



Woodrow Wilson  
International  
Center  
for Scholars

*Environmental Change and Security Program*

## **Climate Change and Water: Challenges and Responses in Australia and California**

**Wednesday, July 15, 2009**

Woodrow Wilson International Center for Scholars

*Edited Transcript—Jon Barnett*

Well, thanks very much to the Wilson Center, and in particular to Geoff and the team at the Environmental Change and Security Program, a program that's admired around the world, and I'm very pleased to be here for that reason. And thank you, Michael, for coming across from California. Good to meet with you again.

So, today I'm going to talk just briefly about Australia's climate and what's been going on and what will happen in the future, some of the impacts of the current drought we've been having, which has been going for nearly ten years, depending on how you want to define a drought. And then I want to talk a little bit about some of the responses that we have had and which we are developing in response to these water stressors.

And I'm going to argue that these are maladaptations, and by maladaptation I mean they're responses to a problem that create more problems than they solve. And so, typically, a good example of maladaptation, for example, is after the heat wave in Europe everybody went and bought air conditioners, consumed more fossil fuels, created a positive feedback in terms of climate change. And that's partly what's happening with water in Australia, as I'll explain. But a maladaptation could be a response that has other externalities or affects on other sectors and other places. And this is just a problem of interconnectedness in terms of environmental systems, and if we implement a solution here, it can have other problems elsewhere. And I think there are some positive developments in water in Australia, but we can talk about those later. I'm going to highlight some of these that I think are slightly problematic.

Then, just if you'll forgive me a play on words -- I'm a social scientist, so occasionally I do that -- I'm going to talk about Australia's mitigation effort, that is the Carbon Pollution Reduction Scheme, otherwise known as an emissions trading scheme. And I'll tell you about what's happening there.



environmental change & security program



So I don't know how much you know about Australia. When I was a child growing up it was a joke that if you went to the United States people would ask you if they had telephones in Australia and a kangaroo in your backyard. Hopefully you're a bit wiser now, but...

It's a very dry continent. And the map up here basically shows you this. Most of the country gets less than 600 millimeters of rainfall a year. The green bits are basically the wet bits, which uncoincidentally is where most people live. Because we have low rainfall, we have high rainfall variability. It's typically the case in all rainfall areas that you get wide fluctuations around the mean, and that's also the history of Australia's climate. And a big driver of variability in our climate is El Niño's Southern Oscillation. And the graph down at the bottom is basically showing when we get a positive cycle of El Niño we get more rain, a La Niña event. When we get negative southern oscillation index we get drought. And when we get drought we also tend to get fire.

And Australia's climate is getting drier. We've been in a prolonged drought since 1999. And these are just various ways of showing you that. The top, left-hand panel here, this is Melbourne's rainfall, and we've seen a decline of eleven percent on the long-term mean in the last ten years. The bottom panel down here, blue is good, more rain; red is bad, less rain. And this in terms of a 50 millimeter positive or negative scale, and you can see across eastern Australia, where most people live, most of our agriculture production is -- it's getting drier. South, southwestern Australia.

Of course, precipitation and temperature combine to create runoff, and runoff is what really matters in terms of water storage because that's what goes into the reservoirs. And the most striking here is -- this is Perth, down here in southwestern Australia. This is the mean, average from 1911 of stream flow feeding Perth's dams. This is from 1976 to 2000, and this is 2001 to 2007. Perth is now getting 25 percent of the runoff into its reservoirs that it used to get. That's not, perhaps, the most significant thing. The most significant thing is those reservoirs were designed to refill in the peak rainfall years. And, as you can see, those peak rainfall years are not so peak anymore. And this pattern -- it's particularly pronounced down here because it's been going longer -- but this pattern is occurring across much of southern and eastern Australia. We're getting less water into our catchments. We're getting less stream flow.





That's an urban water problem, but it's also a rural problem. This is the Murray-Darling Basin about which I'll talk about shortly, and you can see a similar trend in terms of declining rainfall in the last few years coupled with increasing temperature.

So the drought that we're having now is particularly pronounced. We've had variability in the past, as you can see, largely driven by in-flow, but now we have this combination of declining rainfall but also high temperatures, which is making it particularly problematic. And a decline in rainfall translates into a proportionately greater decline in stream flow, and stream flow is what really matters in terms of water.

So it's a dry continent, and we're having this problem; in the last ten years it's getting drier. It could be an anomaly. It could spring back, but the climate models are showing we're going to get more of this. This is likely to become a mean condition, and these extremes are likely to become more extreme in the future because of climate change.

Ignore the graph. I just stole that from CSRO, but I like to do these things.

No matter -- basically no matter what we do Australia's going to be on average one degree warmer by the year 2030. Basically, no matter what we do, Australia will be two degrees warmer by 2100. If we stabilize at 550 parts-per-million carbon dioxide equivalent, which is unlikely, Australia will be between one-and-a-half and three degrees warmer by 2100. If we don't stabilize greenhouse gas emissions, which is probably more likely than stabilizing at 550 ppms CO<sub>2</sub>e, we may be between three and seven degrees warmer by 2100. It's worth pointing out to you, we've already passed 450 parts-per-million carbon dioxide equivalent in the atmosphere. We're committed to a two degrees rise in temperature by 2100 no matter what we do.

If you live in the Pacific Islands, that's extremely concerning, because two degrees local warming is coral bleaching every year. And so, for Australia's Great Barrier Reef, basically, it would look like we're committed to annual coral bleaching on the Barrier Reef by the end of this century, no matter what we do, which is very concerning, and so the Australian government is becoming very worried about adaptation. What are we going to do to deal with these problems?

The climate models are a little bit less certain about precipitation; there's more uncertainty in the results. And I project across a range, but the best estimate is that it will be getting drier.





By 2030, a decline in main annual rainfall of about three-and-a-half percent in Victoria, four percent in South Australia, four percent in Western Australia. The numbers in brackets show the range of uncertainty. On some climate model runs, at the positive end, it shows a slight increase, but most of them are showing declines.

Perhaps more significant, though, is that there will be changing and increasing in these variability in years, but also within years we'll see fewer rainfall events, and when it rains it will rain more, which basically means more heavy rainfall events and longer periods without rain in between, which means more problems of droughting and flooding. And this is generally true across most of Asia and the Pacific.

So, the problems that we have are a very useful way of learning about what might happen in the future. We can use the current drought as an analogy to understand future impacts and think about what sort of responses we might need. But it would seem quite likely that the problems that we're having now are not going to go away; they're probably going to get worse.

So let me talk a little bit about drought and what it means. I'm going to talk particularly about the Murray-Darling Basin. This is it down here; it starts up in Queensland, and the two principal rivers are the Murray and the Darling and its various tributaries. It's a large catchment, and it flows down through New South Wales, Victoria, flows out the mouth of the Murray River in South Australia. And there's been no flow out the mouth of Murray now for about six to eight months. Saltwater is intruding up into the system, and they're talking about building a permanent barrier to stop further saltwater incursion because if it goes much further it'll affect Adelaide's water supply. There's a million people living in Adelaide. It's a problem.

Okay, so the Murray-Darling Basin is important. It produces, by value, 40 percent of our agriculture, it consumes half of Australia's water, and two-thirds of its agricultural water, and most of that is for irrigation -- cotton, dairy farming, pasture, and rice production in particular.

This is a very interesting graph. On the left-hand bar of each of these pairs of bars in blue is the value of production from the particular form of irrigation that it's used for. On the right-hand side is the amount of water it takes to produce that value of production. Okay, so if you look in the middle here, cotton, this is how much production we get from cotton in terms of





value; this is how much water it takes. This is dairy farming on the left, other livestock that's basically grazing for beef, rice, cereals, cotton, grapes, fruit, vegetables, other stuff.

So you can see that some crops are highly inefficient. Cereals, for example, really take a lot of water relative to the value of production we get out of them. Cotton takes an awful amount of water. That's the largest water user in the Basin. It doesn't produce anything of as much value as fruit, for example.

So we have this issue about what we're growing in the Basin and what we're irrigating in terms of the amount of water that's required to produce a certain value of output. It's a structural problem, and it's being implemented for all sorts of reasons, which I'll now go into.

So between 2000 and 2005, in the Basin, there was still a growth in production, and it was largely because of shifting to higher-value crops. People were moving into things like fruit; wine is a big issue now in the Basin, and, of course, we make a lot of money out of wine production. But nevertheless that rate of growth was significantly below average rate of growth for agriculture in Australia, five-and-a-half percent lower, so less growth in the Basin than nationally. Area under irrigation fell by nine percent; the number of milk cattle fell by twelve percent; the number of sheep fell by seven/eight percent. Employment in agriculture fell by twelve percent, and in cotton, a heavy irrigating industry, employment fell by 42 percent.

These are people employed, by and large, living in small, rural towns. They're running out of work. There's less spending in those towns; there's less provision of services. So it's accelerating rural decline. And these towns are important to Australia. It's part of our identity. This is the kind of guy we like to think we are; this is the kind of guy that settled Australia, and we like to think that these people live here in rural Australia, and when we realize that it's not happening any more we might have some very interesting political issues arising.

Across the country in 2006/7 agricultural output fell by 20 percent. Income on broad-acre farms -- that's open-pasture farming, wheat principally -- fell by 50 percent, on dairy farms by 60 percent. We saw rising food prices, which was a function partly of falling supply domestically.





And Melbourne's reservoirs are now just under 27 percent capacity. So we're now on significant water restrictions for Melbourne and have been for a while.

Okay, so we observe this problem for the last ten years of drying. We know that that problem is going to get worse. We are thinking about -- we, the government, the society -- how we might deal with that kind of thing.

Let me talk about one of these responses, and this is a rural response called the Exceptional Circumstances Policy, which is part of the National Drought Policy. And it's effectively a drought relief funding system that has three principal forms of payment: basically, a benefit payment of about \$400 per fortnight per farmer and also for a farmer's wife; subsidization of interest repayments where necessary; and an exit package for farmers who wish to transition out of farming. And certainly because of the drought, the number of farms on Exceptional Circumstances support increased over 2002 to 2008, but nevertheless, of all the farms eligible for Exceptional Circumstances funding, 70 percent didn't ask for it and didn't receive it, which tells you that 70 percent of farms in the Murray-Darling Basin are able to manage climate variability without support from the government, which tells you that perhaps this policy is slightly misplaced.

To qualify as an "Exceptional Circumstances" event so that people can qualify for funding, the event must be classified as rare; it must be a rare drought. It must not occur more than once in 20 to 25 years. That calculation becomes very difficult when you've had a ten-year drought. It must lead to a rare and severe downturn in farm income. That qualification becomes very difficult when you realize that 25 percent of farms in the Murray-Darling Basin haven't made a profit since 1988.

And the system is based by drawing a line around a map and saying, "This is a drought-affected area. Farmers in this area are now able to qualify for Exceptional Circumstances," which doesn't distinguish very well between farms that might be on one side of the line and farms on the other and farmers within that area who are doing quite well and farms that aren't. To its credit, the new government said, "Well, we think this policy might be rather difficult because of climate change," and got the Bureau of Meteorology and CSIRO, who are a large public research agency, to do a review that do most of our climate modeling. And bothly they concluded that this category of rare was going to become very difficult because of climate change. The policy triggers are going to be rather hard now because climate change is going to make "rare," normal.





The Productivity Commission, who is an arm of Treasury and quite powerful and a statutory body that does interesting things in terms of process and competition, did a review of Exceptional Circumstances and said it doesn't help farmers improve their self-reliance, it doesn't help farmers improve drought preparedness, and it doesn't help with climate change management. Effectively exceptional circumstances is creating moral hazard, that is it's discouraging farmers from taking actions to manage risks, and it's possibly subsidizing uncompetitive farms, which is not necessarily -- if you want to be very rationalist about it, which the Productivity Commission is -- it's sustaining enterprises that can't compete, and it's encouraging farmers to take risks that they otherwise wouldn't take.

So, on the basis of this discussion, the federal government decided in principle that they were going to change the EC system, and they were going to release in the 2009 budget a package of reforms that would begin in 2010. That wasn't in the budget, and this was widely discussed in some of the policy circles, that EC was going to change, and that was a good thing. But it wasn't announced, and the government said, "Well, it's partly because of our response to the financial crisis. We can't do this now." But I feel that the power of the rural lobby, which is very powerful in Australia, was probably something that's got the government quite worried: "We don't want to implement this policy until we know what the political ramifications of that are going to be." You annoy the rural lobby in Australia at your peril, and I think the government are reasonably averse to taking that risk. I could be wrong.

So the other thing that we're doing is we're effectively now trading energy for water, which I'll explain shortly. Running decreasing runoff into catchments and cities is being dealt with through three principal mechanisms: through a demand management system, which is based around water restrictions. You can only water your garden two nights a week after 8:00 p.m. in Melbourne. You pay relatively higher prices when your water consumption passes a certain threshold, although those prices are still quite low. There's a rebate system for investing in rainwater tanks and gray water recycling, and that's fairly heavily subscribed.

And there is in Melbourne, no doubt, a whole new set of behaviors around water management in households and water use in households and a culture of water savings. To have a rainwater tank is a good thing. It's a status symbol; it's like driving a Prius, and in fact, at one point, if you went to buy a rainwater tank you had to wait ten weeks for one to be delivered; demand was so far ahead of supply. Widely used. In my neighborhood three years ago you could walk around and people would be using Triple-A water to hose down their





driveways. That is absolutely socially taboo now; nobody would ever do that. That would be a serious cultural error.

So there's a lot of change going on. We now have a per capita water use target of 150 liters per person per day in Melbourne. And most households are getting under that, and that's a big fall. In fact, the consumption of water is so low that there's less water going into the sewage system, and now they're almost at the point of not having enough hydraulic pressure to run the system. It's working yet.

We are also going through this process of building desalinization plants. If you are desalinization manufacturer you want to get on a plane and go to Australia. They're being built or planned to be built in the Gold Coast, Sydney, Adelaide, and Perth. We're going to start breaking ground for one in Melbourne at the end of this year. The Melbourne one is going to cost \$3 billion at least. That's an initial cost estimate, and there's problems of disclosure around this because it's not politically very popular. It'll produce about 150-200 billion liters of water a year. It's going to produce an awful lot of greenhouse gasses, and basically the cost of this is going to be passed on to consumers. This is a maladaptation. We're going to produce all those greenhouse gas emissions to adapt to climate change.

Also in Melbourne we're having cross-basin transfers, and this is significant in Melbourne. Prior to now Melbourne got its water from within its own catchment. So this is a couple of linked developments. A pipeline is going to pump water from across the divide into Melbourne, and the pipeline itself will cost \$750 million. But the water we're getting is coming from this thing called the Northern Victoria Irrigation Renewal Project, which is \$2 billion investment inefficiency in that it's an irrigation area mostly growing fruit. Melbourne Water, which is the authority that provides water to Melbourne, is putting in \$300 million of that investment in exchange for 75 billion liters a year of water coming to Melbourne, which in itself is fine, I think, but very politically unpopular.

The problem, again, is the energy that's required to pump that water over the divide. It's going to take a lot of energy; it's going to produce a lot of greenhouse gasses. It's going to take water out of the system that really needs it for environmental reasons. And, again, households are going to pay. This is our premier down here. There's this public relations campaign about this. As you can see, it's a very violent, heated protest. But there is a significant protest about it.







One of the things, I think, that's going to be very interesting is that households in Melbourne don't understand that whether or not they like it they're going to pay for those developments. So if you're a household in Melbourne that's switched your garden over to native plants that don't use much water, you're using gray water recycling, you've got a rainwater tank, and you've made all these investments to do the right thing, and you still use mains water, you're going to pay twice as much for it, which is going to be interesting politically when that kicks in.

So effectively now water in much of southern Australia and eastern Australia is really being secured through throwing energy: desalinization and pumping water.

Okay, so what are we doing about reducing the cause of the problem, that is, our greenhouse gas emissions, and I'm not sure entirely how I feel about this. This is the Carbon Pollution Reduction Scheme, which is the name the government gave our emissions trading scheme because no one liked the words "emissions trading scheme." So we just call it "Carbon Pollution Reduction Scheme." The initial proposal was, it doesn't matter what happens, we will reduce our greenhouse gas emissions by five percent below 2000 levels by the year 2020. In what I think is a very interesting move -- interesting is my way of saying probably stupid move -- we would agree that we would increase that to fifteen percent if all major economies agreed to reduce their emissions -- and that means China and India, basically, and the United States -- which basically says, "Well, we're prepared to incur the cost of reducing emissions." I don't know why we wouldn't just do it anyway. It's not some incentive that's going to make China reduce its greenhouse gas emissions.

The cost of a fifteen percent reduction below 2000 levels by 2020 is a 1.6 percent reduction in business-as-usual GDP growth. So GDP would grow like that; it'll just grow like that. One-point-six percent, incidentally, is the cost of the 2002-2003 drought to GDP. This is the equivalent, in terms of Kyoto targets, of a four to fourteen percent below our Kyoto baseline of 1990, and it was scheduled to begin in the middle of next year, which, if ever there was a piece of evidence you needed to show that this wasn't well considered, that's an election year.

It was to cover 75 percent of emissions, that is, basically, roundabout a thousand big businesses. That would include fuel, but there will no price rise in fuel because the fuel excise levy will be progressively decreased as the carbon tax on fuel comes in. In other words, there is no signal to consumers for fuel, which kind of defeats the purpose.





“All major greenhouse gasses” doesn’t include agriculture or forestry. There’ll be a cap on the price of permits of \$40 a ton. Free permits will be handed out, and there will be assistance provided to emissions-intensive, trade-exposed industries. That’s coal and steel production.

So the CPRS doesn’t necessarily send the price signals to the heavy polluting sectors of the economy that it needs to. Ross Garnaut ran around -- and I remember this clearly. I don’t understand emissions trading fully. We had an internal report about this from a leading economist, and he said, “Whatever you do, whatever you do, the one thing you must not do is give out free permits.” And it’s in the CPRS.

Politically the opposition didn’t know what to do about this. They had some difficulty. This is a Conservative opposition, a nominally left government in power. But they settled on this thing that, “Well, we don’t know what to do, but we’ll wait for it to see what the U.S. does, and we want to see what happens at Copenhagen. So let’s wait, but we kind of like it, but we’re not sure. We don’t know what to do.” Green groups didn’t like it. They said the targets were too low. The design was flawed. There’s an awful amount of credit that can be achieved by offshore investments. And that there’s not market signal to heavy polluters, and, in fact, it’s going to heavily subsidize some polluters. So, in the first year, 2010, \$460 million would have gone to Rio Tinto, and \$170 million to Alcoa, for example. So whatever they might be suffering in terms of higher payments, they’re going to get back in the form of compensation. Whatever motorists might pay in terms of higher fuel prices, they get back in terms of lower taxes. There’s no price signal here.

Business wasn’t happy either. They said that it was going to come in too soon, and then a move to full trading straight away in 2010 was going to be difficult for them to adjust to.

So there were electoral risks. There were design flaws. It was very unlikely that it would get through Parliament. And the financial crisis meant that, just last month, the government said, “We’ll delay this by a year,” to start it in 2011 with some adjustments. A regulatory authority will now be established before it starts. So there will be a regulator to observe the trade. The maximum target will increase to 25 percent below 2000 levels by 2020 if all the other countries agree. Now that’s actually kind of interesting because 25 percent below 2000 levels is a fairly significant reduction by 2020 in Australia’s greenhouse gas emissions. That’s not going to be easy. It’s not going to be easy.





So I think that if we were to agree to a 25 percent cut below 2000 levels below 2020, I'd be pretty pleased with that. I don't think the CPRS is the policy mechanism to do it because they're giving out free payments and we're capping the price of carbon. The government will also have to intervene, I think. The CPRS is not the policy tool to achieve that, but if they could do it that would be significant. But why we would hold that out as a condition on Kyoto I don't know. And a slower phase into full trading to make businesses happy.

So there's now more support, and at the same time the government's been doing this they've been working powerfully hard to get support from business and from green groups. And the green groups now basically support this revised CPRS amazingly and at the cost of some fairly significant fracturing within the green lobby. And businesses by and large support it. The states are a little bit worried about it. Victoria, for example, had a carbon mitigation program that their analysis basically said, "We've wasted our time. The CPRS is going to completely override anything we can do," and it's weaker than the state of Victoria would have wanted to do.

It remains to be seen what this thing is going to be like. The analysis is still in its early phases. There are certainly still some large loopholes in it: free payments, caps on the price of carbon, extensive use of offshore activities, CDM top activities, and the fact that one of the things you want to be doing is sending a price signal to those sectors that are producing a lot of greenhouse gas emissions. It's not clear that it's going to do that. So, jury's out.

I think what I'm saying here -- and I think what a lot of people are starting to feel -- is that perhaps our response to climate change has been a series of decisions to avoid taking politically risky things. I'm not sure we want to do the Exceptional Circumstances thing because we don't know how the rural lobby's going to respond. We're not sure we want to push too far on terms of demand management in cities because we're not sure of the electoral kickback that we might get if we go too far, so we'll go for big engineering projects. We won't worry about Exceptional Circumstances for a while. We'll build a de-sal[inization] plant; we'll pump water; we'll transfer the political costs to those particular locations, and we'll make sure that the large electorates are okay.

I think there's something else going on here, which is we love market mechanisms in Australia. So we will use a market to solve any problem, and we're trying to do that as well. I don't think we have the policy skill or the memory of how to implement a policy that involves detailed implementation at the level of households and firms. I don't think we know





how to do that anymore. And so I think our capacity to implement policies that don't require the use of markets is now quite low.

I think that our responses, at least to water, are not necessarily appropriate. There are some good things, and I think they're going to lead to higher emissions, and I think that, ultimately, we're going to delay some of the really significant costs of adjustment onto future generations. Sooner or later we have to deal with demand more effectively than we have. We can't just keep manufacturing water.

There are alternatives. If you go back to that graph I showed you about irrigation, the efficiency of irrigation, there is a need for some structural change in irrigation in Australia. We put really good water onto sandy soils to grow grass for cows. It's stupid. And the Minister said on Friday to some Victorian irrigators, effectively, this: "You have to accept things are going to have to change, but there's no program to make that happen." There is some water trading that may be effecting change, but I don't think it's going to do it enough.

I think the possibility of demand reduction, recycling, and urban water harvesting could go much, much further and would be much, much cheaper, probably, than pipelines and desal[inization]. We're spending \$4 billion on desalinization and pipelines in Melbourne, which is an awful lot of subsidies for households to take efficiency measures. But, again, it's kind of hard to do. But there's huge potential, and it's demonstrated potential. Melbourne has been able to reduce its water consumption significantly through these measures. We haven't even tried really yet. It's basically been water restrictions and a rebate scheme. That's not much policy implementation for a big change and a big cultural change that we could be building on.

And in terms of emissions reductions, we really can't expect other countries to reduce their emissions any more than we're willing to do so. To say we're only willing to reduce by five percent is not showing the kind of leadership that's required. We're one of those countries for whom climate change is dangerous. Our forests are going to contract. Our reef is going to bleach every year. We've got significant water stress problems. Two degrees of global warming is very bad for Australia. We have to be working towards a 60 to 70 percent reduction by 2050. We have to put ourselves on a target to do that, and if we don't do it we can't expect others to do it. So when we say 25 percent if every other country in the world will do it too, I think we're missing the point. We should say, "We're going to go for 25 percent by 2020. Show you how to do it."





Woodrow Wilson  
International  
Center  
for Scholars

*Environmental Change and Security Program*

Ultimately, if you listen to the climate science that's being produced about Australia, we don't have much time to get this wrong, and I think some of the decisions we're making are probably going to be inappropriate, that it's almost at the point now -- well, this government has observed that the difficulty of reducing emissions, it's much harder now because if we had have started ten years ago we could have been on a slowing trajectory. We could have done changes in our water system that would make the problem now more easy to manage. I think if we wait much longer it's going to be too late. In effect, we're just going to commit ourselves to higher rates of warming that are just going to impact upon future generations, and no amount of adaptation is going to help. So I'm sort of concerned now that we need to make the right decisions now. We don't have much time any more to get this wrong. Thanks.



environmental change & security program