

Address to the National Press Club, Canberra, September 30 2009  
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## **Securing the future in a connected planet**

Thank you Ken and the Press Club

When it was suggested I speak with you, it was humbling.

You've had the Dalai Lama and Prime Ministers; you've had HG but not Roy.

In the first 10 years, the National Press Club heard from more comedians than scientists, the decade that followed a few more scientists appeared ...but in the last nine years more scientists have been invited than the previous 40 put together. Why?

For the first time in our history science is making predictions of how our actions will affect the world 50 and 100 years from now<sup>1</sup>.

In this future we face the reality that we are all connected.

Our choices in one area such as water, impact on other areas such as food security.

Martin Luther King warned us that we are all joined through an "inescapable network of mutuality"<sup>2</sup>.

We are now beginning to understand what he really meant.

We all want a prosperous and healthy society, but we face significant challenges:

- Securing our food, water and energy needs in a world of finite resources.

We have significant pressures on global systems:

- Population growth,
- Rapid urbanisation,
- And climate change.

These national and global challenges are connected. They cannot be dealt with in isolation.<sup>3</sup>

Individuals, communities, industry and nations are seeking to understand this connectivity and the inevitable trade offs necessary to achieve a sustainable society.

Today, I wanted to share with you some of our scientist's latest observations of rainfall and ocean temperatures and how this is linked to our food supply.

I wanted to outline some new and exciting science to can help global food security.

But I also wanted to show how our approach to science must change if we are to help inform governments, communities and industry how choices in one area impact on another area.

Particularly in a world where water, carbon and biodiversity will have prices and a markets.

I am now nine months into my new role and I would like to share my vision of what you can expect of your national science organization.

Turning to climate change.

You have been saturated with the fact that over the last several decades our climate has been changing.

You also know climate change is not new. That in the past 600,000 years we have been through six ice ages.

Some of you will know that these changes in temperature have also been associated with CO<sub>2</sub> changes.

They are coupled together.

Even the saber tooth tiger lived through several ice ages, a large range of CO<sub>2</sub> and average temperature changes of 5 degrees.

Only 5-8 degrees of change and you get an ice age. That's all.

So what is the essence of what is different this time?

Simply the rate of change.

Atmospheric carbon dioxide concentrations are now well outside the range experienced during these ice ages.

They are now at values not experienced for millions of years.

They are increasing at a rate we have not seen before.

One of the best indicators of this rate of change is sea level.

We have been measuring sea level since 1870 and it has been rising about ten times faster than the average rate of rise over the previous two thousand years.

Since 1993 the average rate of rise has almost doubled again.<sup>4</sup>  
All nations are connected in this change.

So are our latest measurements confirming this rate of change? The answer is yes.

Let me give you just two examples.

Our observations of ocean temperature off eastern Tasmania over the past sixty years have revealed a warming trend of 1.5 deg C.

This is due to strengthening of the southward-flowing East Australian Current.

One of its effects, discovered by Professor Craig Johnson of the University of Tasmania, is that sea urchins, normally found off eastern mainland Australia, are now happily colonising Tasmanian waters.

These apparently insignificant creatures, millions of them, are eating their way through extensive kelp forests and threatening the biodiversity and key abalone and rock lobster fisheries of the region.<sup>5</sup>

The second example is rainfall.

Our modelling is increasingly predicting reduced rainfall in southern eastern Australia, the main generating area for the Murray-Darling.

The predictions range from little change in the mean annual rainfall to a decline of up to 15 per cent for a 1 degree of global warming.

Such a rainfall reduction could mean over 35 per cent reduction in run-off as the rain soaks into dry soils.

Runoff is what feeds our rivers.

This area has more than 50 per cent of all irrigated land in the country. It is linked to our food security.<sup>6</sup>

All our communities need better predictions. We are making increasingly accurate and granular observations of what is happening.

We have 60 ocean probes, three ships taking continuous measurements, four seagliders, and satellites taking physical and biological measurements of our deep southern ocean.<sup>7</sup>

Just today Australia's Marine National Facility, the Southern Surveyor, returned to Hobart having deployed a \$1 million measuring system southwest of Tasmania that will monitor the carbon cycle in the top 400 metres of the Southern Ocean.

With the Bureau of Meteorology we track every single rain event over the Murray Darling Basin River Basin and look at its intensity, how much water it has, how frequent these rain events are and measure the runoff.

We are working to understand where the water is coming from and how much will flow.<sup>8</sup>

This information is critical to future decisions.

We are also contributing on a global scale.

More than 100 of Nobel Prize winning IPCC scientists are Australian<sup>9</sup> and more than 20 are from CSIRO.

The work they and their international colleagues are doing measuring temperature, acidity, currents in places like the deep Southern Ocean.

This work is a vital part of the emerging global picture of climate change.

You can appreciate why we need to continue to build this national and global picture of what is happening.

This is why we will be extending the work we have done on the Murray Darling Basin to the river systems of Northern Australia, Tasmania and south western Australia.

We will continue to build our understanding of our climate variations, rainfall and water resources by extending the work on the Murray-Darling Basin to the river systems of Northern Australia, Tasmania and south-west Western Australia.

We will develop technologies that will help us mitigate CO<sub>2</sub> emissions and understand how Australia must adapt to the future.

One area that we have to adapt quickly is the production of food.

It is hard for me to comprehend that in the next 50 years we will need to produce as much food as has been consumed over our entire human history.

That means in the working life of my children, more grain than ever produced since the Egyptians, more fish than eaten to date, more milk than from all the cows that have ever been milked on every frosty morning humankind has ever known.

Humans have met this challenge once before – from 1960 to 2000 the world food production doubled through a combination of new technology and investment in agriculture.

But this time two things are different.

Firstly we will need to achieve this where carbon and water have a price.

We can no longer simply clear more forest and farm even more marginal land.

Secondly this is happening at a time when we are seeing the greatest migration of our species to urban centres.

We will see profound shifts in the trade and transport of food.

We are already seeing the impact on global seaborne trade of food.

Cereal exports, the highest volume globally traded food commodity, have risen at a rate double that of population growth.

Trade volumes of milk, meat and beans have risen at even faster rates.

Australia has a strong interest in global food security.

We produce 93 per cent of all food consumed in Australia, 1 per cent of all food consumed in the world and 3 per cent of the global seaborne trade<sup>10</sup>. So right now we feed 60 million people.

Increase in global seaborne trade of food presents an opportunity for Australia but Australian agriculture is also highly exposed to climate change – we have significant constraints on irrigation water availability. Our agriculture is also 16 per cent of our national greenhouse gas.

Our science has potential for Australia to produce an even greater proportion of the seaborne trade.

We are making wonderful and exciting scientific developments in new drought tolerant crop varieties, high yielding wheat, greater nitrogen use efficiency and improved grain nutritional benefits lead the world.

One example launched just last month in a breakfast cereal is a new type of barley (called *BARLEYmax*) that's been bred by CSIRO scientists to deliver improved health benefits based on high fibre content. Our trials have shown positive value to consumers in controlling glucose levels and increasing fibre and insoluble starch and beneficial bacteria in the colon.

Another exciting project is the development of alternative sources of healthy Omega-3 oils which are normally obtained from marine sources. We are working to produce these healthy oils in canola and have already demonstrated we can do in the seeds of land plants.

It is not just governments that are realizing that we are all connected and share a common humanity. I was with our scientists completing a research agreement with a major global industry partner to increase yields in cereal crops. We had agreed on our intellectual property and were ready to form a partnership. But we knew that there were going to people in the world who would never be able to pay for these new cereals and something remarkable happened. Both sides then joined as one and discussed how we would meet our commitments to developing markets. How we would meet our commitments to humanity. Never before had this happened to me in a commercial transaction.

This change of thinking is emerging amongst leading organizations. Our young leaders are working via the World Economic Forum with some of

the largest patent holders in the world and our research partners at Fraunhofer, Battelle and CSIR to develop standard licenses to protect IP for “market” uses while making it available to the 1 billion poorest people in the world.

It is not just the leading organisations that are changing their thinking. You are also having different conversations at home.

How many of you know what you pay for your annual power bill? The average Australian household is paying around \$900 a year.

Some power companies offer a “green offset” to their customers.

Any idea what it will cost? Around \$400.

It works out, by the way to \$60/t carbon that you are paying<sup>11</sup>. So do you sign up?

What about installing a roof solar panel for electricity? Expensive? What about the rebate? Doesn't really add up - maybe I'll wait.

But I know I have to reduce my carbon and water usage.

How about a veggie patch on the balcony? But that increases my water usage and I have to drive to buy the seeds and the fertilizer. What about water tanks? And what can you really do with 20 zucchini's in a week and all that silverbeet and rhubarb?

Am I making a difference or not?

Each of you has had these conversations. You understand that there are trade-offs and that these issues are connected and it is not clear where we make a real difference. You understand that we can no longer just focus on single solutions and ignore the system-wide interactions.

This issue was brought to light recently as our executive met with the Tiwi Island Land Council. They were faced with some decisions.

Did they plant forests to become carbon sinks or leave bio-diverse areas that may soon have a market value?

If they plant forests what would be the impact of chemicals used to potential aquaculture opportunities?

It is the same for nations facing the challenges to address climate change, reduce carbon footprint and balance food security and biodiversity and maintain investment.

Living in a world where carbon has a value and irrigation water is restricted means new choices and trade-offs.

At the start of the 21<sup>st</sup> Century, it was clear that the Murray-Darling was in trouble.

A whole of basin water assessment was required. CSIRO was given the challenge by COAG in November 2006 to lead the world's first rigorous assessment of the potential impacts of climate change on surface and groundwater availability across a major river basin.

It was the most comprehensive and technically challenging water modelling project ever undertaken in Australia and possibly the world.

It provides governments, industry communities with the unprecedented level of water information to guide their future planning and investment.

We are working with our research partners to extend this work to the river basins of Northern Australia, southwest WA and Tasmania.

This means Australia will lead the world in building a national model of its water.

This is exactly what a national research organisation should do.

Bring together all the smartest research and researchers across the nation to catalyse a national response to some of the biggest challenges we face.

These challenges cannot be divided into a myriad of smaller discrete projects.

I believe that similarly we need to similarly take on the challenge of building a national picture of our carbon footprint and assessment of future energy options.

The approach will require not only the best multi-disciplinary teams of scientists from CSIRO and our Universities, but also our best economists from places like the Treasury and ABARE, Federal and State policy makers the community and industry.

This platform will be vital in supporting Australia's need for new national infrastructure suited to a new low carbon economy.

For example, we will need to have a grid that can accommodate the mix of renewable energy; that can accommodate households and businesses that want to contribute to the grid.

Many of these trade-offs will be for our policy makers.

The role of CSIRO is to provide the science and help catalyse the development of the "integrated assessment" platform which will be needed for good decision making.

Such a comprehensive picture will allow us to achieve maximal emissions reduction while maintaining economic growth and prosperity.

As we adjust to a world where carbon has a value, adopting a low carbon pathway will require Australia to look at its land and water resources in a fundamentally different way.

We stand ready as an organisation to help Australia tackle these very difficult assessments.

I have spoken to you about some of the major national and global challenges we face and how we cannot secure Australia's future unless our science works on challenges that face all nations.

So what can you expect from your national science organisation. We aim to be one of the most respected R&D organisations in the world. Our strategy remains to focus on these major challenges that face humankind and our nation. We will do this through our 10 National Research Flagships.

We will continue to step up to the plate to work with Universities and other research agencies and organisations like the Bureau of Meteorology to integrate our knowledge into comprehensive pictures of our national water resources, carbon footprint and our biodiversity.

We aim to make an impact in three areas: a sustainable environment, the community and industry.

I have already described much of what we are doing in the area of the environment; tackling the water flows of the Murray Darling and understanding the role of the deep Southern Ocean in global climate. We also have teams building sustainable fisheries and understanding our complex coastal and urban areas.

Our teams are working with global research teams on river systems in China and India and building sustainable agricultural models in Asia and Africa.

Our communities need help facing the challenges of the future. We will continue to develop foods that can improve health; provide nutrition advice to kids and adults. Help make sense of how to make a difference in carbon world. Our "energy" book for households is now on the stands and getting great reviews,

We will continue to bring a cross disciplinary approach to tackle three of the largest health issues that face our nation in obesity, Alzheimer's and colorectal cancer.

We go to great lengths to bring the best science to our communities. When I was recently in Griffith I saw how we are sending daily mobile phone

messages to the farmers in our irrigated areas to tell them how long to turn on the irrigation systems.

We interpret the latest satellite data, weather data and evaporation rates and bring all that to them in the paddock via SMS<sup>12</sup>.

Australians trust CSIRO to bring excellent science to help them with the challenges of today and tomorrow<sup>13</sup>.

But these challenges are not just of interest to governments and communities. We are seeing increased investment from our industry partners as well.

I met with Steve Fludder the Head of GE's sustainability group "EcoImagination" recently.

He told me that the work in eight of our 10 Flagships that is focused on these national challenges was directly relevant to new product strategies across GE.

We will help Australian businesses access the breadth and depth of our organisation and our networks to be more competitive. We are helping CSL develop safe vaccines, BHP Billiton to better understand the performance of products in downstream processing, Telstra enable the house of the future and AGL build the power industry of the future.

To help Australian companies compete globally we need to know what it takes to be globally competitive.

We have recently completed agreements with Bayer to develop high yield cereals; Boeing to lower production costs for their 737 and 777; and Nutech the market leader in X-Ray security, build their next generation scanners.

To build whole new industries we will continue to build platform and breakthrough technologies like wireless LAN that is now in over a billion wireless devices; next generation space technology; polymers to build printable electronics and solar cells and gene technology for new drugs, proteins and plants.

As an organisation with goals and values that go beyond our science, we know we will be successful when our people always go home safely at night and share a sense of discovery; our collaborators and partners realise lasting value from our science and describe working with us as a pleasure; and we remain a trusted advisor to the people of Australia.

Let me assure you. We remain committed to the integrity of our science, which has been a foundation for the Organisation since our beginnings over 80 years ago.

We live in a connected world. Science needs to work on challenges that face all nations to secure a future for humankind. Only then can we secure a future for Australia.

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