



Australian Government

Chief Scientist

PROFESSOR IAN CHUBB AC

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Innovation Forum**

20 MINUTE PLENARY ADDRESS: The National Perspective

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It is no secret to those working in the water sector that water and its management are of critical importance today and into the future.

As Jack Beale, Australia's first Environment Minister said, *"Australia is the lowest, flattest, hottest and driest continent on the earth and we have to manage it accordingly."*

It is a grand challenge. In fact, as I will discuss later, the use of soil and water are one of the eight *Science and Research Priority areas* being considered by the Government. So is Australia ready to face its water challenge?

Within Australia, attention is divided between managing existing water resources and seeking alternative water supplies to the already over-exploited river systems.¹

Groundwater is now supplying a rapidly-growing share of the water Australia uses, estimated to be as much as a third².

The system that delivers rain to south-western Australia during winter has moved towards the South Pole, resulting in Perth now relying on desalination and groundwater for 69 per cent of its water needs.³

In many parts of Australia, combinations of drought and flood⁴ conditions have caused havoc with agriculture, industry and basic living conditions.

It is clear that Australia needs a long-term, strategic approach to this problem.

¹ *Water water everywhere and not a drop to drink*, Christmas, M., RiAus, 22 April 2014.

<http://riaus.org.au/articles/water-water-everywhere-drop-drink/>

² *Groundwater in Australia*, 42 pp, Harrington, N., and P. Cook. National Centre for Groundwater Research and Training, Adelaide, 2014.

³ *Whither Australia's Water*, The Curious Country, 2013.

⁴ *Whither Australia's Water*, The Curious Country, 2013.

On a global scale, The World Health Organisation estimates that over 1 billion people of the world's population of 7 billion people do not have access to a safe source of drinking water.⁵

Rising demand, a growing population, and uncontrollable weather events mean that threats to both national and global water security will only increase in the future.

As a resource, we cannot consider water in isolation. As an article published on World Water Day last year stated - "Water and energy are intrinsically linked. We need energy production to access, supply and treat water, and we require water for the production of energy. Food production requires the availability of both, completing the most crucial resources interaction required for human growth."⁶

Historically, the water and energy sectors have been managed and regulated separately,⁷ a circumstance that defies logic when we consider their interdependency and the critical nature of the availability of both.

⁵ *Health through safe drinking water and basic sanitation*, World Health Organisation, retrieved 30 June 2014. http://www.who.int/water_sanitation_health/mdg1/en/

⁶ World water day 2014 - Greater Co-operation Needed to Improve Water Governance in Australia, Future Directions International, 19 March 2014. <http://www.futuredirections.org.au/publications/food-and-water-crises/28-global-food-and-water-crises-swa/1587-world-water-day-2014-greater-co-operation-needed-to-improve-water-governance-in-australia.html>

⁷ World water day 2014 - Greater Co-operation Needed to Improve Water Governance in Australia, Future Directions International, 19 March 2014. <http://www.futuredirections.org.au/publications/food-and-water-crises/28-global-food-and-water-crises-swa/1587-world-water-day-2014-greater-co-operation-needed-to-improve-water-governance-in-australia.html>

The challenges of managing Australia's water system are obviously diverse and intricate. Challenges that some of you would be better placed to list than me. Challenges that include animal habitats, soil salinity, bushfire and drought.

But chief among them, and high on the radar of policy-makers, must be how best to share available water resources, how to reduce consumption of water and energy and how to access alternative sources.

I would argue that addressing these challenges, as with most of the global challenges we face today, requires two specific ingredients; evidence-based, scientific solutions and a strategic plan to realise them.

I'll come back to the strategic plan, but first to the role of science in addressing these global challenges.

Water is a divisive issue.

Stakeholders in the Murray Darling Basin have faced considerable difficulty in reaching consensus on the issues surrounding water use - environmental flows versus economic activity - that run through communities in three states.

The role of science is to provide evidence to help find the best way forward.

And to carefully and clearly explain it to their stakeholders.

As a nation, Australia's role should be to effectively manage our own water assets, and to contribute to the global water security effort.

And it is all very well to say that science should underpin that effort.

Indeed, I have observed that scientists seem to say this quite a bit.

That doesn't mean the Australian community has uniformly welcomed the suggestion; or that the resources have been there to ensure that the necessary science is done.

Despite increasing droughts and declining rain in eastern, southern and south western⁸ Australia, public investment in water research and management is close to a 30-year low.⁹

And investment in water research is just the beginning.

Our capacity to set out bold ambitions - without thinking about what it will take to follow through on them – never ceases to amaze me.

Indeed, I am confidently informed that we can and should start turning our rivers inland and converting our desert centre into a garden paradise.¹⁰

I look forward to steering my houseboat from Canberra to Alice Springs.

As the people the nation relies on to actually do these remarkable things, you understand that the ambition alone is not enough.

Good science doesn't simply arise from investment in a given research project.

And relevant, talented personnel aren't born when they receive an ARC grant.

⁸ Intergovernmental Panel on Climate Change (IPCC)

⁹ *Time to start banking our water*, C. Simmons, Future Directions International, 9 May 2014.

<http://www.futuredirections.org.au/publications/associate-papers/1678-time-to-start-banking-our-water.html>

¹⁰ *Telstra and Jones Water Australia*, Media Watch, 7 July 2002.

http://www.abc.net.au/mediawatch/transcripts/071002_s2.htm

A skilled scientific researcher has a background in relevant research, has completed a valuable degree, or two, and arrived at university with a school education where science and mathematics were studied under teachers qualified to teach those subjects.

So for Australia to generate the kind of research that will assist in managing our water security, we need to begin by maintaining interest in school science.

We need to have systems in place to support primary and secondary teachers that are teaching science and mathematics and work to improve the current situation where a third (34%) of year 7/8 students are taught mathematics by teachers without a major in either mathematics or mathematics education.¹¹

We need to attract students to tertiary degrees that incorporate studies of water and water system management such as agriculture, civil engineering, earth sciences and biological science.

But even though domestic student enrolments in STEM fields – science, technology, engineering and maths - increased over the last decade, generally, the numbers of students completing degrees in these key fields of education have declined;

- Agriculture and related studies: Graduations are down 24% between 2003 and 2012
- Biological science: Completions have declined from 3041 (2003) to 2088 (2012)
- Earth sciences: Completions have declined from 253 (2003) to 171 (2012)

¹¹ *Proportion of teachers who majored in Mathematics. TIMMS 2011.*

We need to look at the numbers of graduates from these degrees as we see a future where water, among other resources, will become increasingly complex to manage.

They will be essential to increase the capacity of not just the research sector, but also the business workforce.

And while addressing the workforce issue, we also need to be investing strategically in science and innovation – for the long haul.

We must set priorities. We must identify areas of strength and weakness and plan accordingly.

So as part of my call for a national strategic plan, I have proposed science and research priorities to the Government.

The priorities take into account our areas of research excellence, industrial strength, global trends, comparative advantage and Australia's interests and needs.

And I make the point that focusing research and development efforts on fields where we do have expertise and we do have need is not the same as picking winners. It is not backing particular businesses. And it will not be absorbing the entire R&D budget.

Setting priorities is simply a way of ensuring that a proportion of our R&D investment is directed to areas that we need to make sure we have some focus on - and pay attention to - in the national interest.

In some cases we have a particular need in Australia to do something, and in others it might be where we have international interest such as meeting trade agreements that we are committed to.

Ensuring we are investing in these areas is the smart way to use our limited resources.

My list includes a priority focused on improving the use of soils and water resources, both terrestrial and marine. No doubt you will agree with me, that this is an area of immediate and critical importance to Australia.

A priority area where we must ensure we have the investment in the research we need.

But it doesn't stop there. With saying "This is important to us". We must act as though we mean it.

The next step is to identify the practical research challenges to target our research effort in those priority areas.

We must do our best to identify the research we need to help make decisions about what we need to do. Not just glitzy or popular ideas, but the work that needs to be done.

And that is why it is important that we draw on expert advice to identify the challenges.

And to make sure our research is aligned with our needs, we will rely not just upon our scientists. But also advice from business and industry members who know what they hope science can do to help them be competitive in the future.

I am pleased to report that we have some rubber on the road and working groups for each of the proposed priority areas met on March 2 & 3.

Each working group consisted of representatives from industry, expert researchers and officials. They were asked to identify the top 2-3 research challenges in their priority area.

I have been following up on these draft research challenges with various stakeholder groups and will be taking them to the next meeting of the Commonwealth Science Council.

John Gunn, the Chief Executive Office of the Australian Institute of Marine Science chairs the working group on Soil and Water.

Obviously, some work under the different priority areas will also be inextricably linked. As I mentioned, issues associated with water will be relevant when considering food, energy and resources, and environmental change. These potential overlaps have also being discussed with the expert groups and will need to be dealt with as part of a broader strategy.

I started by asking if we are prepared to face our water challenges.

The adoption of science and research priorities will be an important step in in the right direction. And we must continue to act as though we mean it, and back it up by focusing our research efforts – both basic and applied – in those areas.

We must also ensure we have the pipeline of researchers in place. Science will continue to provide essential evidence to help us determine the best way forward.

Can you do more?

Think - how is your work connected to other researchers or other industries, and to the rest of the country, the economy, and society?

I am confident that a lot of you are doing that already.

Think about ways we can communicate differently to break people and organisations out of their disciplines, their silos, and get them working together.

I hope you will join me in imagining – and communicating - a better way of using science in Australia.

And I hope you will see this forum as an opportunity to build on the vision you have for the water that sustains us all and to build the links with the research, business and finance sectors.

Thank you and best wishes for a successful forum.