

Scientists and the environmental movement

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

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

This has provided an incredible strength and urgency to these debates. Science and the scientific method have become so embedded in our culture

that other disciplines even attempt to emulate them, without regard for their shortcomings. By way of example, we have the spectacle of modern economic rationalism, jettisoning important variables such as human values, creativity and the sustainability of ecological systems all in the name of an adherence to scientific principles.

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

- the whole can be understood by

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

The problems

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

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

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

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

Four roles

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

tists and scientific arguments in environmental debates.

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

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

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

The 'scientist as reformer' is generally not a role that many would like to own, with its implications of co-option and compromise. Moyer

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

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

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

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

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

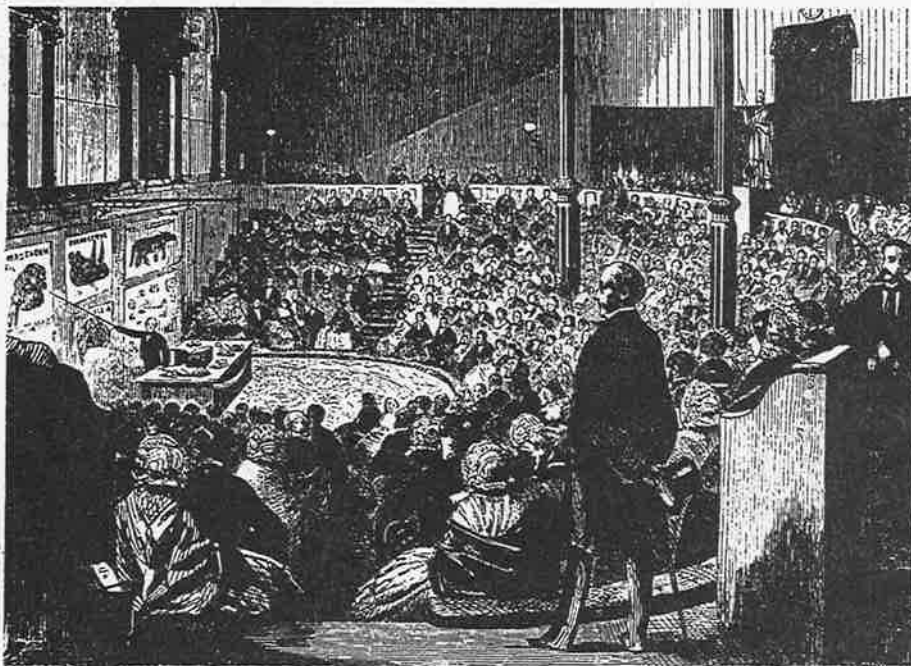
Some ways forward

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

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

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

The role of scientists in demystifying the jargon and re-presenting scientific issues to other members of the public is paramount. Scientific or techno-speak can be, and is often intended to be, disabling for many and, like econo-speak, is part of the structure that disempowers whole communities. The



Harvard sociologist of science Everett Mendelsohn once said that no-one should be awarded a higher academic degree unless they can take the archetypal 'person off the bus' and given sufficient time, have them understand the central principles of their thesis. Now that would be interesting!

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

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

So Blackburn issues the challenge both

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

References

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

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