Special Science Issue

Blinding us with science
Science and the military

Scientists and the environmental movement
**The Social Responsibility of Science**

This conference aims to provide an opportunity for persons with a variety of interests in the Social Responsibility of Science to meet. It is being held in conjunction with the First Australian Science Festival on 27 March – 4 April 1993 in Canberra.

**Topics include:**
- The relationship between government regulation and self-regulation
- Intellectual suppression and the politics of science
- Medical ethics in reproductive responsibility
- Mr Einstein, the citizen is informed. How nuclear technology is being abandoned
- The construction of knowledge about AIDS
- Science policy: for the people or by the people?

**Monday 29 March 1993**

Fenner Hall, 210 Northbourne Ave, Turner, ACT

For further information:
Roger Cross, School of Education, La Trobe University, Bundoora, Victoria, 3083.
Tel: 03 479 2483 Fax: 03 478 7807.
Isla MacGregor, USERP, Hobart, Tasmania.
Tel: 002 44 6892.

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**World Information Service on Energy**

**WISE NEWS COMMUNIQUE**

The World Information Service on Energy (WISE) was set up in 1978 by safe energy activists to function as an international switchboard for local and national safe energy groups around the world. Articles are provided by relays in 11 countries and a world-wide network of contacts.

WISE-Amsterdam publishes WISE News Communique in English 20 times per year and selected articles are then translated into Spanish, Japanese, and Finnish.

The WISE News Communique is an invaluable source on energy developments, particularly relating to nuclear activities, and can be used for newsletters and research as well as for interest to the general reader.

For subscription information:

**WISE**

PO Box 87, Glen Aplin Queensland, 4381

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

M. Taylor's groundless charges rely on smear, and smear has now put our side of the political fence. It can only legitimise the ef­
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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 in­
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More recently the Association of Liquidpaper­
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launched a recycling scheme for used cartons whereby the cartons are col­
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APPM's Shoalhaven Mill at
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A telephone conversa­tion with Shoalhaven's manager last informed us that generally paper recycling reclains 50 per cent of the original paper but that contaminants relat­ing to the plastic liners in li­
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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 car­
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Not surprisingly, the then SA Minister for En­
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The Green Party has campaigned against this
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Ally Fricker
for The Greens SA.

Letters

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so there was no need to wear helmets as most accidents occur where cars and bicycles mix. Along this track every 20 km or so there would be a type of youth hostel run by people who also plant fruit trees, native trees, veggie gardens etc. The youth hostels could consist of old trains, 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 transport and 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 up much room.

Peter J. Timmermans
Cooktown, Qld.

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 Communicator 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雷达ier access to information, individual campaigns have benefited 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 Communicator is facing financial problems. To be specific, if we are unable to raise at least $47,000 (approx. US$25,000) 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 organization, 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!

Peter Timmermans
WISE-Amsterdam Collective

Backcopies available

1977-1992
All of the available back copies of Chain Reaction, currently 51 magazines — from Volume 5, Number 1, 1977 to Number 66, April 1992 — are available as a set for $150. (Volume 1, Volume 2, Volume 5, Number 1, and Issues 23, 26 and 44 are unavailable.)

1985-1992
All of the back issues from Issue 40, January 1985 to Issue 66, April 1992 are available as a set for $120.

Individual backcopies $5.00 each

Chain Reaction 66:
Ecoclties special: crisis in Bangkok; cities and cars; greenhouse gas emissions; chairs, cities and chaos.
Chain Reaction 65, March 1992:
Multifunction Polis; the Federal EPA; Children and TV; AIDEX.

Chain Reaction 64/65, May 1991:
Corruption in the environment movement?; debt for nature swaps; Resource Security legislation; environmental effects of tobacco.

Chain Reaction 62, October 1990:
Genetic engineering; Fraser Island; defining sustainable development; and Aboriginal sovereignty.

Chain Reaction No. 68 

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 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 Representatives seats.

The Greens in South Australia are contesting the Senate election with a fair chance of having a senator accompany Christobel Chamarette to Canberra. Greens will also be contesting the Senate election with a fair chance of having a senator accompanying Christobel Chamarette to Canberra.

Source: Australian Electoral Commission and various other sources.

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Chain Reaction is also the magazine of Friends of the Earth Australia, and it reflects the diversity and openness of Australia's most decentralised national environment organisation.

Chain Reaction has been here for over seventeen years, and since there are still important environment issues to be raised and covered, we’re not going to go away.

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Chain Reaction No. 68 • 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 relations 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 commonality of the stories was remarkable. Cree activists in Canada face problems similar to those facing the Kokatha 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 unifying 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 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 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 tapes, 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.

After the recent meeting, the IWC agreed by consensus to give full consideration in Kyoto to a proposal from 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 the IWC to pass thousands of minke whales a year,' said Mulvaney. 'They will justify the killings as part of a "scientific" management scheme.'

Further information and to offer support:

Native Forest Network, c/- 112 Enui Bay Rd, Deloraine, Tasmania, 7304.
Phone: 609-62-2713.

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:
Kieran Mulvaney on board MV Greenpeace.
Phone: 872 130010
Fax: 872 130011.

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 last recent meeting, the IWC agreed by consensus to give full consideration in Kyoto to a proposal from 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'.

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Further information:

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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 1780 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 cost far cost US$42 billion dollars, $US97 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 Grin­

spons, 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 quantified. It shows that atomic-generated electricity has cost consumers an average of at least 90 cents a kilowatt-hour, far more than other readily available fuels'.

This report calculates the costs of nuclear power generation, and it demonstrates that without even counting liabilities such as accidents and waste, nuclear power has failed on economic grounds,' said Greenspoon. 'Nuclear power is certainly unaffordably expensive, and at best will play a dwindling role in the future energy economy of this country. It simply can't compete.'

Further 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 In­

dependent 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 eviction.

Further information:

Anti-Racism Alliance, PO Box 10212, Sowerby St, Adelaide, SA 5000.
The United Nations has declared that 1993 will be the International Year for the World's Indigenous People (IYWIP) following requests from indigenous peoples internationally through overseas information and cultural relations programs. Two specific projects are the support given to the Aboriginal band Yolnu Viidji 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 posters 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."


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.


Carlton says that the major difference between the Coalition and the ALP is on the petrol tax the Coalition would remove. He argues, however, that the ALP's petrol tax proposal has the potential to increase greenhouse emissions, as petrol use is only one 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 price 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 blandodge 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.

Earth News

Year for indigenous people

The United Nations has declared that 1993 will be the International Year for the World's Indigenous People. Following requests from indigenous organisations, and the UN's efforts to be coordinated 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 coordinated by a small secretariat established within the Aboriginal and Torres Strait Islander Commission (ATSIC).

ATSIC has allocated $2.5 million to be used for 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 Yolnu Viidji 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 posters 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.
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 1983, 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 then as organizer 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 ACT.

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

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

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:

- Dimitry Hawkins, Cam Walker (FOE Fitzroy) – National Liaison Officers;
- Kathleen McCann and Dave Sweeney (FOE Fitzroy) – International Liaison. Diane Mifas (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 McDonald 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 (Fitzroy) 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 the Paying the Rent, the issue had never been discussed at a national meeting. FOE Australia made a commitment to continue to discuss 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 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 Fleurieu 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 evacuated 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 Nutton said many of the sites are still used by Kaurna descendants and they had a right to ensure that these areas of cultural
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 greenhouse issue, the Minister has well and truly passed. On the energy efficiency measures that can achieve this reduction; no program to encourage renewables it was better than previous meetings, there was some suggestion that the strategy at least, NSW officials may have 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 kerbide recycling) is immi-
surably different to any of the others and that the market, as it is, is driven by the need to meet targets. Thirdly, following Ian's comments (FOEI AGM was the location of the 1993 AGM in that part of the world), the Prime Minister, Mr Hawke, also the meeting was the location of the 1993 AGM in that part of the world, made the following comments.

The business of the FOEI AGM ran smoothly enough with energetic healthy dialogue, without the need for flag-dragging – thanks a heap.

On the Forest Policy, there was much groaning. Some believe it is little more than a resource security willy 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 back of a bureaucrat's pick-up truck on the road to Perth.

On waste issues, I urged strongly to the Minister that the much touted national strategy will be Minimization and Recycling Strategy would not meet its glorious target of reducing waste going to landfill by 50 per cent by 2000 unless there is 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 yokes 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 the Minister and the senior officials do not grasp the point that the strategy they have adopted (working with industry to encourage maximum kerbide recycling) is immi-
surably different to any of the others and that the market, as it is, is driven by the need to meet targets.

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.

At this meeting, the Friends of the Earth International (FOEI) met with the Federal Minister for the Environment.

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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.

It's not a compliment! Barry Ninnah, professor of applied mathematics at the Australian National University, gave a talk in 1992 in which he criticized the book *Life Among the Scientists,* a study by social scientists of a biological research institute. Ninnah concluded: unless you are an active scientist you cannot 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; they are not as well known as natural scientists. But if the social scientist and the natural scientist are both ‘shonky’, then the difference is that social 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.

Who 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 unformed. They disagree about what 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 characterized 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 supported 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. The fact that Board considered were the real problems. ‘Unless we get the science right’ he said, ‘emotion can take over.’

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 hold public opinion at arms length. They point the way to alternative 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 Wellington and are guest editors of this issue of Chain Reaction.

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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 – Think God! – the average scientist. But seeing what the man will do. Un bribed, there's no occasion to.1

Blinding us with science

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

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 an increase in radiation dose a hazard, these conclusions were dubious, to say the least. Noting that the Committee included certain illusory figures well-known to readers of Nuclear Knights, 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?

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. 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.
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 PA system. An Australian woman had died under anaesthetic while undergoing an IVF procedure. What made the item noteworthy 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 consummated?

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 so focused on knowledge reigning 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 porcine 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 recom-
manded that the present guidelines on
deliberate release be made man-
datory.) The voices of scientists
advocating release are assured, speak-
ing the language of science with
authority and certainty. It is science in
search of the marketable product, science which increasingly incor-
porates the language of patent law,
commercial acceptability and the
promise of increased economic perfor-
ance.

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 sub-
missions 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 in 1988, in which
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 Pam
Singer. They were shown on interactive
screens posing the question '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
outcomes of past laissez-faire atti-
dudes to environmental impact.

Instead of a pig with wings, the jet-
propelled cane-toad might better serve
as a war-engorged hi-tech symbol of
ecological havoc.

Other exhibits explained genetic en-
ingineering 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 blueticks, flies, 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
one-way science-centred process of
communication from the experts to the
public, with some new fun technologys
allowed 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 be with an adequate
response to the questions the public
may be asking.

It is not a 'direct to the canefield' 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 ques-
tion 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 not even then have the answers.

Gene-toad problem is a thicket-labyrinth-gap
psychology. The science communica-
tion game is a thicket-labyrinth-gap
communication, 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 conseque-
ces, 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.

The American technology writer
Langdon Winner once described him-
self, when he wrote on the topic of risk,
exploring themes of scientific uncertain-
ty, winding his way through labyrinths
of risk/cost/benefit analysis, balancing skillfully along the fact-gap,
and stopping to gaze upon the
colourful befuddlement of mass
psychology. The science commu-
nication 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 conseque-
ces, 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.
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 Cave 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 examination of science and the environment can bypass the military.

Ironically, the military-industrial complex itself is quite willing to climb on the environmental 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 'waste-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. Grunin Island, off the northwestern 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 superbomb -- 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 imagined, 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 millennia -- 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 Alamein, 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. In a matter of half an hour the world will spend more on what is euphemistically called "defence" than it will give the UN 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 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 as on research and development.

In 1946 General Eisenhower, Army Chief of Staff, wrote a memorandum to the Secretary of Defence arguing that the "invaluable assistance" provided by scientists and engineers in the military had actually declined sharply in recent years. Of course, the government argues, the share of the ONF 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.

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 priority to military research and development in its national security policy. The collapse of the Warsaw Pact has reduced the threat of international communism and the Cold War. The end of the Cold War has also reduced the threat of international conflict and tension. In the meantime, the military research and development budget has not been reduced. The military research and development budget has been reduced, the share of the budget going to military research and development has increased. The military research and development budget has increased, the share of the budget going to military research and development has decreased.

The phenomenon is not confined to the US. Throughout the world, almost half a million scientists and engineers are working on military R&D. The phenomenon is not confined to the US. Throughout the world, almost half a million scientists and engineers are working on military R&D. The phenomenon is not confined to the US. Throughout the world, almost half a million scientists and engineers are working on military R&D. The phenomenon is not confined to the US. Throughout the world, almost half a million scientists and engineers are working on military R&D. The phenomenon is not confined to the US. Throughout the world, almost half a million scientists and engineers are working on military R&D. The phenomenon is not confined to the US. Throughout the world, almost half a million scientists and engineers are working on military R&D. The phenomenon is not confined to the US. Throughout the world, almost half a million scientists and engineers are working on military R&D. 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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.

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 obstacles 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 downplay 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 Harbour 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 (NHHAMRC) 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 NHHAMRC limits for dieldrin and five exceeded those for 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 Blundell, editor 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 comments 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 public reaction.

Similarly, methods of analysing data can vary in the sorts of results they produce and data they require and open 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.
assessments have been published, they have been peer reviewed and are available to the public. This ensures that there is an ongoing process of scrutiny and accountability. The environmental impact assessments that are carried out are often the result of collaborative efforts between government agencies, industry, and the public. These assessments are designed to identify and mitigate the potential impacts of proposed projects on the environment. They are based on a systematic and transparent approach, which ensures that all relevant information is considered and that the decision-making process is open to public scrutiny. The environmental impact assessments are usually conducted by independent experts who are not affiliated with the project, ensuring that the assessments are objective and unbiased. This process ensures that the interests of the public are protected, and that the environment is not unduly impacted by development projects. The environmental impact assessments are regularly revised as new information becomes available, and new technologies and methods are developed. This ensures that the assessments remain relevant and effective in guiding decision-making. In conclusion, environmental impact assessments are an essential tool for protecting the environment and ensuring sustainable development. They provide a framework for decision-making that is transparent, accountable, and based on scientific evidence. These assessments are designed to identify and mitigate the potential impacts of proposed projects on the environment. They are based on a systematic and transparent approach, which ensures that all relevant information is considered and that the decision-making process is open to public scrutiny. The environmental impact assessments are usually conducted by independent experts who are not affiliated with the project, ensuring that the assessments are objective and unbiased. This process ensures that the interests of the public are protected, and that the environment is not unduly impacted by development projects. The environmental impact assessments are regularly revised as new information becomes available, and new technologies and methods are developed. This ensures that the assessments remain relevant and effective in guiding decision-making. In conclusion, environmental impact assessments are an essential tool for protecting the environment and ensuring sustainable development. They provide a framework for decision-making that is transparent, accountable, and based on scientific evidence.
carpenter to see that a table wobbles'. Similarly, when confronted with the argument that the mathematical modelling and the valuing of a fuel pond's (F Fare's) 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 Gordon said, 'Well we may not know much about Froude numbers, but we do know about crow numbers'. He called 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 flow, 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 and yet unmeasured (see David Engwicht, Towards an Eco-City: Calming the Traffic, 1992).

* Science is unfortunately still a male dominated area and so an exclusive emphasis on scientific arguments in environmental debates often becomes a contest between men and masculinity, 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 to keep up the momentum and journalist, has proposed a useful model to keep up the momentum and social change. Moyer describes the role of scientist as rebel, reformer, citizen, and scientist as citizen.

1. **Citizen role**
   - The citizen role is an important one. In social movements it is not always possible for everyone to be physically associated with a campaign in its early stages, even if they support it. Family, cultural and economic realistic political forces. Scientists in government or university bureaucracies can come forward with well researched ideas and be accepted with a credibility that the 'scientists as rebels' have not enjoyed. One of the enduring truisms 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!

2. **Reform role**
   - The role of 'scientist as rebel' is to find the holes in the scientific arguments put forward by the power plant and utility builders, the old-growth forest clearcutters (fellas?) and genetic manipulators. Break the counter-block is the strategy—particularly early in the debate—to keep up the momentum and to ensure accountability and maximise awareness of an issue's public awareness. 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 other words, 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 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 cooperation 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 strategies for future revision and solutions. At critical times in a campaign, governments often lose cultural and economic realistic political forces. Scientists in government or university bureaucracies can come forward with well researched ideas and be accepted with a credibility that the 'scientists as rebels' have not enjoyed. One of the enduring truisms 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!

3. **Scientific role**
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4. **Agent role**
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5. **Change role**
   - The role of 'scientist as rebel' is to find the holes in the scientific arguments put forward by the power plant and utility builders, the old-growth forest clearcutters (fellas?) and genetic manipulators. Break the counter-block is the strategy—particularly early in the debate—to keep up the momentum and to ensure accountability and maximise awareness of an issue's public awareness. 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 other words, the assumptions about human needs, human nature and their place in the scheme of things.

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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 _sumpseri_ means 'serve 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 current problems. Is your group radical enough to accept negative growth? Is it based on an ecological perspective? You see, effective 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 the core movement but were critical of the ways and means of the group processes of grassroots organisations. Most members came into USERP with no hands-on experience in the core movement but were critical of the ways and means of the group processes of grassroots organisations.

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.

USERP's work on campaigns against the proposed Wesley Vale pulp mill in Tasmania was yet another case of a state government attempting to fast track a major resource consuming/polluting development.

The outcome of the Wesley Vale debate was the establishment of the 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 that 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 hybrid systems), without coming to..."
grids with the social, political, economic and ethical aspects of the issue, which were often more important than the "pure science". This means that, on many issues, SSRS failed to come to grips with the whole problem and so wasted much of its effort.

For many 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 supported the organisation's programmes through the Department of Arts, Sports, Environment, Tourism and Territories (DASET). Up until this time the administrative work for USERP Tasmania was mainly done by volunteers, 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 member was working briefly on administrative tasks.

The first grant was used initially to employ an administrative co-ordinator to work for four hours per week. As with all voluntary organisations, once paid employees are taken on, other volunteers tend 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 work with the USERP network learnings and processes. 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.

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!'

June Facior, put out a national media release opposing suppression of scientists and the lack of public debate over the proposed legislation.

In August 1991, after a special USERP Tasmanian 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 and intellectual 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 part of a national 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 would 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 DASET'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 fledging needs. Mainstream conservation organisations are heavily depen dent and maintain media profile, long term campaign strategies, membership and public support. USERP in contrast is a much smaller organisation with limited resources. It has no formal structure and alone does not have the capability to deal with the politics of science in environmental debates. USERP apparently does create a forum with the new guidelines and is unable to put the information out, due to lack of spokespersons. In some cases, other conservation groups or politicians will take the issue to the media but in other cases, nothing happens.

Incidentally, 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 as a result of government cuts in science. In such 'working from within', 'working with other conservation organisations', 'too little work is involved in establishing a branch and no funding to assist with such', 'USERP is an elite organisation', 'USERP doesn't have sufficient media coverage' and 'too little 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 ES 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 jointed 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 issue 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

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"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 indeterminism, 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."

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Determinate 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 pick 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, bil-liard-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.

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 competitive too. If you can't compete successfully you 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, 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 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 Stephen Ellkins, '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.

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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 Yauci 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 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.

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 there are lots of people who 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.
In the search for scientific and technological solutions to the global ecological crisis, few scientists have questioned the fundamental metaphors underlying both Western and Aboriginal modes of knowledge production, and the social, economic, religious and political, are integrated and interpreted 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 ecosystem, 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 it gives us our understandable scientific reality and the real. 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 that underpin and finally agree 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 metaphors. There is no sense in which a scientific ontology is 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 ceremonies, 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 of connectedness with the world and each other. A Yolngu gathering of 200 people say, at a funeral, would be seen others obscured, in a systematic way, by 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 science is a myth. 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 been most valuable to socially defined groups, 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 medieval 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 unhindered by political or ecological contingencies. The particularised knowledge of the peasant, the shopkeeper and the priest was soon left out of negotiations, and, contaminated 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 existed, and, where all other things, which cannot be counted, did not exist. All other angles were excluded from scientific reality, and all questions posed were expressed, and answered, in terms of those things which could be measured. So while the Western ontological richness in some parts 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, Western science 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 of highly tuned responsiveness to the physical and social environment, a subtlety and complexity of perception 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 marsh 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, 1986, 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 science. Environmental sensitivity is historical, sociological and religious sensitivity. The scientific process works to balance a vast range of input quantities 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 extended along all the directions which improved our potential to exploit the physical world for our comfort and economic 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, 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 context?

Summing up thus far, it is clear that in no sense is the Western scientific system truer than the Aboriginal 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.

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 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 science 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 ecology 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, Signifying the Land, Geelong, Deakin University Press, 1991) which explores the contrast between Aboriginal and Western knowledge production through the examination of a wide range of graphic and written material.
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 ecologist position that rejects Baconian-Cartesian thinking. I'd like to know first if growing up in the region in which I'm now living, and living very close to nature is part of my childhood, a very beautiful stream next to the mountains 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 childhood. 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.

**Question** You witnessed the roading of the mountains?

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

**Question** Your doctorate is in physics?

**Answer** Yes. Chipko was its sense of what is valuable 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, 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.

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

**Answer** 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 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 cut down 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 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.

**Question** Are they all women?

**Answer** 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.

**Question** So you're an exception to that?

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

**Question** So it was the loss of the stream?

**Answer** 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.

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

**Answer** 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 'ecofeminists' long before the word was invented in the West, and in 1974 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.

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

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

A And control, totally.

Q It's very much a power relationship.

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.

A Yes, very much. Knowledge as power ---

Q 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.

A No. I think the biggest threat is 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.

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

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

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

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.

A Yes, very much. Knowledge as power ---

Q Baconian science.

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

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

A And control, totally.

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


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 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 humanity. 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 precariousness, that science needs to be criticized. 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, antithetical 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 scientific enterprise 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 Nymenworth 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 scientific; it is a man, a father and infected too.'
— Virginia Woolf.

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 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 effects of male bias.

We need more women scientists to overcome the distorting effect of patriarchy. Too much focus in the social sciences is devoted to the role of women. . . . Historians, sociologists and anthropologists, for instance, have in the last two decades been devoting more attention to women's roles in the culture. This same trend has not been evident in the natural sciences. Why? For one thing, the dominant paradigm of the natural sciences is that of the individual and the individual scientist. If a woman scientist chooses to study the social sciences she must confront the same bias. If a woman chooses to study the social sciences, she must confront the same bias. The majority of people actually practising science are women (technicians) but their work is not as easily published as men.

Technicians are not as important as 'real' scientists, the argument goes, because they are not considered to be trained scientists. Their work is seen as supplementary to that of the men. The emphasis is on the individual and the individual scientist. Dr. Frost on the other hand notes, 'the majority of scientists are women who have been subjected to a training framework that is presumably designed for men.'

Trivialisation also occurs in other ways. For example, research on the role of women has been labelled 'soft' science. This is because it is not 'real' science, it is not seen as important as the natural sciences. This is a good example of the distorting effects of male bias. The majority of people actually practising science are women (technicians) but their work is not as easily published as men.

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driven by a violent storm to the north-west of Van Diemens 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 imperial country of Lilliput. Fortunately, while he stated the latitude of the shipwreck, he avoided giving the longitude—and so escapes the chance of finding the scene of his adventures among the pignions upon the coast of present-day Western Australia.

Six hundred and seventy-two companies are entered in the 787 pages of The File project. 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) just for a rebellion, when Australian interference was most important, that AASIC Australian Academy of Science and Technology Organisation—ANSTO. Then come: AAR, Aberfoyle Pty Ltd, Australian Consolidated Mines, Amscan Pty Ltd NL. Other companies such as Agip Nucleare (Australia) Pty Ltd, an offshoot of Italian Agip Nucleare SpA, and Swiss Aluminium (Australia) Pty Ltd make their appearance. The reader may be interested to note which introduces Amscan Inc, also operating in Australia. It reads: 'America's largest mining company, its interests are Anglo-American (AAC) — in terms of value (for its assets and production) a bigger swimmer in the Milly Way than RTZ but none the less, the watchwords are from Rodolpho from the Nation; 'the mind … our share is death.'

Close to home, Amoco Minerals Ltd — a subsidiary of Standard Oil of Indiana, the fifth largest American company, and has mining interests in the Papua New Guinea Ok Tedi project. Essentially miners are mired in mountains, money, governments … and deal mainly in dirt. Three years ago, at the time of the Bongassville 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 by the Freedom of Information Act, seem to show that the 'leadership was well ahead of the Government in Canberra, and the Australian Government, not the first time, but that is another story). Back to The File.

Next comes a competitor of Australian Amam Ltd, which extracts uranium and gold from the Athabasca Basin in Saskatchewan, Canada. Amam. Follows this is Australia's only home-based petrol company. But, wait: 'Amam'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 Co, 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 spaceflesh is fuelled by uranium, its banking system solidly based on diamonds and gold, and osteo-bonded in bedazzled in diamonds and platinum, and the most crucial decisions about its minerals resources taken in London—only two names need be recorded to take back to Mars or Pluto. One of them is RioTintoZinc; the other is Anglo-American (AAC) — in terms of value (for its assets and production) a bigger swimmer in the Milly Way than RTZ but none the less, the watchwords are from Rodolpho from the Nation; 'the mind … our share is death.'

Agriculture is the world's largest source of natural diamonds, held 59.7 per cent by CRA (November 1992) and 41.3 per cent by Ashton Mining (September). 49 per cent held by RTZ (September 1992), 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 crucial 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 that PM Fraser when the arrangements between CSO-De Beers- AAC-CRA-RTZ and the Fraser Government were approved under pressure from a Missouri Court of General Authority. By February 1983, before becoming the world's 'greatest Treasurer', Keating had changed his tune. Two months
and many more things, as shown in the another field of Tax, money on what Mr Fraser kept remarkably quiet. Remittance Boys(?) - gave approval to - of Government 7). The initial 1985 .contract with CSO 1992 (see in particular Part 1, vol. 2, ch.

In 1989 the Argyle venturers took to share in 'the run of the mine' iizto and it WA Inc. Perth between 1983 and 1988 'Labor' also looks at the politics of, well uranium mining, as such as forestry and wilderness protection. (The Age since 1975, has covered 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.

Whatever the political future of South Africa, the Oppenheimers control to world's largest production of gold, and the mining in Australia. In the corridors, the employee will be a way of hedging bets and obliging new industrialising countries with that combination of charm and ruthlessness in which characters The Family and props up The Firm. It is reasonable to assume that the Oppenheimers will be themselves, if not as modern 'discoverers', at least as brave and in'trepid explorers and entrepreneurs. Ernesto, the founder, equipment for this byturning Anglican and putting his industry at the service of Monarchy and Church - for many and ruthless, in 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 This File - are able to mobilise. (By the way, Queen Elizabeth II is mentioned only fleetingly in This File, with reference to Shell and her huge shareholdings in the British and Dutch arms of the company, page 71).

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 unseen of mind, what better way to salute this unique, masterful 'Tillichian' tool than to remember Eduardo Galeano's appreciation of the different meanings of citizenship?

On October 12, 1492, America discovered capitalism in 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 fitted him with intense enthusiasm and on November 27 he prophesied that "all Christians 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 "why all his life.


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 problem's, rather it is a collection of chapters by individual authors which taken together provide an interesting overall perspective. The authors have well-developed knowledge in their area, and the work is well supported by good graphics.

The book includes chapters on biological diversity, sustainable energy, reforming the livestock economy, improving women's reproductive health, mining, 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: 'modest storage in surface facilities that would be guarded and tended by a "nuclear priesthood"'.

The 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.
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.

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

For information and registration contact:

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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.
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