

# The myths of public science



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This fiscal year, the Commonwealth plans to spend \$5.9 billion on public science and innovation. That makes up 2.78 per cent of Commonwealth expenditure. Over the past ten years, the Commonwealth has spent almost \$48 billion on science and innovation. This is a huge sum of money, yet government is not clear on what return the taxpayer has earned on this investment. Rhetoric and emotional support for publicly funded science is running high—particularly when innovation is increasingly being seen as a primary engine of economic growth—yet few people undertake a hard-headed analysis of its justifications.

The case for public science rests upon five key myths, and policy-makers look to these myths when they advocate public science funding. At \$5.9 billion this tax-year, these myths are

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expensive and call for critical examination.

## Five Myths of Public Science

In his 1996 book, *Frontiers of illusion: Science, technology, and the politics of progress*, Daniel Sarewitz sets out five myths that surround public science. The myth of infinite benefit: the notion that more funding will automatically lead to more public good. The myth of unfettered research: any publicly funded research is as likely to lead to some public benefit as any other. The myth of accountability: publicly funded science need only be accountable to itself in order to provide quality. The myth of authoritativeness: scientific process is an objective means for resolving political issues. The myth of the endless frontier: new knowledge is valuable in itself and should be pursued whatever its moral or political consequences might be.

Each of these five myths is alive and well in Australia. These myths stifle the public debate that surrounds

any scrutiny of the money that government spends on public science. (To be fair to Sarewitz, I have interpreted his myths in a manner he may not necessarily approve of.)

### The Myth of Infinite Return:

There is a notion that money spent on science and innovation automatically, at some point, translates into economic growth. This is the basis for calls to increase public expenditure on science and innovation. In the long run, we are told, basic (pure) research will always have some practical value. The Allen Consulting Group, in its 2003 report into the returns from public science, wrote that:

investigator initiated research ... may not be orientated towards generating outcomes ... [but] it must be noted that *it is the quality of research, rather than its explicit orientation, that is the key predictor of eventual value* (emphasis added).

Gordon Tullock, writing as long ago as 1966, has demolished this notion. Arguments such as this are based on look-back bias. It is easy, in hindsight, to identify some pure research that has had an enormous impact. What we cannot be certain of is how much pure research has had an impact. In any event, it is far from clear that Australian industry relies on ‘high-quality’ research from Australian universities. Indeed, the Australian Bureau of Statistics’ *Innovation in Australian Business* report shows that employing a new graduate is the single largest technique that innovating firms use when acquiring knowledge from an Australian university.

#### **The Myth of Unfettered Research:**

This myth argues that not only will basic research have some long-term value, but any curiosity-driven research is likely to have some long-term value. As far as myths go, this one is very seductive. It correctly recognises that picking winners is difficult. Therefore, rather than attempting to pick winners, all basic research should be supported. Further, researchers engaged in basic research should not have to account for themselves, or their work. At the extreme, this myth suggests that research is value-free. At some point, basic knowledge will be valuable, therefore scientists should be free from any constraint to add to the stock of basic knowledge.

This myth has been the focus of public debate in the past few years. Former Education Minister Brendan Nelson vetoed a number of ARC grants in 2004, and again in 2005. Writing in *The Australian*, Professor Elspeth Probyn indicated that ‘the subject of *ministerial meddling* has been on everyone’s lips’ (emphasis added). Mind, the Minister did not prevent the research from occurring, he simply refused public funding. Professor Probyn also wrote, ‘If it weren’t so serious, it would be truly farcical.’ Sex- and gender-obsessed researchers not being funded by the Federal government is hardly serious. Ultimately, this myth implic-

ately rejects any notion of cost–benefit analysis in public funding; the more public research the better, irrespective of the cost or relevance of that research. Clearly, few beyond the scientific community would subscribe to this type of open-chequebook financing.

To rely on science to inform public policy is not equivalent to the science being the public policy.

#### **The Myth of Accountability:**

To whom is public science accountable? To politicians and taxpayers this question might be trivial. The funding basis of public science is public benefit. It is not unreasonable that taxpayers, or their elected representatives, enquire into the exact nature of that ‘public benefit’. Yet it is here that we see substantial conflict. According to the accountability myth, all researchers need do is deliver research that is ‘scientifically sound’. In other words, scientific excellence is social accountability. This world-view implies a phenomenal lack of external accountability.

Science, we are told, is a self-regulating, self-correcting process. To some extent, internal accountability may well substitute for external accountability. The question, then, is whether peer review, open debate, and reproducibility of experimental results provide internal accountability. Woo Suk Hwang—a Korean scientist—published peer-reviewed papers claiming to have cloned human embryonic stem

cells. He has recently been exposed as a scientific fraud. Jan Hendrik Schön—a German physicist—had published over 90 peer-reviewed papers, and had won two prestigious prizes, before being discovered as a fraud. These are not isolated cases; the peer-review process is, at best, an imperfect mechanism. Scientific commitment to open debate is questionable. Anyone who recalls the treatment that Bjørn Lomborg has received cannot possibly conclude that a commitment to open debate exists in the scientific community. The internal quality-control mechanisms are not enough to ensure accountability on quality, let alone the type of external accountability being demanded by politicians.

Privately funded science, whether for commercial gain or purely for a non-commercial search for knowledge, need only be accountable to its financial backer. However, when the government funds any activity, the taxpayer is entitled to demand transparency.

#### **The Myth of Authoritativeness:**

Science produces facts. Facts are either true, or they are false. Consequently to argue that the scientific evidence supports X, but not Y, is an authoritative statement. Many scientific facts are uncontroversial: the Earth is approximately round. Other scientific facts are in dispute. These disputes arise especially when political controversy—that is, whether any taxpayer-funded activity or restriction on activity is justified—is involved. But, contrary to the myth, science cannot resolve political controversy. The notion that politicians can simply make decision by recourse to ‘the facts’ is nonsense.

Political disputes revolve around the consequences of differing actions. What action should be taken? Is it best to act now, or later, or not at all? Many prediction techniques are complex, difficult, and may require scientific training, yet predicting the future is not science. Science produces hypotheses that are tested in reproducible experiments. In other words, science itself

cannot provide the information politicians most need for decision-making. Scientists can speculate, and when the political stakes are high, the return to speculation increases. Consequently, the amount of speculation increases and the certainty surrounding scientific ‘facts’ declines. Further, as more and more scientific work is conducted, so greater understanding leads to more nuanced argument and (genuine) scientific disagreement. It is unsurprising that science provides few clear policy options for politicians.

These arguments, of course, ignore the self-interest that scientists themselves may display. As Sarewitz observes, ‘Authoritative scientific advice is least likely to be available when it is most needed’.

**The Myth of the Endless Frontier:**

To some extent, this myth is an extension of the unfettered myth. If science is free to pursue any area of inquiry, what can we say about the moral consequences of that inquiry? The frontier myth holds that new knowledge has no moral consequence—the application of that knowledge may have moral consequence, but the discovery itself has none. There is substantial evidence to suggest that the wider community does not subscribe to this myth.

To take a topical example, strictly speaking, stem-cell research is not basic science. This type of research, however, illustrates the issues very clearly. To what extent should researchers pursue their research even when extremely valuable contributions can be made? Over 2002–2003 this very question was addressed in numerous op-ed pieces, and in the Federal parliament. It was an ugly debate with phrases such as ‘irrational hypocrites’ being bandied about.

There was strong opposition to aspects of the research, and it is clear that many in the general community do not subscribe to the notion that researchers should pursue any and every avenue of research. Scientists and commentators should not be surprised when the public—or its representatives—de-

mand that publicly funded science be governed like all other publicly funded activities.

Simply relying on the latest scientific study can lead to policy failure.

**Science and Public Policy**

The government is a large consumer of research, as public policy often relies on scientific information and input. But we must draw a careful line here. To rely on science to inform public policy is not equivalent to the science being the public policy. Scientists do not, and should not, make policy decisions. Elected politicians make policy decisions and are required to defend those decisions at the ballot box.

Confusion over this point has led to allegations of ‘science wars’. *The Republican War on Science* is the provocative title of a recent book by Chris Mooney. Writing in the *Australian Financial Review*, John Quiggin suggests that some aspects of this war have been imported into Australia. *The Age*, for example, has run some stories indicating political interference in CSIRO climate change studies.

Scientific knowledge and understanding evolve over time. Simply relying on the latest scientific study can lead to policy failure. Consider Australia’s salinity crisis—subject of an exposé on Channel Nine’s *Sunday* programme earlier this year. In 2000, the National Farmers’ Federation called for a \$65 billion expenditure programme to fix the salinity problem. This exchange between *Sunday* and the Chief Executive of the Murray-Darling Basin Commission, Dr

Wendy Craik, is revealing:

**Wendy Craik:** ‘We were basing our recommendation on the best available information at the time’.

**Sunday:** ‘But that information was wrong wasn’t it?’

**Wendy Craik:** ‘Subsequently I think we would say, we wouldn’t, I wouldn’t support that particular line’.

**Sunday:** ‘Imagine if those billions of dollars had been expended on what you now acknowledge are incorrect models that were talking up the threat of salinity.’

**Wendy Craik:** ‘As a taxpayer I am just as happy as you that we didn’t actually do that.’

Despite there being no observable relationship between public funding and public benefit from public science, government will continue funding. Even when the public science is horribly wrong, government will continue funding. The myths of public science form the basis of much commentary and are entrenched in the public mind. Even to attempt to hold public science accountable becomes a ‘war on science’. The most contested myths are those of accountability and authoritativeness. In a democracy it is inappropriate that unelected scientists should dictate policy choices. Robert Gourlay told *Sunday*, ‘There’s too much at stake in terms of the credibility of public science to admit to a major error in this area of science’. With almost \$6 billion at stake, the tax-paying public are entitled to more than just myths and rhetoric.

Professor Davidson is the author of the *IPA Backgrounder* “Back to Basics: Why government funding of science is a waste of our money”, released in November 2006. It is available at [www.ipa.org.au](http://www.ipa.org.au).

