Science and Politics – Speaking Truth to Power

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Introduction

So many of the big issues facing society are "science-intensive", and beneficial outcomes are unlikely unless science can be actively engaged in the development and assessment of appropriate policies. Climate change, over-allocation of water, endangered species issues as well as a raft of medical issues are all science-intensive issues where factual knowledge from science intersects with strongly held values.

This interface is difficult for science, since the language and operating rules of both make them seem like foreign languages to each other. It is important to explore these issues to find how science may make a more effective contribution, in situations where all interests do not necessarily welcome its messages.

This paper will explore these differences in a general way, and then examine an Australian example of a science intensive conflict about returning water to an over allocated river, the Murray. From this case study the various ways science is misused in such debates will be drawn out, and some lessons for science developed.

The Two Cultures

Science seeks the truth. It makes observations and then develops explanations that are tested by making predictions. Ideas are involved in a Darwinian struggle for supremacy, and scientists often take contrary views to test the current orthodoxy. At all times science is contestable, and alternative explanations can be advanced which will be assessed against the conventional explanation to see if they provide a superior explanation or predictive capacity (Popper, 1969). Before a new hypothesis can replace an old one as the accepted theory, it needs to give better predictions than the one being discarded. While science seeks the truth it can never be confident it has been found. A better or more powerful explanation may be just around the corner.

The political process is also driven by a Darwinian battle for supremacy, but this time the battle is about the underlying values that drive human behavior. We are driven by sets of values that may include things like truth, justice, freedom and religious beliefs but may also include things like taming the environment, conserving nature or creating wealth. We have a mix of these values, and we order their priority in the context of a particular issue. We

frequently believe our particular values are more important than those of others, and should be imposed upon others. Some of us are driven by a will to win, whatever it takes, and we have a range of approaches to risk. Self interest is a powerful evolutionary strategy.

The political process provides the forum for the contestability of these value sets in the context of some specific issue. Politicians listen to a range of interests on any issue and come to a judgment as to the best way forward at that time. Commonly, they make their judgments on the basis of short-term popularity, although longer-term visions of the society they aspire to may provide the framework for weighing up conflicting elements. Many are elected because of the support of particular interest groups, and they will commonly seek to advance those interests.

The world of science and the world of policy have other differences that make connection difficult (Briggs, 2006). Science tends to be driven by the passion of the scientist; others set policy agendas. Science takes time to explore issues and develop understanding; policy issues are frequently developed in great haste. Policy positions are developed in a negotiating framework seeking to embrace a range of interest groups, whereas science is about finding the best solution or explanation. Both groups also seek to protect their position, scientists are the gatekeepers to the knowledge base; policy people seek to protect their power to influence outcomes.

The Anatomy of Conflict

While conflict lies at the heart of both the scientific process and the political process, and might be expected to provide a common foundation for common understanding, it does not.

Science conflicts are resolved by gaining a consensus which becomes the orthodox view, although there will always be contrarians pushing other views. Both groups resort to the data sets, although they may choose different data sets to advance their position.

Political conflicts are resolved through processes of bargaining and negotiation using whatever arguments can be mustered to advance particular positions. The objective is to build a solution that will be supported by a coalition of interest groups. Science is just a tool to help win their case, as are economics, ethics and the law. The objective is not to find a truth, but to find an outcome acceptable to relevant interest groups.

In most conflicts we can identify five key elements.

- Interests, relating to the personal benefit an individual gets from a particular outcome in terms of financial reward or access to a resource.
- Values, relating to where we stand on issues like development–conservation, justice, the sanctity of life and so on.
- Data, relating to our trust in the reliability of available information, its relevance to the particular issue and to the models we use to explore and make predictions from that data. The amount of water required to support the environment, and how it

should be delivered to the environment is a classic situation where imperfect information makes resolution difficult.
- Structural issues relate to the conflicts we create with the boundaries between organizations with different objectives. Fish and wildlife organizations and environment protection agencies are likely to be in frequent conflict with regional development agencies about appropriate ways to go forward.
- Risks – humans have a range of approaches to risk. Some of us are cautious and averse to risk, others are much more prepared to take a chance in the hope of a big win and just hope that the risks are worth it.

These five elements are common in environmental conflicts, although one may dominate. Data elements are commonly used as a Trojan horse to hide other elements. The different elements generally require different strategies to resolve them (Cullen, 1998).

Environmental conflicts are often complex and have several characteristics:

- They have several different parties involved.
- They have several different issues of interest to different players.
- There is uncertainty about how the ecosystem will respond to various operations and possible accidents.
- Environmental information, especially predictive models, is often poor and not available to all players.
- There is uncertainty about how the various political players will act.
- There are high emotions since all participants believe strongly in the virtue of their own position and the self-interest of all opposing positions.
- The conflicts are very public, being played out for the evening TV news so it is easy for participants to get locked into extreme positions and find it hard to back down.

Science can make a number of contributions to an environmental conflict.

- Problem identification – the scope and implications of a problem.
- Contribute to getting an issue onto the political agenda.
- Helping develop and evaluate appropriate strategies to deal with the problem.
- Modeling likely futures with and without an intervention to help communities see the consequences of various actions.
- Monitoring and reporting on what is achieved in any intervention to enable adaptive management to take place.

Returning Flow to the Murray River

The Murray-Darling Basin is Australia's largest river system and has been extensively developed for irrigation. The Basin has an average annual runoff of 23,850 GL, of which 12,809 GL, or 54%, is extracted for human use. There has been growing community and hence political concern about the degradation of the Murray River. Symptoms include loss

of native fish, loss of connected wetlands and associated birds, regular algal blooms in slow moving weir pools, and most recently extensive loss of river redgums on the floodplain.

The degradation of the health of the river is well documented in various scientific papers and Government reports. A national assessment of river health showed widespread change in the condition of many rivers due to human activities (Anon, 2002).

Science has also been important in identifying the various factors leading to degradation, and this has led to various interventions to ameliorate their impacts.

- Pollution due to point source discharge of sewage treatment works. Extensive upgrades and diversion of effluents away from the river over the last 25 years have reduced this problem.
- Blockages to fish movement from weirs has been recognized and a program of fish ladder construction is underway
- Rising salinity due to irrigation and to dryland salinity has led to extensive investments to reduce salt flow or to divert salty water to evaporating basins.
- Damage to riparian vegetation has been recognized, and considerable community effort has gone into fencing and restoration of these areas.

However, one of the main causes of degradation that has been difficult to address is the over-allocation of licenses to extract water for irrigation. Under natural conditions around 54% of the runoff of the basin would find its way to the sea; under present conditions only 21% reaches the sea, and a dredge is now operating permanently to try and keep the river mouth open. While there are still some who believe any water getting to the sea is wasted, this is now a minority view.

Not only has science identified the problems with the health of the Murray, and identified the various stressors that need addressing, some scientists have been active in communicating these issues to the public in an attempt to get them onto the political agenda. University scientists have generally done this. Scientific societies like the Australian Society of Limnology have not been influential since they have found it difficult to come to a position they were prepared to advance publicly due to the diversity of their membership and uncertainty as to their role in public debates.

The other critical factor in getting political attention to the plight of the Murray is concerns of residents in the city of Adelaide that draws its water from the lower reaches of the river. Many people believe mismanagement of the river upstream is impacting on their water supply. Adelaide has a number of political seats that are hotly contested and so this helps get political attention.

However, there are interest groups who seek to block any return of water to the river, mainly on the grounds that taking any water away from irrigation will impact on irrigator and general community wealth. These groups have used a number of tactics to delay addressing the problem.

- Denial of the problem. Arguing that river health was fine and that concerns were overblown. This came largely from upstream interests who were not living with the degradation.
- Delaying tactics. Asserting that other factors were more important than flow, but producing no evidence, expecting these views to be treated as comparable to those of science.
- Engaging advocacy organizations to confuse the issue with articles in regional papers casting doubt on the need for any action, and for water recovery in particular.
- Attempting to silence scientists that work in Government agencies on the grounds they should not be involved with policy.

The problems of the Murray River are difficult to address, and the issues had been hotly contested for some years. Academics and agency officials had been working for some years on developing appropriate ways forward, but the issue had come to a stalemate - a set of problems needing a solution, but with no agreement as to how to go forward.

The Wentworth Group of Concerned Scientists

In 2002 Australia was in the grip of a major drought and newspapers were running drought stories each day showing the plight of farmers. Radio talk back hosts were dreaming of visionary schemes to turn coastal rivers inland to droughtproof the country. Many idiotic solutions were being advanced to address the issue.

A group of experienced scientists from a variety of disciplines, who had spent their careers trying to understand the Australian landscape, came together in some despair at the widespread community misunderstanding about our landscape and the variability of rainfall that characterizes it.

The group came up with a consensus position on key elements. This was released as the Wentworth group's "Blueprint for a Living Continent". It received widespread media coverage and was influential in State and Federal Governments addressing some key environmental issues. There were five clear actions identified.

- Clarify water property rights to give farmers certainty, create a water market and use it to recover water for the environment.
- Restore environmental flows to stressed rivers.
- End broadscale landclearing of remnant native vegetation.
- Pay farmers for environmental services.
- Incorporate into the cost of food and fibre the hidden subsidies currently borne by the environment.

There were some remarkable outcomes from the release of the Blueprint. The NSW Government asked for further work, but moved to stop broad scale clearing of native vegetation and established a regional catchment management structure. The Queensland Government brought in strong controls on land clearing and a Wild Rivers Act to protect

undamaged rivers. All States and the Commonwealth signed the National Water Initiative to implement significant water reforms including a commitment to restore all over-allocated and stressed rivers to sustainable levels of extraction.

The Wentworth Blueprint, and the media coverage it received, turned out to be a focusing event that moved the issue higher on the political agenda, because many in the community could at last see some clear and simple ways forward, and this removed an impediment to action – the confusion of a multi-faceted problem with many positions being articulated by a variety of interest groups.

The National Water Initiative

National water reform was another outcome of the Blueprint. While many agencies and academics had been exploring possible new policy options, the Blueprint built on this work, gave it public prominence and created a momentum for action. The National Water Initiative was signed by the Prime Minister and State Premiers in 2004, and this led to agreement for significant reforms, the creation of a National Water Commission to oversee their introduction and the creation of a $2 billion Australian Government Water Fund to help the reforms. The essential elements of this reform required:

- Water plans that identify sustainable levels of extraction from each river
- Commitment to return over-allocated systems to sustainable levels of extraction, and the provision of $500 million to implement the first step of the Living Murray project to return 500GL to the river.
- Secure water rights for irrigators.
- Creating a market for water licenses to enable water to move to higher value uses.

Irrigation interests now focused on having the available funds spent on upgrading water delivery infrastructure rather than using them to purchase water on the market. Fear campaigns were mounted that if the Government entered the water market it would push up the price of water and make it impossible for farmers to buy water and that rural communities would be decimated if water left their district. Much of the water infrastructure is dilapidated, mainly due to irrigators not being prepared to pay sufficient for water to allow for maintenance, and this seemed a good opportunity to have public funds refurbish it. However, many of the infrastructure projects proposed were ridiculously expensive in terms of the agricultural wealth that might be created.

There is no doubt that in some situations restoring water infrastructure is a good investment that saves water and reduces problems such as groundwater accession. In other situations it just takes water that would have returned to the environment anyway and may well have been allocated to a downstream user. Taking such water as an environmental license and holding it in storage does mean it can be used to achieve better ecological outcomes.

Ample funds are available for infrastructure projects, but water agencies seem to lack the capacity to identify appropriate projects. Irrigation communities still argue the market should only be used as a last resort because of the “social value” of water to irrigation

communities. This would seem to be a delaying tactic in the hope that the political situation will change and Governments will lose interest in the issue.

This stand-off has now been broken, and State and Federal Governments have announced they will enter the water market, and have allocated substantial funds to provide water buy-back programs.

How Science Contributed towards a Successful Outcome

There is little doubt that the Wentworth Group's intervention was a successful element in focusing political attention and moving the discussion from a litany of problems to some understandable and practical solutions.

Lunney (2003) has described the Blueprint for a Living Continent as a major document in Australian conservation biology calling it "more than just an influential report, it is a model for change". He describes the Blueprint as brief, well written and positive. He also criticizes it for not being more comprehensive and addressing some of the other important issues concerning the environment. The Wentworth Group could have written a comprehensive treatise, like many others have done, and it would not have had the impacts of the Wentworth Blueprint which was written to deliver a message to the media and politicians rather than to academic elites.

The factors that seem to have contributed to the success of the Wentworth Group are:

- Clear and simple language that everyone could understand (Kelly, 2006). No qualifiers, conditions or references.
- Clear articulation of the problem, but strongly linked to realistic and effective solutions that could be implemented by governments should they wish.
- No obvious self-interest in that the Group was not just calling for research funding
- The message kept focused on the key points and did not diverge to the many other interests that the authors also feel passionately about.
- The timing was crucial, in that Australia was in the grip of a major drought attracting extensive media coverage, and both the media and the community were ready for solutions that moved the story on.
- The members of the Wentworth Group were recognized in the area and had media standing and skills.
- The group had a shared vision and developed a significant level of trust with each other. There was no competing for supremacy of ideas as is common, but a wish to pool expertise to develop a more integrated solution to a significant national problem.
- The group did not claim the Blueprint was the only solution to these difficult problems, or even that it was the best solution, only that it was an effective solution, and invited anyone with a better solution to bring it forward.

The Wentworth Blueprint is an example of scientists using all of the modern tools of mass media to communicate messages quickly to a variety of audiences. Radio and print media

were critical, but there was also considerable television coverage. Release on the World Wide Web gave instant access to the reports. A benefactor funded publishing a one-page display outlining the Blueprint in national press.

Negative Reactions to the Wentworth Group

The Wentworth Group received some sniping from academic colleagues. Lane et al (2004) criticized the Group for not presenting the evidence to support the arguments and prescriptions. This indicates a profound misunderstanding of how media functions – a normal opinion piece in a daily newspaper is less that 800 words and most news stories much less. The aim was to bring ideas into the public arena where they could be debated.

However the major negative reaction was from some irrigator groups. Murray Irrigation Ltd was reported to have met with the Minister for Science Peter McGauran in an *"attempt to thwart the influence of the Wentworth Group in the present water debate"* (Pastoral Times, 21/11/03). They were reported as being concerned that taxpayer funded scientists were entering a policy debate in a way that may be detrimental to their interests. They argued that since they funded some science through a Government research body, the CSIRO, that the organization should be more appreciative and act as advocates for their interests if funding were to continue. The political pressure did lead the scientists being told by the Minister that they seemed to be encroaching on policy areas, and there were attempts to have them withdraw from the Wentworth Group and be silent. These pressures had only limited success.

How Advocacy Groups Pervert Science

The case study of returning flows to an over-allocated river system has demonstrated a variety of tools commonly used by interest groups to advance their position. Mooney (2005) also describes situations where interest groups seek to confuse an issue to delay regulations that might impact on particular groups. The efforts of the tobacco lobby and some chemical producers are in this category. On the one hand it is reasonable to subject such regulatory proposals to rigorous testing to see if they are necessary and will be effective; on the other hand it is easy to pervert this contestability by selective use of the available evidence, or downright dishonestly.

Table 1: Common approaches to the misuse of science.

Denial strategies	Ignore unpalatable advice, information or data.
	Create noise to divert attention from key issues.
Delaying Strategies	Call for more studies before a decision can be made.
	Challenge the data on which advice is based as not relevant or not representative of the system
	Challenge the models or statistical tools used to analyze the data as inappropriate or unreliable.
	Demand that predictive models be validated with real data

	that may not be available until a species is extinct or a system is destroyed
Silencing strategies	Claim a separation between science and policy and that various policy options are outside the purview of science and are the business only of policy people.
	Punish the messenger – organizational bullying, threaten promotion or future research funds.
	Claim that Government scientists are the same as any public servants and must represent the views of the Government.
	Write very specific terms of reference for science reviews that limit the range of advice offered.
Denigration strategies	Treat particular claims as though they had scientific support and were supported by data and peer review, even when they do not.
	Label as "junk science" results that don't suit an interest group.
	Exaggerate the qualifiers in the advice and demand higher levels of proof than is normally required in Government decisions. Claim that levels of uncertainty in the science preclude action at this time.
	Allow an interest group to focus on one element or one strand of evidence rather than address to overall problem.
	Stack review panels with members with sympathetic views.
	Give prominence to minority science views rather than the broader science consensus.

Identifying and Dealing with Junk Science

It is becoming a common tactic amongst the scientifically illiterate to label as junk science that which does not support their preferred position. Science, like many fields of human endeavor, comes to conclusions based on the weight of the evidence, after considering various outlier positions.

From time to time we do come across flawed science which can be rightly considered as junk science. Junk science can be identified when the conclusions reached don't reflect the data or analysis, or where inappropriate data or analysis is used. Commonly such work is used to advance a position or to promote a particular technique or approach, rather than weigh up the range of evidence.

Commonly the scientific community ignores such junk science; however the danger of this is that the ill informed may believe the work. It is a public benefit when such shoddy or biased work is refuted.

Scientists need to avoid the traps of advocacy where they are selective in the evidence they use and ignore evidence that is not supportive of their position. This can also happen when scientists operate outside their area of disciplinary expertise. Susskind and Cruikshank (1987) point out, such "advocacy science" tends to cancel itself out causing non-scientists to ignore the scientific element entirely since "if they can't agree, how are we supposed to?" For every PhD one seems to be able to find an equal and opposite PhD, and considerable knowledge may be required to understand the subtleties of the various positions.

The Challenge of Junk Journalism

It is a potent and dangerous mix when junk science is used by junk journalists. Junk journalism is characterized by giving undue weight to outlier positions and ignoring the mainstream scientific consensus on an issue. Sometimes such journalists are just muddled with the various strands of evidence they seek to interpret, and at times they give undue emphasis to qualifiers of the work. Such journalist's manage to cast doubt when little doubt exists or may present as certainty when considerable doubt exists. The basic scientific process of conjecture and refutation plays into the hands of such journalists who present a selective view of an issue rather than make a considered judgment on the weight of the evidence. While science may seek the truth, journalists may be simply seeking to entertain, to provoke or to shock.

Scientists and Public Discourse

The knowledge from science is an important element in coming to a policy position, but is only one of the factors that will be considered in coming to a policy position. Scientists have an obligation to bring their knowledge and insights into policy debates, but must understand that a policy position they may come to from their science is influenced by their values, and that others may hold different value sets. Identifying that an action will lead to the loss of habitat for a particular species is a useful input to a decision, but does not mean the habitat must be preserved. That is the value question that needs to be argued, and society will attempt to weigh up the pro's and cons of the decision.

Scientists commonly hold strong values about desirable outcomes, and should be welcome in the political debates as society grapples with the various issues. However, they should not expect their scientific standing gives them any special right to decide value questions for society. Their science needs to inform the debate, not replace the debate. Scientists need also to appreciate that their disciplinary boundaries may be an impediment to multi-faceted policy problems that need to be examined from a variety of perspectives (Ludwig et al 2001).

When scientists do enter the political arena, they must understand they are playing to different rules from those used in science and need to learn the rules of politics and the media. Unless they understand the rules and tactics of policy debate it is like them walking on to a tennis court equipped only with golf sticks. Science in the public arena needs different communication skills from those used within science. Complex issues have to be

simplified, and qualifiers, conditions and detailed references left out of public communication if you hope that audiences will understand. It is necessary to "stay on message" because you are often talking with different groups and repetition is an important part of getting the message across.

Scientists will not be welcomed when they just bring problems to Government. They are immediately discounted as just seeking further research funding. Scientists need to have some plausible solutions that might be acceptable to a range of the stakeholders in an issue. One of the difficulties with getting climate issues addressed is that solutions mean we must all change our behavior. Politicians know this will be difficult and unpopular so seek to defer the issue, focus on longer-term solutions or address symptoms rather than the causes of the problem.

In science intensive conflicts, scientists must not assume that interest groups are seeking the truth; some will be seeking to obfuscate an issue to keep it off the political agenda and delay any action. A variety of techniques have been identified for attempting this in table 1, but personal attacks on the individual scientist are not uncommon.

Scientists need to appreciate that the uncertainty common in ecological science, is a problem when translating that science to policy that has regulatory implications, and will be used to challenge that science (Ludwig et al 2001).

Conclusions

Scientists need to contribute to public debates about the issues important to our society (Lach et al, 2003). They have the tools to assess the importance and extent of a problem, to understand the factors driving the problem and to at least help develop alternative ways of addressing the problem. Scientists have an obligation to ensure that their knowledge and insights are available to the community that funds them. Committed and knowledgeable scientists can make an influential contribution to public policy.

However, scientists entering into public debate need to understand that they are leaving a world where finding the truth is the most important goal, for a world where winning is most important. Some will find the techniques used by interest groups to pervert the science difficult to handle.

Interest groups in a conflict seek to use science to bolster their position, not to seek truth or even find the best way forward. They may use science to try and get an issue on the political agenda so that it will receive political attention and funding, or they may seek to use science to delay an issue being addressed because of concerns about how they might be affected. Science becomes a tool in these situations to help one group have their views prevail over others.

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