COMMONWEALTH OF AUSTRALIA

Proof Committee Hansard

SENATE

RURAL AND REGIONAL AFFAIRS AND TRANSPORT REFERENCES COMMITTEE

Reference: Rural water usage in Australia

WEDNESDAY, 14 JULY 2004

CANBERRA

BY AUTHORITY OF THE SENATE

[PROOF COPY]

INTERNET

The Proof and Official Hansard transcripts of Senate committee hearings, some House of Representatives committee hearings and some joint committee hearings are available on the Internet. Some House of Representatives committees and some joint committees make available only Official Hansard transcripts.

The Internet address is: **http://www.aph.gov.au/hansard**

To search the parliamentary database, go to:
http://parlinfoweb.aph.gov.au

SENATE

RURAL AND REGIONAL AFFAIRS AND TRANSPORT REFERENCES COMMITTEE

Wednesday, 14 July 2004

Members: Senator Ridgeway *(Chair)*, Senator Heffernan *(Deputy Chair)*, Senators Buckland, McGauran, O'Brien and Stephens

Participating members: Senators Abetz, Allison, Boswell, Brown, Carr, Chapman, Colbeck, Coonan, Crossin, Eggleston, Chris Evans, Faulkner, Ferguson, Ferris, Greig, Harradine, Harris, Hutchins, Knowles, Lees, Lightfoot, Mackay, Mason, Sandy Macdonald, Murphy, Payne, Santoro, Tchen, Tierney, Watson and Webber

Senators in attendance: Senators Buckland, Heffernan, McGauran

Terms of reference for the inquiry:

To inquire into and report on:

1. current rural industry based water resource usage;
2. options for optimising water resource usage for sustainable agriculture;
3. other matters of relevance that the committee may wish to inquire into and comment on that may arise during the course of the inquiry, including the findings and recommendations from other inquiries relevant to any of the issues in these terms of reference.
4. the Committee to make its report to the Senate on this matter by the last sitting day in 2003.

WITNESSES

Committee met at 9.15 a.m.

ACTING CHAIR (Senator Heffernan)—I declare open this hearing of the Senate Rural and Regional Affairs and Transport References Committee. The committee is inquiring into rural industry water use. This is a public hearing. The committee has authorised the recording, broadcasting and rebroadcasting of these proceedings in accordance with the rules contained in the order of the Senate of 23 August 1990 concerning the broadcasting of committee proceedings. Before the committee starts taking evidence, I place on record that all witnesses are protected by parliamentary privilege with respect to submissions made to the committee and evidence given. Any act by any person which may disadvantage a witness on account of evidence given by him or her before the Senate or a Senate committee is a breach of privilege.

While the committee prefers to hear all evidence in public, it may agree to take evidence confidentially. If the committee takes evidence confidentially, it may still publish or present all or part of that evidence to the Senate at a later date. The Senate also has the power to order the production and/or publication of confidential evidence. The committee would consult the person whose evidence the committee is considering publishing before taking such action.

[9.17 a.m.]

BETTS, Mr Owen, Member, Culgoa Balonne Minor Water Users Association

PETERSEN, Ms Pop, Member, Culgoa Balonne Minor Water Users Association

TREWEEKE, Mr Rory, Chair, Culgoa Balonne Minor Water Users Association

Evidence was taken via teleconference—

ACTING CHAIR—Welcome. Would any of you like to make an opening statement before we go to questions?

Mr Treweeke—I would like to make a brief opening statement because I did not have the opportunity to appear before your committee at the hearing in St George. A couple of things have happened since then. We have had the release of the draft water resource plan by the Queensland government and we have had the January 2004 flow event, which brought a lot of factors to a head. We have found as a water users group that the draft water resource plan is unacceptable. It does not do anything to redress the situation. It basically acknowledges and puts in legislative form the status quo that now exists in terms of the capacity to extract water from the system in Queensland. The January 2004 flow event demonstrated that very dramatically in terms of the non-flooding that happened below where the extractions took place in Queensland, and in New South Wales there was no flooding of pastoral and grazing land at all. Our association has responded to the draft water resource plan. Basically, we believe the responsibility for redressing the situation lies with the Queensland government because they are responsible for the issuing of licences and for the licensing system that obtains in Queensland.

We believe that the Queensland government are in error in trying to meet their obligations under the Murray-Darling Basin cap by expressing the cap in terms of the storage capacity that has been permitted to be constructed on the Lower Balonne floodplain instead of an annual cap on diversions out of the system. We are pleased that the New South Wales government has compiled a very robust response to the draft water resource plan. This is the first time that a New South Wales government has taken up the issue on behalf of its land-holders on the river systems in New South Wales, and, as far as the New South Wales government was concerned, the draft plan was unacceptable to them.

While the Cullen report recommended, and the Queensland government and other people acknowledged, that flow management may be the way to go in the future on systems such as these, one other factor the January 2004 flow event demonstrated was that such management practices will be very resource hungry in terms of accurate and timely measuring. It will also be resource hungry in terms of input by departmental officers to ensure that if you are to manage a flow down through the system, the advice that is given about how and when water is to be extracted is given on a very timely basis. The other thing I would like to add just by way of information is that the federal government made available $195,000 for a scoping study to outline the further research needs of the floodplain, particularly the New South Wales section of it, which has not been done previously. The steering committee for that study is to be jointly

chaired by myself and Mary Woods, who is Chair of the Queensland Murray Darling Committee. The first meeting of that steering committee will take place next week in Lightning Ridge.

ACTING CHAIR—Thank you very much for that. Does anyone else want to say anything before we begin questions? No, you are all happy there? Owen, could I get your permission to receive as a submission the letter you have sent me that talks about the draft water resource plan and the flow management rules.

Mr Betts—Yes, you may circulate it that way.

ACTING CHAIR—It seems to me that the Minister for Natural Resources, Mines and Energy, Mr Robertson, has said two things that are totally misleading. It appears to me that the Queensland government has used the words of Peter Cullen out of context in that they say Peter Cullen has endorsed the A and B regime—generally the river management regime that is up there—and I do not think he has. Would you like to comment on that?

Mr Treweeke—Professor Cullen's reported comments in the *Land* back in March this year were that he saw no sense in the bunding situation that has arisen out of the so-called A and B type extraction of water from the floodplain. Certainly, as a water users group below, we find it totally unacceptable. We accept the extraction of water through water harvesting licences into on-farm storages to a reasonable extent. We are not anti-irrigation industry but we do believe that the allowance of this so-called A and B class water or floodplain extraction has led to the situation of overextraction on the system. But I believe Professor Cullen would be the best person to answer that question.

ACTING CHAIR—Professor Cullen will be appearing later today. I had a bit to do with the rephrasing of the words and the correction of the interpretation that were in the *Land*. My understanding of the study that Professor Cullen did was that, if the water harvesting and storage capacity on-farm, off-river were implemented, it could do serious damage to the whole environmental system up there. Is anyone aware of an environmental plan being done and associated with the huge increase in extraction of water up there? Was there any environmental planning put around that?

Mr Treweeke—Not that I am aware of.

ACTING CHAIR—I have said publicly and it is my strong view that the environmental plan up there is actually 'first in, best dressed and bugger the rest'. You wouldn't disagree with that, would you?

Mr Betts—You are right on the mark.

ACTING CHAIR—The second thing that Minister Robertson raised when singing from the angel sheet was that Queensland is as pure as the driven snow compared with what is going on in the Lower Balonne; that in fact they are returning 10 per cent of the water to the river in medium flows and low flows. Of course, we all know what the environment needs is a top-up in a big flow. I understand that the 10 per cent has to be repaid, and by the time you spread it over the flow it is actually a 3½ per cent return of water. Would someone like to comment on Minister

Robertson's assertion that the plan that is out for comment is actually going to return water to the system?

Mr Betts—Our big problem is that the extractions were already very high—over 100 per cent in some flow rates down to about 70 per cent. That is where our problem is: the extraction is huge already. When you reduce it by 10 per cent, it makes a minuscule difference. This reduction period is only for up to five days. In this last flow event it would have only made 3,500 megalitres extra per day to be spread over five rivers, which would make no difference to the flood plain.

ACTING CHAIR—I understand the last flow, the January event, was 500-odd thousand megalitres, wasn't it?

Mr Betts—From my records, I believe more like 670,000 megalitres came into the top of St George and 90,000 megalitres went over the border—that is, 13½ per cent went over the border.

ACTING CHAIR—In terms of the local geography—and I appreciate the fact that you have sent maps, which we have here, to identify the various neighbours—would it be fair to say that in that event Cubbie Station, keeping to the 'first in, best dressed' principle, did pretty well out of it? They captured something like 160,000 or 170,000 megalitres. How did everyone else get on?

Ms Petersen—We did not actually get any water at all. The daily release rate maximum from Jack Taylor Weir was 66,822 megalitres. Normally that would give us a flood of 60,000 acres here at Brendale. It never got past being three-quarters of the back-up. So if that flood event gave Cubbie a quarter of its storage, through just being filled, it means that we have to have another three floods of the same size before we get any water here at all. They keep saying that the river is in a healthy condition. Well, if it is, I do not know why all the river gums along the river bank and the lignum on the flood plains are dying.

ACTING CHAIR—There is a paper out for comment now with the A and B licences—the A licence being the bunded water and the B licence being the flood harvest water. I understand that there are banks up now that people are hoping will make them eligible for an A licence—that is, a bunded water licence. I understand, Owen, that some of those banks are above your property Kelso, which is Leith Boully's farm. I take it there are no environmental plans being put around those bunded water banks. Could you describe to the committee what happened during this recent event—that is, the fact that those banks had to be broken for some water to come down at all?

Mr Betts—That is right. The banks are 500 metres above our boundary. The water came down and hit the top side of them, and it was quite obvious that it was rediverting it and none would come onto our land as it used to, so some temporary holds were put in those banks to allow some of the water to come through in this last event.

ACTING CHAIR—So, if they had not breached the banks, you would have got no water?

Mr Betts—That is correct. I believe we would not have.

ACTING CHAIR—Do you think it is pretty extraordinary that a government would allow a land-holder—in New South Wales, it would be fair to say you would probably get put in jail if you did not pull them out—in Queensland to put up those banks with no environmental impact study and no consideration of what is going to happen downstream? Have you expressed your frustrations to the Queensland government about that sort of behaviour?

Mr Betts—Yes, we have in our submission. There was a Connell Wagner study done on where they could put these banks. I have read one of those reports, and it states that no consideration was given to the small flows, which is very worrying.

ACTING CHAIR—Yes. I also note that the original application for the storage proposed 10-metre banks. I understand the Queensland government changed legislation so that people could put in banks for water storage that were under five metres high and there was no attached environmental planning requirement. That is correct, isn't it?

Mr Betts—To the best of my knowledge they started at five metres and now they have been increased to eight metres. As for what study was done, I do not know.

Senator McGAURAN—A point of clarification: who put the banks up; whose banks are they?

ACTING CHAIR—The local land-holders. It is Rafferty's rules up there, you will find, Senator McGauran. I will pass over to Senator Buckland, who is a concerned South Australian senator who has taken a keen interest in these hearings.

Senator BUCKLAND—I want to get to water trading in a moment, but can I first get some comments from you. I read in the *Stock and Land* journal, which I think is a New South Wales—

ACTING CHAIR—No, that is Victorian.

Senator BUCKLAND—Victorian publication, that the National Farmers Federation national president has taken a property in Queensland—Braylands, I think it is called—at Emerald which affects the water in the Balonne River.

Mr Treweeke—No.

ACTING CHAIR—No.

Senator BUCKLAND—That is not right?

Mr Treweeke—No, that is incorrect. Emerald is up in the central part of Queensland and is in a totally different catchment.

Senator BUCKLAND—I will redirect those questions, and I apologise for that; my geography is not all that red-hot. We do not get rain in South Australia very often, so rivers do not exist!

ACTING CHAIR—They look up the river with swollen tongues all winter, looking for the rain!

Senator BUCKLAND—I think it was you, Owen, who said that you can agree to water harvesting onto farm storage to a limited extent. Have you or a group of your colleagues discussed what a 'limited extent' would be?

Mr Betts—We have. Our main concern at this stage is the overland flow extraction, which has mainly all happened in the last four or five years—and development. We are largely prepared to accept what has been given in the original river licences. Our main problem is all the overland flow extraction, bunding and rediverting; it has been the law of the jungle out on the flood plain.

Mr Treweeke—I would like to add to that. The water-harvesting licences are basically capped at a flow rate out of St George of 60,000 megalitres a day. So, once you reach 60,000, there is no increase in the amount of water that can be taken under the water-harvesting licences. If you have a big flood of in excess of 100,000 or up to 150,000 megalitres a day, there is sufficient water then to service the flood plain down below. But, if the extractions from the flood plains are allowed to continue, they go on right up to flows of 200,000 megalitres per day and basically permit up to at least 50 per cent of that water to be diverted. The problem is that some of that water is not actually extracted by pumps but by gravity diversion, which means that it can be done at an enormous rate.

ACTING CHAIR—I want to butt in here, Owen. That is item 3 on your letter. Appendix 4 shows the alarming amount of extraction. That paragraph covers it nicely.

Senator BUCKLAND—Yes, that is right. The concerns you put in your submission certainly cover it very well and that eliminates many of the questions that need to be asked. However, what are your views in relation to water trading?

Mr Treweeke—Trading, even within the irrigation industry up there, is probably regarded with a great deal of suspicion at this stage because most of these are ephemeral flowing streams. You can never predict where the water is going to come from to run the system during a particular rainfall event. Generally, trading outside of particular reaches below where tributaries come in would be regarded as both economically and environmentally questionable. While the new COAG rules are meant to make trading free, I do not think there is an enormous amount of support for it even within the irrigation industry. But certainly, so far as the downstream land-holders are concerned, we have a big question mark over it.

ACTING CHAIR—It is not proposed that the bunded water licences be tradable though, is it?

Mr Treweeke—No, it certainly is not. It is only the water harvesting licences that would be tradable.

Senator BUCKLAND—Do you think there should be constraints on who buys traded water?

Mr Treweeke—I believe that water trading needs to be investigated very closely in these river systems to see what the impacts are of trading licences both upstream and downstream from where they are originally allocated.

Senator BUCKLAND—Are you aware of any instances where someone downstream has bought water from someone upstream?

Mr Treweeke—I am not aware of any, no.

ACTING CHAIR—I want to go back to the general deal that has been dished out and the complication of cross-jurisdictional water flows. Would it be fair to say that the regime that has been put in place in Queensland and adopted and endorsed by the St George community reference group has seriously disadvantaged the downstream riparian rights of all the land-holders?

Mr Treweeke—Yes, that is correct.

ACTING CHAIR—One of the great furphies out there is that somehow there was a decent flow down the Narran to the Narran Lakes—and by the way, I have got those satellite images here that I sent up to you fellows to peg out your country on. Of course, the Commonwealth has a lot of jurisdiction when it comes to the environmental side of all this. Would you like to put on the record though whether there was much of a flow down the Narran? It was mostly local run off, wasn't it? There were six or eight inches of local rain, wasn't there, that got a lot of that water into the lakes? Would anyone like to comment on that?

Mr Treweeke—There was initially an in-bank flow into the Narran Lakes. Subsequently, around Angledool we had a very wet March. We recorded about 10 inches—you have to go back to 1894 to find a wetter March on our rain records—and it put approximately the same amount of water down into the lakes that happened out of the January flow. My advice from National Parks is that the flow into the lakes was insufficient to trigger a bird breeding event. One of our criticisms of the draft water resource plan is that, to a certain extent, it tries to select the Narran Lakes and the Culgoa National Park as icon sites and manage water to ensure that they are serviced but with no regard to the intervening floodplain. As Martin Thoms has made quite clear in some of his research, the lack of flooding of the floodplains means that the production of organic carbon that goes back into the river system to keep it healthy will no longer end up in the Narran Lakes—to their ultimate deterioration.

ACTING CHAIR—At the latest estimate, have you any idea of how much storage has been built on farm—that is, off river—in the Lower Balonne?

Mr Treweeke—In the vicinity of about 1,513 gigalitres.

Senator McGAURAN—On that point, is the moratorium on water resource development that began 2000 still in place?

Mr Treweeke—Yes, except that certain works such as deepening storages—raising the height of the banks to decrease evaporation losses—were allowed so long as the total capacity was not increased. But, in the New South Wales government response to the draft plan, they say, for

example, that data supplied to the MDBC by the Queensland government shows that on farm storage capacity is now five times that which was reported for 1993-94 and has trebled since the WAMP process began in 1996. The WAMP process was a previous attempt to put a cap on extractions from the system. To put this into context, the mean annual flow across the New South Wales-Queensland border is 1,219 gigalitres under natural conditions—in other words, predevelopment conditions—and 612 gigalitres under developed conditions. The total on farm storage capacity in the Lower Balonne is 1,513 gigalitres. That is taken from page 14 of the New South Wales government submission of May this year.

Senator McGAURAN—So the moratorium is a joke?

Mr Treweeke—We believe so, yes.

ACTING CHAIR—I want to go to the bunded water issue—having the second and third bite of the cherry with the A and B water licences. In terms of the Rafferty's rules approach to this, wouldn't it be reasonable to think that there would be some environmental planning put around the principle of bunded water. For those who do not know, this is where you bank off flood country to keep the water off it and then somehow you magically become entitled to the water, in a turkey nest or a licence appropriate to what that land would have absorbed. In terms of recharge and environmental kindness to the land that gets bunded off, has there been any thought given to the long-term effect, the 100-year effect, on the country that gets bunded off? Has any work been done on whether you are actually intercepting a recharge area in the landscape?

Mr Betts—That is a good point. There have been absolutely no studies done on what effect drying out naturally flooded country will do. This country used to be flooded approximately every three, four or five years but now it has a bank around it and will never get floodwater over it again. At this stage nobody has any idea of what that will do in the long term

ACTING CHAIR—What I am intrigued to know about all this is where all the bleeding hearts and the environmentalists are. Why aren't they up there blockading the place? I am doing my best to get it on the map, although I do not think I would describe myself as a lunatic greenie. I am very concerned that the foot in the door that this represents in terms of absolutely ignoring good environmental planning is a national disgrace. I have, as you know, described what is going on up there as a national disgrace. I am just beside myself that no-one has taken ownership of the problem. It is as bad as the La Trobe Valley aquifer issue. To give the committee an understanding of the competing or territorial jealousies along the river there, are there upstream and downstream equity problems that occur within the state as well as over the border? In other words, with respect to the people who are in the confined and traditional irrigation area at St George—and we are getting them along later in the day—have you heard through the community reference group that they are unhappy with the largesse that has been extended to the river harvesters?

Mr Betts—They are certainly not happy—mainly about this 10 per cent reduction. They have had to reduce this 10 per cent mainly because of all the overland flow abstraction way down below them. So they have lost reliability at the expense of people below getting more water.

ACTING CHAIR—I do not think you would have to be a very great environmental scientist to understand that if a river has a median flow of 1,200 gigalitres and there is off river, on farm

storage of 1,500 gigalitres that is already built there are obviously going to be serious long-term issues if that is implemented. We are running out of time, but I would like to congratulate the people of the Lower Balonne for having the courage to speak out against what I see as a tide of self-interest. I would be interested in coming to terms with the prospect of the downstream effect of the recent event. What is your understanding of how much water went into the storage at Cubbie out of the January event?

Mr Betts—I think approximately 150,000 megalitres went in there.

ACTING CHAIR—As far as you know, do they store water for one of their immediate neighbours to grow cotton as well?

Mr Betts—That is correct. One of their neighbours has bunded off land to create an A type licence, and Cubbie Station extracts that water for them.

ACTING CHAIR—Given the construction and membership of the Murray-Darling Basin ministerial advisory body, is there a feeling that there could be seen to be a conflict of interest by some members of that committee?

Mr Betts—There is absolutely no doubt that there is room for a big conflict of interest there.

ACTING CHAIR—Thank you very much. We intend to look very closely at this. Later in the day we will have people from St George coming before us and Peter Cullen is also coming to give evidence. On behalf of the committee, I thank you for your patience this morning. We apologise—we would really like to come up there, as there is nothing like having a look. Obviously, I have had a look several times. I was in Lightning Ridge this week, actually, looking at my cattle. I just wish it would rain. Again, thank you all very much.

[9.48 a.m.]

BEARE, Dr Stephen Carroll, Research Director, Australian Bureau of Agricultural and Resource Economics

ACTING CHAIR—Welcome. Would you like to make an opening statement.

Dr Beare—The submission that we presented basically draws upon the research that has been conducted at the bureau over the last year and a half. It briefly outlines the importance of property rights in the reform process, emphasising the need to separate the access rights to the resource and the rights to access infrastructure, as well as recognising that in order to trade we do have to separate the water from the land, or the land from the water, and also recognising that where water is used is important and in some cases has different environmental impacts, and we need user rights.

Fundamentally, behind that is the need to define these access rights to water as close to the source as possible—for example, as a share of inflows. We need to define the consumptive pool in a way that is meaningful. In doing so, we would ensure the security of access rights to downstream users. A bit of what I overheard in the previous section about the problem of access is that it is basically catch as catch can. We need to be able to account for losses in terms of trading and, when we trade, we need to make sure that we are bearing the full costs of trade. Finally, we need to provide access rights over the losses. At present, nobody owns most of the losses, or there is no explicit ownership right to those losses, so that in many cases we may not have appropriate incentives to save. Of course, all of this needs the ability to measure accurately what is flowing down the river, and in some cases that may not be as easy as it seems.

The paper also outlines a bit about security and the need for security to ensure that there are incentives for irrigators to invest. It outlines the importance of having access rights to infrastructure when they are constraining—and a case in point is the Murrumbidgee, where fairly often the storages get out of balance. Even in the drought there was no water in Burrinjuck, which meant that all the flow was coming from Blowering. Blowering has a nine-gigalitre constraint. How is that rationed to make sure that the best value is being made of that during peak demand? Finally, as I said, it looks at user rights. I want to update the papers that were presented with the submission a little. There is a more recent paper which I would like to provide to the committee.

ACTING CHAIR—Yes, thank you very much.

Dr Beare—I have copies of that paper here, but when I return to my office I will send an electronic version of it to you. In addition, we included a paper on the value of water savings in the Murrumbidgee, but that is pretty much out of date, given the work that is going on with Pratt Water. There has been quite extensive work done to try to catalogue the actual savings. Professor Shahbaz Khan, who is doing that work, is coming here later this afternoon, and ABARE is actively participating in trying to place a value on those savings. I think that work, when it is done, which should be in August or September, will do a much better job of saying what can be saved and what the value is. Finally, if there is time and the committee so wishes, I will highlight

some of the important research that ABARE is doing in this current year, but I will leave that to the discretion of the committee.

ACTING CHAIR—Thank you very much, Dr Beare. You have been talking about the Murrumbidgee management plan. Identifying water savings is pretty important but identifying water use is equally important if you are going to have an audit of what water is available and how much the access right has access to. Has ABARE looked at any water use impacts on forestry?

Dr Beare—Yes. ABARE has done some work on the implications of reafforestation—in terms of both plantations and revegetation—and what implications that has for overland flows. In many cases there are potentially significant changes in the overland flows—of the order of maybe 1½ to two megalitres per hectare in areas where there is a significant opportunity for forestry. My understanding is that that has been drawn out as an issue in the national water plan. It is a difficult one and I think it is going to have to be progressed rather carefully, because in many cases some of these relationships are a bit tenuous, but it has been identified as an area that needs to be worked upon. The general relationships are there, but the question is: is it worth going in and putting in all the institutional arrangements and having the associated transaction costs? Are the benefits of identifying these users and accounting for them going to be worth it?

ACTING CHAIR—My understanding is that the 2020 impact on the southern Murray-Darling Basin is about—and, as you say, the figures are pretty rubbery—1,000 gigalitres gross or 600 gigalitres net. My understanding is that the recent fire event in the Snowy Mountains means another 1,000 gigalitres will now be out of the system during the regrowth period of the bush. In calculating the resource that is available in the river system, is ABARE comfortable that those things have all been brought to account? The Colorado River sharing agreement that was struck in 1922 had one serious flaw which has meant that from 1922 until today they have been arguing about water that is not there. They were two million acre-feet out in their original availability calculation. I would not like to see that happen here.

Dr Beare—ABARE has no direct responsibility for calculating the availability of resources as part of the New South Wales plan—

ACTING CHAIR—Yes, I realise that.

Dr Beare—but it is quite clear, if we look at the allocation over the last 10 years in the Murrumbidgee, that it has declined quite significantly. Excluding the drought conditions that we are currently in, the trend is quite steadily downwards. Not only are there those events that you spoke of but there is also some speculation that we might be entering an extended dry period. If we look at the historical records, the rainfall in the first fifty years of the last century was 20 per cent lower than it was in the second half. If we returned to that, it would be a very significant change. It would also change all your environmental targets: floods that happened once in five years would become floods that happened once in 10 years. I think we are dealing with a system that is extremely difficult to quantify and predict, in the same way that we are trying to work with land based systems. It is arguably difficult, it needs to be flexible, and we need to have the right institutions in place that give the best degree of flexibility so that people can handle the situation and the conditions that are going to change continually.

ACTING CHAIR—Which you would achieve through this access?

Dr Beare—Yes, I think defining a share of inflows is an important thing. At least it gives you a definition of what you have a right to, and you can make an assessment of what it is worth to you and how you want to react to it.

ACTING CHAIR—We have been given evidence that climate change might be going to take something like 25 per cent out of the run-off in the next 70 years, so that is another impact.

Senator BUCKLAND—I just want you to address some of the questions that I have about the water efficiencies that are talked about. My understanding is that the government can buy the water in the marketplace or it can give subsidies for investments by property owners or irrigators for achieving efficiencies. What sorts of efficiencies are we talking about?

Dr Beare—Yes, the government may go in and buy water in the marketplace, especially as the market develops, but that still means you are withdrawing resources from a region. Even if you compensate the owner of that resource, that owner can simply move to Melbourne or Sydney and you are left with less water in the community. Since it is a government initiative, the sorts of effects it has are an important consideration.

That has led, I think, to what appears to be a preference to move down the path of trying to save water through capital works, whether they be public capital works or subsidies for savings. The key thing is to identify what those savings are—to carefully measure them, because if we go ahead and claim we have saved something that we have not we have really just taken the water away from the environment and away from the irrigators in a surreptitious way. We really have to be able to monitor and to know, if we are going to line a channel or put bentonite in it to stop the leakage, that we really will get the savings that we think we are going to get—that we will really stop the overbank flows. Secondly, are they true savings? Is the water being saved not actually being used somewhere downstream? We have to know that these are true savings. For example, water leaking into a nice clean aquifer could be pumped out—it may be being pumped out, and it often is; water leaking into a highly saline aquifer is a loss. We need to understand our system very carefully to understand that.

What is the potential on farm? I think you will have a much better witness on that subject in Shahbaz Khan. That is his field of expertise. He has a pretty good idea of what the sorts of savings are on farm and what sorts of opportunities are there. But there certainly are opportunities to go in and pressurise farm systems, put in drip sprinklers, put in sensors, make sure that you do not put more water down—all the progress that has been made in that regard in South Australia, in particular, probably highlights a bit of what is possible.

ACTING CHAIR—How would the capital works efficiencies be described?

Dr Beare—Capital works might be the channel system. A lot of these channel systems are 40, 50 or 60 years old: the cement has broken up, they are leaky, they are on top of fairly loose soils, and the water is just going through. We can go through and pipe it, for example. There are some options that Pratt Water is looking at, involving putting through plastic flume pipes et cetera to cut that, but there are also more traditional options like just putting down some clay, some bentonite, to stop the penetration. So you have to look at what the savings are and what the costs

of those actions are going to be and you have to have some sort of way of accounting for whether they are going to be there. It is important to remember that some of these capital savings are important in the sense that they are there every year, regardless of the allocation, because we have to have the channels full all the time whether we have half or all of our allocation. So in many cases the actual leakage is the same—that water is there every year, as opposed to fluctuating from year to year.

ACTING CHAIR—I will just interpose to give an example to the committee of water savings by capping and piping. There is a scheme in the north, in the Lightning Ridge-Mungindi area—the Gundabluey scheme—where they have capped a bore. That bore now supplies all the farmers in that region—70,000 hectares and numerous troughs et cetera. It is a stock and domestic scheme. What it used to use in a day to do the same job is the equivalent of a month's water today. By capping the bore and piping the water, what used to flow out of the bore for use in a day can now be made to last 30 days. That is a huge saving.

Senator BUCKLAND—We know that irrigators take water out of the river and that they have an allocation, but we have heard evidence today that many of those irrigators do not have a measuring device that says how much they are taking. I would be prepared to work on an honour system, but in the back of my mind I am distrustful of some people. How much work is being done to get on top of what I think is a really big problem?

Dr Beare—I am a senior adviser to the Pratt Water group. In the progress of that project of trying to identify water savings, it became clear that the accountancy problem was very real. We did not know how much water was coming down the river. We did not know how much water was being taken out of the river. We did not know with any degree of precision how much water was being used on farms. Even when you have a wheel, it is not very accurate. They can be replaced, but—

ACTING CHAIR—They do jam.

Dr Beare—Yes, they do jam. There is the question of whether they ever overestimate, but we will leave that. We can move to the Doppler systems and things like that, which will improve our accountancy. We measure flow rates and heights, but we do not necessarily know the cross-section of the river all that well. It changes with time and siltation, so measurement is very difficult and tough to do on these systems. Senator Buckland, I think you said that we do not necessarily know how much water we are using—are we really any closer to best practice or not? A lot of work has been done on theoretical crop use but it does not really align very well with what we see or what we are being told we use. There are a lot of alignment problems there. Part of the Pratt Water project is to do this accountancy for the Murrumbidgee as best we can. That will be part of the report. I hope it is going to be enlightening. I am not privy to it all yet.

ACTING CHAIR—I can only urge you to include the plantations in your report. The river management plan that this committee received in Griffith many months ago did not have one sentence in it about the impact of plantation forestry.

Dr Beare—As part of that project, they are looking at some plantation options, and specific impacts of plantations on water yields are being accounted for in that.

ACTING CHAIR—Obviously above 35 inches there is an increasing impact. We would like to encourage the plantation people down into areas where we can get a salinity credit as well as the water savings at the top end.

Senator BUCKLAND—You talked about piping systems and things like that. I know nothing more about irrigation than putting a hose on the tomatoes, but I have to say that the evidence we have had has been very difficult to follow all the way through. If you are on the land, I guess you might be able to understand it a little better. The irrigators say that you cannot put water in pipes, because sediment goes through them. They say that they get mud and that they are always out there anyway clearing the channels of sediment. Yet there is nothing in the way of capping, even by just putting something over the top of these channels, to stop evaporation. We must lose an absolutely immense amount of water through evaporation. It is very hard to listen to this story and have everyone coming up with what they are going to do. How much has really been done to address things like evaporation and the siltation of channels and pipes?

Dr Beare—The most extensive study that I am aware of has been conducted by CSIRO in Griffith—and they are coming. It includes measurement of evaporation, which I think is reasonably straightforward. You can look at pan evaporation in a region. You know that the river is going to behave very much like a pan and that the surface area of the channel is what you are going to lose. So that calculation is probably fairly straightforward. But they are also going down and measuring the seepage of various channels. The seepage depends tremendously on soil type.

I think what we have to understand is that each option in each region is going to be very specific. It may be too salty to pipe in some regions and fine to pipe in others. It may be best to run open flumes in some others. It may be best to try to realign bits and pieces. It is not necessary that we have to overhaul the whole system; we can target very—

ACTING CHAIR—Start from the sandhills.

Dr Beare—Which was done. We saw that in the Mallee and the Riverland areas, where there are very sandy soils. They piped everything up. It has been very worth while. With the privatisation of the irrigation areas in New South Wales, for example, we have at least got the potential to have the right incentives to save the water within those systems, because, technically, they should—it is not totally clear from the legislation at the moment—be able to claim that water as their own, so those incentives are there for them to save it. As long as those incentives are there and if there are technical options that are worth it, it will happen. The problem is making sure your institutions are right and that people have the right to save the water to that entitlement. If those incentives are there, we should see the appropriate response in terms of technologies and applications and we have pretty much done the best we can do and we should let it go.

Senator BUCKLAND—But is anyone beyond CSIRO picking up some of the ideas that they have come up with for water conservation? Each megalitre of water you save on a property is going to go down the river somewhere. How serious are we, as far as time frames go, for getting this all in place? It is easy for me to talk—I do not draw much out of the river.

Dr Beare—Since you do have CSIRO here today, could I defer? I think they would best answer how they are doing. Part of the Pratt initiative has also been to ensure that there is an effort to make sure there is uptake, so you do the community consultation to understand why farmers react the way they do, to make sure that they understand what is possible and what the potential returns are going to be to them, and to engage in that sort of consultation aspect—because it is important. You can do all the research in the world, but if nobody understands it—

ACTING CHAIR—Takes it up.

Dr Beare—and picks it up—if you are going just to wait for somebody to be the shining light, pick it up and run with it, and show everybody how it is going to happen, I think you have got to go a little bit harder than that.

ACTING CHAIR—In Melbourne we did congratulate Pratt Water for their initiative in the water area and for bringing along public interest in water. Eighteen months ago I queried the practice of paddy rice, and all hell broke loose. Has there been any work done—and I have asked this question several times during this inquiry—on non-paddy rice? Has anyone done any study on the reality of moving an industry from paddy rice to non-paddy rice and what financial and water usage impacts that would have? I was rung at the time by some scientists who were doing work on non-paddy rice and they said they thought I was talking a bit of sense, even though a lot of people thought I was mad.

Senator McGAURAN—And still do, probably.

ACTING CHAIR—Don't smile, Julian McGauran! Is there any work that you know of that has been done on the economic and financial impact of non-paddy rice?

Dr Beare—I am not aware. I am aware that there is a lot of criticism of rice growing as being, in popular terms, inefficient, but that is questionable.

ACTING CHAIR—Yes, the rice industry have done well. We had better give them a cheerio call today, Senator Buckland. They have actually taken up the challenge of becoming more efficient. They have done that in a huge way. But most people do not understand that the paddy is just the thermostat—the water is just the thermostat for the plant—and, if we can build the thermostat into the plant, we really do not need the water. I just wonder what the economics of doing that are. We might ask witnesses later in the day.

Dr Beare—I know the CRC for rice is looking at the opportunities for water savings in the cultivars. If you can make cultivars less sensitive to the cold, you do not need to keep the pond heights nearly as high as you do. At the moment you have got to keep a pond at about 250 millimetres between Christmas and the end of January.

ACTING CHAIR—For six weeks.

Dr Beare—Yes, six weeks at maximum temperature and maximum surface area with lots of water going up. So there are potential water savings to be had there if you can reduce those requirements—and you would not impact necessarily on anyone's returns or lifestyles.

Senator McGAURAN—What is the status of the submission you have given us of late?

Dr Beare—It is a public document.

Senator McGAURAN—It is from ABARE?

Dr Beare—Yes.

Senator McGAURAN—In your original submission to us you have some very good studies on improving water use efficiency. Connecting the two and reading your conclusion—all in a rush—I take it that you believe in the most liberal of trading systems? In your first paragraph you say:

The goal of water reform is to increase the net social benefits from water use. For this to occur, water will need to be traded to those who value it most ...

So it is off property, off catchment—it is a most liberal of trading systems—and you are able to back that up with your regional studies of efficiencies. Is that correct?

Dr Beare—I would qualify it in two ways. The idea is to make water as widely available as is cost-effectively possible in terms of exchange. There are two caveats to that: first, we have to recognise that where you use the water is important and that, if you move it, you should account for the full costs, whether those be transmission losses or environmental impacts such as salinity. Those have to be accounted for. Second, there is a limit to how far you can push this water rights business—tradable rights. In many cases on a lot of small streams it is not worth it—you are just shifting water from somebody who is doing the same thing to somebody five metres down. Is it worth the institution? Do you want to have institutional rights over the rainwater you capture in your tanks? At some point in time there is a limit to what is effective.

ACTING CHAIR—I hope you are not one of these paper-trading atheists, are you?

Senator McGAURAN—I think he is—that is the point I am trying to get to. The chair, naturally, cuts to the chase.

ACTING CHAIR—No, I do not think he is. I am just saying that I am about to eat you!

Senator McGAURAN—He has cut to the chase: where does ABARE stand? You spoke of caveats—

ACTING CHAIR—On paper trading in water, I have a very strong view, very publicly expressed, that I do not think there is any place in the water market for water speculators and paper traders and people lying on the beach at Noosa owning water rights but having no use for them. I want to ask you about two things under the Victorian regime, but I want your answer to the question about paper trading in water first. If you have got a view on that, I will know whether I have to dong you or not!

Senator McGAURAN—Before you do, you also say that all the economic and social costs—it is very Wentworth—go straight back to the water user, the irrigators. Is that correct? I will find the line.

ACTING CHAIR—Could we just go to the general principle of water trading? Does ABARE think there is a place in the water market for financial institutions, banks et cetera just having a paper trade? I hear what the banks are saying. The banks are saying that you have to have depth in the market—you have got to have a lot of activity. I do not think there is any room for someone in London owning our water.

Dr Beare—I think I can answer that question pretty straightforwardly. There are two things: one is the physical market for water as a commodity, and that is principally what we are discussing. That is, to make sure that there are no undue impediments to the physical trade in water as a commodity so that, if there is a drought, we can shift the water between enterprises to make sure that we preserve those assets that are the most valuable.

ACTING CHAIR—Which you can do now, by the way.

Dr Beare—Yes, except for the fact that there are some constraints and limitations on that. I do not think that the question of who owns the water or the assets question are really questions of economic efficiency per se, so that does not necessarily enter into what you do. Who owns the actual entitlement to the water? The Crown owns it at the moment. If you want to say that it is going to be endowed to an individual who can then trade it to somebody outside that, then you have to worry about potential problems in terms of concentrations, water bearings and all those sorts of issues that have to be dealt with. But that is a different issue than what we are trying to talk about in terms of the physical market for water and making sure that it effectively trades.

ACTING CHAIR—I will leave that to someone else. I have a very strong view. One of the smoke and mirrors of the pro paper traders is that they try to define it just by the trade. I am more concerned with the capital based value of the water and the escape of the capital wealth from where the water is used. Thames London is a great example, which has recently been sold. What they have done in central Africa is just a bloody disgrace. I fear that, if I am a farmer down in the Murrumbidgee somewhere who wants to put in trickle irrigation and I am on the spot market for water, and I go to the bank, bidding against Thames London and MLC and AMP or someone else, and the bank asks me, 'How are we going to secure this half a million dollar loan so we can put this water in for you?' and I say, 'I'm just a manager; I'm on the spot market for my water', they would say, 'There's the door; see you later, because you do not have any equity backing.' It would be one of the great tragedies for rural Australia if the capital base value of water escaped to the city.

Dr Beare—I think I can stop you from having to dong me. The point is that if we had a very mature water market system—

ACTING CHAIR—We do.

Dr Beare—I mean similar to the system for trading electricity and all sorts of other commodities, which I do not think we do. If we had that then maybe then the ownership issues would not be quite so important. But at the moment I do not think irrigators are selling their

entitlements for a very good reason: it is the only natural hedge you have against the insecurity of the system. If you are making an investment in an orchard or a vineyard and you are planning to buy your water on the spot market then you are open totally to the price changes that will occur if there are large clawbacks for environmental water and you are totally exposed to what may happen in interstate trade if a significant volume of water moves out of your valley to another one, because you are exposed to those markets. Because those things have not happened yet, and they are looming as a risk, it would be a sensible decision to hold that physical entitlement as a hedge. I think that is why we are not seeing much water move on a permanent basis. In truth, water does not need to move permanently for the water to be effectively transferred, so there is no need to connect the paper market to the physical market.

ACTING CHAIR—Over my dead body will I allow myself to be connected. I will give you an example. I had a call recently from a guy in the States who was one of the failed cotton growers of the Murrumbidgee in the sixties and seventies. They had the wrong varieties and the whole prospect completely failed. Now they have the right varieties and it works. He rang me from the States, having picked up on this water trading thing, and he said, 'We just want you to know that over here they have absolutely ruined it for a lot of farmers because of the way they trade their water.' These millionaire desert communities, where they have these developments, are prepared to pay up to $US500,000 per megalitre of water for a millionaire enclave, which has put a value in the market which has absolutely ruined the prospect for all the farmers that were on the spot market. That is the danger that I see here, for what it is worth.

Senator McGAURAN—Can you explain to me what this sentence in your submission means:

For this to occur, water will need to be traded to those who value it most, while holding those engaging in trade responsible for the full social costs and benefits of these transfers.

Dr Beare—There are many examples, but I will give you an example of how that would work. If you are going to trade water out of an irrigation area, there are a lot of fixed infrastructure costs. If you simply trade that water out without accounting for those fixed infrastructure costs, the remaining community has to pay a higher cost to cover that. So you are making everybody else pay a higher cost by trading out. We need to have some exit fees so that when you sell that water out, you still carry that burden of the fixed infrastructure that you essentially bought into and move that out so that the costs being borne by the people who are not trading are not escalating unduly. The same thing would be true with all the salinity credit schemes. If you are going to move water from, for example, the Murrumbidgee to the Riverland, there is a potential that you will be putting that water onto much more saline ground water, pumping more salt into the system. You need some way of accounting for the full cost of moving water from an area that is not impacting on salinity to one that might. Those are the sorts of things that that sentence is trying to refer to.

ACTING CHAIR—Have you done work on the long-term impact of stranded assets? The Victorian government have done two things recently. They have completely trampled on the riparian rights of the Upper Murray people and they are not allowed, as you are in New South Wales, to capture a percentage of their water on farm because the government says they contribute 38 per cent of the flow of the Murray, and I think that is just a disgrace. The other thing the government have done is they have now announced that people will be able to trade

stock and domestic rights, and you will end up with a class of stranded assets. Do you have any comment to make about stranded assets?

Dr Beare—We have been making a lot of comment about stranded assets. It is one of the key problems in the area. When we did not trade, it really did not matter how you charged for your infrastructure. But when you trade, it does matter and you have to account for those fixed costs and leaving people sitting there. In the long term it does not matter, but in the short term it does. Another important problem is that a lot of people say that you need to move water to the highest valued use. But the question is: why didn't the highest valued use go to the water in the first place? The answer to that question is that largely it does. Why did they not plant a whole bunch of vineyards in the Murrumbidgee in 1965 and 1970? Because they could not have sold any grapes. They went in and they put in the rice works and they put in the valencias. They have those assets and they are very much fixed.

It is perfectly okay for a rice grower to put in almonds or stone fruit or something else that the properties are probably just as well suited for, but they have invested tremendously in laser levelling that place, making it incredibly efficient for their particular needs and, until that investment reaches the end of its economic life, the returns are quite good. If you look at the capitalised margins on these things, you are saying, 'That's not very profitable,' but they have already made their investments and they are simply now reaping the returns from the investments they made in the past. One of the messages that we have to get across is that you need a degree of patience in this reform process because, if you want to minimise the costs of transition, you will need to allow some of these economic investments to reach the end of their life, whether they be farms or irrigation areas.

ACTING CHAIR—Finally, I have a view that, because of the 6.2 per cent run-off in the Murray-Darling Basin, whatever we do the sums will not add up and we have to remove some activity. Have ABARE or your organisation, Pratt Water, looked at removing some activity, such as some of the northern water, by adopting this principle, as you just said, of the horse before the cart, taking the work to where the water is rather than bringing the water to where the work is?

Dr Beare—I am not quite sure I understand.

ACTING CHAIR—Do you think we should be looking at developing a new agricultural frontier in Northern Australia, where 46 per cent of Australia's run-off is in two catchments up there?

Dr Beare—You are talking about the Fitzroy and regions like that.

ACTING CHAIR—I wondered whether you had done any work on that. If you have not, it is a simple answer, no.

Dr Beare—No, we have not done any work.

ACTING CHAIR—Thank you. My congratulations on your commitment.

Proceedings suspended from 10.24 a.m. to 10.35 a.m.

CAMPBELL, Mr Colin Andrew, Executive Director, Land and Water Australia

ACTING CHAIR—Welcome. Would you like to make an opening statement?

Mr Campbell—Thank you very much for the opportunity to speak with the committee again. I would like to draw your attention to our updated submission. It is about a year since the first version of the submission was written. A lot has happened in that time, so we have updated the submission, and I will talk to it very briefly. I would then like to draw the committee's attention to a couple of new research outputs that are quite relevant to the deliberations of the committee. I will table those; there are copies available for senators who want them.

ACTING CHAIR—Before you continue, the committee will formally receive these documents. There being no objection, it is so ordered.

Mr Campbell—As the submission outlines the role that Land and Water Australia plays, I will just outline the critical point: we do not actually do research and development; we are a research funder and broker on behalf of the Australian government. We are a statutory authority in the agriculture portfolio; we are one of the rural R&D corporations like GRDC or rural industries RDC, MLA, Australian Wool Innovation and so on. We do not do research, we invest in it through organisations like the CSIRO or universities or consultants or state agencies or whomever. We have been operating in this area for about 14 years. As our submission says, about 30 per cent of our research investments are relevant to the issues of management of water resources—from a national irrigation program that has a large number of partners—including bulk water providers, state agencies and industry bodies—through to more ecologically based programs such as the new program we are about to commence that looks at the management of environmental water allocations and measuring the benefits of environmental water. There is also this publication we have got, which is the first phase of a new research program on Australia's tropical rivers. The program will commence in earnest in 2005, but that is a preliminary stage to get a handle on what information exists in the north and it is wrapped together in that very good publication, which senators are most free to have.

I do not propose to work through the submission in great detail. I simply note that, as acknowledged in the intergovernmental agreement of the National Water Initiative, there remain some quite significant knowledge needs if we are going to achieve the ambitious goals of the initiative. We have got to get a much better handle on regional water accounts and get a better understanding of water availability both through time and across catchments. We need to get much better at predicting changes to water availability through climate impacts and land use change. We need to not only develop a better understanding, but also to ensure that understanding is reflected in our policy and institutional arrangements, of the interaction between ground water and surface water components of the water cycle. We need to demonstrate much better the ecological outcomes from environmental flow allocations and we have still got a big job to do to improve the efficiency of the water that we use for irrigation at farm irrigation schemes and catchment scale levels.

We need to develop better models of plugging the science into management and policy in a more adaptive sense so that—as one of my directors, Professor Cullen, says—at least we are

making new mistakes, not repeating the old ones. We need to do substantial work to get some community consensus on the knowledge base and the quality of knowledge that we have. So a fair bit of our submission talks about the need for better coordination of the science around water management in Australia.

As our submission points out, we think there are some lessons to be learned from the Natural Heritage Trust and the National Action Plan for Salinity and Water Quality. There was no explicit knowledge component built into the design of those programs from the outset. To be fair to them, that was not the purpose of the programs; they were about on-ground works. But as a consequence there was an opportunity missed to influence the science agenda and influence the activities of the research organisations. There are already substantial investments in R&D. If we can ensure that there is quite an explicit knowledge component of the National Water Initiative, there is a chance to influence that research effort to get it much better connected with the policy agenda as articulated in the COAG agreement. We have analysed in some detail the science required to implement the National Water Initiative. As I said, with our existing resources we have identified a couple of critical gaps that we are developing new programs in—one on environmental water allocation and one on tropical rivers. The submission goes through that in depth.

I would like to conclude by drawing the committee's attention to something that is literally hot off the press: a compendium of the last 10 years of dryland salinity research in Australia. It was most unfortunate that this was printed just after Gary Nairn's committee published its report into coordination of salinity science, because this package—which I have since shown Mr Nairn first-hand—addresses a number of its recommendations. Essentially it is a synthesis of 10 years of salinity research. I mention it today because salinity remains probably the biggest threat to water quality in southern Australia, including in irrigation areas. Dryland salinity is the root cause of long-term threats in irrigation areas as well. We think this is currently the world's best compendium of salinity science.

There is a very good CD-ROM that enables you to, essentially, trawl through a ute-load of research reports at the click of a button and to search it in a very user-friendly way. One product is designed specifically for policy makers, one for leading producers and their advisers, and one for new and emerging catchment bodies around the country. It has been extensively workshopped with each of those audiences. That is hot off the press and I am happy to make that available for any members of the committee who want one.

ACTING CHAIR—Thanks very much. Certainly I would like a set. My sincere congratulations to Land and Water. I just think this is fantastic. I asked ABARE a bit about our northern frontier, and the northern frontier is here in full living colour.

Mr Campbell—We think that is virtually an atlas of the north.

ACTING CHAIR—It is just fantastic.

Mr Campbell—We went into that project assuming that there was not as much material available as there is—as this project has turned up. We know, because of the activities of mining companies and others, there has been quite a bit of work up there, but there remain some very considerable gaps.

ACTING CHAIR—Am I right that 46 per cent of Australia's run-off is in the Timor and Gulf catchments?

Mr Campbell—My colleagues at CSIRO might know better, but I thought it was even a bit higher than that.

ACTING CHAIR—I think if you include the north-east it is 60-odd per cent. Mr Creighton from the CSIRO says that it depends how you count the numbers and that 40 per cent is not bad. However, it does not matter—we will come to that later with him.

Mr Campbell—It is important to note, though, that it not very evenly distributed through the year and a lot of it rushes out in a few weeks.

ACTING CHAIR—I understand that. But I do note that in the Ord scheme—this committee has had the privilege of going to Kununurra—where there are 70,000 hectares pegged out, we were told there were only 14,000 hectares actually in use because of the various nuances in the local community, so there is still plenty of potential up there. A previous witness talked about taking the work to the water rather than bringing the water to the work, and I agree with that entirely. Do you think there is enough knowledge now of the water available—for instance, in the Murray-Darling Basin—to have a reliable audit of how big the cake to be carved is? Do you think there is enough work being done? Do not look around!

Mr Campbell—Again, perhaps you would be better off asking Mr Creighton that.

ACTING CHAIR—Righto.

Mr Campbell—We certainly know enough to do a better job than we have done to date.

ACTING CHAIR—You could say that a lot of the money that has been spent on the Natural Heritage Trust and National Action Plan on Salinity and Water Quality was thrown around like confetti. There was not a lot of coordination; you applied, got the money and did a little locally. You have just tabled some new documentation which may make the maps out of date, but I have been using a map which made the 50-year salinity prediction in the Murray-Darling Basin, trying to identify the 20-inch and the 32-inch rainfall areas. Do you think that, in dealing with Australia's greatest challenge, salinity, there is a real possibility that we could put some plantations in those areas, get a salinity credit as well as a forest, and use national action plan money to assist its viability?

Mr Campbell—The short answer is yes. That is the sort of thing that is exactly the intent of the national action plan and the catchment strategies that are being developed. With a good understanding of the ground water flow systems, it is possible to finetune where we locate perennial vegetation. I think we need to come up with the right suite of incentives and assistance to encourage those land use changes in appropriate places, but it is critically important that we get the location right for that sort of land use change or we could have perverse impacts on stream flow and so on.

ACTING CHAIR—How far away are we from being able to say with 20/20 vision that, for instance, there ought to be more plantations here instead of there? Are we years away from that?

Mr Campbell—I think in some catchments we would be pretty close now, through the work of the CRC for Catchment Hydrology and others, but the knowledge is not evenly distributed; it is patchy. In some catchments where there has been a lot of work you could get fairly close now, and in others there is a lot more work yet to be done.

ACTING CHAIR—Would it be fair to say that if we do that work—take New South Wales, for instance, and New South Wales plantation forests—there may be decisions made in the future to not replant some plantation areas?

Mr Campbell—I am really not sure. I think that once you have allocated an area of land to forestry there is certainly a fairly big rehabilitation job to then grub out the stumps and convert it to something else, so the cost per hectare of that is pretty high, but if water-pricing mechanisms are brought to bear that might be the decision that those forests owners take.

ACTING CHAIR—So in the future it would not be unreasonable to say to an insistent plantation forester: 'If you insist on going into that 60-inch rainfall area behind Batlow, you may have to buy a water licence. But if you care to go further down to the Tarcutta-Adelong area, which has a 28-inch to 32-inch rainfall, we actually may give you some assistance.' That would not be an unreasonable argument to put?

Mr Campbell—I think that is a plausible scenario.

Senator McGAURAN—Mr Campbell, I may have a different opinion to Senator Heffernan's on the salinity problem. Is the conclusion of the documents you tabled that the salinity problem, particularly along the Murray, has stopped growing, has levelled off and in fact is turning down?

Mr Campbell—No, that is not the conclusion at all. The conclusion of that work is that, while we are developing some much better agronomic measures for living with salt on farm—and particularly in Western Australia there is some very promising work with both salt tolerant natives and new varieties of introduced species—we are still not on top of the issue in terms of export of salt off farm into river systems and the impact on public infrastructure—roads and railway lines—and urban subdivisions in low-lying areas and so on. In essence, I think the land-holder version of that report gives people four very simple options: preventing salt, fixing salt, living with salt or doing nothing. Reversing salinity on farm is still a very difficult process and in most places we do not have practical and profitable options for farmers to do that. At the end of the day, my personal view is that it will be a bigger non-agricultural problem than it is an agricultural problem, that the public costs in terms of river water quality, loss of biodiversity and damage to infrastructure will be more significant than the loss of agricultural production. The only caveat I would put on that is that dryland salinity in some regions is exporting a lot of salt into irrigation areas, so the impact on irrigated agriculture, including things like grapes and so on, could be quite significant.

ACTING CHAIR—Could you give us some figures on the importation of salt versus the export of salt out of the irrigation areas—or is that a question for those behind you?

Mr Campbell—Yes, it is.

Senator McGAURAN—Have you done any studies on the Wimmera-Mallee pipeline?

Mr Campbell—No. We have not funded any work on that.

Senator McGAURAN—Who is undertaking the particular costing project that is going on at the moment?

Mr Campbell—I am not sure. That might be a question better directed to ABARE. We have certainly not funded any work on that pipeline.

Senator McGAURAN—What is your budget?

Mr Campbell—The corporation has an appropriation from the Commonwealth, through the Agriculture portfolio, of about $12 million a year. This year our total expenditure will be nearly $30 million. There is a bit of a difference there, and the rest is achieved through our partnerships with industry, particularly our fellow R&D corporations with whom we run some large collaborative programs. The irrigation program has six or seven other coinvestors with us in that and there are seven R&D corporations funding our climate variability program in addition to the Department of Agriculture, Fisheries and Forestry, so we run a lot of collaborative programs where we are the managing agent on behalf of others.

Senator BUCKLAND—I want to ask a few questions on drawing water from the aquifer. How much research has been done on that, particularly in South Australia but also in outback New South Wales?

Mr Campbell—I think there has been important ground water research, but I am sure my CSIRO colleagues behind me would suggest that there has been nowhere near enough. Dr Khan would be a better person to answer that question. There has been some very good work in South Australia in recent times on aquifer recharge, but I am unaware of work in western New South Wales.

Senator BUCKLAND—I think that is something that we should leave to another witness. I want to go back to the northern water systems. Like Senator Heffernan, I want to say that the book you have provided us with is exceptionally good, and I think you need congratulating on its production. Looking at the northern waters, is there any discussion still being had on diversion of those waters to other systems? I have raised this before, and I am still not clear in my mind what the answer to it is. I can remember, going back to the seventies, that there was talk of diverting the headwaters of the Clarence River across to the Darling system. A lot of people think this is pie in the sky, but I am one who does not actually think that. There might be some environmental problems with it—for example, it might put some bacteria or something into the system. Is this still being considered?

Mr Campbell—I think Australia has a long, rich and colourful history of dreamers and schemers.

Senator BUCKLAND—It is not entirely dreaming, is it? It can be done.

Mr Campbell—Indeed. These ideas get mooted fairly regularly. The point behind this work is to say, 'Without looking at any particular development proposal, let's try to get a handle on what we know about these northern river systems before there is a particular proposal on the books.'

When there is a proposal on the books, you tend to get painted into one camp or the other. Let us try to look at what we know about these systems and fill in some critical knowledge gaps before people jump into the trenches and either advocate a new proposal or try to stop it.

We are doing this work not because we want to look at any particular development option but because we want to get in there before there are particular development proposals on the books. That should enable governments, industries and communities to make wiser decisions about whether or not to get into further interbasin transfers or to develop particular water resources and, if so, how. My own view is that we might be looking at quite different ways of developing water resources in Northern Australia than in southern Australia, so we should not have in the back of our minds some sort of Snowy scheme type model. Rather, a bunch of much smaller scale developments in a mosaic across the landscape might be a more fruitful way to think about it than very large engineering schemes, which are very vulnerable in that sort of system.

Senator BUCKLAND—Dreamers are what made the world develop, so do not knock them too much.

Mr Campbell—Indeed. It was not supposed to be a pejorative remark.

Senator BUCKLAND—No, I do not think it was, and I accept that. If we take this—and we have only had a chance to just flick through the pages—it really does go to prove that we are cropping the wrong end of the country. The dreamer might think that we might see Cubbie Station decide to close up business because it is not worth hanging on to all the water. But, in reality, if we want to grow some of the crops that Australia is turning to now—and I exclude rice from that, because I think that is one industry that has really taken the nettle and given it a good shake; they are doing something about their industry to improve it—and, if we are serious about having environmental flows and about having industry in the southern part of Australia feeding off the Murray-Darling system, then a lot of what we are doing in that area has to move north to where there is a more adequate supply of water. You cannot blame someone like me who goes out and hoses the garden once a week—although I do not these days—and grows a few tomatoes. It seems to me that the non-commercial users are the ones paying the highest price for other people's financial gain.

Mr Campbell—When you look at it in more depth, you find that there are some very significant challenges about developing water resources in Northern Australia. Superficially, that is where a lot of the run-off is, but it occurs over a very short period of the year. There is a drought every year in the dry season. The soil types are not necessarily those that are most fruitful and there is a different suite of disease and pest issues to handle. The hundreds of millions of dollars worth of processing and other infrastructure that has been developed close to markets, in places like Shepparton, is not easily or cheaply built or replaced. So I do not think we should see it as an 'either/or' dichotomy. We have invested in southern Australia. We have invested in the Murray-Darling Basin. We have a lot of infrastructure there, and that is where we have a lot of people. It behoves us to move those systems onto a sustainable basis as quickly as we can.

Senator BUCKLAND—I am not sure that I can agree with that philosophy or line of argument. I think we are now at the point where we do not really have much time to think at all. I agree with the studies that are done. I think this is absolutely superb, and I am really looking

forward to having a good look at it. I will lose friends by saying this, but I am not too fussed by that because I am looking at reality. We say that we should sustain as best we can all the infrastructure setting up townships along the Murray and Darling rivers. But we have set up other industries worth hundreds of millions of dollars, and we do not seem to worry when those industries go by the board or something happens and populations have to transfer their place of residence in order to sustain their lives.

I think we are too protective of those who are taking water, which we have very little of, for granted. We are saying that we will build our economy on water. There is more involved in that. I do not think that is a fair argument anymore. We do not have time to think anymore. It is time to act. During the course of this inquiry, I have become terribly frustrated by the self-interest of some.

Mr Campbell—I do not want to advocate any particular policy position. That is not our role at all. But, as an investor in the research base, we are very keen to ensure that the decisions that are taken are informed by the best available science. We try and ensure that our investments are positioned so that that will be the case. That is why we are investing in science in Northern Australia. We believe it is inevitable that there will be development pressures there, and we want to ensure that they are as well founded as possible.

CHAIR—To put it in perspective, Senator Buckland, I think 180,000 gigalitres runs out of the Timor catchment and 198,000 runs out of the gulf catchment—and we extract about 100 gigalitres. So we are not actually using much. I guess that we can learn from the mistakes down here. Five per cent of the water up there would be more water to use than we have down here. As you say, it is important that we approach it quietly and get the knowledge first, before we make the mistakes.

I would like to raise an issue from item 6 in your submission: 'Investigating an effective system of defining water property titles'. You have commissioned research on that. We have been given evidence, which is pretty obvious, of the conflict between the states' water regimes and their protocols. For instance, we have had evidence that the Victorian government has taken away the right of the people in the Upper Murray to capture a reasonable amount of on-farm run-off; in New South Wales, as you know, it is legislated at 10 per cent. In Victoria, other than for stock water, they do not have a riparian catchment right; in New South Wales they do. As Craig Knowles said, item 1 is the evidence. In Queensland, Cubbie Station recently captured, in the words of the manager, 50 per cent of the flow of the event in the Lower Balonne. That is estimated, because I do not think anyone really knows what goes on up there—it is all estimations. Do you see a role in harmonising the water management regimes between the states?

It seems to me that the people in the Upper Murray have been given a pretty raw deal. They have lost what some would see as a riparian catchment right to effectively prop up the sales pool for the downriver users. I think that they have a bit of a case to be made out. As I often do, I put it on the record that I have a vested interest, because I actually have a water licence which cost $30, 30 quid, or something like that, and now might be worth a bit of money. I think it is unfair for the Upper Murray people to have something taken away. Rather than that, perhaps they should have been given a water licence under the present regime to equalise their treatment with

the lower river fellows. Where are we going to go with all that ? It just seems to be a hodgepodge across borders.

Mr Campbell—I think that the COAG agreement has been a critical first step and the principles set out there are extremely sound. If we are going to get into a comprehensive trading regime, we need to minimise the differences in property right regimes between jurisdictions as much as possible. The work we have done suggests that it would be heroic to try and do that in one go, but there needs to be a convergence over time around some core principles. But that work did conclude that, at the end of the day, it is possible to have a water-titling system that is broadly based on Torrens title, as applies to land—that it is legally, technically and economically feasible for that to happen over time, although not terribly straightforward.

ACTING CHAIR—So does Land and Water Australia have a view on the recent announcement by the Victorian government—which in some ways have led the way; they are a bloody long way ahead of Queensland, I have to say—where they are talking about trading stock and domestic channel water on their channel schemes? This will have an effect of stranded assets. There was a recognition when I asked this question at the NFF conference. They said, 'Sure, we're going to have a problem with stranded assets.' What is the answer to those sorts of questions?

Mr Campbell—I do not think there are easy answers to those questions. We have not funded any work on stranded assets that I am aware of, but certainly we have funded plenty of work through our irrigation program on how to get better irrigation scheme efficiency, and we have funded a national benchmarking study that looks at the relative efficiency of the different schemes around the country and gives us a way of looking at them so that we are comparing apples with apples. So again, through our research investments, we can ensure that we are able to look at the options in a fully informed way. But at the end of the day it is up to governments to come up with the policy response based on that science.

ACTING CHAIR—I guess one of the things that you said in your opening statement, which was about getting the community informed and involved, is super important, and I congratulate your organisation on the documents and the file you have given us this morning. To get community acceptance is to give political courage. Can you understand the frustration that was vented at me in Wodonga the Friday before last by the Upper Murray farmers who have this problem of not being able to capture run-off in that very rigid regime, when they see above them new plantation forests which captured plenty of run-off and are not brought to account?

Mr Campbell—Yes.

ACTING CHAIR—I told them I was going to prosecute their case for them, and I intend to. Sorry, Senator McGauran, I did not let you know I was in Victoria the other day. I snuck in! You were otherwise occupied.

Senator McGAURAN—I was, but I did know. What you say has great merit—and compensation also. Just say yes!

ACTING CHAIR—Have you looked at the Latrobe aquifer?

Mr Campbell—No.

ACTING CHAIR—We are very grateful for your input. I am pretty excited about the publications you have presented us with this morning and I can assure you we will make good use of them.

Mr Campbell—I would be very happy to demonstrate that CD-ROM at some stage if you wish.

ACTING CHAIR—Thank you very much. We will be calling on you and accepting that invitation.

[11.13 a.m.]

CREIGHTON, Mr Colin, Flagship Director, Water for a Healthy Country, Commonwealth Scientific and Industrial Research Organisation

DUNLOP, Dr Michael, Research Scientist, Commonwealth Scientific and Industrial Research Organisation

KHAN, Professor Shahbaz, Research Director, Sustainable Irrigation Systems, Commonwealth Scientific and Industrial Research Organisation

ACTING CHAIR—We welcome CSIRO to the table.

Mr Creighton—Before I start the presentation, I have a couple of comments about your previous discussions—the Northern Australia one was very interesting. I was working with Andrew in Land and Water Australia; I actually set up that activity you have there on understanding just what resources there are in Northern Australia. That followed on from the work we did in the audit.

At the same time, I set up a project which is still on the way which is about irrigation practice, best practice in tropical Australia, how we get that up there before we go through a massive development and so on. Minister Truss announced that at Shepparton at a major irrigation forum, and the responses were interesting. We had a very positive response from the irrigators and the farming community generally about best practice, thinking through the future and all that sort of stuff. We had a hugely negative response from the media—not so negative from the environmental groups who understand the issues of thinking forward. There was a reaction of, 'Oh, no—don't make another Murray in Northern Australia.' If anything, that reinforced to me the role of the project and that activity. I think all the things you have been saying are spot-on in terms of Northern Australia.

The second point I would make is one to Senator Buckland about turning the Clarence inland. I cut my teeth in a prawn fishery on the Clarence a long time ago. From our perspective, there was no spare water. We would retrawl for school prawns and out wider for the kingies and so on, and that water was required for us as fishermen. We were dead set against anything like that.

Senator BUCKLAND—I will just put on the record that my father was a fisherman in the Clarence also, so I am aware of those arguments.

Mr Creighton—The point I wanted to make there was more about the benefits, but we will come to that in our presentation. I think we are in a transition case in Australia about where we are going with water. Are we going to get the maximum benefits that the community is after from our limited water? It is going to get more limited with a range of issues that we have talked about like climate change and so on. But it is not just irrigation, dryland farming, fishing or urban; it is about the whole lot together. I think that is our next big step.

The next point I would make, recognising that you are in the process of moving towards the conclusion of this inquiry, is that I have read the *Hansard* and looked at the various discussions you have had. They are discussions you had to have as we have developed in the last few years. But let us look at where we have got to in the last few years. We have gone from the COAG of the mid-nineties to the National Water Initiative. Yes, there is a long way to go, but Australia is way ahead of most other countries because we have that process of looking at water regularly. What we have not yet got—and this is what I would like you to think about—is the way groups like the USDA deal with the other part of the farm bill that is not market distortion or what the Netherlands do in the way they look at their environment and public health. They have a strong link between the science, the management and the policy. The science does scenarios, the science collects information—yes, we need more information about water and so on, and we can talk about that later—but the science does not play the policy game. It gives the information. The scenarios then go forward to the managers, the bureaucrats, the people in government and so on, and they look through which lever is to be pulled and which opportunities we have got. That comes forward every five years as a report to their parliaments—the US Congress or the Netherlands parliament—and they actually get in there and debate the future of the natural resources or their public health.

That rigour in the way we pick up science knowledge, we understand the progress we are making and then we finetune, move forward, implement changes in management policy is not quite there yet in Australia, but we are a long, long way towards that. I think it is just putting the final touches on it that is important. I would suggest to you that one of the things that you might be looking at in your recommendations is recognising that we have gone a long way, recognising that we are making a difference and recognising that the way forward is probably about a closer link between information and management policy. This is something that Peter Cullen and I, and others, have talked about many times. It is one of those glints in my eye, I guess, over the last few years from doing a land and water resources audit and various other things I have been involved in. It comes back to the thesis we are going to talk about now, which is about water benefits. It comes back to the thesis that, if our communities start talking about the benefits they get from water—it is a commodity, it feeds stock, it is water for industrial plant, it is water for fisheries, it is water for urban lifestyle or whatever it is—rather than talking about megalitres or salt content, we will start making better decisions. We will make better decisions because we will start trading off different benefits of that same limited resource called water. That is what we are about, and that is what we are going to present today.

What we are presenting today is very much about solutions. We have read the *Hansard* and looked at what has been said there, and we recognise that it is time for us in CSIRO to put some ways forward to you. We have this flagship—one of the six flagships in Australia—called Water for a Healthy Country. I am leading that. My colleagues here, amongst many others, are part of that. Of course, we have links with cooperative research centres and everything else. But that flagship is about water, ways forward and solutions.

I put a second comment to you as a draft suggestion towards recommendations, and that is that in your report you start giving us some direction about what you want us to do. I have had one discussion with Senator Heffernan already, but the reality is that we are spending in excess already of $20 million a year of government money. We are there to deliver to your needs. We need direction from the policy makers to make sure our research is going in the right way and heading to the right places of inquiry. That is what we are there for. I am looking for a closer link

between science and policy, and I am saying to you that the flagship is an opportunity to move forward on that right now. I am not asking for dollars; I am asking for direction.

A PowerPoint presentation was then given—

Mr Creighton—I have put the flagship goal up, and I want to come back to that at the end. It is about benefits from water. Our message is that we have multifaceted water use, and we can be smarter in the way we use water. A water accounts or systems approach is essential, and we must look at it in a future perspective. I cut my teeth in the fishing industry. I was also in blast furnaces with BHP, so I have been in industry. I have a dairy farm in North Queensland which irrigates, so I am in agriculture. I am growing trees up there as well. That is the reality of life in Australia today. We change jobs and do different jobs. We are in a wonderful country and we are all getting benefits from water.

Let us have a look at a couple of things outside the Murray to start off. I deliberately put Queensland and Western Australia in here because often in the *Hansard* you came back to the Murray-Darling. I recognise the importance of the Murray-Darling, but the flagship is about Australia—as we all are. A classic example is grazing and the issues of sustainability, sediment and nutrient export to the reef. If we have, as with the bottom farmer shown in the slide, who happens to be adjacent to the top farmer, a smart use of our climate prediction work that we have in Australia—and it is pretty good; yes, we can do more research, but it is not too bad—then we can start modifying our stocking rates to suit the available water and our perennial pastures. What I am saying to you is: it is the uptake of information at paddock and farm scale, as well, of course, as at the policy scale, that is important.

Another issue is fisheries. You already know I have a wheelbarrow to push on that one. This slide shows an example of that, in Fitzroy. The yellow graph is roughly three years behind the red graph. The yellow graph shows barramundi recruiting to the commercial fishery They recruit at age three and they recruit roughly three years after the big rain events. That is pretty basic knowledge. They are the issues of Northern Australia, whether it is prawns, barramundi or whatever—it is about making sure we have that water for those fisheries.

The other part of that is habitat. Much of our work in the flagship in Queensland is about how to repair some of this habitat. The green in the picture shows where the barramundi, as an example species, can now get to. The red is where they used to be caught. That is just in the river, not the wetlands and all the rest of it. So what is the population change? What is the loss of benefit from having that fishery, given that we have not managed that resource in a multi-objective way? We could talk about wetlands and cane areas and about how we could take the soil from the wetter areas and put it on the better cane properties and then recreate the wetlands and end up with more fisheries, more nutrient capture and all the rest of it. That is what we are doing in the flagship. We are working with those regional communities up there to have a hard look at their flood plains and rivers and at the ways in which we can get more benefits from their water.

Western Australia is a beautiful example of a system which involves urban and rural Australia. It is also a beautiful example of climate change. It has a Mediterranean climate. This graph on Perth climate change and dam inflows shows the returns to dams in the last 100 years. You have had some discussion on this before. It is in *Hansard*. I am not sure if you have seen this graph.

The first 70 years on average is the green line. The last 30 years on average is the red line. That is half the returns that we are getting. Is that a long cycle of climate? Is that climate change? Our scientists are suggesting to us that it is probably climate change and that it is probably because the Mediterranean environment is so closely coupled to the marine environment that they are the first parts of Australia to be expressing climate change. The bottom line though is this: whatever it is, Perth is getting roughly half the water it got in the first 70 years of this century, so we have to think of a systems approach to get more water for Perth. There are multiple components to that, and we are looking at those multiple components.

I have put up this map of Perth and the wheat belt of Western Australia to give you a second image of WA. Everything in red is on-demand management; in other words, water restrictions. The lines are not roads; they are pipes going right out to Kalgoorlie and virtually all the wheat belt. Mind you, there are a couple of different pipelines down south. Twenty per cent of the water captured in those dams or from ground water around Perth goes east. It goes to regional towns and rural settlements across the wheat belt, so if we are talking about Perth's water we are also talking about where most of WA's people are—not just in Perth but also in the wheat belt.

We happen to have a thing called 'salinity' in the wheat belt—a surplus of salty ground water. We are about to put a pilot plant into Katanning, with some support from DOTARS and Minister Anderson's regional solutions program. We can produce desalinated water, assuming we have got the capital costs paid for, at around $1.20 a kilolitre. Because we have pipes and pumps, the price of getting that water out there varies from $2 to $10 at the moment. So what have we got? We are getting rid of a ground water problem in a town, we are reducing the load on Perth and its limited water supply, and we are reducing the tax on WA people because we are going to be producing water at a cheaper rate. This is about water benefits. This is about understanding it from a systems approach and looking forward to where we are going to get more bang from our limited water resource. There is a range of other things that we are doing over there, including ground water recharge and so on around Perth. The Gnangara Mound produces 50 per cent of its water. I will not go into that. Let us just say it is a whole system and we cannot do bits of it; we have to look at the whole picture.

We come to the next example. We are now getting onto the Murray, and I will hand over to Shahbaz in a minute. You have already talked about forestry uplands and the Murray. The hatched area and the area behind it is what we are calling the Uplands, which is roughly above Hume or Eildon dams. Roughly, 80 per cent of the water that flows down the Murray comes from this area. Given that 80 per cent of the water from the Murray comes from here, you have to think hard about how you manage this area. We are after water and water quality, so we are working with the communities there on their multiple objectives. They have objectives on water quantity and yield. They have objectives on water quality and salt loads et cetera. They have objectives about productivity and forestry and objectives about biodiversity. This sort of landscape—this was provided by people like Phil Polglase, Hamish Creswell and so on who are doing this work—is not going to excessively cut the water yield. Remember that plantation forestry is not the whole catchment planted at once and logged at once. There are variations in the way this happens.

What we are saying is that, with some smart design, we can get these benefits from water and the benefits of productivity. There is a lot more work to be done. I put that up as an example of some of the things that are starting to happen as a solution towards the Murray problem. I am

now going to hand over to Shahbaz Khan, who is going to tell you about some work we are doing in the Murrumbidgee. It is about water accounts. As I said before, if we know where the water is, we can find out how we can use it better.

ACTING CHAIR—There is some world recognition for this work?

Prof. Khan—That is right.

ACTING CHAIR—Congratulations.

Prof. Khan—Thank you very much. I will be mentioning that as well. First of all, thank you for the opportunity to present some of this work, which is being done with a number of partners, including Pratt Water, Water for a Healthy Country, irrigation companies and farmers. It is a collaborative approach, and what we are coming up with has a lot of acceptance as well. I would like to give you an example of how we can go about smarter management of water—how much water we have, where it is being generated, how it is moving through the landscape, how it is picking up soils, who is using it and whether we can use it in a different way. Everyone thinks that finding 500 gigalitres for the environment is a huge task. I believe it is not such a huge task if we look into the system in a systematic way.

Today I want to look at the example of the Murrumbidgee. The total area of the Murrumbidgee is about 84,000 square kilometres. It is a major catchment. It is one of those catchments in New South Wales which are most secure with respect to the reliability of water—except, as we have seen, for the last two or three years. This year's allocations have started at only nine per cent. This gives us an idea that climate variability is extremely important. Climate change is a reality in Australia. We have looked at the different gigalitre amounts of water in different parts of the catchment. We are trying to understand—for example in the upper catchment, upstream of Burrinjuck Dam—in a given year how many gigalitres of water comes in. We want to know how many gigalitres of water come into the river upstream of Tumut, through the Snowy and Tumut catchments. We want to know whether, on the way, the water evaporates, whether it is going into the ground water or whether it is diverted for consumption.

As we move through the system, I would like to highlight a couple of figures. I would like to give you a bit of an indication of where the major irrigation areas are. We have the Murrumbidgee Irrigation Area and the Coleambally irrigation area. In the year we are looking at, these two irrigation areas used about 1,200 gigalitres of water. Within a reach of the river between Narrandera and Hay, about 164 gigalitres of water are unaccounted for in the data we have on the flows in the river. As we go along, the amount of water that is unaccounted for gets bigger—282 gigalitres and 386 kilometres. It is quite a lot of water. Added together, this is more than the figure of 500 gigalitres. This raises many questions. Is this water going into ground water and being recharged and reused? Is there a problem with our measurement systems? Has this water not been properly used? What happens to the 1,200 gigalitres of water, which is a major chunk of the total of about 5,000 gigalitres? What happens in terms of the efficiency of water? Can we save some of that water?

We have done a lot of detailed analysis in the Murrumbidgee and Coleambally irrigation areas. In the Murrumbidgee irrigation area we have about 1,500 piezometers measuring the ground water levels. We have records of flow into the system and how much water is being delivered.

On the basis of our analysis of the different yields, with the climate and the crops that we grow there and the seepage losses from the channels, we estimate that we can save up to 100 gigalitres of water if we go through technology conversions. That is in one irrigation area. If we pipe the channels, reducing seepage and evaporation, there is the possibility of saving another 240 gigalitres of water. If we line or pipe our channels or use some of the cheaper materials like rice ash or sludge, which are by-products from growing rice, we can save 70 to 100 gigalitres.

There is a fair bit of evaporative loss from storages. In this particular area in a given year about 1.8 metres of water can just evaporate. If the storages are too big—the surface area is big—there are a lot of losses. About 20 gigalitres can be saved from within the storages. If you think about the channels and the task of saving about 100 gigalitres of water, losses are not uniform everywhere. Some channels are leaking more than others. Looking at the investment profiles, if we have to save less megalitres, the dollars per megalitre can be quite high. The figures can be more than $5,000 a megalitre. But there are cheaper savings if we can target where the real losses are.

We have systematically approached the whole of the Murrumbidgee's more than 1,500 kilometres of channels. The colours on the slide show the electromagnetic response from the bed of the channels. If the numbers are small, the losses are going to be higher. To give you one example, the first part of the channel, which is about 30 kilometres or so, is losing more than 10,000 megalitres of water in a given year. That is a huge investment opportunity, if we think about the National Water Initiative and where we should go and invest.

Senator McGAURAN—What is it as a percentage?

Prof. Khan—As a percentage for this particular part of the channel, all the water has to go through. The total use on this particular channel is lower than the losses on it.

Senator McGAURAN—What is the whole percentage?

Prof. Khan—The whole percentage in terms of the total Murrumbidgee Irrigation Area from the channels is about 10 per cent, but channels vary from two per cent to 30 per cent.

ACTING CHAIR—That is the channel that comes out the back of Narrandera?

Prof. Khan—That is right.

ACTING CHAIR—That is on the road from Leeton. There is a bit of sandy country there. I know the country.

Prof. Khan—Absolutely. When the irrigation areas were designed in the early 1900s, they were not designed based on the most efficient way of doing it; they were designed for the easiest way of doing it.

ACTING CHAIR—Yes, it was easy geography to get to it.

Prof. Khan—It is quite weird for me, if we do not have to supply a lot of water and the channel is just running parallel to the river, why we can't go for another diversion and save some of this water. That can be a smart saving that can go back to the National Water Initiative.

This next slide gives us a rough idea of the opportunities if we convert on farm. Conversion on farm is a complex issue. It requires a better understanding of soils, an understanding of the ground water, the type of crops we want to grow and the climatic conditions. The savings will change from year to year. In this slide I am trying to show how many megalitres per hectare you can save growing maize within the Murrumbidgee and Coleambally irrigation areas. Savings can be from less than 0.5 megalitres per hectare to close to one megalitre per hectare. This is assuming that we are converting from a flood to a pressurised irrigation system and we are assuming that the farmers are very good at both ends and they are using moisture sensors and other stuff. This kind of analysis has been done for a number of crops and we have come up with these numbers of how many megalitres you can save, but it costs money to save this water.

The next slide is an example to highlight the fact that we need to look at the life of these conversions and not in short time spans. This is a 25-year analysis which shows the net present value of discounted benefits and discounted costs. I would like to highlight one aspect of this. It is an economy-of-scale question: if we can use the same centre pivot on more than one paddock, it makes it economically viable. But the payback period on this particular graph, which is about 15 years for the best-case scenario, is too long for the farmer. We need to look into investments which can reduce this payback period to less than five years so that farmers will start thinking about conversion and providing this water for other users.

This slide shows the things that Senator Heffernan mentioned. The work we are doing is quite unique. The problems are quite common in the rest of the world. This is a new initiative of the United Nations Educational, Scientific and Cultural Organisation—UNESCO. It is called Hydrology for the Environment, Life and Policy. In its pilot phase, which just finished this year, there were 25 catchments. Out of those 25 catchments the Murrumbidgee was the only one selected as the world reference. This work was taken as the world reference. Now the program has gone to its full implementation phase with 76 catchments, and the Murrumbidgee is still the world reference. We are leading similar kind of research in a number of countries such as India, Pakistan and China.

To sum up, the point I would like to make is that it is not really difficult to find out how much water is there, but we need to adopt different thinking. We need to have systems thinking. We need to think about water as water systems and we need to identify the points where we can make the best gains. Take, for example, the Murrumbidgee. That one channel can give you a lot more benefits, compared to going about everything. The other important point with respect to the Water for a Healthy Country initiative is that we are trying to develop water quality and water quantity accounts. We are looking into opportunities for smarter water use, taking on board climate variability and climate change. I have not presented the climate variability work, but that is looking into whether we can forecast six months ahead so that farmers can be more efficient and more confident about whether to grow summer crops or winter crops.

We are looking into how we can change the land use patterns—both with respect to the crops and with respect to the technologies we use—and gain maximum benefits. We are looking into how this kind of water account framework can provide better location and trading, not only

within the Murray-Darling but also within the whole of Australia. This framework will be converted into benefits which are available now. If we do not take advantage of them they will be benefits forgone. In a nutshell, this whole initiative is about trying to understand where the chances for peak performance are. It is the language of peak performance. It is not the average or best management practice. For example, there are average yields within the irrigation areas, but there are margins within which we can convert rice from 10 tonnes to 15 tonnes per hectare. On average, we can reduce irrigation for maize from eight to less than six or seven. So it is looking into where the points are for peak performance.

Dr Dunlop—The work I want to talk to you about this morning is work that we completed a number of years ago. Rather than maximising on efficiency gains in the current system—the sort of work that Shahbaz has been talking about—we ask the question: what might future water use patterns be like over the next 50 years? The reason for doing this is so that people like yourselves and others can begin to ask the question: what are the best strategies and institutions we need to improve water use outcomes over the long term? I will start with a look back at the last 140-odd years. This slide shows the area of crops and sown pastures in Australia over the last 140 years. This one shows our best estimates of the amount of water used for irrigation in Australia over the last 140 years. This one shows the last 80 years in the Murray-Darling Basin—the diversions from the basin.

The first lesson you learn from these is that the status quo for agriculture in Australia is a significant increase in land and water resource use. Can this continue? Clearly, it cannot continue in our current agricultural areas. The land and water simply are not available. So I think we are in for a flattening of those curves. The cessation of this increase is going to be one of the biggest transitions in Australian agriculture. This is what we are managing at the moment. It is not just some tweaking; it is a major transition that we are managing. It is already happening in some areas. You can see that here it is beginning to flatten off. But it is not particularly clear in the national-level signals. Indeed, not only is there likely to be a flattening off but also there is likely to be a decrease in the amount of water that is used for agriculture, certainly in some areas. There is simply going to be less water in the rivers. You have heard about climate change and you have heard a lot about vegetation changes in the catchments which are likely to lead to less water in the rivers. There is going to be an increase in demand for that water from urban areas and for environmental flows.

I point out that past growth in agriculture has been largely from this increasing land and water resource use. In the future it will have to come much more so from increasing efficiencies—that is, doing what we currently do better—but also changing water uses, such as doing smarter things with water. As well as looking at past trends, we look at some of the issues that might drive change in Australia. What is on this slide is just a quick snapshot—I am sure you are familiar with many of them. With algal bloom in the Gippsland Lakes, we are learning more and more about our degradation in waterways and it is, I think, becoming less acceptable to rural and urban Australians alike.

This graph shows what water is used for. These five bars show the total volume of water used in five agricultural sectors and the returns per megalitre for those sectors. The point there is that the majority of water is used for relatively low returns and the horticultural sector, with the highest returns, uses a relatively small amount of water. This is one way of estimating the returns from water; there are other ways of doing it. It points out that there are significant opportunities

over a long time—over several generations—for increasing the total value of the irrigation sector as a whole through changes in water uses.

The last image on the slide is to remind us that 80 per cent of Australians live in urban areas and might not have daily contact with rural water and landscapes, but a lot of them care about land, water and biodiversity. There are a lot of them—they vote, they pay taxes, they consume agricultural products and, in thinking about the future of rural water, we cannot ignore their aspirations for rural Australia.

We will now start looking forward. In all of these graphs, the orange colour reflects 100 years of history. The three colours represent three scenarios that we have explored. As much as anything, they are put up to demonstrate the capability that we have been developing for exploring and analysing different scenarios. I will talk you through some of them. This graph shows the total area irrigated in Australia. You can see it varies, from a doubling in one scenario through to a 40 per cent decrease in these other two. Half that increase would be in Northern Australia—this is after Andrew Campbell's new research project tells us how to do it—and also a significant expansion in southern Australia, based largely on the efficiencies that Shahbaz's work will deliver for us and using much of that water to expand our area irrigated.

This next graph shows the area of horticulture. It is the iconic high-value irrigated use. It shows how, even with an overall decrease in the area irrigated, you can still achieve a doubling of the horticultural area. We have a doubling in these two scenarios, up to almost a four-fold increase in the blue scenario. These two graphs show the total volume of water used for irrigation in Northern Australia—almost 10,000 gigalitres—and in southern Australia. According to the National Land and Water Resources Audit best estimates, that would be well within what they call the 'sustainability limits'. It is a very small fraction of the total volume of water there. The interesting thing about the southern Australia scenario is that we have decreases from where we currently are in all three scenarios, and the decreases vary from about 800 gigalitres through to an almost 9,000 gigalitre reduction in water used for irrigation.

Senator BUCKLAND—Dr Dunlop, could you tell me the year scale? I can read the rest of it; I cannot read the year scale.

Dr Dunlop—A hundred years and 50 years. The scenarios are 50 years and there is a hundred years of history—1900, 2000 and 2050.

Senator BUCKLAND—Thank you.

Dr Dunlop—These two graphs are the same two graphs that were at the bottom of the other slide—horticulture and southern irrigation. At the top there is a range of benefits that could be derived from all of these scenarios: more high-value commodities, represented by horticulture; more local processing associated with that; greater security for irrigators, resulting from less total volume of water being used, so there is more capacity there; better outcomes for fisheries, both commercial and recreational; better environmental outcomes, resulting from increased environmental flows that are possibly measured in the thousands of gigalitres rather than the hundreds of gigalitres; and, if some of the decrease from irrigation is used to supplement urban water supplies, there is greater security for urban water and reduced pressure on urban catchments, no new dams and increasing environmental flows in the Yarra, for example.

There is a whole range of benefits that could come from these sorts of scenarios. In healthy countries we are working to try to develop water benefits analysis—ways of identifying and analysing these and other benefits so that we can look at different scenarios and say, 'How do they actually stack up against each other?' This provides the information for communities to then make choices that may lead to these scenarios. It also provides the information for policy makers and water managers to design institutions that may allow these scenarios to actually unfold, rather than locking into the current situation. Summarising that point, it is important to highlight that the future distribution of benefits and costs from any pattern of water use will depend critically on the way that our future water management systems—the ones we or you are designing now—are able to balance the short- and long-term benefits and the economic values against the social and environmental values. That is, then, balance the benefits that accrue to different people in different sectors and different places in the community.

I will just summarise by saying that I think it is important to realise that we are actually managing—you are managing—a major transition in water use, from this increase to the levelling off and a likely decrease in water use. It is a significant transition. There are significant opportunities to substantially increase the total value of water use, particularly if you take a broad view of what water use is and of what value is. The future distribution of benefits from this water use will depend very much on how Australians value the different water uses and then how they recognise those uses and how they respond to those uses. That will potentially lead to significant changes in water use, as a result of recognising diversity of values.

Mr Creighton—To conclude, water use is multifaceted; there are various benefits. That is a juggling act for all of us, particularly the community with information from places like CSIRO. A key role for science is to help underpin how we can have smarter use. If we get water accounts right, not only will we know where the water is but we will be able to link that into our markets, our trading systems, our entitlements, our licences and so on. Yes, I know there is a long way to go in terms of licences. In terms of systems management, I refer to the Perth example with the wheat belt. If we are looking for the points of intervention and the points of investment, we have to understand the system. It does not matter whether it is an urban system or a rural system. We have not got the dollars to do everything. We have got to find the key points to invest in. We need to do this in a way that thinks about the future. Shahbaz gave us the example of the irrigation channel through those sand lands versus, say, using the river. If we get it right now then there is a legacy for our future generations. We have got a goal for our flagship. It could be a national goal. It could be the basis of the way to move forward. Certainly we are hoping to position our science to support Australia's development. That is a summary of what we are about.

ACTING CHAIR—Thank you very much for that. I have to say that I am pretty excited and the committee is pretty excited. You have almost blown us away. I just think it is a fantastic presentation. The message for me is that all of Australia should know what we have seen this morning because, as I say, with public knowledge you get political courage. I look forward to selling the message that we have been given today to the wider community. Have you blokes given any consideration to somewhere like Sydney? It is a bit out of our charter, but as part of our water inquiry we have had all sorts of inputs. You talked about recycling. I think the Sydney system was designed for four million people. We have been given information that for $1,000 a company can supply a kit to a home that will reduce water use inside the home by 40 per cent.

As we know, there is more water used inside the house than outside in the garden. I think Sydney has a 40 per cent industrial and commercial use for water.

Mr Creighton—There are a couple of things. First off, the flagship is also about urban Australia, but we did not present that today. We are starting in Melbourne, Sydney and Perth, but we know that all cities are important. In Brisbane there is already reuse because the industry is situated in some cases—it has happened through serendipity—near where the effluent pipelines go into Moreton Bay. So the BP refinery, for example, is using high-nutrient water in its cooling system. There are no problems for the BP refinery, but high-nutrient water is going into Moreton Bay, causing problems in Moreton Bay. We can do more of that.

Then there is horticulture. We have a lot of work going through us and through some companion programs, and Land and Water Australia, about horticulture close to market. You grow a box of tomatoes in Bowen, for example, it gets transported down to Brisbane and all the rest of it. You might get $8 for that box of tomatoes. Somewhere between $4 and $6 is from packing shed through semitrailer to market; what happens on the farm is somewhere between $2 and $4 of your profit. If we can get a lot of our horticulture closer to our city reusing some of that water, of course there are benefits.

The third point then is things like ground water recharge. Perth is an excellent example. They have an official target, under the Western Australian water strategy, of 20 per cent of recharge supplying their water needs. We believe we can get to 30 or 40 per cent. The key issues here are about perception. We are working with the departments of health and so on, who are generally happy with what we are doing. But the community perception of reusing treated water is the problem. So we are putting in place a series of social analysis projects to understand how we move the community forward, how we work with the community and provide the information they need to start thinking about reuse water. For example, if you are talking about Melbourne, the new suburbs will be up the top. We can have package systems there. We can have most of the water captured in the suburb, used in the suburb and reused in the suburb. It is not a big deal in terms of technology, but the plumbing codes are not right. That is not our job, but it is about the policy and the science and the management.

We have just done a report, which I will leave with the committee secretary, about opportunities for water conservation and reuse, and we came to two big blocks of activity. One is about policy—not our job, but here are some things that we know need to happen. This is a report based on meetings right around Australia with a whole range of urban practitioners. The other is about getting on and doing it. 'Let's get on and do some of this reuse work.' The thing to remember, though, is that the cost of reuse water varies substantially depending on where you are in Australia. In areas like Perth, yes, we can do some work in aquifers, but the desal plant, a $300 million job, is still likely to go ahead—no question about that. In other areas like Melbourne and Sydney opportunities for reuse are probably going to come in before desal and other opportunities. In other cities, there may be a new dam. It depends on which city and so on.

In some areas, if you are looking at reuse as an opportunity, it might be good for the urban people—'We're doing the right thing'—but economically it might be cheaper to buy the water off, say, agriculture. What I am saying is that there is a lot of work to be done in urban areas, and you have to do it with a systems approach; you have to think through the benefits and the costs.

The community attitude towards reused water is the big breaker at the moment, the big road block.

ACTING CHAIR—Thanks for that. Do you think there is a need for a federal overview of the whole regime? In other words, should there be a capacity to bring all the states into line? I do not know if that would require constitutional change or something; I have no idea. But do you see the problems as having that sort of league of solution?

Mr Creighton—We would all like to see the terms of reference and how this national water commission is going to work—to see what the National Water Initiative is proposing. I know we cannot have trading in the Murray unless we have thought through all the sources and points of that water in the Murray-Darling because it goes across four states. I know from doing the land and water resources audit that the data sets and so on are not only imperfect but in various shapes and forms. It is hard to get an understanding of exactly what is going on. I know that some of our irrigators—some of my friends are irrigators—have licences in several states and are always bitching that the tenure in Victoria is not too bad and the tenure in New South Wales is 10 to 12 years. There is all this sort of stuff they carry on with. It is not my role to comment on policy but I know that there are a lot of impediments—railway gauge effects, if you like—to getting Australia in the right position with its water use.

ACTING CHAIR—We had a graphic example this morning from the Lower Balonne fellows who happened to be on the New South Wales side of the Queensland border. They just have to put up with what they have got. It is an environmental plan that is called 'bugger-all'—first in, best dressed and bugger the rest. I just cannot see how we can tolerate that sort of regime in the longer term.

Senator BUCKLAND—I echo some of the things that Senator Heffernan said. You have reaffirmed my faith in the CSIRO as a real Australian institution that we need. I was excited by what you had to say this morning and I thank you for that. But there were some things I wanted to explore. I am a bit cautious about asking this because you have probably answered it and I was too slow to pick it up. Earlier on in your presentation you talked about the $20 million that is being spent. Where is it actually going? It is not going to your pocket, is it?

Mr Creighton—Twenty million dollars is in our flagship.

Senator BUCKLAND—Yes, but where is it actually going?

Mr Creighton—I have a small team of people that is managing four main regional laboratories, if you like: south-west Western Australia, the Great Barrier Reef catchments, the Murray and urban Australia. We have scientists in CSIRO working across disciplines on this challenge. We have links with cooperative research centres, irrigation futures, Land and Water Australia et cetera. We have partitioned off Commonwealth money coming to CSIRO to deal with this water issue. Through further activities in CSIRO we are building that to make that program even bigger. In CSIRO through this flagship program—not just in water but in light metals, preventative health and so on—we are saying, 'Government is giving us appropriation. How do we return to government, to their high policy needs, the science they need?' That is what the flagships are about.

Senator BUCKLAND—I will not embarrass you by asking if you think it is enough, but if you were given twice as much money to spend on this would it be properly utilised?

Mr Creighton—I would be busier. We would all be busier. I am looking for more of a partnership. It is not about CSIRO; it is about science. It is about things such as the point you made before: an audit of our water resources. I did the land and water resources audit but we had to use existing data. There is a lot more to be known about Australia's water. There is a lot more technology we have not got.

We have just started a project with the dairy industry. In the last 10 years the dairy industry has something like doubled their production with half the water through just smarter use of existing technology. But what are the next big steps in technology? We need to get a level of investment in some long-term science and some 'out there' stuff. I do not even know what that will be. My job is to manage rather than invent the new stuff.

Certainly if you were going to give me twice as much money I would be saying that I wanted to put a decent set of programs in institutions and partnerships to look at some long-term innovations. I would be saying that I wanted to get a better handle on our water resources and understand exactly where they are—the whole water accounts issue. I would be saying that we need to think about social economic issues, the issues of licences, allocations, entitlements and trading, and the whole process of how we manage water, the benefits and so on. I would be saying that the projects I set up when I was back in Land and Water that Andrew mentioned are just the start of what we need to do in Northern Australia. That is just off the top of my head. We can always use more resources, but I would complete that comment by saying that we still need to make sure that the science engages well with the managers and the policy.

Senator BUCKLAND—Looking at what we have been told, I was thinking as we went through it that it is time the private sector really started putting its money where its mouth is. I do not know if you were here at the time, but I will repeat that I think rice growers are one industry that is quite serious about doing something practical. I was very impressed when we spoke with some of that industry's people. Is there much private sector investment in water technology and in improving water use?

Mr Creighton—If you go to any water conference these days, there is a huge room with lots of private enterprises displaying a whole range of technologies. Shahbaz's work is being done in association with Pratt Water, for example, whose submission we presented here today. My final comment before I hand over to Shahbaz is that Australian farmers, at least on farms, are already contributing through looking at technology, adopting technology fairly rapidly and looking to go beyond best practice. Yes, there can be more contributions but, if you look at the Murrumbidgee and the fact that it has status internationally, perhaps we are doing okay.

Prof. Khan—Your comment about rice growers is a very good example of the Environmental Champions program. That is quite a big highlight of a proactive industry which is not doing things because of the fear of regulation. The other big one for rice growers is the use of the appropriate soils and looking into modern technologies like electromagnetics to make sure the rice is grown only on the most suitable soils. There is a further step in innovation: Coleambally's irrigation is always considered an area which is on the lower side of things in terms of dollars per megalitre, but in terms of innovation it is one of the very best in the world. We are going

through a proactive program in which we are looking into how we can create recharge to manage the environment of the whole of the area as a collaborative effort between farmers—things which people do not even see. A lot of things are happening already.

The other prime example is the land and water main plans where farmers are co-investing. There is private investment with the government to improve their farming practices in things from recycling on their farms so that nothing leaves their farms through to surface drainage improvements. There are a lot of improvements of the infrastructure—regional options like the pumping of ground water and how it links together. There are a number of examples from the farmers themselves.

Product initiative is an interesting one. That is my example about how, if we want to, we can work to high-end technology. At the present, what with the drought and with farmers not having a lot of flexibility with their resources to invest for 10 or 15 years, there is a need for investment from the private sector. The prime example is Pratt Water, which is creating water bonds with the ANZ. There are a lot of those initiatives, but what the private sector needs in the long term is an assurance that these are the real benefits which are coming out of it. If the Murrumbidgee becomes a success story—and Colin has highlighted that it is—then this can be mapped across Australia.

Senator BUCKLAND—I was going to ask you a couple of questions in a moment, Professor Khan, but first of all I want to ask you, Mr Creighton, about the partnership with industry. You won me over when you said you had been involved with blast furnaces.

ACTING CHAIR—You might be cousins.

Mr Creighton—We might be, yes.

Senator BUCKLAND—We are not cousins, but he has got to be a good bloke. In Whyalla there was discharge water, which was predominantly salt water, from the coke ovens and blast furnaces that used to discharge straight into the Spencer Gulf. This created a big black rim and you would not eat the fish if you caught them there. Due to a very simple use of reed beds and improving the mangrove stands in the area, you can actually go out and watch the formerly black water now go out as absolutely pristine water. You can watch the crabs run across the bottom and you can watch the stingrays waiting for the tide to change to get the fish as they come out.

There need to be more partnerships with heavy industry to clean up their water—not all have access to salt water. I think this is part of the problem we have with convincing the population to reuse water. There is nothing wrong with the stuff. I can remember at Woomera—and I do not know if they are still doing it there now—that they had the sewage works there and they were reticulating water to the ovals and to what grass they had up there. There were signs up saying: 'Don't drink it.' The water was actually quite fine to drink, but it was perception. I do not know how we overcome that but, more importantly, I do not know how we overcome this industrial use. Do we charge industries more to force them to do something?

Mr Creighton—There is a lot going on. A lot of industries are talking about a closed cycle—BHP at Port Kembla**,** for example. Not a lot of water leaves the plant anymore. The other thing is that, if you take a modern industry as it develops, the conditions that governments put on them

through the environment agencies are quite stringent towards this end, I think. Take aquaculture. If you look at aquaculture and feeding prawns in big ponds these days, they then have polishing ponds at the end—they might have oysters or something in them—before the water goes back into the marine environment. That is done because of conditions on their licences. That, I suppose, is a good example of cross-compliance. I think industry respects and is delivering to cross-compliance already, and the role of government, of course, is in the licence.

In terms of industry involvement in water, the coal industry in Queensland, for example, has come to us already. It is one of the largest water users in Queensland and of course the coal industry is a huge export earner for the Queensland government. They are looking at how they can manage their water better, recognising that in many cases they are using ground water, and they are using it at close to sustainable levels because of the need to use the water over the short-term time frame of a coal mine. Quite frankly, I find industry receptive to these ideas. It is more a case of, 'What do you want us to do? Let's go on and do it.' If there is an issue of clarity, it is probably about government being clearer about what they want industry to do.

Senator BUCKLAND—Professor Khan, you talked about improving the channel systems and how we would do that. I do not know if you were here this morning when I asked someone else this question, but the irrigators are complaining that they are always digging out the damned channels because they are getting silted up. You cannot use pipes. I asked one group, 'Can you use pipes?' and they said, 'No, all the silt would settle in the pipes.' 'So do you clean it out?' 'Cost, cost, cost. Tough luck.' How do we really do this? You were talking about maybe using clays for bedding down in the bottom of channels. What can we really do—and what can we do that is not expensive—to eliminate the seepage and the evaporation? I have good ideas, but I do not go beyond the ideas.

Prof. Khan—There can be a number of ways to go about saving losses. We need to also realise that some of those losses are beneficial as well. We should not save every single loss, because it may be a gain for some other part of the system. Within the context of the channels, we have looked into a number of low-cost options. Rice hull ash is one of the options that you can use to line the beds of the channels. It is very inexpensive. What you do with that—in terms of burning the rice hulls—is currently a major environmental problem in rice-growing areas. Or you can look at the option of the sludge which is produced from the water treatment plants. That is quite good in terms of the finer particles and the ability of the sludge to make a matrix at the bed. That is another option.

Other options are simple ones that people have tried, like geotextiles which has been tried throughout the world. At the higher end, we go for lining with bentonite clays or with piping the channels. I think piping needs to be done very carefully because we are talking about massive volumes of water to be moved. If the piping is done just for the gravity flow then it is a nuisance because then you have added friction, unless it is done under depressurised systems. What we are proposing is: let us think about horses for courses. Some of these new technologies I have mentioned—for example, ash or sludge—may have shorter life spans of only five to 10 years but they are very inexpensive so we could replace them, depending on where the ground water table is and the surrounding conditions.

Overall, the analysis we have completed shows examples for anything from less than $500 but the cost increases do go higher and higher. My belief is that you should not be lining every

single part of the channel; you should do targeted lining. Evaporative losses are very small compared with losses from seepage. That is another very important aspect; it is only about two per cent compared with about eight per cent from seepage. It can be worthwhile in terms of the economics of saving water to use some sort of cover or to put piping everywhere. I am of the belief that for some of the horticulture commodities—for example, for growing wine or citrus—we should go for a pressurised irrigation system, both on farm and off farm, depending on the level of service you want to provide and how you want to achieve a higher quality of product from those areas. It needs to be looked at in the proper context. There are a number of options throughout the world that are available that we can look into to provide solutions.

Senator BUCKLAND—Thank you for that. It clears up a few things that have been confusing me about the channel irrigation system that we have got. Could I turn to urban use; we touched on it a little bit. I can remember that two or three years ago there was some discussion that Perth had such a large aquifer underneath that it could draw all its water from the aquifer.

Mr Creighton—Was that the Officer Basin?

Senator BUCKLAND—Yes.

Mr Creighton—It is out past Kalgoorlie and it is very salty.

Dr Dunlop—I think you are referring to the aquifer that goes out under the ocean.

Senator BUCKLAND—Yes, I can remember them saying Perth has got water to spare. What is the state of that?

Mr Creighton—All our work is pointing towards smarter management of the existing aquifers and desalination. I am not sure about that deeper aquifer.

Dr Dunlop—It is not my area of expertise but my understanding is that the big question with it is that as you draw up this high quality water, the degree to which seawater will seep into the aquifer and pollute the whole resource is completely unknown. We do not know how much water can be taken from it. Although there is a large amount of water there, that does not mean that you can use that large amount of water. You would have to ask our Western Australian colleagues for an answer on that.

ACTING CHAIR—That brings me to the Latrobe aquifer which, as you know, is a big problem. Is the CSIRO doing work on that?

Mr Creighton—Yes, Tom Hatton is leading an assessment of that at the moment. As I understand it, his report is due to be presented to Minister McGauran shortly.

ACTING CHAIR—It has been deferred.

Mr Creighton—It is an issue again of a system—in this case, the system goes from marine to land—and it is an issue to do with industry and agriculture. I know there is always the opportunity to say you have never got enough information to make a management decision—

ACTING CHAIR—I think it is time we did.

Mr Creighton—I think that is an example of where we have to take some sort of risk management approach. That is the way Tom and I designed their current assessment—to say, 'Let us present the facts and figures—at the level of accuracy we have for those facts and figures—as the basis for the way forward rather than doing more science.'

ACTING CHAIR—Yes. My understanding is that, if the gas and oil extractions combine with the rest of it, we are going to have an environmental problem there of huge proportions if we are not careful. There is a solution, I understand. Then there is the risk of coastal subsidence coming into the equation. I would encourage you to hurry along!

Mr Creighton—There often are solutions. I will give you an example. In the cane lands on the Pioneer River, which is around Mackay, farmers were individually taking ground water for irrigation, to give the planted cane crop a first drink. But that was bringing in sea water, so the water was getting saltier—the same sort of issue we are talking about. We went to Canegrowers, the association. We explained the problem. They called together all the growers. The growers then—not us, not government—paid for meters on every farm. The growers monitor those meters. The government—in this case, it is the Queensland department of primary industries, I think, these days; whatever its name is this week—takes their data, analyses it every three to six months and gives them back the information. It is a solution based on user management.

ACTING CHAIR—What has been the outcome; are the farmers using less water?

Mr Creighton—The farmers use less water, manage their water and do not just splash it around willy-nilly. Because the farmers understand the link between the marine water and the fresh water they are using—the fresh water is coming off the hills; the marine water is coming in from the ocean—they are using less water. It is metered: they can measure it, they know what is happening and the problem is gone. I am using it as an example of where, with understanding of science and the system, and individual action through some collective work—in this case, the far-sightedness of the local cane growers group—you can solve problems. I think the Latrobe is a bit more complex than that, but in many cases that sort of technique can drive us to solutions.

Prof. Khan—I would like to comment about Latrobe.

ACTING CHAIR—Most definitely.

Prof. Khan—I previously worked in the mining industry, looking into the aquifer depressurisation in the Latrobe Valley through three mines—Geelong, Hazelwood and Loy Yang—and the issues associated with that: as water gets out of the aquifers, the clay starts becoming dewatered and there is subsidence, which is what has happened in the Latrobe Valley. Then there are competing users, like the Yarram irrigators, and we have oil-pumping operations within the sea. As aquifers become depressurised, there is an issue as to how water will start mobilising from the aquifer going towards the sea. There are issues related to the shoreline going down and whether there will be more flooding. There are a lot of complex issues.

One of my PhD students, Jurgen Schaeffer, who is a principal hydrogeologist, is working on the same problem. I understand that, because it involves more than one stakeholder and more

than one industry, there is no consensus even on what is right and wrong about the data. There is a need—and that is being done now—to develop a very good understanding of the hydrogeology of the total system. There is a hydrogeological divide, according to my understanding, which separates the ground water impact of pumping offshore from the impact of pumping from mines; that needs to be taken into account in a proper way.

The other big issue for the Latrobe aquifer system is that there is relatively less recharge compared to the amount of water which is available in deeper aquifers, and how that can be sustainable given the climate variability and climate change scenario. So I agree on a similar cooperative approach, but we need to get an agreement on data and the models, and we need the organisations to work together and form a similar kind of arrangement as we have in the Murrumbidgee area, where different organisations are trying to solve similar problems.

ACTING CHAIR—We were given evidence on this in Melbourne. The most obvious thing to me was the jurisdictional ownership of the thing, and for many years no-one really has wanted to own the problem. It is obviously a huge problem: the subsidence version of what could happen, but which is not necessarily going to happen, is quite scary.

Senator McGAURAN—That is a good subject. Thank you, Professor Khan, for pointing out the complexities of it. When did you say that report might be out?

Mr Creighton—I cannot give you the date; I can find out and report back.

ACTING CHAIR—The reporting date has recently been extended. It was due in August.

Senator McGAURAN—On one of your graphs you showed the returns to the amount of water used. What returns? Dollar returns?

Dr Dunlop—Dollar returns. It is based on the ABS statistics reporting the gross value of those sectors. So it is the gross value of the sectors divided by the volume of water that that sector uses. The relativities of statistics from different places vary from year to year but horticulture is always the big one that sticks out.

Senator McGAURAN—What is the use of that to us or to yourself, given the incredible fluctuations according to the marketplace?

Dr Dunlop—The relativities between the different sectors—the animal industries and cotton and rice compared to horticulture—are pretty robust. That information is one way of looking at the contribution to the Australian economy of those different sectors compared to the amount of water they use. I should point out that those returns per megalitre do not equate to the profitability of the enterprises, at all. Many horticultural producers are struggling because of oversupply, whereas rice farmers are making a lot of money, even though they are at different ends of the spectrum as far as returns go. But, in terms of their contribution to the economy and the amount of money that goes through a sector—and presumably in relationship to jobs as well—it is an example of what they produce relative to the water they use. So it is to illustrate that there is a very large difference in the contributions relative to the water that is used.

Senator McGAURAN—Correct me if I am wrong, but I got the impression, Mr Creighton, that you thought the 500 gigalitre environmental release that has been agreed upon under the National Water Initiative was the minimum and not enough.

Mr Creighton—No, I did not mention that at all.

Senator McGAURAN—But I did get that impression. Correct me if I am wrong.

Mr Creighton—Michael mentioned that in one of his scenarios; Shahbaz mentioned it in terms of finding savings. I have not got enough knowledge about the Murray to understand the relative impacts of sediments, salts, the changing water regime, freshwater flow, changing riparian habitat and all the rest of it that makes up the Murray's current condition. When we did the land and water resources audit, we showed very clearly that there is a need to manage this as a system, that wetlands cannot be barraged off, red gums need drinks and all the rest of it. But the actual detail of megalitres probably leads us down the wrong path sometimes. Going back to my industrial history, my uncle was a moulder. He came down from Broken Hill to the Mildura area to build the barrages in those days, and he showed me photos many years ago of horses and carts in the bottom of the Murray. Of course, this was because there were periods when the Murray was quite dry—years when the Murray was quite dry—and then there was a flood. So how much of this issue is about the regime and how much of it is about the volume? My gut feeling says that it is about the regime and it is about how you manage the system, not about a particular volume of water. So when we get diverted off into 500 gigalitres or 1,000 gigalitres or whatever, I think we have lost the plot. I think we have to look at the system.

ACTING CHAIR—I will impose a little bit of discipline on the committee because it is approaching lunchtime and we have a tight schedule. I would like to ask a couple of questions. On slide 22 you talked about the role of a water accounts framework for allocation and trading. Can you comment on Land and Water's proposal for a Torrens type title, or is that outside your area?

Mr Creighton—It is something that we are starting to think should be in the flagship in terms of the science of the way forward. It is something we know is closely aligned with what the National Water Initiative through state agencies has to think about. We need some sort of title. I do not know whether it should necessarily be Torrens, but that is the way we are managing our land resources. Other countries are using Australia's expertise in the land title to put systems in place for their land title. We cannot manage it unless we can measure it. We cannot trade it unless we can measure it. We cannot manage that trade. I do not believe we are about a free-form economic open market here, because we are about public good as well. It does not matter where we are in Australia, the values and benefits of our water, as we have been talking about, are multiple. We are not about a willy-nilly open market; we are about some managed trade. We cannot do that unless we have accounts. We cannot manage the trade unless we have got licences and accounts that are closely linked together.

ACTING CHAIR—I take it that you blokes would see what is happening at Cubbie, where it is all guesswork, as pretty sacrilegious.

Mr Creighton—We cannot continue to go on on a basis of guesswork, whatever the issue is in water resources in Australia—whether it is Cubbie or Northern Australia. If I had more

investment, one of the things I would be doing is getting a better understanding of Australia's water resources in an accounting framework.

ACTING CHAIR—Should allocations be defined as net return flows? Is there a possibility that, if you traded the water with someone who became a more efficient user, he would be intercepting water that would have, under the old owners, been returning to the aquifer or whatever? Professor Young raised this as an issue.

Mr Creighton—This is part of that systems approach that Shahbaz was talking about. Certainly, as water gets more valuable, I am not going to allow any of it off my property back into the river; I am going to try to use it and make profit out of it. If I am paying in an urban environment for so many litres of water, I am going to try to use what I pay for. We have come from a system in Australia where you got an entitlement. You may not have used it all—sleepers and dozers and everything else—or, if you did, you allowed much of it to go via ground water or surface run-off back to the system, then someone else picked it up and used it. As we get more precision about our irrigation, our dry land or whatever it is, that is not going to happen. But, unless we have a water account and unless we understand the system, we are not going to be able to put some numbers on the changes. If we get to very efficient irrigation then, yes, there is going to be less water in the river because there is less water coming back from irrigation.

ACTING CHAIR—So your accounting will take account of the efficiency of the two systems that the water is traded between.

Mr Creighton—There is no other way to manage our water resources.

ACTING CHAIR—Are there any further questions? I am sure Senator McGauran would like to go on. I apologise for cutting you off, Senator McGauran.

Senator McGAURAN—The previous group that spoke to us, Land and Water Australia, submitted volumes on the salinity problems. I thought I saw somewhere that CSIRO said that the tide has been turned on the salinity creep.

Mr Creighton—If you go to my work in the land and water resources audit, which I did when I was collocated with Land and Water Australia, you will see very clearly that in dryland salinity we are yet to see the full load come down, particularly with the Murray-Darling catchment. However, with regard to irrigation salinity and ground water management, we generally believe the systems are in place to minimise the likely impact of salinity from irrigation. Shahbaz might want to correct me or change that.

Senator McGAURAN—So it has been measured as a downturn?

Prof. Khan—There are a lot of major, important impacts which have not been considered. The question was raised by others on the back bench about ground water pumping and ground water use. Within the irrigation area since the cap came in—and that happened after 1994 or 1995—when you look into ground water pumping you see that has gone up quite a lot for both the Murray and Murrumbidgee catchments. So what is going to be the major impact of that? It is going to alter pressures, and those in deeper aquifers have gone down. This, combined with improved irrigation practices and drought, means the shallow ground water levels have gone

down tremendously. That means that there is less salt which is now being mobilised from the irrigation areas going back into the channel systems.

The other question which is related to salinity, again in the irrigation context, is: how many tonnes come in and how many go out? It is a quite interesting figure. For example, for the Murrumbidgee roughly 450,000 tonnes of salt get mobilised in an average year. It depends on the climate variability as well. Out of those 450,000 tonnes, once the water goes into these irrigation areas—the Murrumbidgee and Coleambally areas—about 100,000 to 150,000 tonnes of salt never goes back to the river, so there is an important aspect which I would like to take up following on from Colin. If irrigation efficiency is improving with the water trading that we have discussed and if the return flows, either through surface water or ground water, are not going back somewhere, then these irrigation areas are net sinks of salt. An example is the global channel control in Coleambally. Overall about 10 per cent of water is used to go down through two channel systems on the old creeks. That has been reduced substantially, so that is also a major downside which we need to bring into our management. One other point which I would like to mention and to have recorded is that ground water systems are not just the catchments which we see on the surface. Lachlan-Murrumbidgee-Murray is the same ground water system. It is one catchment. So what we have in the Murray and what we are doing with the Murrumbidgee and what is happening with the Lachlan with the deep ground water action means that the whole dynamics of ground water and how it affects salinity have completely changed in the past five or six years.

ACTING CHAIR—Could I get you to further clarify that. Would that be the unbroken aquifer west of the line of Albury, Narrandera and Hillston? Is the aquifer that you are referring to the one that is all linked up?

Prof. Khan—Absolutely.

ACTING CHAIR—But east of there it is broken?

Prof. Khan—East of there it is a different system. That is the mid-Murrumbidgee area. But, as you go to the lower Murrumbidgee, the Lachlan, Murrumbidgee and Murray are part of the same aquifer system.

ACTING CHAIR—Which is approximately that line from Albury and Narrandera. That is right on the money.

Prof. Khan—Absolutely.

Mr Creighton—There are maps in the first report of the audit, if you need them.

ACTING CHAIR—I have got the maps. I just wanted to get this on the record.

Senator McGAURAN—Senator Buckland mentioned that he had been advised that if you start to pipe your channels you are going to get silt in your pipes. Is that true?

Prof. Khan—The channels were built on the old theory of non-silting, non-scouring channels. Interestingly, it was developed in India and Pakistan, during the time the British were there, by

two eminent engineers. One of them, Kennedy, is still remembered in that part of the world. The idea concerns the rate at which water moves. You design the channel so that it carries the silt rather than depositing it and the rate of flow is such that it is not going to scour the sides. This brings us back to my earlier example that, if the gravity kind of system is still there and the gravity is not enough and we put the pipes there, then we are going to silt them up if the velocities are not enough. But if we go for pressurised systems where the velocities are sufficient and the water does not stay stagnant and siltation does not occur then that can be solved.

ACTING CHAIR—I have a question which is outside the argument. It is about government policy in the future. In terms of future government policy, could you first identify what you see as the biggest past management blunders? I accept that certainly in the Riverina the aquifer knowledge is limited, and I can tell you from my own experience that we lost our shallow water some time ago. Also, where are action and research most urgently needed in terms of your work?

Prof. Khan—In terms of the example which I have given in a lot of detail, I think one thing that we need to get very clear is that, in terms of accounts, we might have allocated the same job twice with respect to surface water and ground water. Their interactions are very strong in some places; in other places, surface water moves and ground water does not have any impact. We need to get that right in terms of our allocation of water. So I think that is an important part of policy. The second thing—in the kind of climate we have and from my experience in other countries—is that we have a huge climate variability to deal with. We need to use our aquifer systems as capacitants within our system and, as there is less water, we need to use that water more reliably.

The third thing which is very important, which I have learned as I have discovered more and more about these systems, is the way we are managing the environment. For example, in the lower Murrumbidgee there is an allocation for the environment because that part of the system used to get flooded 99 out of 100 times if there was no irrigation. So we are supplying water which is left over through the spilling of dams or because of irrigation, and some of that water is used for winter cropping as an opportunity. But the water has not been reaching the environment in the way it should have been reaching it, because of the altered regime. So we need to look back very carefully into all those aspects.

I believe there are huge savings to be made. For example, with the winter cropping example I gave you in the lower Murrumbidgee, if and when water becomes available, there is no security: water is applied on the land for environmental and other purposes, water goes into the soil and then, only during winter, people go and do the planting. All the summer period water actually goes as evaporation lost from the system. Giving a small allocation, about 50 gigalitres, for instance, in that part of the system for cropping, as a separate thing, and then thinking about how we supply to red gums and lignum and looking into rookeries—I think a lot of those policy options need to be looked at again, with better water accounting and more consensus with the community.

ACTING CHAIR—Have you done any work on the lower Lachlan? I declare an interest. The lower Lachlan is a more pristine environment in terms of what happens there, but it is also seriously neglected and abused as an environmental prospect.

Prof. Khan—Absolutely. There is the same problem there. Redbank, the Nimmie-Caira and the lower Lachlan are all relatively flatter flood plain areas which under average conditions—as people defined natural conditions when there may not have been as many diversions—used to get flooded very frequently and regularly. But, because of interventions—we have built levies for flood control; we have altered flow patterns—all of these areas I think are still neglected. We are talking about six icon sites on the Murray, and I think there are a lot more on many other systems which are not—

ACTING CHAIR—I will put in a bid for the poor old Lachlan and the lower wetlands there.

Prof. Khan—I think there is a lot to be done over there—absolutely. The Lachlan does not see the daylight, in that it never reaches the Murrumbidgee anymore.

ACTING CHAIR—I understand that. I keep telling people that, even though the map says that perhaps it does, it does not actually reach it.

Prof. Khan—The other thing I would like to highlight is that the capacity of the river channel systems has completely changed. We need to get our heads around that. In the Living Murray initiative, for example, when we are talking about taking water from the Murrumbidgee and that water passing all the way through, it may not do so. The flow systems have been altered, the velocities of flows are not the same, and siltation of certain parts of the river has occurred, so that if you pass the same amount of water under natural conditions it will end up somewhere else. There needs to be a fresh look at the river morphology—how it links with the ground water and the surrounding land usage.

ACTING CHAIR—Before I ask for a final comment from any of you about any future policy input for the committee to consider, I will just go back to the Upper Murray fellows who have lost their riparian catchment right. Given the sensitivity of the area and its importance to the catchment of the Murray, would the solution be for them to simply be allocated a part of the sales pool instead of a riparian catchment right and to have an irrigation right—just a simple licence?

Prof. Khan—I looked into this issue while I was working for a consultant in Victoria—through alpine valley farmers. My understanding was that the water trading rules at that time—and I looked into it about five years ago—were not proper rules in terms of the proper use of water and the reticulation losses in the system. There is the example of the lower Murrumbidgee, where we could give some security of supply, and I believe there should be a similar kind of fresh look at the Upper Murray—in terms of dam storages as well as determining where rain falls, natural waterway definitions, how this water is going through and whether these people have some better rights than some of the investors there.

ACTING CHAIR—I think they have been dudded, but anyhow. Are there any other comments?

Senator McGAURAN—By the state government.

ACTING CHAIR—They have been dudded. I will not apportion the blame.

Mr Creighton—There is a comment about policy. Australia has come a long way—with Landcare, the Natural Heritage Trust and the national action plan—on this whole issue of sustainability. But that long way is scratching the surface, because 60 per cent of Australia is in some sort of private ownership. We have not yet got to the point where we have said: 'Let's rationalise between economic and market driven factors and the agenda that we who live in a largely urban environment'—the 80 per cent that Michael talked about—'are wanting from our rural communities.' Are we going to give them incentives? Are we going to regulate them? Are we going to give them a higher price for their product when we know we are trading globally and we probably cannot do that as we might anyway, unless we take on US policies?

What is the big policy that is going to take us from having this strong community attitude—both urban and rural—to being a good natural resource manager and making that happen? Shahbaz commented about the central pivot—it takes somewhere around 10 to 15 years to get the returns. But of course in an agricultural industry you want returns for your capital investment in about three to five years. I could keep on going about planting trees or whatever issue you want to talk about. Yes, precision agriculture would take us some way—fertiliser, liming and all the rest of those sorts of things—and there are opportunities there. But what is the big policy that is going to take us from NHT and the national action plan, which is almost ceding the concept, into widespread action?

ACTING CHAIR—I think you talked about Amsterdam. Was that in this conversation?

Senator McGAURAN—That was the previous one.

ACTING CHAIR—Maybe the reason that is doable is that it is a federal sort of snapshot. I just wonder about that for this.

Mr Creighton—I do not know.

ACTING CHAIR—That is for us to think about. Congratulations to the CSIRO. We are very impressed and deeply indebted. We will be in further touch. My very many thanks.

Mr Creighton—Thank you for having us here today.

ACTING CHAIR—Keep up the good work.

Proceedings suspended from 12.48 p.m. to 1.50 p.m.

COLE, Mr Ian, Chair, Darling River Food and Fibre

KIDD, Mr Ray, St George Irrigation Area Pty Ltd

ACTING CHAIR—Welcome. I place on record that all witnesses are protected by parliamentary privilege with respect to submissions made to the committee and evidence given. Any act by any person which may disadvantage a witness on account of evidence given by him or her before the Senate or a Senate committee is a breach of privilege. The committee prefers to hear all evidence in public, but it may agree to take evidence confidentially. If the committee takes confidential evidence, it may still publish or present all of that evidence to the Senate at a later date. The Senate also has the power to order the production and/or publication of confidential evidence. The committee would consult the person whose evidence the committee is considering publishing before taking such action. Senator Ridgeway has another commitment today, and I am chairing this meeting. We are conducting this part of our proceedings by teleconference. Our witnesses are in Bourke and St George. I invite you to make an opening statement before we move to questions.

Mr Cole—Darling River Food and Fibre is a nonprofit, nonpolitical organisation that was set up to assist and represent its members on the Darling River. We are a body that represents the irrigation industry and other water users on the Darling. Our membership includes Bourke water users, Bourke cotton growers, the horticulture industry in Bourke, associated local businesses and the Bourke Shire Council. We have a number of aims and objectives, which I do not really need to go into here; suffice to say that we are a representative body for those interests. I am also the chair of the Mungindi-Menindee Advisory Council, which is a wider body encompassing the whole of the Barwon-Darling river system from Mungindi to Menindee. The membership is made up of each water user group and each local government body along the Barwon-Darling river system, and other organisations. We have had Aboriginal representation and others as well. We have people who are stakeholders on the river, such as riparian users. Today I really want to represent the irrigation communities and water users along the length of the Darling, from the junction of the Culgoa and Darling rivers—where it starts—down to Menindee Lakes.

We believe that water use and water planning in this system and its tributaries should be guided by fairness, equity and balanced sustainable use of the resource. We believe that sustainable industry is dependent on a healthy system and that capping diversions at sustainable limits is vital. We support the COAG water reforms that emphasise implementation of environmental flows and cost recovery pricing. We applaud the National Water Initiative, which talks about the removal of barriers to trade, implementation of secure access entitlements and the new risk assignment principles that are embodied in that initiative.

We do have some concerns about water use above us in the tributaries. Our use of water from the Barwon-Darling is insignificant compared with the development in the tributaries above us. We do have some serious concerns about the Condamine-Balonne draft water resource plan that was released to us late last year without any consultation. Do you want me to go into that?

ACTING CHAIR—Perhaps we better give Ray Kidd an opportunity to say a few words and then we will come back to you, because we have a discipline on time here.

Mr Cole—I understand that. I just did not know how much you want me to say. You can come back to me on that.

ACTING CHAIR—We will flush that out with a few questions, I am sure.

Mr Kidd—I am an allocation holder in the St George irrigation area. I have been there for a bit over 30 years now and some irrigators were there three or four years before me. I represent the St George Irrigation Area Pty Ltd. A group of us got together and we formed a company to represent and look after the rights of the irrigation area farmers—those on what is now called 'supplemented water'. We represent only a small proportion of the total take of water in our region, but we are the group of irrigators who got into it first. Our main complaint so far has been what seems to be a negligent approach by government to property rights in relation to the water reform agenda.

There are a lot of things about the water reform agenda that we support: the separation of water from land and tradability—I do not think anybody has any problems with that concept as the way to move into the future and develop highest price, highest value usage of water. The water reform agenda has been going for a long time, and we have been labouring to have our property rights in an irrigation area significantly recognised in that process. We have some very specific problems in that our public infrastructure has been grossly overallocated. We cannot get this fact recognised in the water reform agenda process, no matter how much we represent ourselves in different forums and deputations to ministers in governments from both sides of the political spectrum. We seem to be having a real problem getting proper definition of property rights. We come up against a range of vested interests. Obviously, the water barons are moving in and taking up huge quantities of water, and the established irrigation industry—which, in our case, has been there for 30 or 35 years—finds itself being greatly constrained in the process. We believe that our property rights are being very seriously infringed upon. I think if the water reform agenda is to have credibility in the long term, the property rights issue should be addressed upfront so that everybody in the water industry knows and understands the property rights of other people in the industry.

ACTING CHAIR—Ian, with regard to your concerns about what is going on upriver, do you think that the ever expanding capacity of the Lower Balonne—with its off river, on farm storage, the A and B bunded water application et cetera—is a serious long-term threat, not only to the contribution that the Culgoa used to make to the Darling but also to the environment generally in that area?

Mr Cole—Yes, I do. I generally do not like to criticise fellow irrigators but I believe there has to be fairness, balance and sustainability. I do not think we have any of that in this draft plan before us. Historically, we receive over 20 per cent of our flows from the Condamine and Balonne system, coming down mainly through the Culgoa, with some coming through the Bokhara River. The present plan seems to have been framed without regard to the Darling River and the impacts of further growth in extractions. Flows from that system to our river are valuable. They are often critical to a large number of people—not just farmers but also communities along the river—right along its length from the Culgoa junction down to Menindee Lakes. Water from that system is valuable for irrigation farming and for stock and domestic use. It is critical for town water. Communities including Bourke, Louth, Tilpa, Wilcannia and Menindee depend on the Darling for town water.

There are approximately 80 active irrigators along this stretch of river who grow about 10,000 hectares of crops on average each year. The main crop is cotton but there has been a diversification into other crops. Peanuts, soybeans and a lot of winter cereals are grown. Over the past 15 years we have had a rapid expansion of horticultural industry at Bourke—mainly table grapes, citrus, melons and jojoba. In recent years that has mainly been through cotton growers diversifying into permanent plantings under drip irrigation. The motivation for that has been water reform and the need to get the best return for each megalitre used.

Our region experiences probably the lowest rainfall of any irrigation region in New South Wales. We have also been impacted by substantial development on other New South Wales and Queensland tributaries. There have been times in the past when flows from the Culgoa have been the only source of water to maintain these supplies, whether they be for town water, for stock and domestic or to complete or maintain a crop. The survival of the towns along this river at and below Bourke is reliant on the continuation of an equitable share from the Culgoa system and the other tributaries.

ACTING CHAIR—I have made a statement—you have probably read it—that I think there has to be greater public information and understanding of these water issues. Because we really cannot control what happens over the Queensland border, there is a weakness in the water planning system. Do you think there is a role for the Commonwealth in all this?

Mr Cole—I do think there is a role for the Commonwealth although I am not sure how that could work because the jurisdictions responsible for land and water are the states. I suspect that there is a constitutional problem there.

ACTING CHAIR—There is, yes.

Mr Cole—I guess that the Commonwealth has got ways of working with the states through COAG and things like the National Water Initiative. But, yes, I do think there is a role for the Commonwealth. I just find it difficult to understand that a draft plan can be done on a tributary like this with no modelled information on the hydrological impacts on the Darling River. This plan completely ignores the social, economic and ecological values of the Darling. We suspect that the reduction in flows to the Darling from what we had some years ago to now would be as high as 75 per cent. It would be at least 50 per cent.

ACTING CHAIR—I obviously think that the environmental plan in place up there is 'first in, best dressed'. Ray, could you give us a glimpse of the changes confined to the original irrigators' area at St George? What have the growth of the water harvesting regime downstream and the proposal to have even further growth with the A and B licence regime done to the people who, as you said, bought a place there 30 years ago and had a reasonable expectation of water supply and security?

Mr Kidd—In that area, the only impact that downstream extractions—whether licensed or otherwise—can have on an upstream situation is purely in the areas of politics and management. In a scheme like ours, which is based on Beardmore Dam, if, from lobbying by other irrigators, we find ourselves being constrained or having to take something less than what we consider to be our legitimate entitlement, it means that the public infrastructure is being taken out of service, and that creates earlier flood-harvesting opportunities for irrigators downstream. Irrigators and

licence holders downstream of St George have had a vested interest in, in effect, scuttling the workings of the public infrastructure that started the whole irrigation thing off 35 years ago. That is where we have had problems. The involvement in the water resource industry of the political lobby of what you might call the big end of town has made it very difficult for the irrigation area farmers to make their claims. We have a grossly overallocated infrastructure. We have had five ministers in four governments make commitments to the building of an offstream storage to rectify the overallocation problem, but that has not happened. In spite of ministers even telling the parliament that they had built the storage and solved the problem, the storage still has not been built—that is, other than an owner of a property building it for himself and installing major diversions. That could involve around 50,000 to 80,000 megalitres of private diversion.

Moving to the other downstream issues and the A and B type licences that have already been referred to, about half of the approximately one million megalitres of extraction that can now be put into storage between St George and the border would be picked up in what I call 'nonconforming works'—in other words, works that are not subject to licensing of any sort. I gather that, under the water management plan, there are plans for this water to be given licences. I think it is constitutionally wrong to be constraining conforming works and then having new licences for what are considered to be nonconforming works.

ACTING CHAIR—I entirely agree. I think the environmental plan in place up there is 'first in, best dressed—and bugger the rest.' It beggars belief that, as you say, a whole lot of earthworks have occurred there on which the law has been silent and that they are now proposing to encase that with law and give a water entitlement that is worth a lot of money to something that was originally just 'bushranger' work. I have to say that we understand that issue. I would like to think that, on your behalf and certainly on behalf of the boys down at Bourke, the cavalry has arrived at last.

Senator BUCKLAND—I want to ask you about water quality. I understand that the flow is reduced to almost a trickle, if any at all. Has that done anything to the water quality that irrigators are getting at your end of the river?

Mr Cole—Do you mean at Bourke?

Senator BUCKLAND—Yes.

Mr Cole—The Darling is an event based river, like most rivers this way. Although it almost always flows, over the last couple of years, with this horrendous drought we have had, it has stopped flowing a number of times and we have had some water quality problems. However, those water quality problems and the lack of flow have really been forced by the drought, not necessarily by diversions upstream. What concerned us was that the big flow earlier this year, which originated up in the Balonne River and came down the Culgoa system, was reduced alarmingly by diversions on the Lower Balonne floodplain, to which you have referred. When you have less water, especially in summer, you obviously have a lesser quality water, particularly as evaporation takes place. We have had some water quality problems here at Bourke over the last couple of years but, in the years before that, we did not have what you would call bad water quality problems. We had an outbreak of blue-green algae, as you may remember, back in the early 1990s. I think that issue has been dealt with and managed quite well. Generally, we do not have water quality problems, because it is an event based river and

when the flows come they come in such good, handsome volumes that any water quality problems are mitigated by the flow.

Senator BUCKLAND—Do you still get flooding where you are in Bourke?

Mr Cole—Yes. The last big flood we had was in 1998. That got up to about 280,000 megs a day. We can have very big floods here at Bourke. With the current levels of development on the tributaries, we are still going to have big floods. What we are worried about is that the small to medium level floods on some of the tributaries will be taken away, so we will get less water in the times that we need it. If you look at the New South Wales government's submission to the draft plan on the Condamine-Balonne, you will see that they have modelled the figures that have been given to them by the Queensland department. One of the things they are worried about is the total loss of minor to small flood events from the system—and so are we. When you get a big flood on it, nothing can stop it; but it is the small to medium flow events that we are concerned about, and the mean annual flows across the New South Wales-Queensland border. Under natural conditions those are about 1,200 gigalitres a year. Under today's development conditions the model figure is half that.

Senator BUCKLAND—How much more water is required to be in the river to maintain a flow that you say would not leave you at a gross disadvantage?

Mr Cole—Again, it is a hard question to answer because we do have an event based river. We had an event earlier this year where we were able to come out of a drought and fill our off-river storages. That was not a huge flow, but it was a good enough flow to be able to fill some storages and make sure that all town water needs were taken care of—stock, domestic, riparian and other uses—and it also put a couple of hundred thousand extra megalitres into the Menindee Lakes. So it is really not a matter of the level, because we live on an unregulated stream. When I say 'unregulated', I mean that the river only really flows when it rains and we do not have a dam to regulate a flow down to us. Most of the tributaries—the Macquarie, the Namoi, the Gwydir—have dams but we do not.

We are regulated by our pumping height threshold. There has to be 1,250 megalitres a day going past Bourke, for example, for us to be able to turn on a reasonable sized pump. Then it is only limited pumping until it gets higher again. We are also limited by our licensed volume, the size of our pumps, the number of our pumps and the environmental flow package that we have introduced. We also have a voluntary pumping roster and a development embargo. So there are lots of controls, but the flow itself is not regulated like a dammed river.

Senator BUCKLAND—What is the attitude of producers in Bourke to water trading?

Mr Cole—We see it as a positive thing. We have never had water trading, even on a temporary basis, like the tributaries have had. We see it as a positive thing; I cannot see how else we could see it. Some people do see it as a negative thing in that water could be transferred out of your area and cause social and economic dislocation. I would not see that happening here, because Bourke is actually an ideal place to grow the crops that we grow. We have good soils for horticulture, cotton and other crops. We have a work force, so we have infrastructure. It would be very unlikely to see water traded out of here. But we see taking away trading impediments as

a good thing for the industry, as it will allow water to trade to the highest value use and be used more efficiently.

ACTING CHAIR—Ray, we do not want you to feel out of this. There is a different regime in place in Queensland and New South Wales. What do you think about trading water licences across the border? Would you be alarmed, for instance, if a lot of people up your way sold their water licences and rights to someone at Bourke?

Mr Kidd—I suppose I would have to give a political answer to that question—yes and no. One would like to see maximum productivity within one's region but, likewise, I believe that state borders and shire boundaries should be right out of the equation as far as efficient river usage and management are concerned.

ACTING CHAIR—We will take that as the answer. What if, for instance, I have a poultice of money because I have sold a big development and I move to Noosa and I decide that I will buy all the water in your part of the state and just have a spot market operated off the beach at Noosa. Do you think there ought to be paper trading in water?

Mr Kidd—I see no problem with water being traded in the same way that land is traded. You will have middlemen in such processes—risk takers—and that is fair enough. We take these risks when we trade land. But mother nature put certain limitations on where you can trade water to.

ACTING CHAIR—You are not afraid of the prospect of withholding water to jump the price up when you have to operate on the spot market? In other words, you are going to have a lot of tenant irrigators, who are tenant farmers to the speculators. This has happened around the world, with serious problems. You are not concerned that Swire Hong Kong Pty Ltd, for instance, could manipulate the price of water? I am not alleging that they would, by the way, but just as an example.

Mr Kidd—We allow foreign investment in our industries in Australia to own land, run cattle properties, feedlots and so on. I do not see that there is a problem with that principle, as long as the property rights attached to the water that they buy are preserved and looked after. I think the critical thing that needs to be addressed in the water reform agenda is property rights not only with respect to the volumetric factor but the reliability factor.

ACTING CHAIR—If, for instance, water became so valuable in the long term that all you fellas up there decided you had to go to trickle irrigation, if you had sold your water rights to 'Bamboozle Pty Ltd' in Pitt Street, Sydney—and they, of course, would accumulate the huge 'river of gold' from the capital growth value of the water, which would be a transfer of wealth from the bush to the city—do you think it would be a problem when you went to the bank to borrow half a million dollars to put in your trickle irrigation?

Mr Kidd—No, as long as it is within normal trading purposes. At this point in time the water is owned, and should be owned, by the property owner, who has the licence.

ACTING CHAIR—What I am saying is that, once the water licence is separated from the land, I could live in London, own all the water in your district and speculate on the spot market

with it. You say that is not a problem. I actually think it is a serious problem. Anyhow, that is your summary of it.

Mr Kidd—That entrepreneur based in London would have to buy that water from a property holder, who has the licence at the present time. At the present time, he would have to buy the land as well.

ACTING CHAIR—You have misunderstood me; maybe that is why I am a bit alarmed at your answers. This is a scenario where you separate the licence from the land.

Mr Kidd—Yes, the licence would still have to be sold as if it were land. The water is becoming real estate in terms of the tradability situation and, like land, it will operate on a market basis. If you are going to have free trading, international trade agreements and that sort of thing—and if you are going to have tradable water as a separate entity—I do not think you can control that marketplace to eliminate certain people from it.

ACTING CHAIR—We will see about that. I have to say I have a different view to you.

Mr Kidd—I have not put a lot of thought into that one.

ACTING CHAIR—Given the proposal for A and B water licences, do you think bunded water licences ought to be tradable and compensatable? I have to say I do not agree at all with the principle of bunded water. I think the lack of environmental planning in that part of Australia is a national disgrace. There has been no environment planning attached to all the earthworks that have gone on there. What is your view of all that?

Mr Kidd—The history is that the state government sought to declare the Lower Balonne a designated area. I think that was in 1989. The water harvesting lobby lobbied very strongly against that proposal, which would have given the state government control over works on the floodplain. That designated area did not go ahead. Consequently development has gone ahead without any planning or constraints. That has given us a situation now where half the water take is going into unlicensed works. Under the current water plan, there are plans to turn those nonconforming works into conforming works. In places on that floodplain, we have properties picking up overland flows, with flow registrations at St George as low as 5,000 megalitres a day. We have people picking up offstream flows all the way up the scale. I think it is wrong to be issuing new licences to those works when at the same time, as part of the water reform agenda, you are taking water away from conforming works that have in some cases been installed for 30 years, subject to licences, water charges and all those sorts of things.

ACTING CHAIR—You will not have an argument from me on that.

Senator BUCKLAND—I will ask you both to briefly respond to this question. If water was traded or, as we have been told about, held by some rich company in a capital city away from the land, what would be the value of your land if you wanted to sell it, without the water licence? How much would you lose for that?

Mr Cole—You would lose most of it. You would lose probably 90 per cent or more once you took the water away from it at Bourke. I think what you have to do here is, first, realise that we

all at the moment hold our own water entitlements. If we are going to go ahead and invest in long-term systems for trickle irrigation and permanent plantings or major infrastructure for cotton, for example, I think you have to manage your own risk. You have to ask, 'Well, have I got the capacity to be able to water what I'm doing?' If you have your own licences, you would have to say, 'Yes, I do'. I do not think anyone would go out there and take a punt on, say, putting in a whole lot of new infrastructure and development without access to water at a known price.

ACTING CHAIR—I regret to inform you that we have met a lot of people who think they are actually going to do that—that the spot market is going to be manageable. Can I thank you both for your attendance; obviously, we are very grateful. We regret that Mr Ken Pearce, who was to appear, has been unable to appear, and perhaps we can hear from him at another time. So thank you very much, everybody, and I just hope you get a bloody big rain up there shortly.

Mr Cole—Thanks.

ACTING CHAIR—No worries.

Mr Kidd—Thanks very much. I think we need to keep talking about these matters. As a final parting I would say that the property rights issue is the one we have to sort out. I think if we do that properly most other problems will fall into place.

ACTING CHAIR—Thanks, Ray. Thanks, Ian.

Mr Cole—Thanks, Bill.

[2.27 p.m.]

HOOY, Mr Theodore Simon, Assistant Secretary, Coasts and Water Branch, Department of Environment and Heritage

SLATYER, Mr Anthony James, First Assistant Secretary, Land, Water and Coasts Division, Department of Environment and Heritage

ACTING CHAIR—Welcome. If you would like to make an opening statement we would be delighted to hear from you.

Mr Slatyer—We have no opening statement. We will just do our best to answer your questions.

ACTING CHAIR—The Commonwealth obviously has some input in this area. Over there on the table are the maps of what I call the national disgrace of the Lower Balonne. Could you describe to the committee the constitutional powers of the Commonwealth with regard to water so that we get that on the record—the Ramsar environmental side of our responsibility?

Mr Slatyer—That is a very broad question.

ACTING CHAIR—I think it is important that people understand that, in dealing with the across-the-border problems of the Lower Balonne et cetera, really the only constitutional power that we have, is for instance in that case of the Narran Lakes—what is happening there. Have you blokes recorded what happened there in this last event in January? Have you got any information you could supply to us about what went on at the Narran Lakes as a result of the January flood event of the Lower Balonne?

Mr Hooy—No, we do not.

ACTING CHAIR—All right.

Senator BUCKLAND—What elements of the river systems do you actually monitor, control or have authority over? We are talking about water availability for primary producers through irrigation or flooding—some in the Lower Balonne depend on flooding. I am really not sure where you fit into it, because I do not hear anything from you kicking up and down—what advice you are giving to the ministry, the Prime Minister or the minister as to how to rectify some of these dreadful problems that we have in our river systems.

Mr Slatyer—We are eternally providing advice within the government on the environment issues that arise with water flows, and that is the normal policy business of the department.

ACTING CHAIR—Can I just flush you out a bit there? With regard to the environmental planning impact of the proposed A and B regime, which is the draft proposal in Queensland at the moment for the Lower Balonne, has the department done a study of the environmental impact, for instance, of the bunded water principle? It seems to me that there has been no

environmental planning at all, and it is a national disgrace, and I wonder why we are allowing that to go ahead without insisting that there is an environmental plan attached to it.

Mr Hooy—The government has not been engaged in any direct environmental monitoring or directly in any detailed analysis of the Condamine-Balonne water-sharing plan. We are coinvestors with other members of the Murray-Darling Basin Commission in the Narran Lakes study, which you would probably be aware of, and you would also be aware of the $195,000 data analysis study that was announced relatively recently by Minister Truss. So we are investors in data collection, but we have not gone down the path of any direct analysis ourselves.

ACTING CHAIR—Do you think we should?

Mr Slatyer—You are asking us to express a matter of opinion.

ACTING CHAIR—No, it is not estimates; you do not have to answer the question. We are a pretty folksy sort of committee, so we tend to extract things we should not.

Senator BUCKLAND—If we take the Murray-Darling system and concentrate on that, where do you actually fit into the scheme of things? I am really struggling, because I see the system as part of our national heritage and I see you are part of the environment area. What are we protecting—the environment, our heritage or nothing at all? I really am struggling to see what the department is doing.

Mr Slatyer—The Australian government is a party to the Murray-Darling Basin Commission and the secretary to this department is a commissioner on the commission, so directly participates in decisions of the commission on matters in the commission's jurisdiction. The department also advises on policy in regard to, for example, the position of the government on the icon sites and matters of that character which are of an environmental nature. So our place may not be very visible, but we are fully involved in the workings, if you like, of the public policy machinery.

Senator BUCKLAND—I imagine you are aware of the devastating effects that Cubbie Station has had on the Lower Balonne. Has the department been giving advice to the government as to what should be done to assist the now struggling irrigators and flood reliant producers in that region? Also, are you giving advice on how to protect the environment in that area? Surely, no water means no fish; no fish, and the whole thing goes belly up.

Mr Slatyer—We have provided advice within the government, through the minister, on the environmental aspects of that, yes.

Senator BUCKLAND—What advice have you given?

Mr Slatyer—That is advice within the government, so we are not able to reveal it.

Senator BUCKLAND—We might have to flush that out and we might ask questions about that later. I do not think we have anything to flush it with. We move down the river a little bit further to my home state of South Australia. The state government in South Australia under Minister John Hill is taking some very courageous decisions, as I see them. He is certainly

unpopular; it does not matter what he does, he is unpopular with someone now. But he is doing things to revitalise that section of the river that he has control of: the bottom end—the worst part, I guess. It does not seem that there is any national coordination—I would have thought you would have had a role in that—to sustain flows coming through the river. I know there is going to be more water going down—a gift not from God but from others, because the gift that God gives us is not getting down the river. I just do not know where you fit in; it is worrying me.

Mr Slatyer—Through our involvement in the commission we have been part of the decisions being taken on the works and measures programs to make the most of the water that is in the river and in contributing to environmental outcomes, including in South Australia. We have also advised within the government on the best use of the $200 million in funds that the government has announced to contribute to overallocation in the Murray-Darling Basin and the attainment of their first-step objectives. They are the kinds of advisory roles that we have exercised.

ACTING CHAIR—Theo, I am aware that you went to Brewarrina.

Mr Hooy—That is right.

ACTING CHAIR—You would have got the mood and frustrations of the people in the Lower Balonne there. How do you coordinate with the Department of Agriculture, Fisheries and Forestry? Do you compare notes?

Mr Hooy—We work very closely with them. As an example, on an average working day, I would be on the phone at least a couple of times to someone over in DAFF on water related issues. Most of the tasks associated with the workings of the Murray-Darling Basin Commission are shared between us. We often attend the same meetings. It is a very close working relationship.

ACTING CHAIR—Given that the Narran Lakes is a Ramsar site, surely you can give us a bit of a glimpse of what happened there this year. How much of it was local run-off and how much of it came down the Narran River?

Mr Hooy—I could not.

ACTING CHAIR—Who could?

Mr Hooy—The New South Wales Department of Infrastructure, Planning and Natural Resources—DIPNR. They are essentially responsible for water management. I am not absolutely clear on the relationship, but there is a management role jointly between the Department of Environment and Conservation, which is responsible for New South Wales wetland site management, and DIPNR, which is responsible for the broader water allocation issues and coordination of—

ACTING CHAIR—How do you make a judgment on whether the right or wrong thing has been done by the Ramsar site?

Mr Hooy—In effect, we are in that process now. There is a lot of work that has been done in the past by New South Wales on the environmental needs of the Narran Lakes Ramsar site. As I

indicated before, there is a four-year study being conducted by the Murray-Darling Basin Commission. It is not easy to determine what the long-term environmental needs are of that Ramsar site given that its functioning is very intricately interrelated with surrounding wetlands—the Macquarie Marshes, the Gwydir and what have you.

ACTING CHAIR—But surely what we are saying in code here is that there has been a complete oversight for many years of a fair dinkum study into these sites. Sure, we have a four-year study now, but what about five years ago? What was happening then? Nothing.

Mr Hooy—Some work was being conducted by New South Wales National Parks—

ACTING CHAIR—The Commonwealth has constitutional responsibility for this, doesn't it?

Mr Hooy—We do, but the management arrangement for Ramsar sites is one that we essentially share with the states. The states, in most cases, bring forward proposals for the nomination of Ramsar sites. In effect, they have made the decision to bring those sites forward. There is a clear understanding, as far as we are concerned, that when the states do that, they have made a commitment to manage those sites. We do not have managers at—

ACTING CHAIR—So you cannot direct them?

Mr Hooy—We cannot direct them.

ACTING CHAIR—There are a few alarming things that we have discovered in the voyage of this committee, none more alarming than the complete lack of ownership of the problems of the Latrobe Valley aquifer. That blows me away. But what is happening up here in the Lower Balonne, I think, is a national disgrace. It just beggars belief that, just by a stroke of the legislative pen, you could do away with the requirement to have an environmental plan attached to all this bunding of banks and earthworks—that God knows what has gone on—in the Lower Balonne. The Commonwealth have no capacity to say to a state, 'We think you ought to have a look at the environmental impact of all of this.'

Mr Hooy—The constitutional position is quite clear: the states are responsible for the management of natural resources. I suppose the primary lever we have is the EPBC Act, but the EPBC Act essentially only enables us to intervene when there has been a significant impact on a matter of national environmental significance.

ACTING CHAIR—After the crime. It is a post-crime power. Often the police cannot come in until someone does something. You are in the same position.

Mr Hooy—We would like to think that we are a bit more proactive than that.

ACTING CHAIR—So would I.

Mr Hooy—We have a process of development of management plans for Ramsar sites, where we encourage the states to develop management plans and, of the 64 Ramsar sites, 50 of those have management plans. Some of those have been in place now for so long that they are currently being reviewed. The difficulty we have with Narran of course is that, with the best will

in the world, a management plan prepared for a Ramsar site in New South Wales cannot effectively impact on the actions of another jurisdiction.

ACTING CHAIR—In other words, there is an absolute fundamental flaw in our environmental planning arrangements across the border, through no fault of anyone other than the Constitution?

Mr Hooy—I would prefer to call it a fact of life rather than a flaw.

ACTING CHAIR—It is a fact of life, so I guess it is a question that this committee should give serious consideration to remedying.

Mr Slatyer—In acknowledging the situation, the National Water Initiative agreement seeks to address some of these problems.

ACTING CHAIR—We were going to take you to that and ask what you see as coming out of the wonderful work that has been put in by everyone to achieve the National Water Initiative. Obviously, we could ask endless questions but, if you would like to describe to us what you think the journey and the adventure might be ahead, through the National Water Initiative, we would be grateful.

Mr Slatyer—The foundations, I think, have been well laid and we now have to build the house, so to speak. With regard to the planning problems that you have identified, the NWI does lay down a number of disciplines that states will be expected to observe in their planning processes, and that includes taking into consideration downstream and cross-border impacts of their planning processes. The Australian government will be monitoring these plans through the national water commission. It is, I guess, a missing link. This is a framework that did not exist in the past—that may be one of the reasons that the sorts of problems you have described have arisen. If the agreement is fully implemented by the states, as we assume it will be, we will be in a much better situation in the future.

Senator McGAURAN—Just while you are completing the national water agreement brief, will the environmental flows—I do not quite see it—be treated as any other water user, with the rights and the costs attached? Has that been sorted out?

Mr Slatyer—They may be. The agreement allows environmental water to be treated either in a rules based manner, where water is set aside for defined environmental purposes, or as an entitlement, which would carry with it the same characteristics as consumptive water. We would expect that there will be elements of both in most systems.

Senator McGAURAN—But it is not cemented yet?

Mr Slatyer—Well, the allocation of—

Senator McGAURAN—The amount.

Mr Slatyer—water under these new arrangements is yet to occur.

ACTING CHAIR—So is it before or after the rural allocation, or in tune with it, essentially?

Mr Slatyer—My colleague is just reminding me of the exact words of the agreement. The critical first step is that there would be a statutory basis for the environmental allocation. There is a time line in the agreement for states to bring about the statutory reforms that are necessary, and they will need to define how they go about that through their own processes.

ACTING CHAIR—I have to say that I am pretty alarmed by the lack of capacity to actually coordinate the across the border stuff—and it may well flow, as I say, from the good work of the National Water Initiative and the goodwill displayed by all the states that participated in that. But it worries me. I can remember back a year or two ago when there was a proposal to have an irrigation set-up out in some of the channel country, which, given the experiences of the Lower Balonne, would have had a disastrous impact on the downstream channel country. It just beggars belief that the Queensland government could, with the stroke of a pen, do away with the need to have an environmental plan on some of this activity in the Lower Balonne by saying, if the original proposal was 10-metre banks, 'All right, we'll legislate five-metre banks and we don't want to hear from you, just do it.' And now they are creeping back up to eight metres—it makes sense for them to be 10 metres, I would have to say, because there are two metres of evaporation. If we did in the lower Lachlan what has happened in the Lower Balonne, I think, if I did not rectify it, they would put me in jail, and yet up there they get away with it. It just beggars belief. I think you have a lot of work to do.

Mr Slatyer—Under the new framework, the starting point would be to define the environmental outcomes that are sought in the catchment and then management measures that would be permitted and the water diversion measures that would be permitted would flow from that.

ACTING CHAIR—What troubles me is that this A and B thing—that is, the bunded water and overland harvesting—is out for comment with the Queensland government at the moment, and it seems that there does not need to be any environmental planning associated with it. It just beggars belief that you could have—as we were told this morning they are now up to—1,500 gigalitres of on-farm, off-river storage and there has been no real planning put around that. No-one has broken the law, but the fact that that can go on in Australia is a national disgrace. Are there any further questions?

Senator BUCKLAND—No.

ACTING CHAIR—We are very grateful for your attendance. Theo, you are still welcome to come down to the Lower Lachlan some time. One of the things that we—

Mr Hooy—Thank you.

ACTING CHAIR—took evidence on this morning was the lousy deal that the Lower Murrumbidgee, the Lower Lachlan and other lower rivers are receiving—some of the environmental outcomes. There is plenty of talk about compensation for loss of irrigators' rights, but there is absolutely no talk of consideration of the environment and the people that live off that environment, and I think it is pretty unfair. Thank you very much for your time.

[2.58 p.m.]

CULLEN, Professor Peter (Private capacity)

ACTING CHAIR—Welcome. We appreciate your ongoing contribution to the important issues surrounding water in Australia. Do you have any comments to make on the capacity in which you appear?

Prof. Cullen—I am a consultant and commentator on water issues, based in Gunning, New South Wales.

ACTING CHAIR—I invite you to make an opening statement, and then we will go to questions.

Prof. Cullen—Since I last appeared before the committee, we have made considerable and dramatic advances with the signing of the intergovernmental agreement on the National Water Initiative. Whilst at times I am a little impatient at the rate at which we advance these matters, one has to say that having that agreement signed off by the states and the Commonwealth, with broad support from the conservation and farming communities, is a very significant and historic step for this country and does give us a foundation for water reforms for the 21st century. So we should not underrate the progress that has been made. I am happy to talk about various elements of that.

I would also like to draw to the committee's attention the fact that the Australian Bureau of Statistics recently brought out their *Water accounts for Australia 2000-01*. It might be helpful for the committee to get that, if it has not already been made available to you. I have been doing some work that looks at how irrigation water is used in this country and what wealth we create from it. I am happy to table this document after I have discussed it. The bureau of stats tell you the gigalitres of water used in each state for each of a range of crops. 'Pasture and other' is a bit of a mishmash, but they also look at dairying, vegetables, fruit, grapes, rice and cotton. They give you the gigalitres used, the area of land used and the gross income that has come from those enterprises. From that you can work out how many megalitres of water have been used per hectare and how many dollars per megalitre have been returned.

This is a fairly superficial analysis, because those sorts of gross margins do not build in the cost of production. But they do give you some idea of what we are getting. I was surprised to find that South Australia makes $1,079 a megalitre from the 1,300 gigalitres that it gets and uses. New South Wales has seven times that amount of water—7,300 gigalitres—and makes about $324 million. There is a remarkable difference between the states in the revenue that is being created from the irrigation industry. Victoria is in the middle course. It is interesting to reflect on what causes that. I do not pretend to have done that analysis, but it is soils and climate, and the security of the water right is also important. In South Australia it is a highly secure right, so it is going onto perennial plants, whereas a lot of the New South Wales right is for much less secure water, so it goes into annual crops. It is interesting to see that disparity.

You get the same thing within the industries. In New South Wales, revenue from pasture and other is $124 a megalitre. Their best performance is grapes, at $1,200. But grapes in South Australia, at $,2400, are almost double that. You wonder why these disparities occur. I have not worked through the different reasons for that, but I think the information could be useful to you in putting your report together. I am happy to table this compilation, but you should go to the primary source, which is the bureau of stats water accounts.

There are a couple of other things I would like to open up. One thing becoming apparent is that we do not have very good data to make a lot of these decisions. As we have moved to a regional model for natural resources management, we have set targets and invested Commonwealth and state money, but we have left self-monitoring and self-reporting in place. Given the amounts of money and energy that are going into this at the community level, I suspect that we should be looking again at a more integrated water monitoring system that picks up and periodically reports on stream flow, the river health measures that have now been developed, and ground water depth and quality. It may be better that that be done at a state level with some federal guidelines and support. One of the things the committee might like to think about is what we need to do to make sure that we have a more solid database for making many of these decisions that communities and governments have to make.

The second issue I want to raise is the science agenda. I understand that you have had a submission this morning from Land and Water Australia, of which I am a director. I am aware of what was in their submission, and I do not want to repeat that. But I do think the idea of developing a knowledge strategy to guide land and water in this country is probably now a necessary step. I would like to see a review of our science capacity. That is not all that easy to do. We have a number of groups that are contributing important science. We probably also have a number of gaps where we have nothing, and we might like to think about how we could build that capacity.

I would like to see some assessment of research needs, and I think that should come from two sources. It should come from the regional bodies themselves, and I know both South Australia and Victoria have been assessing their needs with their regional bodies and are coming up with shopping lists. It should also come from the science community, because they have views as to what the important things are as well. Those two lists could be put together to develop almost a portfolio of ongoing knowledge investments that we need to make, which, even if just put it out into the community, would guide universities and research establishments with their choices of areas.

Of course, a third element to that is strategic investment to deliver on some of those things. As I am sure you found out, we have a whole lot of different investors in the knowledge base but we are not necessarily getting the best strategic investment. Land and Water Australia obviously would be one group that could play a bit of that role but it is a function that probably needs to exist somewhere in the system. That is where I will finish off. I am happy to respond to any issues you have.

ACTING CHAIR—Sticking with the science, the NFF had a conference here a week or two ago. At that conference, it was flagged that there is new phenomena appearing in the water debate—that is, competing science and paying someone to have a scientific view that opposes and demolishes someone else's scientific snapshot. Do you have any comments to make on that?

Prof. Cullen—Science is always a contestable thing. Within science, the opinions that people get from the data and from the models and frameworks they use are very hotly contested. We publish, and people write rebuttals. That is the process of science. I have no objection to that; that is how we learn. I am concerned, though, when what I regard as pseudoscience is brought onto the table—not to produce new data or new models but just to try to create confusion and uncertainty. Because there is uncertainty, it is impossible for anyone to act. It seems to me that that is a tactic that was used by the tobacco companies in the 1970s with regard to smoking and health. I remember we had at least a decade of people saying, 'The evidence is uncertain so we shouldn't be trying to banish smoking.' That sort of debate is a prostitution of science and knowledge, and I am certainly very much against it. But robust debate with competing hypotheses is how science does advance.

Senator BUCKLAND—That is interesting. After hearing from the CSIRO earlier today and also from my dealings with them in the past, I would put them aside from that because they are scientists who go about what they should be doing and then leave it for others to rip them apart or support them. Keeping the CSIRO out of it, are we getting value for money for the scientific research that is going into our water needs?

Prof. Cullen—We could do a lot better. The suggestions I have spoken about—trying to get some idea of national needs and trying to focus the research community—would help, as would making sure there are investments tied up with those needs. At the moment investments tend to be much more idiosyncratic than that. People champion particular things.

The other critical element to getting value from our science investments is how we deliver the science to the people who need it—that is, those regional communities. We have 60 catchment committees around Australia, all putting plans together and doing things, but not necessarily being as well informed by the existing science base as they could be. We have not yet thought through a useful mechanism for delivering the science to those audiences. It is almost impossible for the researchers to traipse around 60 different committees explaining their work, and we do not have any middlemen to package that knowledge. That is an area that I am working on at the moment—how state and federal governments can facilitate the regional catchment models we have embarked on. There is a gap with delivering knowledge to them. I think there are some ways through that gap.

I am exploring the idea of learning circles at the moment—where each of those regional committees might have someone who takes the lead in salinity, say, or river restoration. It might be a good thing for those people from the different catchment committees to be brought together three or four times a year to sit down with the state experts and some of the research community and to spend two or three days just learning from each other. The community groups would learn where the science base is. The science base would learn from the community what the issues and problems are. It seems to me that the co-learning model, where we stop thinking about how we deliver bundles of science to some unsuspecting community and sit round a table with them and try to work out how we address problems, would be a more profitable way. I think governments can do that, so I have tried to develop that model a little at the moment.

Senator BUCKLAND—It is refreshing to hear you say that, because we are at the stage now where we have done enough talking and, as you say, scientific development is a matter of someone coming up with something and having it rebutted. But I think we have done that. It

would be nice—and it is refreshing to hear you talk about sitting down and doing something. We know the problem. I do not think anyone can tell us any more about what the problem is. It is time for some of these great science people—and we have got some great science people—to sit down together and say, 'There is common ground here somewhere; let's get started in fixing the problems.'

Prof. Cullen—I think that is happening, and I think you have seen that with the National Water Initiative. I think the very promising alliance between the farming community, the conservation community and the science community has got us to that position, so I think you are starting to see that. But I agree that it is long overdue.

Senator BUCKLAND—Being very parochial, I think that in South Australia we have made very big advances in the last 12 or 18 months in relation to water.

Prof. Cullen—You have also established the Centre for Natural Resources in South Australia, which is pooling money from the different bodies and trying to invest it strategically. I have had a look at that model. It is working and, although it is a very promising model, it can probably work better.

Senator McGAURAN—Professor, you are to be credited for being one of the leaders of the national debate and kicking it off, but you did that with the theme, 'the Murray is dead', and from there the debate carried on. But do you really still believe now, with a far more mature debate—which I credit you with leading—that the Murray is not dead at all, that perhaps you were inadvertently exaggerating because you were talking during a drought? Do such way-out objectives as a 1,500 gigalitre environmental release now look too much? Does the idea of the irrigators paying all and getting no compensation have any place in the debate anymore?

Prof. Cullen—I am not sure I said any of those things. I am not sure I have ever said that the Murray was dead. I said the Murray was in trouble and needed some attention, but I have never said that the irrigators should be bearing all the costs of this. In fact, I have been working quite heavily to see that there is public investment. It was not the irrigators that printed too many water licences, it was governments, and therefore there is an obligation to correct that. The scientific report on the Murray does say that 1,500 gigalitres is necessary, in order to have a fair chance, and I have not seen any evidence to say that it is less than that. What governments are committed to is the first 500 of that as the first step, and that is going to take us at least five years to deliver. During that time our knowledge and understanding will improve, and I guess we will be able to review those figures then. But we are starting the third of the anticipated journey.

Senator McGAURAN—So the Murray is not dead?

Prof. Cullen—I never said it was dead. I have said—

Senator McGAURAN—It was dying.

Prof. Cullen—I have said the Murray was in trouble. I guess the symptoms of that are the loss of the native fish in the Lower Murray, the almost permanent algal blooms in the Lower Murray weir pools, the rather large loss of red gums and the general health of the flood plain in the Lower Murray, because it has not had floods for a long time. They are the symptoms.

ACTING CHAIR—Senator, I would not be intimidated by Senator McGauran trying to put words into your mouth and to misquote you. You will be pleased to know that you should take great comfort from the fact that you get misquoted all over Australia—nowhere more than in Queensland. I will ask a couple of questions. What should pricing for full cost recovery mean—recovery of recurrent delivery costs or recovery of capital costs, including an allowance for environmental externalities to allow for the fact that a consumptive use may have an environmental cost? What should full cost recovery mean, do you think?

Prof. Cullen—The intergovernmental agreement spells out that there should be a charge for the resource and there should be a charge for the storage, treatment and delivery of the resource. We traditionally have that, at least in most jurisdictions, although not necessarily in New South Wales, for the irrigation water. The agreement also spells out that there should be a charge for the government costs of monitoring and management. I think those three elements make up a price. The environmental externalities were something that COAG agreed to in 1994, but that has turned out to be devilishly difficult to cost and do. I think the Victorian government have a very innovative approach to that, which they explained in their white paper, where they basically said, 'We know there are quite a lot of environmental externalities and we are going to take five per cent of the revenue of all water suppliers and put it into our restoration fund.' That seems to me to cut through a lot of those definitional problems. It does create a pot of money that can then be used to implement the Victorian river health strategy. I think that is a very useful way forward that other jurisdictions could learn from.

ACTING CHAIR—What is your opinion of Mike Young's robust separation model for water property rights?

Prof. Cullen—I am very positive about it. I think it is being picked up by a number of jurisdictions and I think it is the fundamental way to go with water entitlements. Mike has also made the point that we need to be careful with improving water use efficiency, because a lot of the inefficiency at the moment is in fact contributing to the environmental flow. As we lift efficiency on particular farms we will in fact in many cases be reducing the amount of water that is overflowing into our rivers, so we need to build that into our thinking.

ACTING CHAIR—There is another area where you have been somewhat misquoted, I think. What do you think of the Condamine-Balonne draft water plan and the proposition also of bunded water licences, the A licences?

Prof. Cullen—I think the A and the B licences, which I understand came out of community consultations in the early 1990s, are in fact a serious mistake and I would be very pleased to see them disappear. The logic of them was that if people put up bunds to create a farm dam they should be given an extra licence for the water that would have flooded their land. This was the type A licence. You can see the logic for that, but the logical extension of it was that people started to put up bunds just to create type A licences and that seems to be a scandalous way to manage water on a flood plain. I cannot see any justification for having type A and B licences and I would be very pleased if they disappeared. As I read the draft water plan I did not see a mention of A and B in the current draft Condamine water plan. It may be there but I did not see that.

ACTING CHAIR—My understanding is that they certainly look like going ahead with it, but I am unaware if it is there in as simple a language as that. In any event, you did a consulting job up there in which I think you were selectively quoted, shall I say. I think we were told this morning that 1,500 gigalitres of off-river, on-farm storage has been built. I think you correctly stated in your observations earlier that, if that were implemented, you would have some concerns with the impact of that on the river, down river et cetera. Would you like to refresh our memory on that?

Prof. Cullen—I was asked by the Queensland government to advise them on the Lower Balonne issue after the government had suggested that it was going to try to resume Cubbie Station for environmental reasons. The irrigators argued that there was no evidence of degradation and so the Premier invited me to review the scientific evidence. Unfortunately for the Queensland government I could not find particular evidence of degradation in either the streams or in Narran Lakes or whatever. That surprised me and it surprised the agencies. As I looked into it I could find out why they had got the wrong impression, because some sampling was done at the wrong time, but then I realised that I was also dealing with a situation where the impacts of these water infrastructure developments often take 50 years to really show up. So there are long lag times. Secondly, when I was working in Queensland, which was at the end of 2002, they had not had a lot of rain for quite a while and so some of the infrastructure that was there had not in fact ever been used.

So my first observation was that I could not see any existing environmental degradation but I had a serious concern that, if the infrastructure in place at the time was all used, it was likely that there would be serious degradation. That of course led me to the question of what the environmental needs of that system were. In the inquiry I did, which I presume you have a copy of—I am happy to table another copy if you need one—I reviewed the science underpinning it and tried to make some estimates of what that environment needed to sustain itself. Just at the time I was doing this work, the Queensland government and the Murray-Darling Basin Commission were commissioning a substantive study on the Narran Lakes. That study is under way and I think it will be reporting next year. So my findings were interim, pending that study.

I was also asked to review the ecological elements of this, not the economic impacts on downstream irrigators who have been disadvantaged by water being taken from them—that was not part of my equation. The four environmental assets I found were: the Narran Lakes, which are a Ramsar wetland and were readily identified; the channels of the Culgoa and Narran and that flood plain; the Darling River; and the Culgoa flood plain itself, where there are two national parks with coolibah vegetation on them. I then tried to work out the wetting needs for each one of those, and I found there was remarkably little input from the state agencies on all of those other than Narran Lakes. No-one seemed to know much about the wetting frequency for coolibah on the Culgoa floodplain. We now think that river red gums need to get a wetting about every 10 years if they are going to survive and the coolibah can probably go a little bit longer—12 to 15 years. Twelve to 15 is roughly the period when you get a large flood on the Culgoa, which the irrigators do not really have much impact on; it is a really big flood. So I am hoping that the natural floods will keep them alive.

Most of my work focused on the Narran Lakes, which was the area that did seem to be at risk. The Narran Lakes used to wet every two years. If all of the existing infrastructure was used, it would wet every six years on average, and it was our view that that would lead to a significant

change in the Narran Lakes. We then tried to estimate the wetting requirement needed to sustain the vegetation, the birds and whatever, and came up with a judgment call of about every 3½ years. That was picked up into the water planning process and, whilst I have not done all the modelling, I have had a look at some of the model outputs and I believe that the plan they have come up with largely met those wetting requirements for the Narran Lakes.

ACTING CHAIR—Given the extent of the anticipated A licence regime, which was preceded by extensive earthworks and bunded banks being put up in anticipation of qualifying for bunded water licences, and given all the storages that avoided environmental planning because the government with the stroke of a pen said, 'If you keep them under five metres, you do not need to have one'—and now they are gradually building them up again because of the evaporation rates—are you surprised there has been no demand by the Queensland government to have some sort of an environmental plan? The environmental plan I described for the Lower Balonne is: first in, best dressed and bugger the rest. Do you think it needs to be a bit more complex than that?

Prof. Cullen—I think water planning in Australia over the last 50 years has probably never had adequate environmental underpinning. Queensland is the last cab off the rank in developing a lot of its water resources, and it might have been hoped that they could have avoided some of the mistakes we have made in other states. But they are somewhat different systems: they are flood pulse systems, rather than the more constant systems we have in the south. But I think the government has now got a fairly robust water planning framework in place, which I think is a reasonably effective one that has substantive community involvement and substantive science input. I think they have quite a good water planning framework in place, but in that situation they are dealing with the mistakes of past governments, when water planning was almost nonexistent as far as I can see.

ACTING CHAIR—So with what is out there as a draft now for A and B licences—

Prof. Cullen—I not think there is anything about A and B in the draft—that I could see.

ACTING CHAIR—Anyhow, you would like to knock A and B on the head?

Prof. Cullen—Certainly.

ACTING CHAIR—I am amazed that there has been no environmental work done on what happens to a piece of flood country when you peg it off from water for all time.

Prof. Cullen—It certainly does not stay as flood country, does it?

ACTING CHAIR—No, and how are we to know there is no recharge for the aquifer and things like that inside the area?

Prof. Cullen—There has been quite a lot of ground water work done up there, looking at the salinity hazard. I am not familiar enough with the work to talk about that, but a lot of the irrigation is on substantial ground water resources. As for just what the impacts are, I am probably more concerned about the impacts of large farm dams on the ground water level. I am

not sure how well that has been studied and understood. But I am not familiar with the work that has been done there.

Senator BUCKLAND—What is the effect of evaporation from those large dams? We have talked a lot today about evaporation and the channels for irrigation, with others who I now accept are better qualified to answer—rather than my rough guess. Some of those dams are absolutely immense. What are the losses through evaporation?

Prof. Cullen—I cannot give you a figure, but I imagine it would be well over a metre or something like that. There would be significant evaporation losses from ones that large, though.

ACTING CHAIR—To assist you, Senator Buckland, I think there is a two-metre evaporation. It is bloody outrageous. Professor, do you have any idea of the evaporation—which is another issue, I think, for the government and for future policy—from the likes of the Menindee Lakes? I understand that there is more evaporation there than there is use at Bourke. Have you done any work on that?

Prof. Cullen—I have not really done anything on that, so I cannot comment—but there is a lot of evaporation from a lot of the wetlands in the Lower Murray system. One of the things I have been arguing during my time in Adelaide is that we really do need to have a substantive ecological study of the Lower Murray, the Coorong and those lower lakes. They seem to have flip-flopped over time in salinity, due to barrages, drainage and other things. We are driving so much of our Murray decision making on the basis of the Lower Murray, the Coorong and the Murray mouth, yet our scientific understanding of that system is very limited. It is surprising that there has been so little investment in that knowledge, and I have been advocating a very substantive study so that we are better informed when making those judgments.

Senator BUCKLAND—You mentioned grapes earlier on. Having been in South Australia in recent times, you would have—

ACTING CHAIR—You probably have a drink of red wine occasionally too!

Senator BUCKLAND—Yes, I have been known to have one. I am interested in that for a couple of reasons and I would like to get your thoughts on it, Professor. As you drive across from Adelaide to Canberra, you pass through, around the Narrandera area—and it is not just Narrandera, but that is one that comes to mind—a huge acreage of grapes. In fact, every time I drive through it, which is about twice a year, there seem to be new vineyards going in. Firstly, what effect does their opening up that land to grapes have on us—and it is not going to last; I cannot see it lasting—and, secondly, what happens once that is finished? Alternative crops? Someone is going to have to use that land. Are they storing water for that, do you know, or are they just pumping it straight out of the river?

Prof. Cullen—I would think they have bought water licences and they are just taking it from the river and irrigation systems. I do not think they have any large storage areas particularly.

ACTING CHAIR—No, there are no tanks.

Senator BUCKLAND—I do not know how much you drove around the Adelaide Hills area, but where they are putting in new vineyards—that is, over the last five or six years—they are digging dams that would not normally hold water and they are putting in plastic as lining. Is that having a major effect, do you think, on water flows through the small rivers and creeks in the hills?

Prof. Cullen—Yes.

Senator BUCKLAND—I suppose I could have answered that, but there must be a scientific effect that is happening.

Prof. Cullen—I am currently working on my report for the South Australian government, following my time there. One of my concerns has been what I regard as the mismanagement of the hills catchments. On average they provide 60 per cent of Adelaide's water, yet the planning controls have been quite inadequate and the hills are still not proclaimed as a catchment, so there is no control on bores or farm dams. Given that it is such an important part of Adelaide's water supply, I find it amazing that both agricultural intensification and urban subdivision have been allowed to go on in the hills.

One of the things I am putting to the government is that they have to decide whether that is going to be an ongoing part of Adelaide's water supply or not, because, with the decisions that have been put in place, the yield from those catchments seems to have dropped in the last five years. There are also increased risks of contamination. I believe that the hills catchments have to retain an important part of Adelaide's water, because putting all of their faith in the Murray is too risky given the salinity issues on the Murray. I am urging that they proclaim the catchments under the water act, control farm dams—at least any further farm dams—and control bores. Under the National Water Initiative they now have metered bores, which will be a helpful way of getting some controls on some of the things that have been happening.

Senator BUCKLAND—I did raise that for a specific reason, and I hope the chair does not mind me diverging a bit. The reason I asked you that is that I am looking at buying a property in the Adelaide Hills region.

ACTING CHAIR—Are you declaring an interest?

Senator BUCKLAND—Not yet. The property has two dams on it. In passing, as there has been quite a bit of rain up there recently, I asked the owner about another area. I said, 'Is that a dam or is that a storage hold?' He said, 'No, it seeps away there, but with a bit of quick thinking you could put up a wall and line it.' My wife told him in fairly colourful terms what he could do with his idea, but there seems to be a total disregard now. It seems people just catch everything they can. It was actually on a watercourse through to the next property. It worried me, and that is when I went round and looked at these other dams that are all lined. It must cost a fortune—and I have not got the fortune—to pay for one.

ACTING CHAIR—They will probably put the price of this property up on you now.

Senator BUCKLAND—They will lose a sale, won't they? I am concerned about the disregard for water use by a lot of people.

Prof. Cullen—I think you have hit on the most fundamental problem with water management in Australia: what are the obligations of an upstream person to downstream users and to downstream environments? It is the same issue for the Culgoa and it is the same issue between rice growers and the South Australians. What are the appropriate rights and obligations of those who live upstream to those who live downstream? We have not had a robust debate about that. We have a philosophy that you grab what you can unless it is regulated. The South Australian governments have not regulated that. In my view, they should have regulated that 50 years ago. At the moment, there are no particular controls, which I find scandalous.

ACTING CHAIR—There is another side of that. We have taken evidence from the Upper Murray catchment, which they say contributes 38 per cent of the Murray. They have actually had their rights extinguished by the Victorian government, which is probably the other end of this debate that Senator Buckland has raised. I think it was probably unfair that their rights were extinguished for the potentially caught water—I suppose you would need to have some sort of measurement of what they would do to be included in the sales pool for the downriver users. Do you have a view? I actually think that the solution would probably have been to give them a water licence so it was calculated in the system. Obviously most water licences in the sixties and seventies were more or less given, so I cannot see why these fellows who have had their riparian catchment rights removed should not have a water licence. Have you got any ideas of what would be a reasonable solution for those Upper Murray blokes that want to grow 50 acres of cherries, tobacco, hoochy-cooch or something?

Prof. Cullen—No, I do not. I think it would be an issue in a greenfield situation where you had not already sold the water to someone else. There is the current situation where the downstream people have invested with the expectation that they are going to get their water. For governments to just chop it off is a very tricky situation

ACTING CHAIR—If we are going to buy back water for the environment—and there is not a lot of water, just a few thousand megalitres—couldn't we buy their water back for them?

Prof. Cullen—It might only be a few thousand megalitres at the moment, but I think once you set that precedent there will be quite a big queue.

ACTING CHAIR—I appreciate that, and I put that to them: if you start, where do you finish? It seems incredible to me that you have this lack of harmonisation across the states in the Murray-Darling Basin. Under this regime, Victoria has removed their riparian catchment right, New South Wales has legislated a catchment right and in Queensland the chairman of the Murray-Darling Basin ministerial advisory body is complicit in an operation where they capture half the flow of the entire catchment in one place. There is a lack of harmonisation. Do you think we should be doing a bit more work on harmonisation?

Prof. Cullen—I very strongly believe that. Hopefully, the National Water Initiative will give us a more effective framework in which to do that. The Murray-Darling Basin Commission seems to have had real difficulties doing that, because it is effectively a creature of the states. They cede as little as they can to a central authority and wish to maintain their independence. On these cross-border issues, that just does not work, and I think we have demonstrated that. Hopefully, the National Water Initiative will give us a framework and, with national competition payments, will give the federal government some leverage to improve that situation. But, as I

have said, we are dealing with 100 years of making railways of different gauges which do not connect at the border, and that is hardly a surprise.

ACTING CHAIR—Is there any further wisdom that you would like to lay on us or any other information that you could make available to us?

Prof. Cullen—No. I am happy to respond to your questions, and I think I have said all the things I wanted to say. In your conclusions, I urge you to think about a monitoring program so we can measure the effectiveness of these things and get more substantial and credible data than we are perhaps getting at the moment. I am a little concerned that there is a feeling that the catchment groups will design their own monitoring programs, so we will end up with 60 different monitoring programs and none of them will be comparable. That could lead us into a lot of other mistakes, so I think that is one of our next steps.

ACTING CHAIR—Do you think there has been an oversight in water planning with the growth of plantation forests?

Prof. Cullen—It is nicely picked up in the intergovernmental agreement that interception will be looked at. It has been one of those issues. We started off probably 15 years ago saying, 'We need to put plantations in to control salinity.' Then we realised we were potentially drying up some of the rivers. It is another example of where we have not done systematic, system-wide planning. We put in place ad hoc solutions to particular issues, and it is like a hydra—we create another round of problems that we then have to solve. The intergovernmental agreement does specify that states are going to get a more transparent and comprehensive water-planning process. If it can be achieved, hopefully it will avoid some of those issues.

ACTING CHAIR—Yes. It specifically mentions interception, rates et cetera. Is there anything that we ought to be mindful of regarding the water trading regime?

Prof. Cullen—I think it has been well canvassed. There has been a lot of debate going on through the intergovernmental agreement. I have nothing in particular to add to that. I am reasonably comfortable with where it has got to. I do not want to see a market just emerge. It seems to me it needs to be a designed, controlled and managed market; otherwise we are going to create some further mistakes. But I am confident that, when you look at the income that is being generated from the different irrigation enterprises, a market to facilitate water moving around amongst those industries is the way to increase the national wealth. I believe we can double the GDP, probably with half the water. We could certainly double the GDP coming out of our irrigation enterprises if we could get water moving to the more efficient enterprises.

ACTING CHAIR—Thank you very much for your attendance and for changing your schedule today to fit in with our schedule. We are very grateful, and we look forward to further direction from your wisdom. Can we have those documents?

Prof. Cullen—Certainly.

[3.41 p.m.]

DALTON, Mr Ross Kenneth, General Manager, Water and Murray-Darling Basin, Department of Agriculture, Fisheries and Forestry

DEANE, Mrs Dianne, Manager, Water Policy and Reform, Department of Agriculture, Fisheries and Forestry

ACTING CHAIR—Welcome. Would you like to make an opening statement and then we will ask you a few questions.

Mr Dalton—By way of opening comments, since we provided some information to the committee there have been a couple of major announcements made by the government. Sitting in the back there and hearing some of the questioning, you have obviously picked up on things like the National Water Initiative and decisions on the Murray-Darling Basin Ministerial Council. Some of those areas are well known and well traversed so, for your benefit at the end of a long day, I will not go through those in detail. If that is sufficient by way of introduction, I would be happy to, in the nature of the hearing, just take questions. I think I have a fair sense of some of the things that you might be interested in, so it might be the best way of using the time.

ACTING CHAIR—We heard earlier today from the Department of the Environment and Heritage. It was obvious from that evidence that there are some serious constitutional, shall I say, constraints on the Commonwealth's capacity to involve itself in water planning in Australia. We had difficulty in discovering the connection, except for the fact that they do cooperate closely with your department. Have you got any comments to make on some of the difficulties that you have encountered in coming to terms with Ramsar and things like that? I am pretty dismayed at the way there has been this serious lack of environmental planning around things like the Lower Balonne, because of the make-up of the system. We had evidence a few weeks ago about the Latrobe aquifer. Have you any comments guidance to give the committee on how we could improve some of the deficiencies that have occurred in the past?

Mr Dalton—I would want to think carefully about my response, as I am sure you would appreciate.

ACTING CHAIR—And you do not have to involve yourself in government policy. We will not do an estimates on you!

Mr Dalton—No, I appreciate the committee environment. I think I would like to pick up on some matters which are within the National Water Initiative and—if it is not ultra vires—to pick up on a comment that Professor Cullen made during his final comments. I think if you looked at the history of water resource management in Australia you would find that there have been changes in the way in which we have looked at the resource, in the filter we have used. We went through some of those comments in our submission. I do not want to go on a long historical excursion, but I will just populate it a bit, with your indulgence: a land fit for heroes; closer settlement; resource development as a means of developing the agricultural base of Australia;

and, I think, the land of 'golden soil and wealth for toil' was the kind of philosophy that people approached.

We recognise that the way in which we use our landscape has involved major externalities, whether it be in salinisation, the loss of some critical habitats, the overallocation of some of our forests, perhaps—we have made decisions about our nation about that. We have reached the point, I think, where we understand that, rather than thinking of just components, we are actually trying to think more of systems. So we understand that upstream and downstream actions can result in negative externalities on users. I think your questioning about plantations demonstrates that we need to think not just in terms of one sector but more broadly across the landscape and the interrelations in the activities.

So we have moved from a development focus to understanding more the systems—nature—and some research and science has been behind the development of that understanding, together with broader thinking about the sustainability issues. I think we have reached the point where we understand that truly integrated management means thinking about not just the productive use but the performance of the ecosystem and how it services and provides clean water and habitat for a whole range of productive and environmental uses.

The part I want to pick up on that Professor Cullen mentioned was that I think we have reached a critical stage in the evolution of our approach to natural resource management, where we are wanting to be clearer about being able to monitor and evaluate the impacts of our interventions, whether they be on the productive side or in environmental and natural resource management enhancement. We have had a focus of: develop, use, identify externalities, recognise the legitimate environmental issues—and that was a key part of the 1994 water reforms, which said we need to have environmental use recognised as a legitimate use. And now we have gone a bit further on and said that we actually need to think a bit more about how all the activities integrate across the landscape—not think about the monitoring and understanding of the processes as an afterthought, but actually build them into our planning approaches.

That is a journey and there is growing sophistication around how that might be operationalised. A large part of the investments that we make at the Commonwealth level is in trying to focus on research, science building and better information. We spent money on the National Land and Water Resources Audit as part of that. It is a critical element of the planning around our regional programs—the National Action Plan for Salinity and Water Quality and so forth—and it is embedded in the discussion in the National Water Initiative. This takes us once again to a critical point: from thinking about water resources in a segmented way to thinking about the interactions across the hydrological cycle—the interventions and measurements; the catchment balances is one way of looking at it—and trying not only to think of them in a whole-of-cycle, integrated way in a research sense but also in a policy and a management sense.

Various parts of the nation would be better served than others in that, but I think that is the direction. In that process it is inevitable that there will be a better understanding of the interrelationships between the productive and environmental demands, if I can put it that way. There is a real challenge in getting real-time information on how the resource is reacting, and that might feed through to better decision making on a day-to-day basis. For example, if an irrigation farmer has better information about moisture loss, evaporation and crop requirement that might lead to better approaches to water management or water auditing. Scale it up over a

catchment and you might get a better understanding about the overall water balance and catchment needs and that might better inform water planning. That is a longwinded answer to your question, but that I think is the philosophy and the road that we are on.

ACTING CHAIR—When the original COAG meeting was held, do you think we should have said that one of the building blocks of the process should be to set the environment aside as the first priority and then build the rest around it instead of setting aside so much water for the irrigators et cetera and—oops!—finding out what is then left for the environment? Should we have given that a higher priority in planning?

Mr Dalton—You are talking about the 1994 approach, are you?

ACTING CHAIR—Have we got something to learn from that?

Mr Dalton—I think we have learned to the extent that I think the National Water Initiative talks about a planning base which tries to identify at a gross scale the environmental requirements, with the consumptive pool being, if you like, the residual—an amount that is determined in relation to what the environmental requirements are. That is a fairly complex process, but I think that is the way in which various jurisdictions have approached it. Of course, from time to time, there will have been various approaches in how science might bring some views to bear on what is the appropriate environmental quotient or requirement. I think that is also a journey. There is obviously a tension that policymakers have to deal with between an adaptive management focus that marries up with having an allocative regime which provides it certainty. That is I think at the base of what the National Water Initiative is trying to say: a level of guarantee about the environmental water and how it might be allocated and defined against the certainty around access for consumptive purposes and trying to provide a sufficiently clear set of access rules and processes around how you might move from water as a consumptive to an environmental process. That, of course, is what the risk assignment framework is about.

ACTING CHAIR—One of the vagaries of the National Water Initiative—it appears to me to be a vagary—is the assertion that somehow we are going to deal with speculation in the water market. But I am not too sure that I have heard what that actually means. You may be aware that I have some serious concerns about a whole lot of hibhobbers in the water market.

Mr Dalton—Yes. I follow your interventions in this debate with interest. I think that is an area where we would seek to have further serious analysis and investigation done. There are probably a wide range of views, as you have identified, about the possibility of speculation. Clearly there are some issues in the development of the framework for markets to operate that need to be considered.

ACTING CHAIR—I think we have made some progress, I have to say. I can recall going to the NFF conference here two years ago and to a couple of other conferences where I have said to the audience, 'Hands up all of those people who know what a nationally traded water right is.' Very few hands went up. I did not think there would be any. I am bloody sure that I did not know what a nationally traded water right was. I think we are on the journey to understanding just where and how you can trade water rather than just seeing it as a banker's river of gold. As to the speculative side of it, I still do not think that people have their heads around what could happen if you had a hot spot market for water and what the flight of capital would be from the bush to

the city in such a process. There is talk about trading of the water, but there is also the capture of the capital base value of the water, which I think is important. I think it is important to attach it, if we can, to where it has to be used to back you up at the bank when you go to get a loan to convert from furrow irrigation to trickle irrigation or whatever. I would like to think that is something that you fellows were putting a lot of thought into.

Mr Dalton—Certainly a number of areas for further work are identified in the details of the attachment to the National Water Agreement which talks about some of the trading products and arrangements. I would not want to go too far at the moment—

ACTING CHAIR—It is a work in progress.

Mr Dalton—other than to say that it would be a brave man who would predict how markets will behave. Governments, I think appropriately, try to establish the framework within which markets operate. Critically in that area, I think—and this has been identified in the National Water Initiative—is the issue of access to information. If you have information which is available to third parties, you probably start to whittle away some of the potential for people to exercise arbitrage or to rely on people's ignorance.

ACTING CHAIR—I realise I am taking up the time of the committee, but I have looked in some detail at the journey that Thames Water in London has been on with some of their water investments and at some of the community outcomes from that in places like Africa. I think that, if it is good enough for the Australian government to block the sale of Woodside petroleum in the national interest—and given that Australia's most precious natural resource is water—I think we ought to make sure that we have some sort of line in the sand on who can own our water. That is editorial comment.

Mr Dalton—I took it as that.

Senator BUCKLAND—The government is funding quite a few groups to do research into our water. It seems to me that these bodies all seem to be going their own way. There is no direction. They are coming to conclusions. Is anything being done to coordinate what they are doing? It is one thing to have broad community input, but, at some point in time, someone is going to have to show leadership. It does not appear to be happening.

Mr Dalton—You are referring to things such as investment in and by CSIRO, the CRCs and the various R&D corporations.

Senator BUCKLAND—Yes. You might have heard me say earlier on that I have a lot of time for the CSIRO. But there are other groups out there, including some state funded groups, looking at the water issue. What is worrying me is that no-one seems to be on the same tram and they are coming to different conclusions. Is this something that is going to perpetuate the debate?

Mr Dalton—The motivation and the objectives of some of the science and research organisations would obviously flow back to who is the investor in the research and the funding, in some cases. I will make a couple of comments and then I might leave it at that. First, in relation to some of the R&D corporations, of course—and we invest, through our portfolio, in Land and Water Australia—the government, through the parliamentary secretary, provides

advice each year on broad-level priorities for the R&D corporations to structure their research programs around. As a portfolio, we also get involved in informal and sometimes formal contact with organisations like the CSIRO, whereby they seek advice and input to the construct of their research programs and the lens that we bring to them is: what would we see as being useful for CSIRO to do which meets the objectives of our portfolio and the government's priority?

We also have involvement, usually of a project nature, in some of the research setting and projects that are undertaken by the CRCs. Other agencies would be doing similar kinds of interactions. So that may certainly appear not to be a particularly well-coordinated or centrally coordinated kind of approach. There are also state and private organisations doing the same thing. I think some of the directions that organisations may wish to follow in serving the interests of better water resource and environmental management can be pursued by looking at what we are saying in the National Water Initiative, given that it is signed off by the Prime Minister and first ministers. So there are some high-level priorities that research organisations could then use as a reference point or touchstone.

We have been involved in trying to influence industry based research. So it is, to use the phrase we have both used now, a bit of a journey. I think you are always looking to see to what extent we can marshal resources to work towards a particular direction that would give us the best result. If the committee were to come to a view that further coordination or further linkages would be profitable, I am sure there would be many people interested in that observation. The water area is so diverse. One of my staff has great pleasure in talking about matrices and looking at the rows and the columns. I think water is a bit like that. You can come at it from different ways. From time to time you might vary the approach.

I reflect on the comments I made following your first question, Senator. I think it is important, having established what we think the policy framework is and where we think some of the science is, that we then build some of the relationships and some of the connections that help deliver that better understanding of the operation and the linkages of the resource, the monitoring and the measurement. I do not have one single answer for that. I certainly think that it is always a good discipline to stop and look and reflect on this: is the research model that has been developed appropriate to what we see as being the agenda for the next 10 to 15 years? I do not want to posit one particular answer for that other than to say I think it is appropriate to do that and to try to build good links so we have scientists understanding what some of the policy and public resource management issues are, which helps in defining their research agenda, and then building the links back the other way.

Senator BUCKLAND—During the course of this committee we have talked about water trading. This might be a difficult question for you to actually answer. I will ask you what you think and you can give me an answer if you wish to. One witness indicated to us today he thought that if he were to sell his land without the water rights he would probably lose 90 per cent of the value. I thought he was somewhat optimistic, but he said it would be about 90 per cent. Is any work being done to look at property value as a whole given the effects of water trading? If it gets out of hand, you will have sections of now-viable irrigation lands written off as waste.

Mr Dalton—That is a really complex issue, and I suppose you would expect a bureaucrat to say that.

Senator BUCKLAND—It is. I do not need you to say that. I know it is complex. I am just wondering what your thinking is.

Mr Dalton—We are still at a pretty early stage in the experience of water trading. In my view, the results have been positive. We have been able to improve the allocation of water amongst competing end users without having to have heavy-handed intervention, so the market has been making a judgment about things. We will continue to see that as markets mature. The structure and the nature of infrastructure provision in irrigation areas is different, but it is also changing. Some of the issues about water trading get tied up with the continuing provision of infrastructure and I think we see further investigation of that happening as a result of decisions in the National Water Initiative. In many cases there will be a decision that communities will confront themselves.

I think it is interesting and noteworthy that in the National Water Initiative there is some agreement about the extent to which the irrigation districts of New South Wales are looking at allowing for a greater level of trade out of those areas. That is the four per cent issue. Clearly, apart from individual concerns, there might be community concerns. Those are things that governments would be seeking to get a better understanding of and to monitor in much the same way that there would be some interested government observers as to whether there is any kind of market distortion caused as a result of the issues that you were raising.

The Australian Bureau of Agricultural and Resource Economics could tell you, from their modelling, the benefits that accrue as a result of water trade. I am reminded of the concerns expressed by the Country Women's Association over the last 12 months about water moving out of districts. I think there is still a long way to go in rural communities to get a better understanding of what is possible and also of some of the downsides as well. I am sorry that I cannot be more specific than that. I do not think we will turn back the story on trade. In an area where supply is limited and there is capacity for a new development, trade is the way in which that is most efficiently effected.

Senator BUCKLAND—This is not a criticism, as your answer is predictable and does not surprise me. Something you said that causes concern to me and, I think, to a lot of the community—and may even cause concern to you—is that we are at the early stages of our experience with water trading. The difficulty I see is that, while it is the early stages, it has started. Once it starts, there does not seem to be any mechanism in place to prevent water trading on a larger scale than we are doing it now.

Mr Dalton—I do not have a view about the appropriate level of trade.

Senator BUCKLAND—I am not asking for that.

Mr Dalton—I say that for a reason, which is that I think the market will determine that. In the planning process—

Senator BUCKLAND—Can you say why you think the market should set a standard?

Mr Dalton—The trade will be what the market determines it wants to clear. Clearly, in the planning process, there needs to be an understanding of the constraints on how much water can

move out of a district before we start to get third-party impacts—rivers flowing backwards, or insufficient water to maintain the system. There clearly need to be particular rules from zone to zone that only X per cent of available water can be traded, because once you get beyond that you start to have environmental or infrastructure issues. Once there is an understanding of where the tip-over point is, the market will from time to time determine the temporary trade, taking into account seasonal conditions and the motivations of individual sellers—whether they wish to lease their water out for the next five years and then access it in the sixth year, or whether they wish to, in effect, call in their superannuation. There would be a whole range of motivations as to why people enter the market in the longer and shorter term.

Senator BUCKLAND—Using Senator Heffernan's analogy of water trading, you can get a city based person wearing thongs and drinking Planters Punch sitting by the pool and trading in water. Now that I understand this water trading issue, it is coming home very strongly to me that many of the irrigators and farmers who are reliant on our rivers do not have a clue what we are talking about. They are naive when it comes to water trading. To me that is something of very great concern.

Mr Dalton—I cannot comment on the extent to which individual irrigators or regions understand the dynamics of water trading. But there are some areas where people are experienced. The extent to which that knowledge would increase is something I cannot predict.

Senator BUCKLAND—We had a witness in South Australia who I thought should have known everything there was to know about water trading. I thought they would have been briefed to the back teeth with it. I do not think she understood what we were talking about. That is a person within the rural community and within the farming and irrigating network that should have been on top of the issue. I do not think she knew what water trading was.

ACTING CHAIR—What needs to be separated here is the paper trading regime. Most people can come to terms with trading with neighbours up and down the river.

Mr Dalton—What I am hearing is the third party non-land-holder. I think that will be inevitable.

ACTING CHAIR—Please do not say it is inevitable.

Mr Dalton—Okay. I will not speculate.

ACTING CHAIR—The only other operation for that person other than that of capturing capital growth is screwing an extra margin out of the poor bugger that has got to use the water. That is how he will do it; he will screw the market. This goes to your original statement on what the pathways of farming have been. One of the pathways of farming has been the protection of the institution of the family farm. It is a bit like home ownership in Australia. We are flirting with the idea of changing the culture of water farming to one of tenant farming of water. If that all happens, a whole series of people will be reliant on the spot market for water. It will be a bit like the oil market. That will change the culture.

Mr Dalton—Only if they do not have access to entitlement.

ACTING CHAIR—Yes, but there are some people now who are doing quite nicely, thank you very much, and who did well last year. I will not embarrass them by nominating who they are. When water was getting a bit tight for certain irrigators, they withheld it. Nearly the full permanent transfer price on a temporary basis for water was reached, and then they traded the temporary trade. Given that a legislative pen can control that, I do not think we need to or should impose that prospect on users of water.

Users of water include the environment and urban dwellers. I do not think Australia should agree, as a principal pathway, to the greed complex of banking and financial investors by having water as a speculative commodity. I entirely disagree with that. You can have the value of water trade to the higher user. Professor Cullen said that in South Australia they make much better use of their water as turnover. You can do all of that without having a whole lot of leeches and greed in the system. It beggars my belief that, unless some serious thought is given by the planners, this will happen. I do not want to see—going back to medieval thinking—tenant farming. That is medieval stuff.

Mr Dalton—I cannot predict how a market will behave—

ACTING CHAIR—All I know is that the National Water Initiative picks up the issue. To finish off where I started, there is a motherhood statement: 'Yes, we're going to beware of speculation in the water market'. But I am not too sure how. Could you explain to the committee how you think the new water commission will work?

Mr Dalton—I cannot give you any further advice other than the description of it in the intergovernmental agreement.

ACTING CHAIR—Is there a document locked away in a cabinet somewhere that says, 'This is what we mean,' or is this just another motherhood statement?

Mr Dalton—No—and I cannot give you any further details because I am not privy to the discussions.

ACTING CHAIR—I appreciate that.

Mr Dalton—At the moment that is the responsibility of the department of primary industries and the cabinet. However, I can say there is a clear commitment in the creation of the commission to taking a very strong assessment role in the process going forward from COAG. I understand that details of how it is envisaged and its modus operandi are under discussion at the moment.

ACTING CHAIR—This is probably the wrong place to raise this issue, but I have difficulty with the idea that we are going to introduce the stock and domestic market to the traded water market. The Victorian government have announced recently that they are going to have stock and domestic water trading. For the average farm it is of small order and it is comforting to think you have access to a water supply for your stock and domestic requirements. The thinking is, 'Well, we can put all that into the sales pool for more activity.'

I do not think I agree with that. I am not across the fine detail of what they have proposed, but Minister Thwaites has announced it and that then starts the stranded asset argument. That may cause a bigger problem than just saying, 'There will be no trading in stock and domestic water.' A farmer who leaves a property of 400 acres on a channel somewhere can screw the last $3,000, $4,000 or maybe $5,000 out of the value of the sale by separating the stock and domestic right. I do not think we should allow that to happen. I am editorialising again, hoping someone out there is listening.

Mr Dalton—That is the Victorian approach. Up to this point, stock and domestic have been seen as separate from a licensing kind of regime. I am not privy to the reasons why the Victorians would want to go that way or to the extent to which other jurisdictions may follow.

ACTING CHAIR—I am concerned in that a group of bankers and carpetbaggers came to see me 18 months ago and I nearly threw them out of my office because they were saying, 'Why don't we create a trading market in riparian water rights?' You would understand the implications of that. You could buy yourself a little place in the hills somewhere where, unbeknown to you, the bloke who had it before you has traded the riparian water right away. You might put up a shed on the place and then not be able to capture enough water for a cup of tea. I find all that to be the gross of greed in banking activity.

Mr Dalton—I do not think the National Water Initiative envisages that stock and domestic water would be—

ACTING CHAIR—I appreciate that. But it comes down to the question of how, under the National Water Initiative, we harmonise the stock and domestic tradable regime with the protected regime here and the first-in-best-dressed regime in Queensland. We have a bit of work to do.

Senator McGAURAN—Perhaps you can clear up for me two vagaries with the National Water Initiative. Firstly, the principle of compensation for loss of water rights has been set down; does that also include underground water? Secondly, statutory recognition has been given to the principle of environmental water; will environmental water be treated on the same level as all other users—by that I mean with the same rights but also with the same costs?

Mr Dalton—My understanding about the ground water issue is that there is no differentiation between the treatment of ground water and the treatment of surface water. So, if there were a water sharing plan in relation to ground water—this is my understanding—and there was a change in the risk assessment formula that you referred to, ground water, to the extent that that is part of the water sharing plan, would be covered. I do not know the details of how it would work out in each area, but it was seen as being surface water and ground water applicability.

In relation to being treated the same as other users, I might say what I see as implicit in that and just seek your reaction: does that mean that environmental users pay the same kind of headworks charges as consumptive users? I cannot give you a straight answer on that because I do not know how each jurisdiction would pursue that. I think that, if environmental water had to be managed in a certain way, there are costs associated with the management, retention and distribution of that water—that would not be a cost-free exercise; there would be some cost associated with that.

ACTING CHAIR—If you were buying back water for the environment and it was coming out of New South Wales and going back into Victoria, you would have to have some sort of harmonisation of those processes otherwise you would have a different—

Mr Dalton—I was talking not so much about drawing back but about the management of the environmental water that is allocated. Regarding the part that you are talking about, where you are moving from one category to the other, I think there would need to be some recognition of the fixed cost associated with that.

Senator McGAURAN—Which becomes the custodian's cost—the government's cost—and does not suddenly end up as a levy on the irrigators.

ACTING CHAIR—But the issue would be that, if you are buying the water for the environment from two different sources which have this different cost base for infrastructure, or the headworks, as you say, it would be cheaper to buy from one source than another for the environment. I will ask a question so that it is on the record—it may be for you to think about or it may not be. Another one of the interesting findings that we have had was at Moree: we discovered that a quarter of the bore licences, or ground water licences, in the wider aquifer were owned by people who do not actually have an aquifer. It is a bit hard to understand how that is, but it is. Craig Knowles, the minister, looked quizzically at me when I put it to him too, but it is a fact.

On 1 July last year, under what was proposed and deferred, they were going to separate those licences from the land. So the people that had a valueless water licence for 1,000 megalitres on a farm that did not have an aquifer were going to be able to trade it to some poor bugger that was being disadvantaged because the calculation on the aquifer included these phantom licences. I think it would be a fraud on the public purse if those people got compensation for those licences. Under the National Water Initiative, will there be some input into those sorts of questions by the Commonwealth?

Mr Dalton—I do not know enough about the specifics of the Gwydir arrangements that you are referring to.

ACTING CHAIR—It is just something for the department.

Mr Dalton—It may be something that the New South Wales government may wish to engage the Commonwealth in discussions on.

ACTING CHAIR—That concludes the hearing. I think we have done all right, haven't we!

Mr Dalton—You gave me the luxury of giving you my history of waters!

ACTING CHAIR—The committee are very grateful for your input, and we hope for a continuing dialogue and the exchange of plenty of ideas. Some of the documentation we have been given today has been pretty good. We have some interesting information, for which we are grateful to all the witnesses. Thank you for your attendance.

Committee adjourned at 4.29 p.m.