise, and cannot be set aside while environmentalists study other problems apparently unrelated to war and the arms race. No examination of science and the environment can bypass the military.

Ironically, the military-industrial complex itself is quite willing to climb on any green bandwagon it sights. An advertisement by Deft Coatings in *Aviation Week and Space Technology* featured a picture of the B-2 stealth bomber with the heading 'Clean Air is an International Responsibility'. Apparently Deft's 'water-borne primers' prevent the release of over a million and a half pounds of solvents into the environment each year. What the bombers could release, or indeed have released, into the environment was not mentioned.

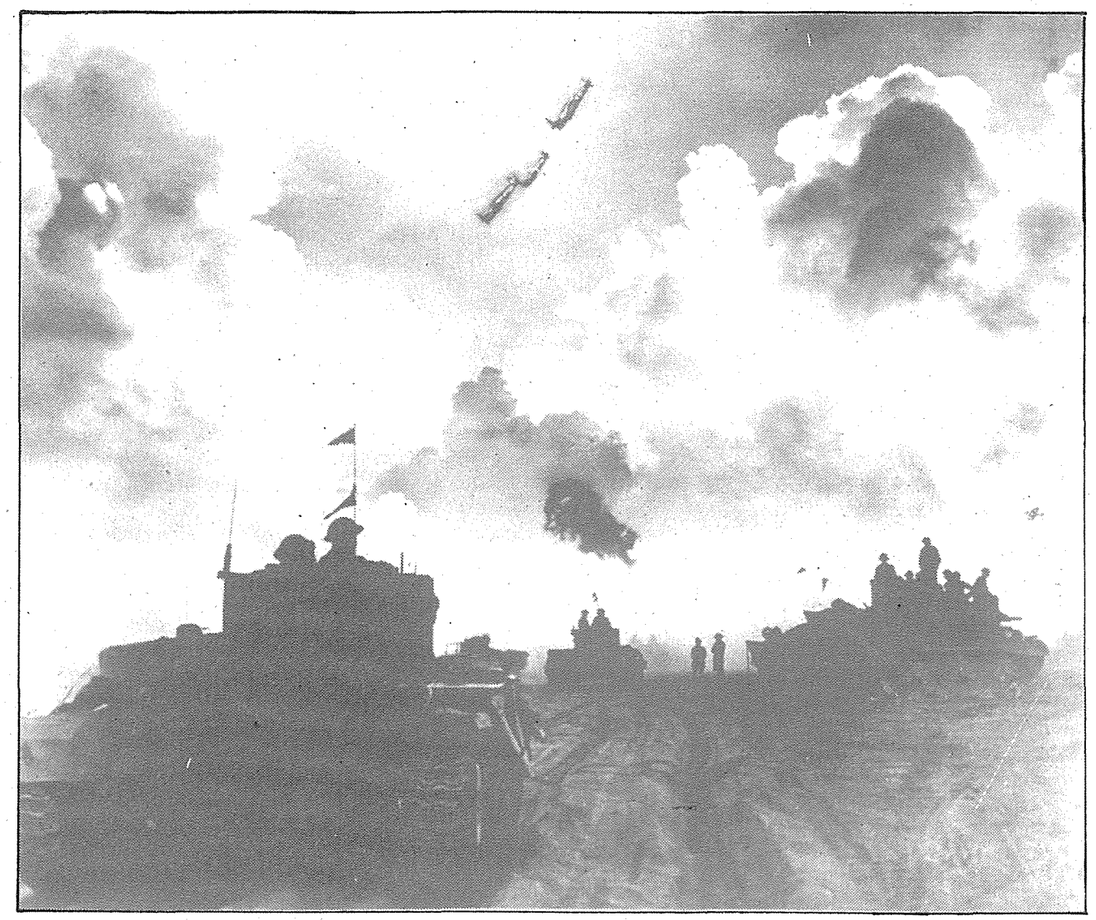
In Iraq, Kuwait and northern Saudi Arabia, the combined effects of the bombardment and the movement of military vehicles will persist for decades. The closest equivalent is the 1942 El Alamein battle in northern Egypt and, according to Dr Arthur Westing, a researcher into the environmental effects of war, the tanks involved in that battle so loosened the topsoil and sand that duststorms in the region became ten times more frequent and also much more severe. Also in World War II, in Libya alone, approximately five million mines were deployed, and it took thirty years to clear the land. It is reported that during the Gulf War a greater tonnage of munitions was dropped and fired than during the whole of World War II, and in a much smaller area. The fuel-air explosive bombs used to clear minefields were themselves a 'desert storm', pulverising whatever topsoil existed in the desert and destroying any vegetation present. Clearing the environment of very dangerous unexploded bombs, shells and mines is expected to cost more time and money than the widely reported oil damage.

It has been said that before World War II the only signs of old battlefields were cemeteries and monuments. Since that war, modern science has continued to produce weapons with their own devastating afterlife, whether actually used or not. Nuclear weapons at once spring to mind, but chemical and biological weapons leave their own residue. Gruinard Island, off the north-west coast of Scotland, is infected by anthrax, following an experiment in biological warfare. Drums of various chemical weapons have been dumped off coasts, with no regard to the possibility of corrosion and leakage. The legacy of the defoliant herbicides used in Vietnam is notorious.

Environmental degradation is not the only problem. What of consumption of non-renewable resources? Even before the Gulf War the military were responsible for five per cent of the world's total consumption of petroleum, as well as six per cent of aluminium and eleven per cent of copper. Defence establishments lock away large areas of land; Maralinga is yet to be cleaned up after the British atomic bomb tests, and the beautiful Jervis Bay, recently proclaimed a national park, has to live with Navy designs on the area, including an armaments depot.

Yet, as the environmentally friendly stealth bomber, with its 'green' coatings, demonstrates, weapons scientists do care about the planet. Any day now, a killer comet may be discovered, on a collision course with Earth, and must be intercepted. If the extinction of the dinosaurs can be attributed to the impact of an enormous asteroid near Mexico 65 million years ago, we certainly don't want the human species to suffer the same fate. At a NASA workshop at the Los Alamos National Laboratory, scientists called for a fleet of over a thousand new missiles armed with the world's entire arsenal of nuclear warheads, to save our fragile home from this cosmic disaster. Edward Teller, 'father' of the hydrogen bomb and ardent advocate of the neutron bomb, proposed a new super-bomb – so powerful that it could never be detonated on Earth – to intercept such an asteroid. The handful of non-weapons scientists at the workshop, including experts on asteroids and comets, were horrified by such proposals. As Robert Park, Professor of Physics at the University of Maryland, has wryly observed, the Star Warriors propose 'to defend Earth at stupendous cost against an imagined menace that, if it exists at all, might not threaten Earth for millenniums – or thousands of millenniums'.

Don't laugh. The Strategic Defence Initiative spent billions of dollars in pursuit of unbelievable technologies, despite an initial incredulous reaction from the scientific community. Few reputable scientists or military strategists believed that it was feasible to build a leak-proof shield against nuclear attack. Many scientists and universities strenuously opposed the program, but the bureaucracy pulled together a set of projects, slapped security classifications on some existing university defence contracts, and established an office and budget for this massive exercise in 'national security'.



Tanks waiting to advance on the dawn of the battle of El Alemein, 23 October 1942.
(Photographer: Frank Hurley. Reproduced with permission from the National Library of Australia.)

Environmentalists on the whole seem to have a bad attitude to the threat of massive asteroids. They keep on fussing about matters closer to home and complaining not only about defence budgets but also about science policy.

Environmentalists on the whole seem to have a bad attitude to the threat of massive asteroids.

The Director of the UN Environment Program once noted: 'In a matter of half an hour the world will spend more on what is euphemistically called "defence" than it will give UNEP in one year'. And this spending includes a large component for research. Global spending on military research and development is approximately one quarter of the global R&D budget, and military research has often been called the oxygen which fuels the arms race. It is claimed that there are almost as many US scientists and engineers working, directly or indirectly, on ways to destroy life as there are working to improve it. Certainly the US spends twice as much on military R&D as on research and development devoted to all other social goals.

In 1946 General Eisenhower, Army Chief of Staff, wrote a memorandum to senior officials of the War Department on 'Scientific and Technical Resources as Military Assets' drawing attention to certain 'lessons of the last war' namely the 'invaluable assistance' provided by 'resources in the natural and social sciences' and the need to translate them into a 'peacetime counterpart'. In the same year the Office of Naval Research was established as the first federal agency to contract for basic research, followed by the Army Research Office (1951), the Air Force Office of Scientific Research (1952) and the Defense Advanced Projects Agency (1958). Each of these institutions was empowered to contract work from universities and other research institutions. Other important sources of military R&D funding to academic institutions in USA are the Department of Energy, the National Aeronautics and Space Administration (NASA) and the National Science Foundation. During the Reagan administration, weapons programs accelerated from 38 per cent of the Department of Energy budget to 65 per cent. In the same period, grants for energy conservation and for solar energy fell by about 88 per cent.

The phenomenon is not confined to the US. Throughout the world, almost half a million scientists and engineers are working on military R&D. Australia's Defence Science and Technology Organisation, the second largest research and development organisation in the country, employs 1,000 professional scientists and engineers, and counts the defence forces and also the defence industry as its principal customers.

The costs are far greater than the nominal price tickets on this massive diversion of human and capital resources to the military. There is much talk of 'spin-offs', but Seymour Melman, professor of industrial engineering at Columbia University, and others argue that military design criteria are actually harmful to competence in the civilian industrial sector. Environmental 'spin-offs' could be even more elusive; environmentalists are wary of technical fixes at the best of times. The greatest cost, however, may lie in the skewing of the pursuit of knowledge, that concept so fundamental to scientific rhetoric. When evaluating proposals from university researchers, the military substitutes its own evaluative criteria for the traditional peer review process of the academic community (granted that this has its own shortcomings).

Australia has embarked on 'the largest defence capital investment in Australia's peacetime history' according to the 1987 Defence White Paper. Our new submarines will have 'the most advanced underwater combat systems in the world', for example. Indonesia, commonly cited as our chief potential threat in the region, has a defence budget less than one quarter of the Australian budget. Indonesian defence expenditure has actually declined sharply in recent years. Of course, as the government argues, the share of our GNP allocated to defence is much lower than in, say, Norway or Sweden. And while most OECD countries are cutting defence budgets, China, Thailand, Taiwan, India, Malaysia and others are increasing theirs. Nevertheless, at a time when superpower and regional tensions and perceived threats are lessening, the Australian Defence Force's strategic modernisation programme is ruled by its own momentum; if the new weapons systems are more capable, argues the government, this does not indicate a new militarism, but is the consequence of technological modernisation.

we have too many of the world's most advanced fighters for our current needs

Despite, or because of, modern arsenals, there is increasing recognition that there can be no military solutions to most of the world's most intractable security problems. Australia may discover that it has given too much emphasis to military solutions and to high level threats, while disregarding low level contingencies. Thus, argues Andrew Mack in *A New Australian Militarism*: 'we have too many of the world's most advanced fighters for our current needs, but no adequate coastal surveillance system.' If the use of force is becoming ever less practical, argues Mack, we should 'be allocating more resources to non-military approaches to enhance regional and global security'. Yet the ratio of Defence to Foreign Affairs spending is approximately 20:1, even though the Foreign Minister has described an approach to security requiring 'adequate financial support for non-military instruments'.

The military command over human, scientific and financial resources inevitably tends to favour military approaches to security over non-military ones. But even in World War II, the scientific establishment itself was already selling not only new techniques but also the strategies to go with them. Once again, here are the solutions; where are the problems? Once again, 'because it's there ...' All military technology that can be developed should be developed; otherwise, an enemy will make it and destroy us. This logic leads to escalating arms races and increasing risks of accidental war, and keeps countries in the debt trap. Low income countries, as a group, currently allocate about 20 per cent of their budgets to deadly weapons – modernisation in the name of defence. Nor is the 'one jump ahead' logic exclusive to military-funded research. The economic war also, the threat of international competition, is constantly invoked to justify research and development programs. There is no automatic guarantee that if money could be saved from military research it would be turned to good account for sustainable development, human dignity and the environment.

We live in 'interesting times' as the old curse has it. The collapse of the superpower-based Cold War occurred at the same time as it became less and less possible to ignore a set of unprecedented global challenges. Inevitably there was talk of 'redefining national security' to include 'environmental security' and in the USA a 'strategic environmental initiative' mooted. The chairman of the Armed Services Committee proposed a $200 million 'Strategic Environmental Research Programme': some data gathered by the armed services and intelligence agencies would be made available to non-military scientists; military aircraft, ships and submarines as well as satellites would collect information on air and water quality and on global climate; the powerful computers used by the Departments of Defence and Energy would be made available for civilian research. 'Sounds good', according to the Department of Defence. And in fact Congress adopted the proposal, the idea behind which was to combine environmental concerns with the interest of the military in retaining its research and technological capability in a time of shrinking defence budgets.

But what is going on here? Is it a demilitarisation of traditional security thinking, or a militarisation of eco-politics? Slotting the environment into the national security file may undermine the sense of 'our common future' and of one planet – concepts in desperate need of nurturing.

And what of military research paradigms? Working on large complex weapons systems requires assumptions quite alien to environmental thinking. For example: my work is a small and circumscribed piece of an enormous system that I do not need to understand; people are sources of unreliability, and their effect should be minimised; uncertainty cannot be tolerated; and so on. And what of research criteria? Green criteria are different from those of the military and often from those of mainstream science also.

The military-scientific complex is not about to wither on the vine. Its roots are firmly in the Baconian revolution, and its growth is rank, its branches tough and thorny. We need to beat swords into pruning hooks, and smartly.

Mary Cawte tutors in technology and the environment at the University of New South Wales.

Bias and credibility in environmental impact assessment

*Can we expect environmental impact statements to be objective? If not, can their assumptions and value judgements be made more transparent? Can their biases be better aligned with the community interest? **Sharon Beder** attempts to answer these questions.*

ENVIRONMENTAL Impact Statements (EISs) have lost credibility with environmental and resident groups over recent years because they are being increasingly perceived as biased public relations documents. This arises in part because the community generally expects that an EIS should be an objective scientific report whilst many consultants and project proponents view an EIS as a supporting document prepared as part of the procedure for gaining approval for a project.

The goal of a completely objective document is illusory because science itself is socially constructed. This is exacerbated by the circumstances of EIS preparation where large investments, careers and the viability of businesses are at stake. It is therefore inevitable that the values and goals of those preparing an EIS will shape its contents and conclusions through the way scientific data is collected, analysed, interpreted and presented.

Why an EIS can't be objective

Because the EIS is done rather late in the planning process the project proponents will almost certainly have committed considerable financial resources to a particular option at a particular site. The EIS at this stage becomes another obstacle in a field of bureaucratic hurdles on the way to their end goal. Naturally, they will want that document to emphasise the advantages of the project to the community and to down play the disadvantages.

Occasionally there are gross abuses of the EIS system by project proponents who leave out vital information or falsify results. For example, the Water Board omitted the findings of two studies of fish from its EISs for the Sydney deepwater outfalls. The studies were undertaken by the Fisheries Research Institute in the vicinity of the ocean outfall sites. In one study, seven out of eight blue groper sampled near the North Head outfall were above the National Health & Medical Research Council (NH&MRC) maximum residue limits for mercury and one red morwong out of eight was also over. In the other study, red morwong and blue groper caught near the sewage outfalls were found to be accumulating dieldrin and DDT and of the 58 red morwong sampled, ten exceeded NH&MRC limits for dieldrin and five exceeded those limits for DDT. Several more were just under these limits for dieldrin and DDT. The omission of these studies enabled the Board to claim that toxic waste coming through the outfalls would not be a problem when they were extended into deeper water.

Such blatant omissions, although sometimes difficult to detect, are probably rare nowadays. More often biases are subtle and arise from the many value judgements that are made at every stage of the preparation of an EIS.

Problem definition

An EIS requires that the proposed project be justified and alternatives considered. Both justification and the framing of alternatives will be shaped by the way the problem is defined that the project is supposed to be solving. For example, in the Sydney Harbour Tunnel EIS, the problem was said to be traffic congestion. Traffic built up and slowed down on the approaches to the Sydney Harbour Bridge, causing delays to people trying to cross the Harbour by motor vehicle. A second crossing was therefore justified, and alternatives framed, in terms of providing better road access across the Harbour.

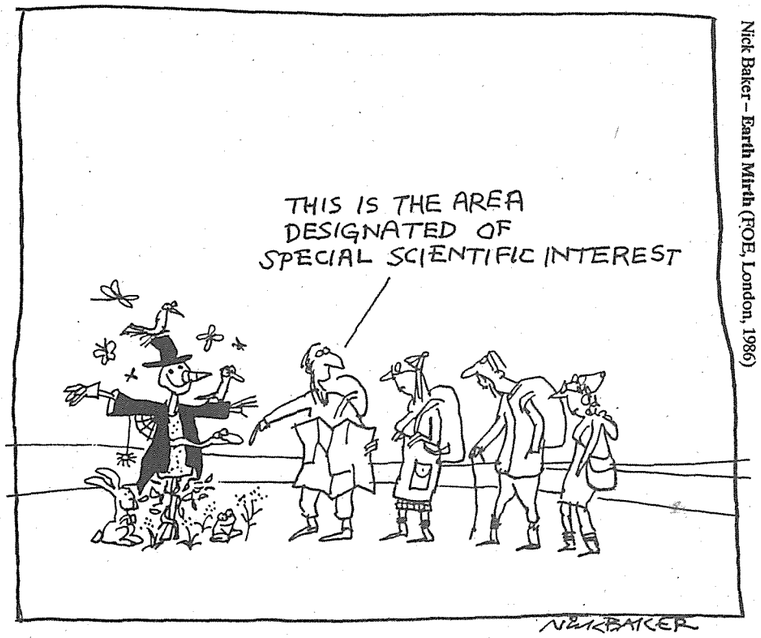
Opponents to the Tunnel did not perceive congestion to be a problem at all. Ted Mack, then Mayor of North Sydney, argued that congestion shaped a city by encouraging the movement of people and businesses to other parts of the metropolitan area so that new centres of activity were established. Ross Blunden, emeritus professor of traffic engineering, argued that congestion encouraged people to change their journey times or take public transport. Both concluded that a second crossing, far from removing congestion, would merely attract more car traffic and that congestion on both crossings would be the eventual outcome.

Impacts covered in EIS

The scope of what is to be covered in the EIS is also a matter of judgement and the way it is decided varies from state to state. In NSW, the proponent decides on the scope of the EIS after receiving some direction from the Director of the Department of Planning. In Victoria, it is decided in consultation with the public. A narrow scope can make a project appear more desirable. Using the previous example of the Sydney Harbour Tunnel, one can see that, whilst the proponents could argue that pollution would be reduced in the immediate vicinity of the Harbour because of smoother flowing traffic, a broader scope would have ensured that the wider impacts of increased car usage were also taken into account.

Data collection and analysis

The design of an EIS study requires judgements of what types of impacts will be significant and the collection of data requires decisions about the time period and area over which samples are collected, the species to be studied and the quantities of individual specimens to be collected, and more generally the scale of study. Such decisions are not made only on the basis of what might be considered by a scientist to be appropriate, but are also affected by considerations of cost, time availability, previous studies and perhaps even likely outcome.



Nick Baker – Earth Mirth (FOE, London, 1986)

Similarly, methods of analysing data can vary in the sorts of results they produce and data they require and those preparing an EIS will choose the methods using many criteria, apart from the 'purely scientific'. Even where the method of analysis is uncontroversial, assumptions and judgements will need to be fed into the analysis. For example, a cost-benefit analysis for a road project will require estimates of the value of time saved and may require estimates of the value of bushland or open space lost to the community. Most EISs require some form of forecasting of population numbers or other human activities and this requires assumptions such as where people are likely to live and work and what their habits will be in the future.

Data interpretation

Data collected and the results of analyses can be interpreted in a number of ways. Naturally an EIS is likely to present the most favourable interpretation that is available. Again, Sydney Water Board EISs provide blatant examples. The results of a 1973 fish contamination study were reported in its EISs for the deepwater ocean outfalls. The study showed that heavy metals exceeded maximum residue limits in ten out of eighteen organisms (including fish and mussels) taken near the outfalls. At the time the study was done an internal memo states that the Board and its consultants were concerned about the results:

> It was agreed that, while the data only represented analyses of individual specimens, levels of heavy metals and pesticides detected in this small number of samples were such as to suggest that a potential public health threat or environmental hazard might exist within the study area...

Yet when the EIS for the Bondi outfall was published in 1979, the Water Board

actually stated that:

> Whilst the statistical significance of the 1973 survey is not able to be clearly established the results are encouraging in that they indicate that no serious environmental problem existed even prior to the full implementation of source control of restricted substances...

Presentation

Even though real world engineering is fraught with uncertainties an EIS can be carefully worded to avoid any impression that anything is uncertain. For example, a draft environmental impact statement prepared by Byron Shire Council at the end of 1987 was given to me the week before publication. It contained the sentences;

> There should be little, if any, impact from the development, upon the S.E.P.P. 14 wetland within the site...
>
> A less than satisfactory result in the performance of the works and associated artificial wetlands would result in a forced abandonment of the wetlands disposal option and cause Council to again pursue the ocean outfall option with its inherent high cost and public opposition.

These sentences were omitted from the final published version of the EIS and the following inserted in their place:

> Monitoring results indicate no effect on the adjoining wetland areas...
>
> A close monitoring programme will enable Council to assess the performance of the proposed ponds and to determine the need for additional wetland areas.

Moderating bias and removing conflicts of interest

It is often argued by supporters of the system that the Environmental Impact Assessment process has built in checks against bias and distortion because the EIS is subject to public scrutiny when it is displayed and then it is assessed by government authorities. Those preparing the EIS, generally professional consultants, are aware of this and few would risk their reputations by preparing a shonky EIS. However, as I have been arguing, the bias in EISs is generally not of the type that can be pointed to as being incorrect or a lie or an omission. More generally, the consultants have merely made their choices and judgements at the more favourable end of a range that is scientifically credible.

Nevertheless there are ways in which the social shaping of an EIS can be made more transparent to the reader. Rather than attempting to appear objective an EIS should incorporate discussion of assumptions, choice of methods and different interpretations that can be made of the studies. The unedited reports of sub-consultants' and raw data should also be made publicly available. The final EIS could be subject to peer review.

It has been suggested that peer review be anonymous because of the retribution that can be meted out to those criticising an EIS prepared for a powerful organisation or business interest. However, anonymity can also provide a cover for abuse since the reviewer cannot be held accountable for their comments. It is for these reasons that whistle blowers and those who speak publicly against the work of their peers in the public interest should be encouraged and protected. Employees and sub-consultants should also feel free to speak out when they feel their work has been misrepresented or wrongly interpreted in the EIS.

The major factors preventing a more transparent and accessible EIS and an atmosphere conducive to free discussion of likely impacts arise from the way the Environmental Impact Assessment process is itself structured. Those who prepare the EIS, or hire the consultants to do so, usually have much at stake, financially or politically. The consultants themselves can also have much to lose. Consultants are dependent on the judgement of clients and that judgement is based on whether they are perceived to be able to deliver what is required by the client. Consultants with overdeveloped consciences, who do not put the client's priorities first, are less likely to be given work in future. Professional integrity and codes of ethics don't always withstand such pressures.

Consultants could be more independent if they were not directly hired by project proponents. An independent panel with community representation could choose the consultants from tenders. Proponents would still pay the consultants. In this way a firm which compiled an EIS that led to the abandonment of a project would not be penalised for doing so by being denied EIS work in the future. Of course such a panel would have also to be independent from government because of the prevalence of government projects that would have to be assessed.

Biases would still remain since judgements would still be required but there would be a better chance that those biases would be aligned with the community interests rather than the project proponent's interests. Also there is more likelihood that consultants under such a system would be willing to make EISs more transparent to the public and to discuss uncertainties and unknowns. Nevertheless I have found both developers and EIS consultants opposed to such a scheme because it suits them and the cosy relationship they have with each other.

***Sharon Beder** is a lecturer in the Department of Science and Technology Studies at the University of Wollongong and author of the book **Toxic Fish and Sewer Surfing**.*

A Guided Learning Course on *EISs: Issues for Users* by Sharon Beder is available from Engineering Education Australia (02-955 8200). It contains six hours of video material and several written booklets, and uses the Sydney Harbour Tunnel as a case study.

Scientists and the environmental movement

*Science and scientists can help the environment movement, but there are also dangers in relying on them. **Stuart White** examines the roles of scientists and scientific arguments.*

PERHAPS MORE THAN any other social change movement, the broadly-based and relatively recent struggle for the environment has relied upon and attracted scientists. Household names associated with the ecological warning bells, such as Rachel Carson and James Lovelock, are those of scientists, and scientific arguments have been used in almost every environmental debate.

This has provided an incredible strength and urgency to these debates. Science and the scientific method have become so embedded in our culture that other disciplines even attempt to emulate them, without regard for their shortcomings. By way of example, we have the spectacle of modern economic rationalism, jettisoning important variables such as human values, creativity and the sustainability of ecological systems all in the name of an adherence to scientific principles.

It is by now well documented that there are severe shortcomings with humankind's recent (the last few hundred years) obsession with a form of science that assumes that:

- the whole can be understood by analysing the parts in isolation;
- the observer is isolated from the observed;
- values and intuitively derived knowledge do not constitute scientific proof;
- cause and effect can be determined absolutely given sufficient data;
- anything is predictable given sufficient information.

The problems

The environment movement has tended to use scientific arguments on these same terms. Indeed it is very difficult to do otherwise, given the pervasive nature of the assumptions. The dominance of scientists and this mode of science, however, can limit the environment movement in the following ways:

- It focusses on the problem rather than on possible solutions. The scientific work on greenhouse warming or nuclear winter, for instance, is conducted by very specialised scientists, whose contributions to the debate need to be balanced by a consideration of the broader picture, which involves the socio-political aspects of energy use and a raft of other issues.
- Scientific arguments are vulnerable to counter-arguments. An over-emphasis on a single scientific argument in an environmental campaign can cause the whole campaign to come unstuck if new scientific studies indicate contrary results. For example, relying on arguments regarding reactor safety as a strategy against nuclear power risks a setback if new, allegedly safer designs are developed, whereas a strategy that focusses on all aspects of nuclear power, including the economic, social and moral arguments against it, would have greater strength.
- It can obscure the strength of an appeal to the public sense of what is right or wrong based on sound intuitive reasoning. Amory Lovins, physicist and energy policy analyst, once said (in relation to nuclear power) that 'you don't have to be a

carpenter to see that a table wobbles'. Similarly, when confronted with the argument that the mathematical modelling and the value of the Froude number (a number used in calculations of the behaviour of layers of water of different temperature) show that sewage from the Sydney outfalls will stay trapped beneath the surface, sewage campaigner Richard Gosden said, 'well we may not know much about Froude numbers, but we do know about crowd numbers'. He went on to help organise a 250,000 strong protest rally and concert on ocean pollution.

- An inevitable focus on the quantifiable can often be at the expense of the important, if it can't be measured. This reinforces other prevailing ideologies such as current economic thinking, which places no value on the unfortunately named 'externalities'. For example, when looking at the impact of increased traffic flows, it is easier to measure and therefore consider the air pollution, but the social impact of loss of exchange opportunities in the community may be far more significant, but left unmeasured (see David Engwicht, *Towards an Eco-City: Calming the Traffic*, Envirobook, Sydney, 1992).
- Science is unfortunately still a male dominated arena and so an exclusive emphasis on scientific arguments and reliance on scientists in an environmental debate often becomes a contest between men and masculine values, reinforcing the imbalance that exists in other parts of our society.

Four roles

Bill Moyer, a US-based activist and journalist, has proposed a useful model of the roles that people adopt within social movements. He defines four roles, those of citizen, rebel, reformer and change agent. He suggests that all four are important components and each is crucial at particular stages of a social movement. I believe this model equally well describes the role of scientists and scientific arguments in environmental debates.

The citizen role is an important one. In social movements it is not always possible for everyone to be publicly associated with a campaign in its early stages, even if they support it. Family, cultural and economic reasons can make direct involvement difficult. However, social change requires that there be people arguing a case over the back fence with their neighbour, or in the case of scientists, in tea-rooms and laboratories. The disarmament movement owes a debt to the founding publishers of the *Bulletin of the Atomic Scientists*, whose readership included vast numbers of 'scientists as citizens' influencing the debate on the armaments issue which still extends tentacles into the majority of scientific and technical workplaces in the US.

The role of 'scientist as rebel' is to find the holes in the scientific arguments put forward by the power plant and outfall builders, the old-growth forest clearfellers (fellas?) and genetic manipulators. Block and counter-block is the strategy – particularly early in the debate – to keep up the momentum and to ensure accountability and maximise public awareness of an issue. With all such debates, the scientific data are generally far less significant than the assumptions on which the interpretation of the information is based. In other words, the real issues are often the values, the vision of the future, in many cases the assumptions about human needs, human nature and their place in the scheme of things.

A survey in the early eighties quizzed proponents and opponents of nuclear power for agreement on the basic scientific data regarding reactor safety, waste disposal and other issues on which scientific arguments were being applied. The authors found that, once it was fully explored, both sides demonstrated major agreement on most of the 'facts' of the matter, indicating that the real differences lay in the values and interpretation of the data.

The 'scientist as reformer' is generally not a role that many would like to own, with its implications of co-option and compromise. Moyer certainly flags this negative aspect as a danger of this role. At certain stages of a campaign, I believe there is a place for this role to help consolidate gains made and implement aspects of a future vision and solutions. At critical times in a campaign, governments often lose control of the agenda through political forces. Scientists in government or university bureaucracies can come forward with previously marginalised ideas and be accepted with a credibility that the 'scientists as rebels' have not enjoyed. One of the enduring ironies that I have noted is the number of times that those in social movements have to 'let go' of the ownership of ideas in order for them to be taken up by governments, companies or their head of department!

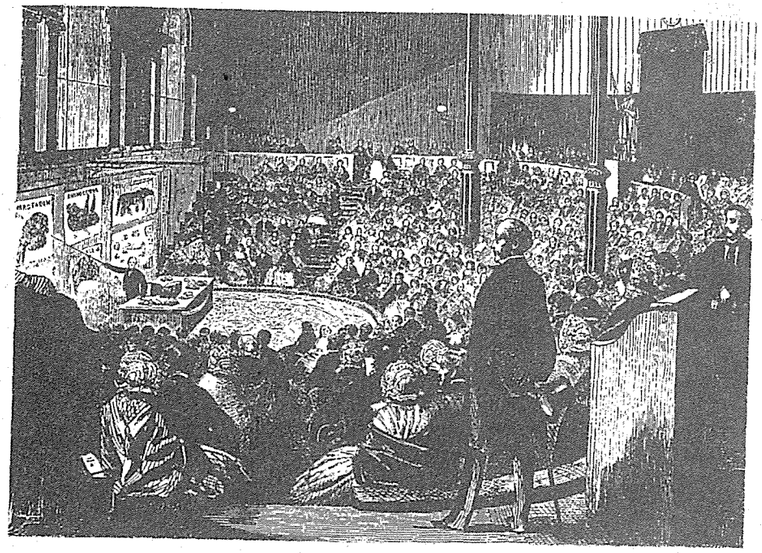
Moyer describes the role of 'change agent' with some fondness.

> Protest is not enough. Movements must also say 'yes' by educating the public about existing conditions and policies, promoting alternatives and involving the whole society in the long process of social change.

Of course the role of 'scientist as change agent' is no different, and in fact this role necessitates an approach to the world that challenges the straitjacket that scientific demarcation imposes.

An effective 'change agent' poses, in a public way, the 'strategic questions' that can generate new answers. Strategic questioning is a tool for social change work promoted by activist and comedian Fran Peavey, author of *Heart Politics*. Strategic questioning assumes that appropriate answers to problems can be found by people or communities in dialogue, and involves the asking of increasingly powerful questions to which the asker may not yet have the answer. New questions allow the possibility for new answers to arise. Strangely enough, this can be very difficult for those with a scientific training, particularly when the questions require leaps out of the specialist field, or questioning the very role of that area of expertise in the debate. These questions are of the type, 'why isn't the Emperor wearing any clothes?'

Some ways forward



I don't believe it's all bleak for scientists in the environment movement. Clearly we have an invaluable role to play, helping to counter the inappropriate uses of scientific arguments, asking strategic questions, demystifying the science for others.

More generally, science itself, the way it is taught and practised, will need to change. A greater emphasis on interdisciplinary studies is needed, which unfortunately means making up for lost ground in a number of Australian university campuses where good interdisciplinary environmental science has been under siege (e.g. Monash University and the University of Tasmania). New disciplines and fields of study can themselves help the process, such as general systems theory and chaos theory.

There is great potential for the integration of science within the community. A more community-based science would be responsive to the direct needs and understanding of people. Science would then be 'on tap but not on top' in the community, as it is in the case of the science shops in The Netherlands, where community groups, unions and citizens can engage the services of partly voluntary scientists and other professionals. A science shop was set up in Canberra by the Women in Science Enquiry Network (WISENET). It operated successfully for a time but eventually closed due to lack of money. The science shop is an excellent idea and unfortunately in Australia perhaps a bit ahead of its time. A similar project, the Skills Bank of the Society for Social Responsibility in Engineering (SSRE), also ran successfully for a time and then spawned Jacana Consulting which is based in Sydney and includes environmental groups and unions amongst its clients.

The role of scientists in demystifying the jargon and re-presenting scientific issues to other members of the public is paramount. Scientific or techno-speak can be, and is often intended to be, disabling for many and, like econo-speak, is part of the structure that disempowers whole communities. The Harvard sociologist of science Everett Mendelsohn once said that no-one should be awarded a higher academic degree unless they can take the archetypal 'person off the bus' and given sufficient time, have them understand the central principles of their thesis. Now that would be interesting!

Thomas R. Blackburn was Associate Professor of Chemistry at a New York college when he wrote:

> much of the criticism directed at the current scientific model of nature is quite valid. If society is to begin to enjoy the promise of the scientific revolution or even to survive in a tolerable form, science must change. In its own terms, the logical-experimental structure of science that has evolved since Galileo's lifetime is magnificent. It has, in Lewis and Randall's phrase, its cathedrals. To demolish these, to reject what has been achieved, would be barbaric and pointless, since the very amorality of science makes it not wrong, but incomplete. The claims of science as such (as opposed to say 'defense' research), as well as the claims of its critics, while contradictory, are not incompatible.

So Blackburn issues the challenge both to science and to the critique of science. If the global ecological and social fabric is to survive at all, then there is a need to develop a new way of 'doing' science and ways of integrating values into our science and integrating our science into the community.

References

- Thomas R. Blackburn, 'Sensuous-Intellectual Complementarity in Science', *Science*, 172, pp 1003-1007, 1971.
- Bill Moyer *The Practical Strategist*, Social Movement Empowerment Project, 721 Shrader Street, San Francisco, CA 94117, ph. (415) 387 3361, 1990.
- Fran Peavey *Heart Politics*, New Society Publishers, Philadelphia, 1986.

Stuart White is an electrician, physicist and aspiring change agent who lives in northern NSW. As an anti-nuclear activist he studied nuclear physics, then completed his Ph.D. in solar energy research. He demystifies science on regional ABC radio each fortnight and works on 'grey' (rather than 'green') environmental issues.

User(p) friendly science?

Working from 'within' is the preferred option for most scientists and provides them with some satisfaction with their contribution to environmental debates without risking their careers or impinging on their personal lives. ***Isla MacGregor*** *relates her view of some experiences working on the 'outside' with United Scientists for Environmental Responsibility and Protection (USERP) scientists.*

IN JUNE 1988, Tasmanian and federal governments ignored the recommendations made by scientists on the future of Tasmanian forests (Helsham Inquiry). The results of the Helsham Inquiry and recognition of some members' experiences of intellectual suppression were the two driving forces behind the inauguration of USERP. Additionally, the proposed Wesley Vale pulp mill in northwest Tasmania loomed as a major threat to unprotected areas of Tasmania's National Estate. Other Australian states had pulp mill proposals waiting. Tasmania would be the test ground for scientific scrutiny of the first Environmental Impact Statement (EIS) for a new Kraft pulp mill.

The Latin word *usurpare* means 'seize for use'. When USERP was first set up the name inspired much debate. Many thought it was too radical, a name that did not sit well with the self-image of many scientists. Before agreeing to become a patron of USERP, Dr David Suzuki posed some questions:

> It is far too late for band aid solutions to our global problems. Is your group radical enough to accept negative growth? Is it based on an ecological perspective? You see, if conflict resolution is just a matter of satisfying economics and job demands and minimising environmental hazards, it's not good enough.

USERP's founding members thought that it was 'not good enough' for scientists to remain silent or be silenced amidst the world's deepening environmental crisis.

Some members of USERP had worked in the mainstream conservation movement but were critical of its strategies and image and of the constraints of the group processes of grassroots organisations. Most members came into USERP with no hands-on experience in voluntary organisations although some were members of Scientists Against Nuclear Arms (SANA). SANA had shown that scientists can play a significant role in public education and debate on the scientific, ethical and political implications of the nuclear arms issue. USERP would provide another approach to the public and policy makers for the environmental debate. USERP knew of other scientists' organisations internationally and of the Society for Social Responsibility in Science in Canberra but had little knowledge of their experiences.

USERP was set up in a non-hierarchical style; it did not want to imitate 'leader-led' conservation groups. Working groups were set up to work on specific issues and a consultative committee established with the primary role of approving any public comment. Unlike SANA, whose membership is restricted to scientists and technologists, USERP did not wish to support the concept of a group restricted in membership to a professional élite. Furthermore, if scientists want to democratise science then they would need to involve the community directly. Only in providing an open membership can USERP satisfy these principles. (The open membership is still a contentious issue for some members and for potential members.)

Other branches of USERP quickly sprang up in Victoria and South Australia. Canberra, Sydney and Brisbane soon followed.

USERP Tasmania and Victoria launched an intensive campaign criticising the Wesley Vale EIS. Wesley Vale was yet another case of a state government attempting to fast track a major resource consuming/polluting development. USERP Tasmania held many press conferences and lobbied dozens of politicians and its members worked very long hours outside of their normal jobs. For several months, USERP Tasmania scientists exposed themselves to political, peer group and public scrutiny over their outspoken position on Wesley Vale. For some, this was their first venture into 'politics'.

There was little time for discussion on important issues that related to the campaign, such as negative growth and the terms of reference of the EIS, particularly in relation to sustainable resources. Neither was there open discussion on the attempts at intimidation and suppression which some scientists experienced. Several resident action and conservation groups campaigned vigorously against Wesley Vale and it was interesting to observe the competition between organisations to have internationally reputable scientists speak on their behalf. USERP's work on Wesley Vale was, essentially, a catalyst in Tasmania for debate on the implications of scientists' involvement in environmental debates.

The outcome of the Wesley Vale debate was the establishment of a CSIRO Pulp Mill Guidelines Committee. When the report from this committee was made public, USERP made no public comment. Individually, the reasons varied from 'the marine science in the new Guideline is good', 'lack of comfort with other affiliations' and 'lack of time'. Some believed that there was no sinister aspect to this lack of response from USERP scientists, while others thought, to put it simply, that self-censorship had prevailed.

There are similarities here with the experiences of the Society for Social Responsibility in Science (ACT). In a letter to USERP shortly after it was set up, Mark Diesendorf said:

> many members of the former SSRS Committee wanted only to represent "the facts" (e.g. the basic chemistry and physics of environmental pollution; the biology of hydatid cysts), without coming to

grips with the social, political, economic and ethical aspects of the issue, which were often more important than the "pure science". This meant that, on many issues, SSRS failed to come to grips with the whole problem and so wasted much of its efforts.

For some members of the public, USERP's silence was seen as tacit agreement with the new guidelines and maybe more importantly, agreement to any similar, large scale pulp mill development. For Tasmanian USERP members who worked on Wesley Vale, the aftermath of the debate would be a deciding factor in their future activism. Most joined mainstream government committees but are no longer active within any conservation organisations. Those who remained working in USERP continued to maintain the organisational infrastructure or maintained support for the group.

After the flurry of activity with Wesley Vale and the initial administrative tasks associated with the organisation's national development, USERP Tasmania worked on smaller issues. USERP applied for and received $2,000 funding from the Grants to Voluntary Conservation Organisations (GVCO) program through the Department of Arts, Sports, Environment, Tourism and Territories (DASETT). Up until this time the administrative work for USERP Tasmania was mainly done by women – students or non-scientists. In fact, without these people it is doubtful whether USERP could have run any campaigns at all. Only one male professional scientist had worked briefly on administrative tasks.

The first grant was used initially to employ an administrative co-ordinator for four hours per week. As with all voluntary organisations, once paid employees are taken on, other volunteers tended to decrease their input.

The Toxics Working Group began its marathon campaign (currently still going) on the controversial and serious chemical contamination from the Exeter Tip in the north of Tasmania. Like other USERP branches, Tasmania made submissions to enquiries and was invited by state government departments to make comment on management plans and attend seminars. On one occasion, it was suggested by a state government politician that a USERP member be invited to participate on a scientific advisory council. A Liberal politician castigated the proposed USERP scientist as being a 'green' and therefore 'politically biased' even though he agreed that he was 'a good scientist'!

On 29 June 1991, USERP Tasmania published a signed petition against resource security legislation in the Hobart *Mercury*. Some of the 116 scientists who signed the petition were state public servants and were later censured for their actions. National President of the Australian Civil Liberties Council, June Factor, put out a national media release opposing suppression of scientists and the lack of public debate over the proposed legislation.

A Liberal politician castigated the proposed USERP scientist as being a 'green' and therefore 'politically biased' even though he agreed that he was 'a good scientist'!

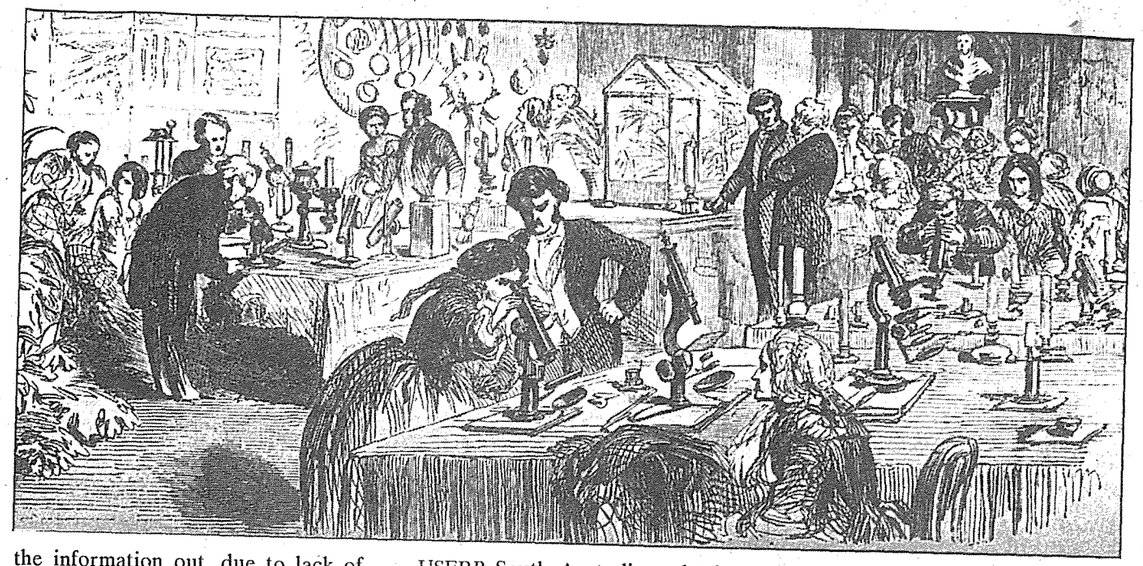
In August 1991, after a special USERP Tasmania meeting on intellectual suppression, which attracted the largest number of participants since the inaugural meeting, the Intellectual Suppression Working Group (ISWG) was set up. The ISWG joined a national network of individuals working on the issues of scientific censorship and intellectual suppression. Although the ISWG has focused on amendment of state service acts nationally, to allow freedom of speech, this will not solve the problem of intellectual suppression and its repercussions in environmental debates.

Suppression is basically about government *corruption* in environmental management. Nevertheless, USERP can provide a forum for discussion, personal support and encouragement to resist suppression. The ISWG plans to produce a pamphlet on intellectual suppression as well as an audio-visual education kit for national distribution.

The issue has encouraged a great deal of debate. Comments have included, 'I don't think it's an issue for USERP to be working on', 'It doesn't happen to me ... although I can see it does affect others', 'I can find ways of working round it', 'If someone did come to USERP for support on intellectual suppression, exactly *what* could USERP do?', 'If intellectual suppression did not exist there would be no need for USERP at all!' and finally 'intellectual suppression touches the core of the moral/ethical dilemmas facing many natural scientists today!'

Organisationally, USERP's key problems have been lack of active participation and funding. Mainstream conservation organisations can draw on the resources of the 'grassroots' and also receive reasonable grants through DASETT's GVCO program. USERP is only just developing its grassroots and it is hoped that as a result of the review of the GVCO program, USERP will receive funding commensurate with its fledgling needs. Mainstream conservation organisations are heavily dependent on paid employees to maintain media profile, long term campaign strategies, membership and public support. Interestingly, there has been a major increase in the number of scientists employed by major international and national conservation organisations but these groups cannot stretch themselves to deal with the politics of science in environmental debates, let alone develop policy on *science*.

On several occasions resident action and conservation groups have contacted USERP requesting support for campaigns. Due to lack of members prepared to speak out, USERP has been unable to assist these groups. On a few occasions USERP has received leaked information but has been unable to put



the information out, due to lack of spokespeople. In some cases, other conservation groups or politicians will take the issue to the media but in other cases, nothing happens.

Ironically, at times USERP itself is silenced because of the need to protect sources and individuals' jobs and in some cases their continued ability to work from 'within'. In 1992, when USERP went public about supporting whistleblowers, one distraught member cancelled membership saying that if government officials found out, then the member's employment could be threatened.

USERP would like to be able to employ a national liaison/administration officer (to be based in Canberra) to lobby as well as develop organisational infrastructure and policy. USERP branches in Canberra and Sydney folded shortly after they were established. Individuals' reasons varied from 'I'm working from within', 'working with other conservation organisations', 'too much work involved in establishing a branch and no funding to assist with such', 'USERP is an élite organisation', 'USERP doesn't have sufficient *really* concerned scientists', 'lack of leadership' and 'too far to travel across town'. In these states, there are still scientists acting as contacts for USERP, in the event that enthusiasm is revitalised.

USERP South Australia and Victoria still have a solid core of individuals participating in energy and agriculture working groups. USERP SA has made submissions to the House of Representatives Standing Committee on Science and Technology's report on release of genetically modified organisms and the EIS on the Multi-Function Polis. Additionally, it holds public forums and has regular guest speakers.

On 16-17 November 1991, USERP Victoria and the Monash University Geography Department jointly hosted the *Victorian Rainforest Symposium – Definition and Management*. A new definition for Victorian rainforests was presented by David Cameron, a scientist working for the Victorian Department of Conservation and Environment. For over a year this department prevented public distribution of his paper. The symposium was an outstanding success and USERP Victoria continues to lobby on the issues of rainforest conservation in Victoria. USERP Victoria has also campaigned for the establishment of an independent science council. USERP Brisbane is starting to document case studies of censorship and suppression and will host the 5 July 1993 'Social Responsibility in Science' symposium at the Ecopolitics VII conference.

Although USERP Tasmania only has a small core of active individuals, there is enormous support from the community and some conservation organisations. In retrospect, considering the impediments facing scientists to be active in USERP, the organisation has achieved and is recognised for its successes. For those people who continue to work with the USERP network, learning about and challenging the power structures of science will provide a very constructive contribution to the environment movement. Considering continued trends in the privatisation of science, cuts in science funding and an increase in contract employment, it can only be hoped that scientists will be motivated with a greater sense of inter-institutional solidarity combined with environmental responsibility.

Isla MacGregor is a science activist who has worked with USERP in Tasmania since 1988 and is Convenor of USERP's Intellectual Suppression Working Group. She can be contacted at 6 Akora Street, Mornington Tasmania 7018, phone (002) 446892.

Is the 'new paradigm' of physics inherently ecological?

"A new age is coming, right? The old days were the days of mechanistic Newtonian physics, rigid social frameworks and brutal attacks on an alien environment. But that's been superseded by quantum theory with its indeterminacy, where everything interacts with everything else in the universe. The coming perspective is a holistic world view: interaction, wholes, none of that old, hateful possessive individualism. The new world view is inherently ecological. After all, ecologists tell us, nature is interdependent. Humans should fit in with nature, not dominate it. Nature really is holistic, and that means society should develop in that direction too."

Many environmentalists think they are part of an emerging new age, encompassing everything from the 'new physics' of quantum theory to a holistic ecological consciousness. But does it all really fit together so nicely? Ex-physicist and sceptic ***Brian Martin*** *punctures a few balloons.*

OVER THE YEARS, I've heard quite a few people say things like this. I usually listen politely. I agree with many of their ideas about society. But I can't agree that these ideas are justified by some new 'holistic' paradigm of subatomic particles and ecology.

Ideas about links between physics, nature and society have been popularised by some talented writers. Fritjof Capra captured the imagination with his book *The Tao of Physics*, which argued that there is a strong link between conceptions of nature found in quantum theory and strands of eastern mysticism, specifically Hinduism, Buddhism and Taoism. Capra suggested that scientists are finding out that nature really works the way that mystics have long realised: it is interactive, indeterminate and doesn't distinguish between subject and object. A similar picture of the 'new physics' and mysticism is painted by Gary Zukav in *The Dancing Wu Li Masters*.

Sociologist Sal Restivo decided to examine these claims. He found that the alleged link between physics and mysticism can't be sustained. Capra picked out certain features of physics and certain features of Eastern traditions and found similarities. But, Restivo argues, if you picked out different features of quantum theory or different features of mysticism, or both, quite the opposite conclusions could be reached.

In fact, by picking examples appropriately, you could find similarities between mysticism and old-style, billiard-ball, Newtonian physics.

Whose arguments should you believe, Capra's or Restivo's? Ideally, people should make up their own minds after carefully studying both sets of arguments. But very few do this. Capra's work is widely known but Restivo's is virtually unknown. Why? One reason is that Restivo only published his ideas in a densely written academic tome entitled *The Social Relations of Physics, Mysticism and Mathematics*.

But there is another reason. Many people want to believe what Capra has to say. They want to believe that nature is on *their* side. Many environmentalists want to believe that nature – nuclear processes as well as forests and oceans – really is interactive, holistic, non-hierarchical and mysterious. If nature is this way, then society should be too.

But how do we know what nature is 'really' like? There's a problem here. Scientists have no guaranteed method to determine the reality of nature or, for that matter, the nature of reality. They can only develop pictures and models to describe it. And the models they use are drawn partly from current ideas about society.

In developing his theory of evolution, Charles Darwin was influenced by ideas about society presented earlier by Thomas Malthus, who described society as competitive. Although Darwin recognised a role for cooperation, he made competition – a struggle in which the fittest survive – a central metaphor in his picture of nature.

After Darwin came the social Darwinists. They emphasised only the competitive aspects of the theory of evolution. They said that because nature *is* competitive, therefore society should be and those who can't compete successfully deserve no support. Social Darwinism was quite a convenient justification for ruthless capitalist exploitation.

Peter Kropotkin, the famous anarchist from the last century, believed in cooperation rather than competition. He looked at nature and found lots of cooperation. He then used what he found to justify his belief in cooperation between humans. Murray Bookchin, one of today's leading anarchists, has used the same sort of approach in *The Ecology of Freedom*.

Different people can draw different conclusions from nature. The trouble is that 'nature' doesn't speak with its own voice. It must be interpreted, and there is plenty of scope for different interpretations. And not all interpretations are ones you might like. The Nazis, remember, made a big thing of links with nature.

So here's the process. At any given time, there are ideas about how society is and should be organised: competitive, cooperative or whatever. When scientists describe nature, they draw on some of these ideas. Then some people say that because nature is competitive, cooperative or whatever, society should be too. It's all rather circular!

My view is that if we want an egalitarian society, we should argue for it and try to create it and not worry about whether nature is competitive, cooperative or something in between. Ideas about new paradigms in physics really have little connection with the organisation of society.

Capra's later book *The Turning Point* tells of the transformation of society towards a new ecological paradigm. It sounds attractive but, on closer inspection, Capra's analysis of society turns out to be confused and unhelpful. He has no coherent strategy for challenging and replacing the old systems of power. (Interested readers should consult Stephan Elkins, 'The politics of mystical ecology', *Telos*, Winter 1989-90.)

If you want to read Capra, do so by all means. My point here is simple. The idea of a 'new ecological paradigm' of physics or society is only one way of looking at things and, furthermore, it may not be a very helpful perspective when it comes to the tough slog of creating a better society. Claims about a new paradigm should be taken with a dose of scepticism.

And remember, a new paradigm isn't always a good thing.

Postscript

Back in the 1970s I was impressed by Carlos Castaneda's fascinating book *The Teachings of Don Juan*, which describes the author's encounters with a Yaqui sorcerer and a completely different way of understanding and interacting with the world. Castaneda expanded on his experiences in later books, describing a different paradigm for comprehending nature.

Years later, I came across the critiques by Richard de Mille. According to de Mille, Castaneda almost certainly never had the experiences he tells about in his books. In other words, the stories are fraudulent or, if you prefer, fictional. The 'separate reality' described by Castaneda was a hoax.

Now, you may choose to believe Castaneda or to believe de Mille. That's your choice. The point is that most readers of Castaneda have never heard of de Mille's criticisms. My guess is that lots of people *want* to believe in Castaneda's stories. Scepticism seldom makes for a best-seller.

Looking for inspiration from modern physics or from mystical traditions can be a deceptive process. What is found in these quests may simply be an exotic version, a distorted reflection, of our familiar, banal, everyday experiences. Rather than looking for an alternative somewhere else, eventually we will just have to deal with our own lives and society.

Brian Martin is in the Department of Science and Technology Studies at the University of Wollongong.

Aboriginal science for the ecologically sustainable future

*In the search for scientific and technological solutions to the global ecological crisis, few scientists have questioned the fundamental assumptions which underlie the Western scientific system, a system, it could be argued, which actually produced the crisis. **Michael J. Christie** examines some myths underlying both Western and Aboriginal modes of knowledge production, and discusses how the socially negotiated metaphor within Western science is consistently denied, leaving a dangerous pretension to absolute truth.*

RECENTLY WE HAVE heard much in the media about a relatively new concept in the Western world – the ecologically sustainable future. When we look at the state of our planet and the failure or reluctance of Western science and technology to devote itself whole-heartedly towards achieving the goal of sustainability, we are led to begin a search for new paradigms in science and new ways of negotiating the scientific agenda.

Aboriginal science is a mode of knowledge production which has evolved to allow human beings to fit into, rather than outside of, the ecology. It is a science in which all human dimensions, the social, economic, religious and political, are integrated and interpreted within, and in terms of, the rest of the physical universe.

Many white Australians would agree that we need a science which allows us to discover and maintain ourselves as part of the ecology, rather than separate from it, but most would discount the potential of Aboriginal science to teach us how to do this, on the grounds that Aboriginal science has so clearly a mythological or religious basis to it. We are inclined to say that Western Science, for all its faults, is the science of the really real, and that to give up our demonstrable scientific reality in favour of a semi-religious system would be naive.

However, in their nature and structure, the Western and the Aboriginal scientific systems are, in fact, fundamentally alike. Both consist of complex webs of propositions and interpretations beaten out and finally agreed upon by groups of scientists. Both require some sort of faith, or acceptance of a particular picture of the world. Both are socially negotiated pictures of the universe which inform the ongoing life of the society. Each system bears with it certain strengths and limitations, which we need to understand fully, not the least because our Western system has been developed so that its limitations are very difficult to identify.

There are two fundamental characteristics which both the Western and Aboriginal ontologies share. (By ontologies, I refer to the picture of the world which a scientific system develops.)

Metaphor as framework

First, all ontologies are essentially metaphor. There is no sense in which a science or ontology can be said to be *equivalent* with reality. It must, in every respect, be a picture or a model of reality. In Aboriginal science the metaphorical basis of the ontology is actually celebrated, and its truths are expressed in ways rich in metaphor. For example, the popular Aboriginal identification of two different parts of the land relating to each other as mother and child ignores the obvious physical differences between land and people. Land can not give birth to more land, yet this metaphor assumes a different connection which contributes to a total picture of the cosmos. The mother-child metaphor (in Yolngu language this is affectionately known as Yothu-Yindi, the child next to the great one) interprets and formalises and integrates scientific knowledge from all different areas of Aboriginal reality. It can be used to describe the way waters and winds or totemic animals relate to each other. Similarly, different clan groups stand in yothu-yindi relationships to each other as they depend upon each other for ceremonials, marriage bestowal, procuring food, and many other ways.

This knowledge-building through metaphor is also true of the Western scientific ontology, although less readily admitted to. Developing a metaphor involves selecting a particular picture of reality and fitting our data into that picture. The Western scientific system, like the Aboriginal system, ignores some of the obvious differences between elements and focuses upon those aspects which are found to be congruent according to the chosen metaphor. An obvious example of this metaphor building in Western science is the process of quantification. When I say that there are 200 people in this room, I am making, in some ways, a rather bizarre metaphorical leap, by assuming that in one sense we are all identical, and therefore can be included meaningfully in a set of '200 people'. We are, in fact, all quite different, so different that it would be impossible for me to actually define what a *person* is, but my scientific system allows us to assume that in some sense we are all alike, and to that extent, counting people is a meaningful scientific process.

Aboriginal scientists refuse to make such a huge metaphorical leap. They know each person is an individual, from a certain family, from a certain part of the land, from a certain totem, related to each other in particular ways. It is their relatedness and their affiliations which are significant in the Aboriginal system, and to quantify people would force us to ignore those other metaphors which define our various modes

Each system develops certain dimensions of truth at the expense of others

of connectedness with the world and each other. A Yolngu gathering of 200 people say, at a funeral, would be seen by Yolngu scientists in terms of a variety of roles and dimensions specific to the context. They would see the close relatives of the deceased, people who are the managers for the totems of the deceased, people in the correct relationship to do the ceremonial singing or the painting, people whose land forms part of the dreaming track chosen to return the spirit to its home, and many others. Aboriginal science ignores, in this instance, the common humanity shared by the 200, and perceives and labels them according to different metaphors appropriate to the context. In the Aboriginal context, the fact that there are 200 people present is useless information. Western science, on the other hand, ignores the reality that all elements are given meaning by their context, and cultivates a metaphor in which they can be manipulated as abstractions without reference to context.

Thus in all scientific systems there is the building of knowledge on a framework of metaphor, and, at the same time, a sort of censorship is involved. Some things are revealed and others obscured, in a systematic way, by the operation of a metaphor. The Aboriginal knowledge makers discount quantification as unproductive because it necessitates examining things out of context. The Western scientists censor out the intuition, the ideas and traditions of uneducated people, and the folk wisdom of the past and confine themselves to empirical data. The metaphor building at the heart of Western science lies in its refusal to admit any but hard data, and it gives rise to a hard, mechanistic model of the world in which human appetites and weaknesses are out of the picture.

Negotiation of knowledge

If we cannot see the selection processes of metaphor-making and censorship at work, we may fall victim to the myth that Western science is *discovered* not negotiated, a myth perpetuated at all levels of Western science and science education. The apparent independent unfolding of Western scientific knowledge through *discovery* is an illusion; *our* knowledge is no less socially constructed than Aboriginal knowledge.

In Aboriginal knowledge making, the negotiation process is readily admitted to. Over the ages, from the social, emotional and intellectual environment in which the Aboriginal thinker was immersed, those insights which have best reflected the socially defined situation, and those which have best contributed to socially defined goals, have been selected, pooled together, discussed and refined and progressively contributed to the evolving ontology. Mythology records many of these insights. And the mythology indicates to Western viewers that Aboriginal science is demonstrably a social construction which reflects the social structures, economies, motivations and aspirations of Aboriginal

people. As the physical and social universe changes, Aboriginal scientists constantly re-negotiate their ontology.

A different form of negotiation is taking place in Western science. When Copernicus broke with the church's science, when the economists left the marketplace for the universities, and the botanists left the farm for the laboratory, they did so in order to pursue their investigations without the restrictions imposed by religious, social, economic or environmental fluctuations. They, as it were, negotiated to limit themselves to those data which can be counted unarguably, so in effect they would be unhampered by political or ecological contingencies. The particularised knowledge of the peasant, the shopkeeper and the priest was soon left out of negotiations, and, uncontaminated by the fuzzy effects of traditional wisdom, a very clean-cut, ever expanding, powerful and impressive science blossomed.

The aspect of this science which was negotiated in the laboratories and universities was its strictly positivist dimensions. One could say that it was agreed to construct a picture of the world in which only those things which could be counted exist, and where all those things which can't be counted, don't exist. All other angles were excluded from scientific reality, and all questions posed were expressed, analysed and responded to only in terms of those things which can be measured. So while the Western ontology is rich in some sorts of truths, this is at the expense of other truths which it has chosen to ignore.

The background of each science

It is impossible to say that one system is truer than the other. Each system develops certain dimensions of truth at the expense of others. And each system has evolved to suit the needs of the scientists in the community.

From the Aboriginal point of view, the Western ontology is hopelessly impoverished by its inadequacy to account for social, psychological, spiritual, economic and political realities of day to day life. Aboriginal science has developed in parallel with an economy which is based upon constant, ongoing, highly tuned responsiveness to the physical and social environment, a subtle and complex responsiveness which involves simultaneous reception and processing of large amounts of extremely varied and constantly fluctuating stimuli. To quantify things or examine them removed from their context in this culture is hardly adaptive.

For example, Western science has produced incredibly detailed knowledge of the reproductive behaviour of crocodiles along with wonderful technology for measuring time, but there is no way the Western scientists can predict, using their knowledge and technology, exactly when the crocodile eggs will be laid on the swamps. Aboriginal scientists, on the other hand, know little of the Western microscopic detail, but know that 'the moment in which crocodiles start to lay their eggs is ... entirely predictable if one pays attention to march flies'. There is a certain sort of march fly which will come and tell you the eggs are there. 'The other type of biting fly tells you that the bush plums are ready' (D. B. Rose, 'Exploring an aboriginal land ethic', *Meanjin*, 1988, p. 382).

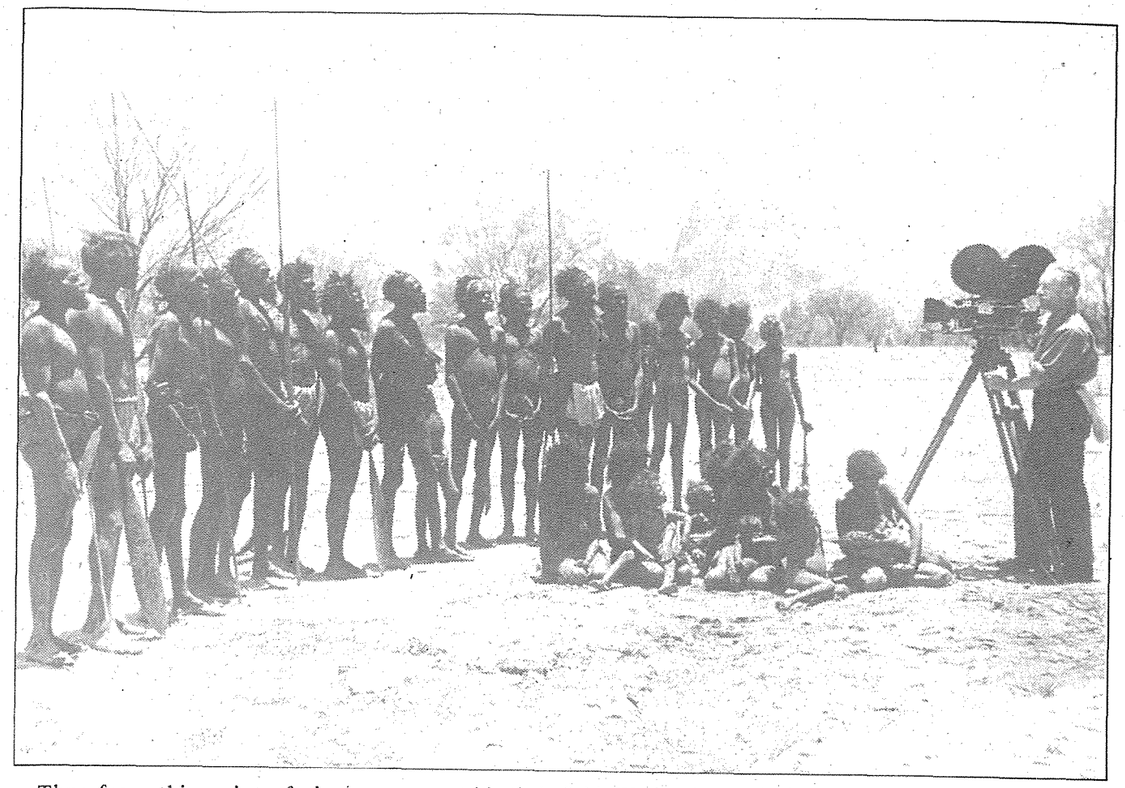
In Aboriginal science thousands of seemingly unrelated pieces of information are organised through complex webs and levels of metaphor which are utterly alien to our Western taxonomies. Incorporated into this environmental sensitivity is historical, sociological and religious sensitivity. The scientific process works to balance a vast range of input qualities and angles in a structure from which knowledge production is an ongoing situation-specific process. An economy and life style which demands this high level of sensitivity to the whole ecology lends itself to the development of an ontology rich in successive layers of metaphor, one, in fact, which celebrates and gives life to the work of metaphor in religious practice.

The Western scientific system on the other hand has developed in a world which placed humanity apart from and above the natural world, and in command of apparently inexhaustible resources. In our early days Western science appeared to need no ecological constraints, and it quite naturally expanded along all the directions which improved our potential to exploit the physical world for our comfort and wealth. This expansion of Western knowledge was incredibly fast. We refer to it as an explosion of knowledge - it exploded because it was unconstrained by the social, psychological, political economic and ecological realities which constrained the development of Aboriginal science.

This has brought about the monumental dilemma of the modern world: that we now have, without any doubt, the *scientific* knowledge to solve the world's problems, but what we are lacking is the *political will* to implement the solutions. The response from an Aboriginal scientific position would be: 'What more could you expect if political realities have not been embedded in your scientific system? How can you expect science to solve your human problems if it depends upon an ontology which accords things their scientific value only after they have been abstracted from the day-to-day social and political and economic context?'

Summing up thus far, it is clear that in no sense is the Western scientific system truer than the Aboriginal one. Both have pursued and developed certain dimensions of the truth at the expense of others, in response to the economic, cultural and political demands of the cultures which produced them.

Furthermore, the Aboriginal system, in its own sphere, is impressively ecological, in a way in which ours is not. The features of Aboriginal science which give it a firm ecological grounding are the ongoing negotiation of knowledge, and the extensive use of a large range of metaphor to interpret scientific data within a social, political and economic context. The work of metaphor and negotiation in Western science is generally denied or ignored by our own scientists, and yet these take centre stage in the ecologically based science of Aborigines.



Thus from this point of view, Western science has two fundamental weaknesses. The first is that the only metaphor available or allowable in Western science is the positivist empiricist one. With access to only one metaphor, we can produce only a very limited picture of who we are and how we fit in and what we must do. No matter how empowering or exciting pure science may be, it is by definition irresponsible, and thus simply not good enough to solve our present ecological dilemma.

The second weakness is that the negotiation process in Western science-making is, in effect, all over and done with. The pure sciences are, by definition, not open to the mitigating influences of negotiation. The negotiating has been done: only empirical data are to be admissible. When physicists or mathematicians are confronted with the human problems associated with the technologies they produce, they can claim that these problems are, as it were, outside their field. We need an ecological scientific methodology to return all our knowledge and ideas to the one unified field.

Some time in the future, if we are going to survive, we will develop an economy and a lifestyle which is sustainable. It will not be supported by a constant and unchanging view of the world, but by a mode of science production which is sensitive to the interaction of human needs, emotions and intuitions, as well as to the almost imperceptible moment by moment, year by year changes in the environment. A science like this will lead us to understand, care for and respect the part we human beings have to play in the ongoing greater ecology of the planet.

Acknowledgements

I am indebted to the Aboriginal elders of our community and to everyone else at the school, including the children, for the ideas expressed in this paper, also to Dr Helen Watson from the History and Philosophy of Science Department of Melbourne University who has been involved in this work. I highly recommend her book (*Singing the Land, Signing the Land*, Geelong, Deakin University Press, 1990) which explores the contrast between Aboriginal and Western knowledge production through the examination of a wide range of graphic and written material.

Michael Christie has lived and worked in Northeast Arnhem land as a teacher/linguist since 1972, first at Milingimbi and, since 1985, at the Community school at Yirrkala. He has qualifications in education, linguistics and educational anthropology. *This article is reprinted, with permission, from the* ***Australian Science Teachers Journal****, March 1991; the second part of the article, omitted here, deals with school science curriculum.*

Putting science in its place

*By persistently seeking answers to her questions, **Vandana Shiva**, a theoretical physicist, began to understand that something was seriously wrong with science if it fostered health-threatening nuclear reactors, encouraged a green revolution that destroyed ecologically safe indigenous agriculture, and justified the clear-cutting of the Himalayan oak forests. In 1988 Shiva's intellectual journey led her to publish **Staying Alive: Women, Ecology and Survival in India** [New Delhi, Kali for Women and London, Zed Books], in which she argues forcefully that the reductionism of Western science, ecologically blind corporate investment, and the violence against land and women in India are all connected. We publish excerpts of her conversation with Barry Greer.*

Question You mentioned that over the last 10 years you've moved from someone who is a scientist trained in the Western tradition to someone who now has taken an ecofeminist position that rejects Baconian-Cartesian thinking. I'd like to know first if growing up in the Himalayan foothills is related to your change in thinking.

Answer I was born and brought up in the region in which I'm now living, and living very close to nature is part of my life. I was also the daughter of a forester, and we travelled a lot. Until the 1960s, we lived in the Himalayas without roads. All the changes that have since taken place are part of my personal family history.

Q You witnessed the roading of the mountains?

A Yes. And I will always love nature, wanted to know nature, and picked up physics as the most effective way to know nature.

Q Your doctorate is in physics?

A No, there was a shift in my career to the foundations of physics. I worked for India's Atomic Energy Commission with the idea of joining it eventually as a scientist, and was informed for the first time by my sister, who is a doctor, about the hazards of the nuclear system. I felt very cheated, and I wasn't willing to live with the hazard, so I switched to theoretical physics.

I switched [in order] to answer basic questions for myself about how the world works. Every time I had tried to ask those questions of my AEC seniors and supervisors, I was assumed to be rude and disrespectful. Applied physics doesn't allow questions about its own foundations.

Q You weren't allowed to question basic assumptions?

A Not of the science itself. So I shifted into working on the conceptual mathematical foundations of physics, and did a PhD on the foundations of quantum theory.

I went back to India with an urge to relate science more to society, and did work on science policy to understand why Western science in Third World situations never performs as well as it does in the West. I started realising very fast that part of it has to do with the irrelevance of Western science – irrelevance both socially and culturally, but also economically.

That discovery was around the same time that the Chipko Movement [see box next page] was growing more powerful: The movement developed in the mountains where I came from, and I'd go back every summer to work. People were fighting to save the forest where I had been the daughter of the forester in charge. I knew that patch of forest, and it was very different – it was very degraded.

The combination of factors just drew me more and more into working on the ecological issues.

Q Chipko women?

A Yes. Chipko. It was their sense of what is of value in the forest. What they found of value was exactly what we devalued in the scientific system. What the women found wasteful were the pine trees that had been introduced into our area and which are very degrading to the ecosystem. The pine trees turn the Himalayan foothills arid, they turn the soil acidic.

For agricultural systems, where leaf fodder is very critical to agriculture, pine trees provide no fodder compared to oak or rhododendron. Oak and rhododendron are the first things that are removed by forestry operations that also replace variety with monocultures.

That experience of learning what the forest is – that it's different to different people – was really one of getting closer to the village communities, from whom I'd been insulated in my childhood because of my status and the fact that we lived in barricaded forestry houses. It's really in my adult life that I got to know the ordinary villages and my own people.

Q Was there a particular event that you would consider pivotal in all this?

A There's a very special event. There was a particular place I wanted to go for a holiday. I remembered it from my childhood, a very beautiful stream next to an extremely lovely oak forest. I had not been to the place for 10 years, since I was a child. I planned to swim in the stream, but it was a mere trickle. The forest wasn't there, and there were few trees left. So that, actually, was my initial exposure to Chipko.

I was so troubled about the disappeared river that I talked to the villagers, and they started talking about how badly things had gone. They connected the disappearance of the stream and the deforestation. The World Bank was behind the thinking on this kind of thing. There was a huge horticulture project to plant apples at high altitude. To clear land for apples, they just clear-felled all the old forest at the top where the streams came from. So you get these barren slopes – even apples don't grow any more. You don't have forest, you don't have apples, you don't have the streams.

Then the villagers said things were improving now, or things will get better, because now we have Chipko. So we visited these full-time activists – about 12 people who have given up their lives to spread the Chipko message village to village, and that's all they do.

Q Are they all women?

A The people who travel are never women, because the women are taking care of everything in the villages: their cows, their children, their fields, and their food. So the people who become full-time activists are always the men.

Q So you're an exception to that?

A I don't have to take daily care of agriculture and feeding the cattle. I have the luxury of walking away.

Q So it was the loss of the stream?

A Yes. The next very big thing was in the early 1980s. Two days after the birth of my son, in September 1981, I got an assignment with a team of people to work on the impact of mining in the region where I was born, where I'd gone to have my baby. I never went back to my job after that; I worked on the matter of mining and just made a total switch away from academic life. Since then, I've lived on with my little boy, and worked informally as life demands ... and survived.

Q Those are the personal experiences that led you to ecofeminism, but could you tell me your intellectual heroes?

A I read them after a lot of my own

Chipko

'Chipko' is a Hindi phrase that means 'embrace our trees'. Northern Indian women who wanted to stop the commercial exploitation and destruction of their forest homeland literally embraced trees to save them from the axe. The women depended day-to-day on the forest for fodder, firewood, and clean water.

Chipko women were 'ecofeminist' long before the word was invented in the West, and in 1987 they were awarded the Alternative Nobel Prize in Sweden 'for vision and work contributing to making life more whole, healing the planet, and uplifting humanity'.

thinking. What I found was a resonance. In fact, after I'd written *Staying Alive*, I then read Susan Griffin and Caroline Merchant. I called the manuscript back from my publisher and said, 'Listen, I've got to cite some people who are saying the same things'. They are my heroes, in the sense that I respect them very deeply, but their contributions aren't formative to my thinking. My heroes are really the village women.

Q Chipko.

A Absolutely. Absolutely. For me, my intellectual assumptions, my assumptions about life and about development – all those shifts have taken place because of these people, whom I respect extremely deeply. I recognise that they are so much brighter in all kinds of ways. They're full of fun, they have the capacity to smile in tough situations. They have so much grit in them. I don't derive as much strength from any other interaction in life. If I visit them twice a year, those are the two occasions when I come back feeling charged.

There are two other people who've been influential to me in India, both very senior men. One is a person who's full-time Chipko, Sunderlal Bahuguna. His work has been a very major contribution to the ecological thinking in the country as a whole.

Another person is a leading intellectual in our country who started working on alternative ideas. He is basically a political scientist, but he became the leading figure in alternative thought, in alternative traditions of knowledge, and created space for freaks like me in our society – you know, places where we could meet and talk and interact. His name is Rajni Kothari.

Q A lot of what you say in *Staying Alive* is a rejection of some fundamental assumptions of Western, masculinised science. You connect two key terms that are related to that criticism: reductionism and violence. Do those ideas connect to the personal experiences that led you to ecofeminist thinking?

A The United Nations University commissioned a programme on a series of issues. One of them was to answer this question: Are science and violence related to each other? I was asked to do a paper for that programme, and it gave me an opportunity to think very seriously about it.

I did a paper called 'The Violence of Reductionist Science'. I tried to work through how the women who were protecting the forest conflicted with a certain world view. What was the violence of reductionist forestry that impinged on them and their beliefs? They knew more about the forest than any forester, but they didn't count as a source of knowledge; and that was a violence. The new knowledge that was brought in was violent to the nature of the ecosystem because it forced apart linkages and relationships that should work in cohesion. Then there was the violence of the privilege system, too, because it is built on insularity. And there was the violence I had been subjected to when I was having my little baby, which I fought against and didn't allow to happen. But I could imagine every woman in every society goes through that.

Q Could you explain?

A The conflict between, again, a reductionist, mechanistic system of handling the female body, against women's knowledge of what they want and see as fit. I went in for my delivery, and the doctor insisted I had to be cut up. I said, why on earth? She said, because you're so old, your body's all wrong. I said, I feel fine. Listen, give me a chance. I was 28, and she said I was too old.

A lot of people say, aren't Newton's laws true? I turn around and say, I'm not talking about that. I'm not talking about abstract equations. I'm talking about science as it comes embodied in concrete, personal relationships. It protects itself as science, and it attacks as science. That's what I'm interested in. Not whether Einstein and Newton are true when they write E equals mc squared. That's abstract stuff.

Q You stated in *Staying Alive*, very bluntly in places, that Western science ignores or excludes certain bodies of knowledge.

A There's a whole body of knowledge familiar to people who live in the forest. It's a system that has not even been counted. The tropical forest is now a major issue. Who are the people who are consulted at this point about what has to be done with the forest? Nobody is going back to Indian nations in the Amazon and saying, we made a mistake. You tell us what is the forest, what is your knowledge of it. Then we'll base our management strategies on that. The managers and the experts still sit in Washington. I think the biggest threat to the planet has come precisely from the kind of arrogance caused by elevating one knowledge above all others.

Q That elevated knowledge is scientific empiricism?

A Yes, it's a monolith that got created in the West by trampling on its own alternatives – traditions that women carried or dissenting traditions other scientists carried. Those options were squashed.

Even now you can see ecologists, who are more linked with biology in its real life, being totally trampled on by the dominant group in biology, the molecular biologists. You can see how the plurality, even within biology, is being destroyed to create one monolith, so that everyone says, 'The world is made of genes, the world is made of genes, the world is made of genes.'

I don't think there's any hope for planetary survival as long as there is one knowledge that is more secure, or more valid, with a validity based on invalidating and delegitimising everything else around it. That monopoly on thinking is a basis for the destruction.

Q It's very much a power relationship.

A Yes, very much. Knowledge as power is the biggest threat.

Q Baconian science.

A Once Western science starts taking an equal place, it will very often be that it has to take second place.

Knowledge systems that have been pushed back will turn out to be much more valuable for handling the task at hand.

Q Do you see Euro-American science and technology as the same old 19th century colonialism in new clothing?

A I see the two very closely linked. In fact, I see Eurocentric science as the invisible instrument of continued colonialism when all other chains have broken.

Q It's still an attempt to influence and manipulate?

A And control, totally.

This interview first appeared in What's Happening magazine, Washington DC.

In 1974, the women of Reni in northern India threatened to hug the trees to stop them being felled. The women's protest was known as the Chipko movement, and saved 12,000 sq. km of sensitive forest.

Careful of science – a feminist critique

Should we beware of science because its capabilities are so life-threatening? Or should we cherish science because it is so precious? Or, alternatively, should we transform science into a life-affirming pursuit by caring labour? All three, says ***Patsy Hallen.***

WE NEED TO BE careful of science because of its life-destroying potential. Half of all scientists and technologists work on war-related research while a third work for large corporations, mainly in teams on profit-motivated research projects not of their own choosing. Science has become incorporated into the military-industrial complex and often serves the interests of profit-making and social control.

The mind-set of our age is that science is neutral and value-free. But this picture of science functions as a smokescreen. It succeeds in directing our attention away from facts about the social structure of science and its practices. The discourse of value-neutrality performs an ideological service in favour of the status quo and prevents us for examining how science is actually organised (its take-over by the military-industrial complex, its social stratification, its exclusion of female practitioners, its culture, gender and species biases) and what science actually does (its practices of environmental degradation and the squandering of the earth's biological capital, its practices of social control and the deliberate cultivation of human greed).

Let me point out, though, that no matter how compromised or how deeply embedded in the military-industrial complex, science is one of the most precious human activities. This is one good reason why it needs the talents of the other half of humankind. Science is precious. I learnt this when I went to Nigeria. I started out teaching university students about the limitations of science: 'Save us from science.' As a result of cultural inter-play, I ended up appreciating some crucial aspects of the scientific ideal: 'Save us from fear, superstition and the dictates of personal power.'

> *'Measured against reality our science is childlike and primitive and yet it is the most precious thing we have'*
> *– Albert Einstein.*

But it is for the very reason Einstein articulates, its preciousness, that science needs to be criticised. In order to strengthen it, in order to take care of it, we need to understand its contemporary nature. We need to see that certain aspects of late 20th century science are repugnant, anti-creative, life-threatening, devastating to biological richness and diversity and disruptive of dignity and freedom.

We are prevented from seeing the way science actually works and whom it excludes because of the way we are educated about science and because of the way we are educated as scientists. Most scientists are not heroic adventurers working on the challenging frontiers of knowledge. They are puzzle-solvers within normal science. Which scientist would choose to develop a new flavour of cat food? And even when the area of research and development is new and challenging, who sets the agenda? How many scientists would choose to genetically engineer flowers to be longer lasting and to bear the company colours?

Human values and interests shape science in the following ways:

- the selection of goals for science;
- the choice of problems and research projects on which science concentrates;
- the methodologies and knowledge-producing practices of science;
- the choice of experimental design;
- the way we behave towards our research subjects;
- the language we use (for example, the terminology, the 'hard' sciences: are women less well-equipped to penetrate nature's secrets?);
- the very content of our theoretical formulations in science;
- the evaluation and interpretation of scientific results; and
- whom we consider as scientists (depending on one's gender or class, identical work earns the label of lab assistant or scientist).

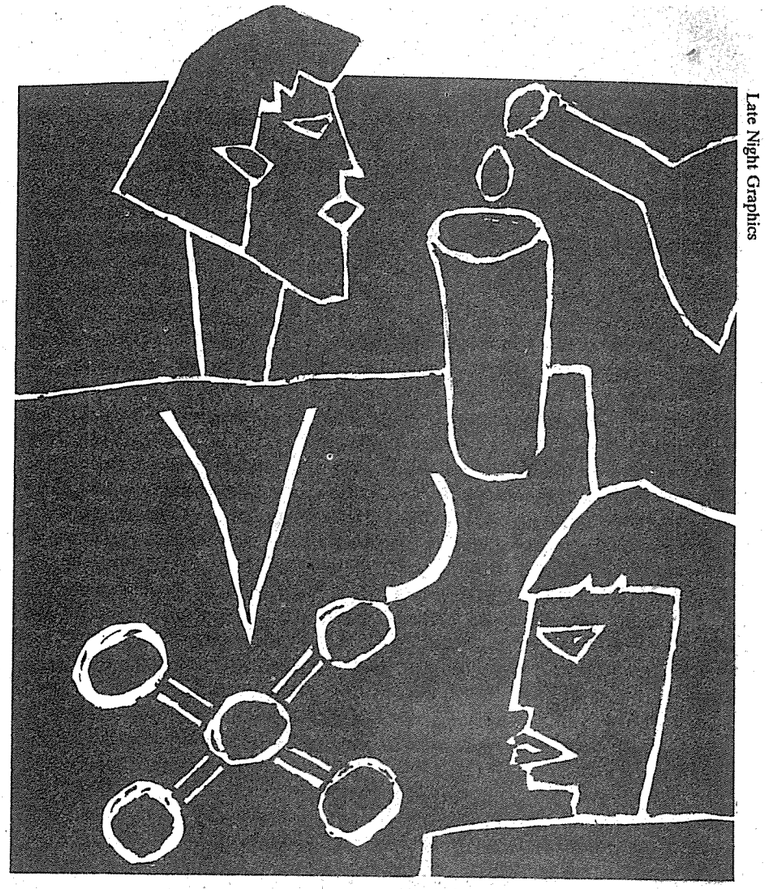
The argument that science functions to increase profit, to maintain social control and to exploit nature has been convincingly made many times. But when feminists use gender as an analytic category, they face immense obstacles, for they touch new raw nerves. If science is neutral, the scientist is absolved from the complex social responsibility scientific work entails: we know how hard it was to fight this battle. If science is free of gender-bias, the scientist is absolved from giving up his privileged position: we can see how hard it will be to fight this battle.

Science needs to confront head-on the problem of its biases: its masculine bias, its cultural bias. As Marion Namenwirth states: 'Patriarchal science needs a coronary bypass and feminism is [helping to] provide it.'

Having considered how and why we need to both beware of science and to cherish science, I would now like to consider three strategies for transforming science:

- ensure that more women enter science;
- promote more equally recognised women in science; and
- metamorphose science by nurturing a world of difference.

> *'Science it would seem, is not sexless; he is a man, a father and infected too'*
> *– Virginia Woolf*



Late Night Graphics

Masculine Bias

Aristotle was an outstanding naturalist. He founded the fields of biology, botany and zoology. His observations of dolphins, for example, have not been surpassed to this day. Yet he 'observed' that women's brains were smaller and spongier than men's.

Another example of how there is more to seeing than meets the eyeball comes from the leading microscopists of the 17th and 18th centuries. When they looked through the microscope at male sperm, they claimed they saw minute men inside, with arms, heads and legs. Their observations were askew not due to the limited powers of the microscope, but because of their firm belief, dating from the time of Aristotle, that women are only passive incubators, contributing nothing substantial to conception.

Our culture takes as 'natural' the dominance of men and the subordination of women. As Donna Haraway's work in primatology indicates, researchers in this field are seriously constrained in their hypotheses, observations and interpretations. The (almost exclusively) male researchers exaggerated the extent and importance of male dominance, male aggression, male initiative and the role of competition in controlling troop behaviour among primates. This astigmatism seriously compromised data collection and theory construction in animal behaviour and evolutionary theory until female primatologists entered the field in the 1970s.

Ruth Bleier has shown how today's theories and studies of the brain are no less influenced by male biases. She carefully analyses studies concerned with significant cognitive differences that relate to sex differences, for example, women's supposed inability to

do mathematics. Her studies reveal that these cognitive differences between men and women are given credence far beyond the quality and quantity of the supporting data. Moreover, Bleier tried to get her criticisms published in a leading journal showing how some of the most influential studies on sex differences in cognitive functioning were seriously flawed, but to no avail. So not only do ideological commitments determine scientific observations, which have the pretence of being 'neutral,' they also determine ease of publication.

Bleier's work raises the several important issues including the question: Why is so much time and money spent on the issue of sex differences in cognitive abilities, when the best experiments seem to show that these differences between men and women are trivial compared to the differences between people of the same sex? The full answer to this question must include the distorting effect of male bias.

We need more women scientists to overcome the distorting effect of patriarchy which looms not only in the social sciences but in the natural sciences. But we need not only more women scientists, we need women to be equally recognised practitioners of science. The majority of people actually practising science are women (technicians) but their work is marginalised and trivialised. Technicians are not as important as 'real' scientists, the argument according status and pay goes, just as housework is not as important as engineering. To express it in Sandra Harding's words: 'Until the emotional labour of childcare and housework is seen as desirable for men, the intellectual labour of science and public life will not be perceived as desirable for women.' In calling for women's equal recognition, we are touching deep areas that require revolutionary changes in the social relations between the sexes. At the moment, our patriarchal society needs 'inferiors'.

Even when the scientific work done by women is objectively indistinguishable from men's work, it tends to be marginalised, trivialised, rendered invisible. James Watson in his book *The Double Helix*, an account of the discovery of the structure of DNA, minimised the work of Rosalind Franklin and distorted her person. Ann Sayre wrote a book on Rosalind Franklin that exposes Watson's biases. The book is subtitled 'A Vivid View of What it is Like to be a Gifted Woman in an Especially Male Profession'.

In our patriarchal culture, a woman is either not quite capable of first-class scientific research or she must be abnormal as a woman. With white males holding most scientific posts and the majority of prestigious positions, the idea of a scientist becomes fused in people's minds with a white male. So to gain acceptance into the scientific community, women must demonstrate that there is no deviation from the norm in their attitudes and beliefs. Because science has been so firmly identified as male, women in scientific fields have had to mediate between two worlds and a dual identity: to be a 'real woman' is to be non-scientific, to be a 'real scientist' is to be non-feminine. For instance, if a woman scientist chooses to be assertive, she invites criticism since such behaviour is disconcerting coming from a woman; if she tends to be docile and supportive of others, she may be faulted and lose out for not pursuing her career with the appropriate drive.

Hence it seems correct to say that there will not be more equally recognised female practitioners of science until both science's relations with society and the relations between the sexes are altered. This is why we must work towards transfiguring science by caring labour. One way both men and women can transform science is by incorporating both experiential knowledge and the personal dimension into their scientific explanations.

Theorists such as Nancy Hartsock and Hilary Rose suggest that women experience themselves and tend to define themselves concretely, sensuously, relationally. This yields a new notion of power as reciprocal empowerment, the power to energise others. If a science can be generated out of such experiences, it is likely to help topple the edifice of dominance.

These feminist scholars are engaged not in replacing one paradigm for another (male dominance with female dominance) but in moving the boundaries as to what counts as genuine knowledge. A necessary condition of this profound shift is for scientists to acknowledge that they, like everyone else, have values and beliefs which will affect how they practise science.

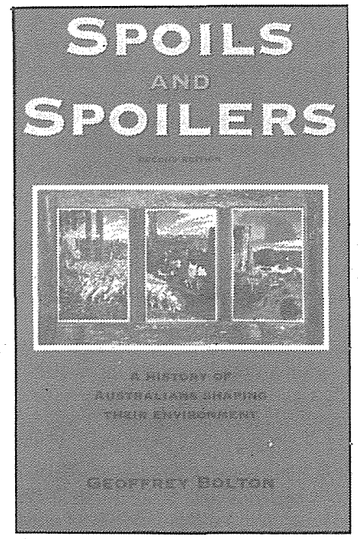
One goal, then, of a transformed science is to facilitate scientists' exploration and understanding of the ways in which their personal, social and environmental identities specifically affect their perspectives, approaches, methods, practices and scientific results. Other goals include: to reconceptualise the methods, theories and objectives of science without the language and metaphors of control and domination and to eliminate research that leads to exploitation and destruction. Other allied aims entail the willingness to be accessible rather than élitist and authoritarian, the ability to be humble, recognising that each truth is partial, the facility to be more at ease with uncertainty, being aware of the wisdom of Socratic ignorance, the capacity to recognise the limits of human understanding and the true complexity of nature and the desire to enhance the cultural diversity among the practitioners of science.

For these goals to be aimed at, let alone realised, profound, political and psychological changes must take place at the structural, the collective and the personal levels. These life-affirming objectives will require a tremendous shift, both in our collective consciousness, which is steeped in a mechanistic, patriarchal world-view, and in the structural organization of science, which is embedded in a vast military-industrial complex.

In spite of the overwhelming odds against such deep changes, feminism carries the seeds of a transfigured science. If we wish to unite our head, hand and heart we need to care.

__Patsy Hallen__ teaches at Murdoch University, Perth. This paper is abridged from a paper in __The Trumpeter__, Winter 1989.

Reviews



Spoils and Spoilers: A history of Australians shaping their environment

By Geoffrey Bolton, Allen & Unwin, Sydney, 1992, $17.95 (pb) (2nd edition)

Reviewed by Kathie Fletcher

In *Spoils and Spoilers* Geoffrey Bolton looks at how white settlers struggled to survive in Australia whilst seeing the land as an enemy to be conquered. He describes the period during which the land was opened up and settled including the rush for gold, the spread of agriculture, the impact of cities and the sprawl of suburbs.

Early colonists identified poorly with the land and its natural features tending more to act in a way that was alien if not totally destructive to the new environment in which they were living.

Bolton starts to explore the concept that early settlers had of 'land as private property which might be cultivated, possessed, inherited and transformed' (p. 9). Particularly interesting is chapter 2 'The British Impact' where he discusses the 'intellectual and aesthetic attitudes' of the first white settlers. He points out that in the minds of the English colonists 'an essential mark of a citizen was ownership of property. Property was what belonged to a specific individual and distinguished that individual from others' (p. 11).

It is obvious that throughout history this attitude has played a key role in Australia's past development and continues today. Colonists (farmers, planners etc.) wouldn't dream they had anything to learn from Aboriginal people about the care and guardianship of the Australian environment. Bolton describes conservation as a series of attempts by individuals and/or small groups of concerned settlers. The ideas nurtured from past experiences in foreign homelands.

Although the book makes an initial acknowledgement of Aboriginal occupation and achievement, it doesn't continue throughout. It attempts to chart the history of the environmental movement but makes little reference to Aboriginal groups or grassroots organisations and concentrates mostly on government supported environmental organisations.

Bolton compares conservation legislation throughout the States of Australia and it is surprising to see the different attitudes amongst government planners and officials.

The book attempts to cover a wide range of issues and although there is a certain skimming over of the history of the environmental movement, there is some useful information. The material is presented in a way that is easy to read and understand.

I particularly enjoyed the quotations Bolton has used which relate the attitudes of the settlers to the land and its use. A NSW report spoke of:

> ... stocking our waste waters, woods and plains with choice animals, making that which was dull and lifeless become animated by creatures in the full enjoyment of existence, and lands before useless become fertile with rare and valuable trees and plants. (p. 97)

The only other criticism I have is the praise given to the mining companies for their supposed site clean ups ... I believe no amount of tree planting can rectify the total destruction caused by the toxic wastes of the mining industry.

This is a good book to read but I would recommend reading it alongside literature that focuses on the Aboriginal perspective on their lands and how they are best kept unspoilt.

Aspiring film maker Kathie Fletcher has lived in both Australia and Aotearoa.

Reviews

The Gulliver File
Mines, People and Land: a Global Battleground

by Roger Moody, Minewatch, London, England and WISE-Glen Aplin, Queensland, 894 pp, 1992, $50, free to Aboriginal groups (hb).

Reviewed by **George Venturini**

How does one review a telephone directory? For this is what *The Gulliver File* resembles in size. In content it is more like a Gotha of malefactors of (mostly) private wealth. How to do justice to the work of Roger Moody and a support cast of hundreds, Little people and countless struggling movement groups (among them highly visible WISE-Glen Aplin, Queensland) which made this book possible? It landed in my postbox on Summer Solstice Day 1992. And how to have copy in Canberra by mid-January 1993?

The genesis of the book dates back to 1978, initially as an *exposé* of corporate links among uranium companies. The scope was enlarged to become a compendium of companies which mine anything on earth – from coal and base metals to industrial metals, to uranium, gold and diamonds.

The File should prove particularly evocative to thoughtful Australians.

If one had been in London in the (northern) summer of 1726, and had moved in any but illiterate circles, one could not have missed hearing of a certain extraordinary, brilliant and vastly diverting book. Jonathon Swift's *Gulliver's Travels* begins with a voyage to Lilliput. In the very first pages, a fictitious Lemeul Gulliver, first a surgeon, and then a captain of several ships, sails from Bristol on 4 May 1699 on a voyage to the South Seas. He is 'driven by a violent storm to the north-west of Van Diemans Land'. It should be remarked how little was known of the South Pacific Ocean, or New Holland, at the time when Swift wrote. Abel Tasman had touched Van Diemens Land in 1642 and given a very inaccurate account of the sea he had traversed. That would leave sea-room enough for Swift to place his imaginary country of Lilliput. Fortunately, while he stated the latitude of the shipwreck, he avoided giving the longitude – and so one escapes the chance of finding the scene of his adventures among the pigmies upon the coast of present-day Western Australia.

Six hundred and seventy-two companies are entered in the 787 pages of *The File* proper. Access is facilitated by introductory information, and various types of abbreviations. There is a six page country index, followed by a veritable cornucopia of linkages in a 33 page index of the companies mentioned. First is (almost *par force*) the AAEC (now the Australian Nuclear and Science Technology Organisation – ANSTO). Then come: AAR Ltd, Aberfoyle Ltd, Australian Consolidated Minerals, A[ustralian]fmeco Pty Ltd NL. Other companies such as Agip Nucleare (Aust) Pty Ltd, an off-shoot of the Italian Agip Nucleare SpA, and Swiss Aluminium (Aust.) Pty Ltd make their appearance. The reader may be arrested by a quote which introduces Amax Inc, also operating in Australia. It reads: 'America's largest mining company has offered us a share in the mine ... our share is death'. The words are from Rod Robinson of the Nishga Tribal Council, British Columbia, 1980.

Closer to home, Amoco Minerals Ltd – a subsidiary of Standard Oil of Indiana, the fifth largest American company – has extensive interests in the Papua New Guinea Ok Tedi project. Essentially miners are movers; they move mountains, money, governments – and deal mainly in dirt. Three years ago, at the time of the Bougainville rebellion, when Australian interference in the internal affairs of Papua New Guinea became more overt, it seems that 'Australia's military leadership' (?) had pushed for direct support against the rebels. Documents classified AUSTEO (AUSTralian Eyes Only), but obtained under the Freedom of Information Act, seem to show that the 'leadership' was well ahead of the Government in Canberra (*The Australian* 23 July 1990 – not the first time, but that is another story). Back to *The File*.

Next comes a competitor of Australian uranium miners: Amok Ltd, which extracts uranium and gold from the Athabasca Basin in Saskatchewan, Canada. Ampol follows. This is Australia's only home-based petrol company. But, wait: 'Ampol's main revenue now comes from its uranium holdings rather than oil' (p. 76).

Most of the 31 companies first appearing in *The File* have a presence in Australia. Number 32 could be called Mine Inc. It is the Anglo-American Corp. of South Africa Ltd. Stepping off a spaceship, making a whirlwind tour of global mining, then examining the index of *The File*, 'a visitor from outer space may be forgiven for assuming that – if spaceship earth is fuelled by uranium, its banking system solidly based on gold, it leaders fashion luxuriously bedecked in diamonds and platinum, and the most crucial decisions about its minerals resources taken in London and Johannesburg – only two names need be recorded to take back to Mars or Pluto. One of these is [RioTintoZinc] – in terms of market capitalisation and influence, by far the most powerful mining conglomerate this side of the solar system. The other is Anglo-American (AAC) – in terms of value (for its assets and production) a bigger swimmer in the Milky Way than RTZ ... but handicapped by its identification with the apartheid state' (p. 77). The theologians of economic rationalism should reveal that first when they speak of internationalising the Australian economy. If AAC and RTZ were ever officially to merge, the resulting behemoth would be mining, manufacturing and selling anything – in a short time thenceforth, everything – from aluminium to zircon. AAC – the largest employer of African black, cheap, voteless labour – is operating in Australia. It continued, undisturbed, throughout the HawKeating sanctions trumpery. Good 'Eavens!

(RTZ, of course, hardly suffered an 'image' problem: in Australia, most notably, it operates behind a wholly-held company which controls 49 per cent of CRA.)

Thirty nine pages and 423 endnotes of *The File* are devoted to AAC. It reaches Australia in many ways – some of them known at point of entry: Eastern Investments Ltd hold a 15 per cent interest in Normandy Poseidon Ltd and a 9.3 per cent interest in Poseidon Gold, which is 76 per cent held by Normandy Poseidon. This is really the key – in more than a metaphorical sense. Through its holdings in Poseidon Gold, it controls a 29 per cent interest in the Kalgoorlie 'Super Pit' and a 49 per cent interest in Pan Australian Mining Ltd. It has a 100 per cent interest in Commercial Minerals Ltd (Australia's largest industrial minerals operation), 100 per cent of Box River diamond mine, as well as 41 per cent of Command Petroleum NL – with interests in oil and gas production in Australia, Papua New Guinea, and in the North Sea through a Dutch based company. Eastern's interests extend to Hong Kong, Singapore and Thailand (AAC Annual Report 1991, with some small variations in Normandy Poseidon Annual Report 1992). The world is the limit – for the time being at least.

AAC and the other provinces of the Oppenheimer Empire control more than one half of the capitalisation of the Johannesburg Stock Exchange, every imaginable product of industry and commerce, financial resources, mining houses and investment, coal, uranium, diamonds and gold. How much gold? Enough to call to memory a passage from Teresa Hayter, *The Creation of World Poverty*: 'When Cortes advance towards Mexico, Montezuma sent envoys to him with gifts of golden collars. According to a Mexican text preserved in the Florentine Codex, the Spaniards were in "seventh heaven":

> They lifted up the gold as if they were monkeys, with expressions of joy, as if it put new life into them and lit up their hearts. As if it were certainly something for which they yearn with a great thirst. Their bodies fatten on it and they hunger violently for it. They crave gold like hungry swine.

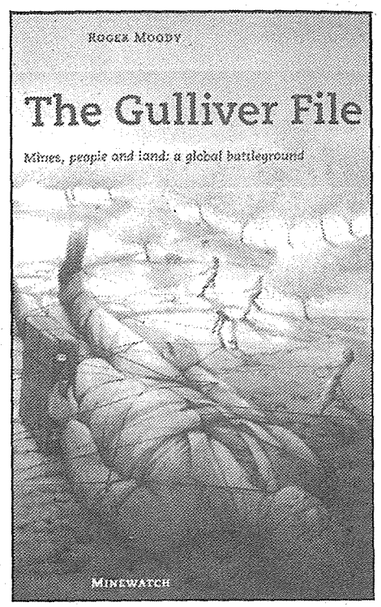
'Later when they reached Tenochtitlan, the splendid capital with 300,000 inhabitants, the Spaniards entered the treasure house,

> and then they made a great ball of gold and set a fire, putting to the flames all that remained no matter how valuable, so that everything burned. As for the gold, the Spaniards reduced it and made bars.

'So the first purveyors of European 'civilisation' were philistines, as well as "hungry swine" and "monkeys".' (Hayter, 41-42)

AAC manages to appear more gentle than the Spaniards or the Portuguese of old – but no less determined 'to subdue the earth.' (*Genesis*, 1, 28) In the end, there cannot be 'sustainable mining'. As Lewis Mumford pointed out in his *Pentagon of Power*, mining set the pattern for later modes of mechanisation by its callous disregard for human factors, by its indifference to the pollution and destruction of the neighbouring environment, by its concentration on the physio-chemical process of obtaining the desired metal or fuel, 'and above all by its topographic and mental isolation from the organic world of the farmer and the craftsman and the spiritual world of the Church, the University and the City. In its destruction of the environment and its indifference to the risks to human life, mining closely resembles warfare.' Our National Treasure, 'Nugget' Coombs, observed that 'Mumford's words refer to the role of mining in the creation of industrial society. But much of the quotation would still be relevant to the policies of mining corporations, even though those who decide and speak for them would, in their private lives, be models of concern for mankind and its environment'. (Address to the Australian Academy of Science, 'Science and technology for what purpose?', Canberra 1979).

It is likely that AAC will get as much gold as it wants – in time, because the vehicle for the recent penetration of *apartheid* capital into this part of the world has been 'the illusion industry':



diamonds. The story is fascinatingly complex. The gist is this. In October 1981 Prime Minister Fraser made noises about 'not giving in to a South African monopoly' at Argyle, in Western Australia. He was referring to the Central Selling Organisation, an arm of De Beers, which was seeking – as indeed was promised in 1982 – the exclusive right to sell all the diamonds of any consequence. Argyle, the world's largest source of natural diamonds, is held 59.7 per cent by CRA (11 March 92) and 41.3 per cent by Ashton Mining (24 August 92). CRA is 49 per cent held by RTZ (9 September 92), Ashton is 45.65 per cent held by Malaysian Mining Corp., which is indirectly controlled by AAC (28 per cent) and De Beers (10 per cent). AAC and De Beers have cross-holdings of 30 per cent and 39 per cent, respectively.

Mr Keating, as Shadow Minister for Minerals, made even louder – but exceptionally well briefed – noises than PM Fraser when the arrangements between CSO-De Beers- AAC-CRA-RTZ and the Fraser Government were approved under pressure from a moribund Court WA Government. By February 1983, before becoming the 'world's greatest Treasurer', Keating had changed his tune. Two months

Reviews

later, his FIRB – Foreign Invasion Remittance Boys (?) – gave approval to the marketting arrangements with CSO. Mr Fraser kept remarkably quiet.

In 1989 the Argyle venturers took over the WA Diamond Trust, set up in 1984 through the Burke government's Development Corp.; it was the first 'operation' of what became WA Inc. The Burke government had been anxious to share in 'the run of the mine' – and many more things, as shown in the *Western Australia, Report of the Royal Commission into Commercial Activities of Government and other matters* Perth 1992 (see in particular Part 1, vol. 2, ch. 7). The initial 1985 contract with CSO came up for 'renegotiation' early in 1991 and there were the usual press calisthenics: 'Argyle diamond venturers are threatening to torpedo De Beers' cartel' (*The Age* 26 April 1991). The contract was renegotiated – a formality – in May 1991 for another five years.

Between 1983 and 1988 'Labor' Governments in Perth and Canberra surrendered Argyle diamonds to the largest South African conglomerate, Senator Evans' anti-*apartheid* posture notwithstanding! Members of the Oppenheimer Family visited Australia in 1984 and 1988 – at least. During the last eight years The Family quietly secured a large slice of the gold in, and north of, Australia through the Normandy Poseidon group (that is another story).

One is then looking at a new world (order?) of global conglomerates driven by a tendency to merge under the umbrella of one large parent corporation, one Family, one Firm. It is a world in which the social function of the market – allegedly the generator of price signals through the forces of supply and demand as activated by independent operators – is deadened (of course, was it ever alive?). At times that world is orderly, but at an enormous social cost, in a *régime* which is the antithesis of democracy. Towards the end of his travels, Gulliver comes upon the Houyhnhnms, who make frequent use of the word *Yahoo*. Our local performers – whether matey, slick, sleeckit or of the street-fighter type – are left in charge of grunting illusions about dèmocracy. The 'real' world is a pyramidal structure at the apex of which one expects to find one person. Mrs Elizabeth Hanover-Saxe-Coburg-Gotha-Windsor-Battenberg-Mountbatten is said to be the largest single physical shareholder/beneficiary in RTZ. As such she draws royalties from uranium – another field of RTZ-AAC activity (but that is another, long story – again). Money flows not only from such shows of democracy as Australia, but also from places like Namibia – until three years ago illegally occupied by South Africa, and from which Japan is to draw yellowcake until 1995. Why Japan should import plutonium from France in 1992 remains a total mystery. But while our neighbours protested against the passage of the *Akatsuki Maru* (*The Age* 21 December 1992), the Australian Government was quick to promise assistance (*The Age* 7 December 1992). And that is another story again. Then there is Roxby Downs, likely to fall to Minorco, which is AAC – rumoured to hold a 35 per cent interest in Western Mining Corp. WMC holds 51 per cent of Roxby. Mrs Windsor gets by on a personal, untaxed, estimated wealth of $17 billion, still equivalent to 60 per cent of the total wealth of Australia's top 200 (*Business Review Weekly* 1 March 1991). The true facts are wrapped in the *mystique* of The Monarchy, and cannot be questioned, but must be furthered along with that other piece of cant which is the 'Westminster system'. Phillip Hall tried to penetrate the enigma, investing his life in *Royal Fortune – Tax, money & the monarchy* (London 1992); but the riddle remains. Little does it matter that, at the end of *annus horribilis*, Mrs Windsor has agreed to begin paying tax – on what *she*, still, will decide to declare (again, another story).

Whatever the political future of South Africa, the Oppenheimers control to world's largest production of gold, and the mining in Australia and in the countries to its north will be a way of hedging bets and obliging new industrialising countries with that combination of charm and ruthlessness which characterises The Family and props up The Firm. It is reasonable to assume that the Oppenheimers see themselves, if not as modern 'discoverers', at least as brave and intrepid explorers and entrepreneurs. Ernest, the founder, equipped himself for this by turning Anglican and putting his industry at the service of Monarchy and Church – for mutual enrichment, of course. Whether in the struggle for majority sovereignty and rule in South Africa the Oppenheimers will finally be seen as responsible for perpetuating the world's most entrenched system of racial exploitation, or the country's prime economic agent for change, is still difficult to say. This is because of the well oiled propaganda machine such empires as AAC, and RTZ, and De Beers (and The Firm) – as well as the others listed in *The File* – are able to mobilise. (By the way, Queen Elizabeth II is mentioned only fleetingly in *The File*, with reference to Shell and her 'huge shareholdings in the British and Dutch arms of the company', page 711).

In the closing days of 1992, 500 years after Columbus' first invasion of the 'new' world, 350 years after the encounter of the Indigenous People with Abel Tasman, 250 years after Swift was declared unsound of mind, what better way to salute this unique, masterful 'Illichian' tool than to remember Eduardo Galeano's appreciation of the different meanings of civilisation?

> On October 12, 1492, America discovered capitalism as Christopher Columbus, financed by the kings of Spain and the bankers of Genoa, brought this novelty to the Caribbean islands. In his journal of Discovery, the Admiral employs the word "gold" 139 times and the word "God" or "Our Lord" 51. These unspoilt beaches filled him with tireless enthusiasm and on November 27 he prophesised that "all Christendom will do business here". In that at least he was right. He may have believed that Haiti was Japan and that Cuba was China and that the inhabitants of China were the Indians of India, but about the business side of things he made no mistake'.

Best wishes to all for a meaningful Year for the World's Indigenous People.

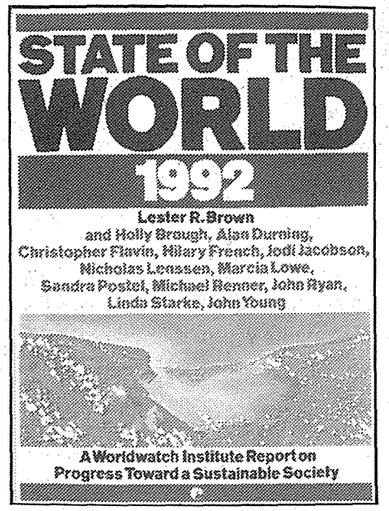
Dr V. G. Venturini is a lawyer who has been asking 'why?' all his life.

State of the World 1992: Report on progress towards a sustainable society

By Lester Brown *et al.*, Earthscan Publications, London, 1992, $29.95.

Reviewed by Larry O'Loughlin

The *State of the World* series of books has been produced by the Worldwatch Institute based in Washington, US,



since 1984, with the current edition going into 27 languages.

The book is not an atlas of the world's problems, rather it is a collection of chapters by individual authors which taken together provide an interesting overall persepective. The authors have well-developed knowledge in their area, and the work is well supported by tables and graphs.

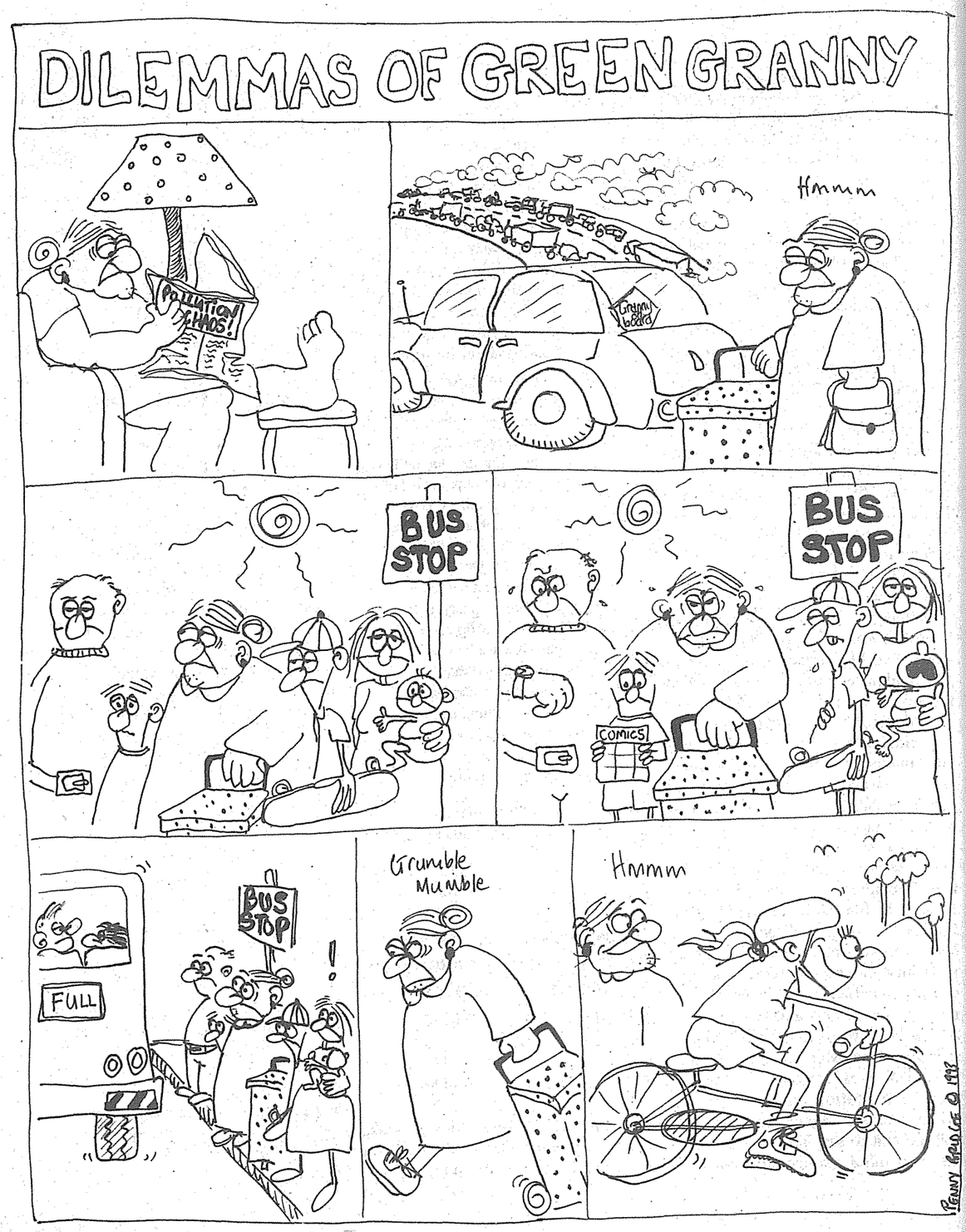
The book includes chapters on biological diversity, sustainable energy, reforming the livestock economy, improving women's reproductive health, mining, cities, sustainable jobs and 'The Environmental Revolution'.

The chapter 'Confronting Nuclear Waste' by Nicholas Lenssen is fascinating as it shows that as nuclear waste is such an immense problem without a foreseeable solution, we may have to go back to a suggestion by a former Director of the Oak Ridge nuclear facility: 'indefinite storage in surface facilities that would be guarded and tended by a "nuclear priesthood"'.

Hilary French's chapter 'Strengthening Global Environmental Governance' is an essential text for anyone interested in this area.

The *State of the World* series is a valuable and respectable reference as well as a provider of fascinating reading.

Larry O'Loughlin is an editor of Chain Reaction.



ECOPOLITICS VII

ECOPOLITICAL COMMUNICATION

School of Australian Environmental Studies
Griffith University, Brisbane

2 - 4 July 1993

The objective of Ecopolitics is to bring together a large section of the community to promote the discussion and understanding of environmental issues and their political implications. Ecopolitics aims to achieve this objective by providing an alternative channel for communication and exchange of experiences and knowledge.

The seventh Ecopolitics conference will be held at Griffith University in July 1993 and will be organised as a series of papers with reasonable time for discussion and criticism, plus workshops, seminars and discussion groups of a more informal nature. Contributors are invited to present papers and workshops interactively.

The theme will be **ecopolitical communication**. Around this broad theme we invite interested parties to submit papers on issues in political ecology. In addition, we will be exploring ways to:

- overcome barriers to communication
- recognise common ground
- provide opportunities for strengthening networking skills in the ecopolitical arena

For information and registration contact:

The Organising Collective
Ecopolitics VII Conference
School of Australian Environmental Studies
Griffith University
Nathan, Qld, 4111

As the sun sets in the distant swamps
The coolness of the desert air tingles the body
Reminds you
of this timeless land
The richness of its history
and the stories untold
The richness of the landscape
The beauty of its flora
Being part of the land
Must be a special thing.

6.6.92

John Renshaw
A Far Away Place, 1992.

NURRUNGAR 93

CUT THE LEASE ON NURRUNGAR

HAND BACK THE WOOMERA ROCKET RANGE

EASTER 1993
8–12 APRIL

NATIONAL PEACE DEMONSTRATION

Organised by the PEace Action CollectivE SA (PeACe) in coalition with the Australian Anti Bases Campaign Coalition.
PeACe, GPO Box 1025, Adelaide, SA 5001. Telephone (08) 410 1197