

The Essence of Science: The Social Responsibility of Communicating

WHEN we were students, we were taught that a piece of scientific research was not completed until it had been published. Research was not just a matter of personal discovery, it was a part of a larger scientific enterprise — an effort to understand how the world worked. But since then, it has become clear that science must be viewed as part of a larger social picture. Especially in ecology and conservation biology, research cannot now be considered complete until its significance has been explained to the general public. Indeed, if a study has no significance to society as a whole then the research should not be supported by government funds. Better general understanding of how the world works is significant for everyone, although sadly much ecological research in both Australia and the United States involves more and more sophisticated studies of more and more trivial problems.

Both the need for more intelligent selection of research topics and for communication of research results to a broad audience is, fortunately, being increasingly recognized. In the latter area, the Ecological Society of America has recently helped establish the Aldo Leopold Leadership Fellows Programme. The Programme is training senior ecologists to communicate with the general public and to give testimony before Congress about the crucial environmental issues facing society. It is a competitive programme, and many more first-rate ecologists applied for the first two classes (20 trainees each) than could be accommodated.

Since no one could be considered a world-class ecologist today who does not make his or her knowledge and expertise directly available to the general public, it is tragic that Australian scientists are discouraged from helping society cope with its nearly overwhelming environmental problems. Recent changes in the way research in Australian universities is encouraged by Commonwealth funding rewards communication among scientists, but devalues any attempt to explain science to the general public. Universities could ignore these policies and encourage their staff to interact vigorously and openly with the community, but the brand of managerialism now prevalent in universities responds only to financial reward. This, combined with the notorious practice of Australian government agencies censoring the ecologists they employ, is cheating the Australian public by

denying them complete access to the findings of what may be, *per capita*, the finest national group of environmental scientists in the world. It is a disgraceful policy, that should immediately be reversed.

Instead of discouraging communication with the public, governments and universities should make it a requirement for research scientists to periodically present the results of publicly-funded research to the non-scientific community. This can be done through the publication of popular scientific articles, letters to newspapers, and being available to the media (radio, television, and the print trade) for interviews, articles and advice. Failure to communicate in this way should make individual scientists ineligible to receive public funding for their research, while universities with active programmes of public science communication would be rewarded with an increased research quantum.

We recognize that many, perhaps most, scientists lack the skills to communicate effectively with the general public or with the media. This is not a reason for inaction or retreat to the "Ivory Tower". As with the Aldo Leopold Leadership Fellows Programme, training is required. Scientists not only need to learn how to communicate with non-specialist audiences, they need to learn that it is as much part of the scientific process as applying for grants and publishing the results of their research in peer reviewed journals. Workshops for senior scientists on how to communicate effectively with the public and social responsibility are required. Changes are needed in the instruction of undergraduate and graduate students. Science students need to be taught ethics, and about human society and how to be human. Students of the humanities, economics, law and business need to be taught about the culture of science and the importance of science to human endeavour. As much to incorporate these changes as to cope with the expansion of knowledge in the past century, undergraduate science programmes require a minimum of a full four years for all students, not the three years typical of Australian universities.

The message is simple. Change and participate in the scientific process at all levels or lose your rights to conduct research. Communicate your research to the public who funded you. Tell them why it is important. Pressure governments

to change poor policies with respect to science, education and biological conservation. Help agencies write better policies and to develop management protocols based on the best available science. We should determine the direction of scientific endeavour and discourse in our communities, not politicians and bureaucrats whose environmental, social and economic policies provide convincing evidence that they have no real understanding of ecological processes or of the dependence of humanity on the services provided by healthy, functional ecosystems. If governments and

managerialism are allowed to continue to marginalize science and to prevent scientists from communicating with the general public, not only will we lose our rights to conduct research, but we will have failed to meet our responsibilities to communities within which we live. Our failure will mean that future generations will inherit an environmentally challenged and depauperate planet, a planet devoid of the life and opportunities we have been privileged to enjoy.

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Editorial Policy on Referees

THERE is more to being a scientist than completing a research project and communicating the results to one's peers and the general public. Scientists have a wide range of responsibilities both within the scientific community and within society as a whole. I have frequently urged my colleagues to participate in the political processes of environmental management and conservation. It is equally necessary for scientists to contribute to the mechanics of keeping the scientific community functional. Individuals need to take responsibility for organizing scientific meetings, administering scientific societies, reviewing grant applications, and publishing professional journals. Peer review of the work and research proposals of colleagues is a necessary contribution of time if the machinery of science is to function smoothly. As editor of this journal, I can assure you that not all scientists accept these responsibilities.

The greatest challenge in being the editor of a scientific journal is not in finding good papers to publish. Rather, it is in finding individuals willing and able to critically and constructively review papers submitted for publication. As we all know, constructive refereeing is necessary to ensure quality publication. Despite this, more than a third of reviews sought by this journal are either inadequate or are never received: hence, the need to send all papers to three referees. Poor and tardy refereeing accounts for the largest part of the delay from when a paper is received to when it is finally published (or rejected). So serious is this problem, that I now refuse to accept

papers from individuals who have consistently failed to participate in the process of peer review. In addition, when I am asked to referee a paper by another journal or to review a grant application by a granting agency and the author or applicant is a person who I know refuses to participate in reviewing the work of others, I refuse to referee their work. In doing so, I am careful to explain the reason to those who have made the request.

Can I ask that if you receive a paper to review and are unable or unwilling to do so that you at least advise the editor. Often we simply cannot find out if the paper was even received despite repeated requests for an answer. If you cannot referee a paper, it would be helpful if you could suggest an alternative referee. If you want to referee the paper, but it will take longer than requested (usually three weeks), please advise us and more time will be granted. Passing on a paper for review to a colleague, even a postgraduate student, is entirely appropriate so long as the person asked to fill in has the necessary knowledge. I do use postgraduate students as referees from time to time and am considering using postgraduates as the third referee on a regular basis. Advice from readers and contributors to the journal on this particular point, as well as names, contact details and area of expertise of suitably qualified and willing students, would be welcome. I believe it would be good experience for students and it would take some of the burden from more senior individuals, most of whom I will concede are already very busy.

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