ANZCCART / NAEAC CONFERENCE

LEARNING, ANIMALS AND THE ENVIRONMENT:
CHANGING THE FACE OF THE FUTURE

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DEMOCRATICALLY MODIFIED SCIENCE

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Introduction
The Parliamentary Commissioner for the Environment (PCE) is independent of the Government, reporting directly to Parliament through the Speaker of the House. This independence gives us the neutrality necessary for our role as an environmental "watch dog". Our work is to monitor and assess the effectiveness of New Zealand's systems for environmental management and sustainability, and to investigate and report on matters of environmental importance.

Caught in the Headlights
The PCE's recent investigation, exploring public attitudes to the idea of genetically modified biocontrols for possums, brought together the most fiercely controversial scientific field of our times, genetic engineering (GE), and the ongoing difficulties of pest management in New Zealand's intensively infested landscapes (PCE 2000).

Previous studies of the issues surrounding possum control methods (Fitzgerald et al, 1999; PCE 1998a; PCE 1994), and New Zealand's experiences with the unlawful introduction of rabbit calicivirus disease (RCD) (PCE 1998b), indicated that resolution of such issues will demand attention to a far wider range of concerns than the scientific, technical and practical challenges. Our investigation around the proposed biocontrols confirmed the fundamental importance of many other dimensions of such research and potential applications of new technologies. These included:

- understanding and respecting the full range of communities' values and worldviews, perceptions and priorities, and their assessments of science, needs, ethics, humaneness, safety, effectiveness, risks, costs and benefits;
- improving dialogue between science and citizens, and proactively addressing a disturbingly widespread pattern of public distrust and suspicion of science and its institutions;
- providing for meaningful public input into processes for making decisions and determining the parameters and directions of research;
- recognising and actively protecting the rights and tikanga of tangata whenua guaranteed under te Tiriti o Waitangi (the 1840 Treaty of Waitangi);

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- ensuring the sustainability of our unique biodiversity and production landscapes, and of the export and tourism industries that are the basis of our economy; and
- taking a strategic approach to the development and possible utilisation of new technologies in the New Zealand environment.

In relation to learning and improving public involvement in the ongoing business of science, we noted that thus far New Zealand research institutions and research investors are only just beginning the necessary processes of societal engagement to fit their work into the social, ethical, economic, cultural, constitutional and Treaty contexts (PCE 2000, p 86). We considered knowledge and information needs, and the dauntingly vast uncertainties and unknowns which characterise any immature technology such as GE (ibid pp 44-6). We looked into opportunities for public participation, and commented on various methods for communication and providing information to the public (ibid pp 67-77). We identified some critical areas for more research, not only in the fields of biocontrol technologies and their safety and effectiveness, but also in response to the challenges of public expectations of science. Work is urgently needed on the determinants of acceptability of technologies to different groups and sectors, on the cultural, ethical and spiritual dimensions, on the economic implications, on liability frameworks, and on mechanisms for communication and debate (ibid pp 86-7). We recommended (*inter alia*):

- a substantive increase in research into the interface between biocontrol technology, inclusive of GE, and New Zealand society,
- programmes for education and the exchange of information and views, and
- an independent information provider to be a trusted source of information about new technologies (ibid pp 89-90).

Other initiatives

Our project focussed on possum biocontrols, as a particular new technology which, targeting a common pest, would have relevance for most New Zealanders, and as a point around which wider issues of societal engagement with science could be assessed. A number of other recent studies and initiatives have also picked up these broader questions, both in New Zealand and overseas.

The hearings and submissions process of the Royal Commission of Inquiry into Genetic Modification (www.gmcommission.govt.nz) were a relatively formal forum where the voices of a wide range of interested groups and concerned citizens could be heard. While the official hearings necessarily followed a courtroom model, with structured presentations of evidence and cross-examination, some of the other sessions, and notably the hui with tangata whenua, took the Commission members into very different modes of learning and receiving information – for example, the two young Maori at Turangawaewae Marae who made their submission in the form of a dramatically rhythmical rap song. New Zealand's Royal Commission is the first of its kind in the world, and its report and recommendations will be enormously significant, not only for the future of GE, but also in terms of the ongoing engagement between science and the public.

Other initiatives include:

- last week's workshop hosted by the Royal Society and the Ministry of Research, Science and Technology, on "Science in Society", beginning an ongoing series of Royal Society efforts to further the debate (www.rsnz.govt.nz/news/talks/scisoc),
- the British Council's seminar and e-debate on "Democratic Science", with participants from around the world contributing ideas on the knowledge economy, communication, the impacts of globalisation, hypermarket and forum models, and transdisciplinary science (www.riverpath.com/britishcouncil)
- a survey undertaken by MORI for the Wellcome Trust on "The Role of Scientists in Public Debate", exploring British scientists' responses to increasing calls to become more involved in communicating their research to the public, and in dialogue about the social and ethical implications of their work (www.mori.com/polls/2000/wellcometrust, Hughes 2001)
- an international web-based survey of scientists and engineers, conducted by the American Association for the Advancement of Science and UNESCO, to identify the ethical issues that advances in science and technology are likely to raise in the 21st century (www.nextwave.org),
- the Online Ethics Centre for Engineering and Science, offering resources for understanding and addressing ethical problems that arise in science work, and promoting learning and education in these areas (http://onlineethics.org/), and
- the investigation by the British House of Lords' Select Committee on Science and Technology into "Science and Society", addressing a "crisis of confidence" in science; the Select Committee recognises that many other factors besides science are involved, and recommends:
    - communications and media training for scientists,
    - engaging the public as "a normal and integral part of the [scientific research] process", and
    - involving stakeholders and the public in the wider task of setting priorities for research

  (www.publications.parliament.uk/pa/ld199900/ldselect/ldsctech/38/3802).

There has also been an increasing number of articles and papers mapping out various perspectives on the challenges facing science and society in the new millennium. The ongoing discussions have focussed on communication and the media (eg Cronin 2001, Scott 2000, Highfield 2000, Crichton 1999, Karlberg 1997, Hornig and Talbert 1993, Nelkin 1987), on uncertainty and risk assessment (eg Bradshaw and Borchers 2000, Wynne 2000, Sullivan and Hunt 1999, *NZ Science Review* Risk Assessment Conference issue 1998, O'Riordan and Jordan 1995), on the relative responses of experts and non-experts (eg Wynne 2000, Shrader-Frechette 1999, Chociolko 1995), on adaptive systems approaches as opposed to reductive linear models (eg Gallopin et al 2000, Ulrich 1999, Gough et al 1998), and on the very nature of science itself (eg Brenner 1998, Ziman 1998, Myers 1997, Nader 1996). These few relatively random examples are only the tip of the iceberg – the many inter-related issues around science, the public, and processes of learning and communications are now, rightly, being given high priority.

A new kind of science

Most of these initiatives and papers reach very similar conclusions to our possum biocontrols study – recognising the acute interest of the public in science and its applications, and encouraging the evolution of more inclusive, more accessible, more democratic forms of communication and learning. There is acknowledgement that the increasing corporatisation of science, and the commercial imperatives driving much contemporary research, are also powerful influences on communities' attitudes. There seems wide agreement that the 21st century will require new kinds of relationships between science and the people who encounter the products of that science in their landscapes, workplaces, supermarkets and doctors' surgeries.

How will learning be different? Perhaps the most radical shift is in the expectation of what is to be learned and by whom. Science communication can no longer be primarily a one-way process, with professional, highly trained experts providing scientific information to the "uninformed public" – the classic top-down "expert-led, deficiency-remediation approach" (Gough et al 1998, p 368). Scientific learning will become more of an egalitarian process where many different viewpoints and different kinds of information – technical and non-technical, empirical and emotional, quantifiable and subjective, formal and personal, authorised and unorthodox – are all accepted as valid, and valued.

Scientists will have as much learning to do as anyone else – including mastering the skills necessary to communicate effectively about their research and to engage convincingly with the public. Scientists also face some steep learning curves in canvassing and meaningfully integrating the diversity of stakeholder views, concerns and priorities relevant to and potentially affecting their research. For many, this will not be easy. The paradigms, methods and tools that scientists will need in the new arena of public involvement are in many ways fundamentally alien to the traditional expectations of what science is all about. Many scientists are still trained and habituated to think of themselves and their endeavours as working to an ideal of ordered rationality – precise, analytical, disciplined, free from bias because of its reliance on verifiable facts, autonomous, authoritative, and consistent in its methodological approaches to solving problems and testing hypotheses. These qualities are critically important, and must be scrupulously protected – not only for scientific and academic rigour, and the professionalism and satisfaction of science practitioners, but also for the credibility of science to the public, and confidence in robust methodologies and findings.

In addition, the science community will need to integrate and demonstrate a range of radically different conceptual frameworks in relation to their profession and roles, their fields of research, and the eventual applications of their work. Some of the studies noted above recommend special training programmes for scientists to help them deal with these challenges and maximise the opportunities of public involvement (eg Hughes 2001, House of Lords Select Committee 2000 www.publications.parliament.uk/pa/ld199900/ldselect/ldsctech/38/3802). And a previous ANZCCART conference also included comment on the need for training for scientists in these areas (Fleming 1999). I would endorse the value of such training initiatives. But it is also important to acknowledge existing competencies – many scientists will be able to draw on teaching experience and their work with teams of students, on skills and personal qualities from their non-professional lives, and on their passion and enthusiasm for their speciality and for science in general. The stereotypical white-coated, incomprehensibly arcane science-nerd is a dangerous myth – many scientists are creative communicators, clear and imaginative in talking about their work, sensitive and practical in engaging with non-specialists. Such individuals should be highly valued by their institutions, and their role and skills assiduously fostered.

Communication processes

In responding to challenge and change, it can be interesting to go outside the usual frameworks of reference. I would like to suggest that, in the processes of communicating science and engaging with communities, there are some useful lessons that can be learned from the advertising industry.

Advertising is often scorned and dismissed as a rapacious, mendacious and utterly amoral business. The writer George Orwell described it as “rattling a stick inside a swill bucket”. But the fact remains that advertising and marketing are the dominant modes of public communication by which most citizens of the Western world receive information, images and ideas. “Marketing analysts have revealed that the average American is exposed to over 20,000 radio, TV, newspaper and outdoor ads, sales pitches, flyers, coupons, signs and other promotions *every week*” (Wendel 1998, p 21, his emphasis). Advertising, marketing and public relations are ubiquitous in our society – highly sophisticated, continually evolving billion-dollar industries. The public are familiar with and acculturated to its methods, framing assumptions and sheer flair (Klein 2000, Beder 1997, Frank 1997, Mayhew 1997). Therefore when you’re developing a communications strategy, and looking for ways to make contact with the public, it’s worth studying the tactics of the super-communicators.

A few key principles can be highlighted as starting points. They may seem obvious, but communications failures will often have their origins in inadequate attention to the basics.

1: <u>Check out your audience</u>: Who do you want to reach? Which groups or sectors need to learn about what you’re doing, and give you their feedback? Often it is assumed that communication is a process aimed at some generalised amorphous mass called “the general public”. But thankfully humanity is diverse and varied, and we are all gloriously different. Market surveys and data mining – extracting specific patterns, trends and critical variables from statistical information – are an essential part of the process.

Depending on your messages and objectives, you may not need to go very widely at all. The particular nature of your research, and its potential future applications, will determine your priority groups. Discriminate, and target key groups – business, political sectors (both national and local), rural, Maori, women, young people, and affected parties (eg neighbours, beneficiaries). There may be a direct relationship with your work, or the relevance may be more associative. With possum biocontrols, for example, the most obvious interested groups were farmers and conservationists, but because the proposed biocontrol methods aim to affect fertility and reproduction, women’s responses were also important.

Different information, styles and methods will work for each group. An important factor is the specificity with which you explore your audience's characteristics, demographics, behaviours, attitudes and values. A general category of, for example, "women" may give some very broad-brush indications, but a range of other variables will shape learning and communication – rural/urban, age, education, culture, motherhood, marital status and sexual orientation, religious and other beliefs, economic status, and work experience. Understanding your target groups and their expectations will be an ongoing, evolving process – advertisers and marketers are continually adjusting and refining their approaches, based on reactions to previous campaigns. In some ways it's very similar to the environmental principle of adaptive management, where close monitoring and feedback loops provide information for fine-tuning.

2: <u>Check out the opposition</u>: Good advertising is acutely aware of the competition. For science communication processes, this will often be the other voices, agencies and groups active in your field – the competing messages, value frameworks and stories about science that are vying for your audience's attention. It is important to acknowledge the sophistication, intelligence and commitment of the NGOs and campaigners on science issues, many of whom have extensive knowledge and/or formal scientific training, and base their arguments in exhaustive research.

You need a good understanding of the messages and themes being disseminated by the competition, and the responses of your target audiences. What ideas, values and priorities are being highlighted? What are the underlying patterns and concerns? Position yourself strongly relative to the opposition. This can be done in a number of ways:

- firmly counter any major challenges,
- contrast your strengths to any weaknesses or gaps in others' arguments,
- stake out a totally new area or aspect your competition has not made a priority, or
- endorse and support their priorities and values, and integrate these into your programmes.

Whatever tactics are appropriate, a few fundamental rules will almost always apply:

- avoid trivial squabbles and irrelevant matters – the undignified spectacle of "confrontations of duelling experts" (Chociolko 1995, p 24) that only serve to erode confidence in science,
- avoid being defensive, and
- avoid being hostile, negative or destructive of other participants in the debate, or their values and ideas.

3: <u>Have credibility</u>: Why should your audience trust you? Why should they believe what you're telling them? Why should they even listen to you? Credibility is a complex and often very fragile component of the communication matrix. It includes such factors as sincerity, consistency, accountability and transparency – being able to demonstrate quality and integrity in your operations and your product. In the feedback we received from various groups canvassed for the biocontrols investigation, the rigour and comprehensiveness of trialling and testing processes were continual themes – people wanted reassurance that a thorough, proper job is being done.

Credibility is also shaped by communication style and the methods and media chosen. It can be enhanced or undermined by a number of factors. These include the language and vocabulary used, the visual images, the accessibility of your data, and the overall pitch or levels at which you engage with your audience. Most fatal of all is any perception of overt spin or manipulation – as Roy Rogers, the cowboy movie star, said: “The more you do something that don’t look like advertising, the better advertising it is.”

4: Have clear messages: Be as precise as possible about the responses, changes and feedback you want from your audience. Seeking “increased public awareness” is too broad and waffly. Do you want to change their attitudes? get their approval? change their behaviour? get specific reactions to a range of options for new research projects? The clearer you are about why you’re engaging with your audience, the easier and more effective the process will be.

Clarity is also important in relation to the different messages you’ll want to communicate about the various dimensions of science and your work. Avoid confusion between the different levels or tiers of the overall enterprise:

- particular research projects, methodologies and technical matters,
- the problems or needs being addressed, and the evidence that demonstrates their importance,
- your agency, institution or university,
- your field or discipline, and
- science generally.

What information does your audience need to know? How much is really necessary for an understanding of the issues? Overloading busy people with too much detail, secondary information and explanations will often alienate them, or just bore them into dismissing you. On the other hand, too skimpy a presentation, or an analysis that comes across as superficial, will insult their intelligence. Sensitivity to your particular audience and their expectations will be critical.

Even more basic than the level of detail is the question of relevance. Why is this science important to your audience? why do they care? how will it affect them? why do they need it? or why do they want it? (which is not necessarily the same question, as any marketer knows). Identify some point of meaningful connection between your audience and your science work, and keep it central in your messages and your overall approach. Often this will be easier and more direct in the form of stories, narrative threads or structures that draw out the significance of your science work, that resonate with people’s lives and dreams, and help them to locate themselves in relation to the technology or scientific information (Lustberg 1997, Johnson-Cartee and Copeland 1997, pp 65-73).

5: Have adequate resources: Effective communication takes money, time, expertise, preparation and planning, monitoring and follow-up, and, often, rather expensive technical and imaging services. While it would be extremely unlikely that many scientists (especially in New Zealand) would have the kinds of communications budgets of the big ad agencies, it will be important for science institutions and project managers to make adequate allocations for public information and participation programmes.

The advertising and marketing industry can of course charge everything back to the client, and it would seem logical for science to build a communications component into project budgets, as for other overhead costs like workplace safety and support services. Other opportunities to ensure adequate resourcing include special grants such as the Science and Technology Promotion Fund administered by the Royal Society – contestable funding for activities that foster positive attitudes towards science, mathematics and technology. I rather like this year's deliberate targeting of "non-attentive audiences" (www.rsnz.govt.nz/funding/st_promotion/index.php).

New Zealand is a nation of improvisers, and there are many ways of getting what is necessary for a good communications programme. For those scientists within universities, one idea would be to explore collaborative projects with the departments of Marketing, Media Studies, Art and Design, Drama, and Information Technology. There would be strong potentials for science to learn and benefit from the creativity of students and staff in these areas.

Conclusion

Throughout its long history, science has undergone many changes in response to new discoveries and new social, philosophical and political conditions. Science is continually in a state of evolution, or revolution – for example, Copernicus and Galileo, the influx of scientific information from Islamic Spain at the end of the Middle Ages, Darwin and the *Beagle*, Bohr and Heisenberg and the extraordinary implications of quantum physics, and the awesome significance of Hubble's work with redshifts (Bragg 1998, Panek 1998, Silvers 1995, Ferris 1989, Burke 1985). The challenges now facing science and technology will be equally critical for the 21st century. There are enormous opportunities to develop new forms of communication, public participation, accessibility and learning, and to "change the face of the future".

REFERENCES

Beder, Sharon, 1997. *Global Spin: The Corporate Assault on Environmentalism.* Scribe, Melbourne.

Bradshaw, G A, and J G Borchers, 2000. Uncertainty as Information: Narrowing the Science-Policy Gap. *Conservation Ecology* 4(1):7. www.consecol.org/vil4/iss1/art7

Bragg, Melvyn, 1998. *On Giants' Shoulders: Great Scientists and their Discoveries from Archimedes to DNA.* Hodder and Stoughton, London.

Brenner, Sydney, 1998. *The Impact of Society on Science.* www.sciencemag.org/cgi/content/full/282/5393/1411

British Council 2001. *International Seminar on Democratic Science*. www.riverpath.com/britishcouncil/report

Burke, James, 1985. *The Day the Universe Changed.* Little, Brown and Company, Boston.

Chociolko, Christina, 1995. The Experts Disagree: A Simple Matter of Facts Versus Values? *Alternatives*, Vol 21, No 3.

Crichton, Michael, 1999. *Ritual Abuse, Hot Air, and Missed Opportunities*. www.sciencemag.org/cgi/content/full/283/5407/1461

Cronin, Karen, 2001. *Science versus Suspicion: The Art of Communicating Science and Technology*. Paper presented to Corporate Communications Conference, Institute for International Research, May 2001.

Ferris, Timothy, 1989. *Coming of Age in the Milky Way.* Vintage, London.

Fitzgerald, G P, L S Saunders and R L Wilkinson, 1996. *Public perceptions and issues in the present and future management of possums*. MAF Policy Technical Paper 96/4. Ministry of Agriculture, Wellington.

Fleming, Jean S, 1999. Science, Scientists and Trust. *Innovation, Ethics and Animal Welfare: Public Confidence in Science and Agriculture*. Proceedings of the Joint AWAC/ANZCCART Conference, Wellington, November 1999, pp 75-82.

Frank, Thomas, 1997. *The Conquest of Cool: Business Culture, Counterculture, and the Rise of Hip Consumerism.* University of Chicago Press, Chicago.

Gallopin, Gilberto C, Silvio Funtowicz, Martin O'Connor and Jerry Ravetz, 2000. Science for the 21st century: from social contract to the scientific core. *International Journal of Social Science*, Vol 168.

Gough, Stephen, Christopher Oulton and William Scott, 1998. Environmental Education, Management Education and Sustainability: Exploring the Use of Adaptive Concepts. *Environmental Education and Information*, Vol 17, No 4, pp 367-80.

Highfield, Roger, 2000. *Selling Science to the Public*. www.sciencemag.org/cgi/content/full/289/5476/59

Hornig, Susanna and Jeffery Talbert, 1993. *Mass Media and the Ultimate Technological Fix: Newspaper Coverage of Biotechnology*. Center for Biotechnology Policy and Ethics, Texas A&M University.

House of Lords Select Committee on Science and Technology, 2000. Third Report: *Science and Society*. www.publications.parliament.uk/pa/ld199900/ldselect/ldsctech/38/3802.htm

Hughes, Catherine, 2001. Shackled to Stereotypes: Scientists know that their image is poor and accept that they need to do something about it. *Science and Public Affairs*, February 2001, pp 21-23.

Johnson-Cartee, Karen S, and Gary A Copeland, 1997. *Manipulation of the American Voter: Political Campaign Commercials.* Praeger, Westport.

Karlberg, Michael, 1997. News and Conflict: How Adversarial News Frames Limit Public Understanding of Environmental Issues. *Alternatives*, Vol 23, No 1, pp 22-7.

Klein, Naomi, 2000. *No Logo*. Harper Collins, London.

Lustberg, Arch, 1997. Ten Commandments of Media Salvation. *State Government News*, Vol 40, No 10.

Mayhew, Leon, 1997. *The New Public: Professional communication and the means of social influence*. Cambridge University Press, Cambridge.

MORI 2001. *The Role of Scientists in Public Debate.* www.mori.com/polls/2000/wellcometrust.shtml

Myers, Norman, 1997. The scientific enterprise. *The Environmentalist*, Vol 17, pp 149-151.

Nader, Laura, 1996. *Naked Science: Anthropological Inquiry into Boundaries, Power, and Knowledge*. Routledge, New York.

Nelkin, Dorothy, 1987. The high cost of hype. In: *The Ethical Dimensions of the Biological Sciences*, eds Ruth Ellen Bulger, Elizabeth Heitman and Stanley Joel Reiser. Cambridge University Press.

New Zealand Science Review, 1998: Risk Assessment Conference issue, Vol 55, No 1-2.

O'Riordan, Timothy, and Andrew Jordan, 1995. The precautionary Principle in Contemporary Environmental Politics. *Environmental Values*, Vol 4, pp 191-212.

Panek, Richard, 1998. *Seeing and Believing: The Story of the Telescope, or How We Found Our Place in the Universe*. Fourth Estate, London.

Parliamentary Commissioner for the Environment, 2000. *Caught in the Headlights: New Zealanders' Reflections on Possums, Control Options and Genetic Engineering.* PCE, Wellington.

Parliamentary Commissioner for the Environment, 1998a. *Possum Management in New Zealand: Critical Issues in 1998*. PCE, Wellington.

Parliamentary Commissioner for the Environment, 1998b. *The Rabbit Calicivirus Disease Saga: a biosecurity/biocontrol fiasco*. PCE, Wellington.

Parliamentary Commissioner for the Environment, 1994. *Possum Management in New Zealand*. PCE, Wellington.

Scott, Alister, 2000. *The dissemination of the results of environmental research*. A scoping report for the European Environment Agency. Science and Technology Policy Research Unit, University of Sussex.

Shrader-Frechette, Kristin S, 1999. *Evaluating the Expertise of Experts.* www.fplc.edu/risk/vol6/spring/shrafrec.htm

Silvers, Robert B, 1995. *Hidden Histories of Science.* Granta, London.

Sullivan, Rory, and Amanda Hunt, 1999. Risk Assessment: The Myth of Scientific Objectivity. *Environment and Planning Law Journal*, Vol 16, No 6, pp 522-530.

Ulrich, Werner, 1999. *Systems Thinking As If People Mattered: Toward a Knowledge Democracy*. Erskine Lecture, University of Canterbury, May 1999.

Wendel, Peter, 1998. Making Political TV Spots that Work in an Age of Media Clutter. *Campaigns and Elections*, Vol 19, No 7, pp 18-21.

Wynne, Brian, 2000. *Expert Discourses of Risk and Ethics on Genetically Manipulated Organisms: the weaving of public alienation*. CSEC, Lancaster University.

Ziman, John, 1998. *Why must scientists become more ethically sensitive than they used to be?* www.sciencemag.org/cgi/content/full/282/5395/1813