COMMONWEALTH OF AUSTRALIA

Official Committee Hansard

SENATE

RURAL AND REGIONAL AFFAIRS AND TRANSPORT REFERENCES COMMITTEE

Reference: Rural water usage in Australia

WEDNESDAY, 11 DECEMBER 2002

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SENATE

RURAL AND REGIONAL AFFAIRS AND TRANSPORT REFERENCES COMMITTEE

Wednesday, 11 December 2002

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

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

Senator Greig for matters relating to the Fisheries portfolio

Senator Allison for matters relating to the Transport portfolio

Senators in attendance: Senators Buckland, Ferris, Heffernan, Lees, McGauran, Ridgeway and Stephens

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 4.21 p.m.

BOULLY, Mrs Leith Ester, Wentworth Group

COSIER, Mr Peter Aubrey, Wentworth Group

CULLEN, Professor Peter, Wentworth Group

MORTON, Dr Stephen Ross, Wentworth Group

WILLIAMS, Dr John, Wentworth Group

YOUNG, Professor Michael Denis, Wentworth Group

CHAIR—Welcome. I declare open this public meeting of the Senate Rural and Regional Affairs and Transport References Committee. This is the committee's first opportunity to publicly canvass issues raised by its inquiry into water resource usage. The issues were referred to the committee on 21 October this year for report by the end of 2003. We are looking into three main areas: the current rural industry based water resource usage; options for optimising water resource usage for sustainable agriculture; and 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.

This is a public hearing. The format today will differ slightly from the usual formalities. Whilst the committee is commencing its considerations of this fairly complex reference, we have not as yet received any written submissions from any individual or body. I think it would be useful for you to make some opening remarks, then I will encourage the members of the committee to engage in open discussion with you on the matters you raise. You may also care to provide written material. I note that you have already provided copies of *Blueprint for a living continent*.

It should be noted that the committee has authorised the recording, broadcasting and rebroadcasting of these proceedings in accordance with the rules contained in the standing orders of the Senate concerning the broadcasting of committee proceedings. So this is going out live to many people in the parliament and I am sure they are all listening. Before the committee commences taking evidence, let me place on the record that all witnesses are protected by parliamentary privilege. As I said, this is very informal. I invite you to make some opening remarks.

Mr Cosier—I will give you a very brief introduction, which is basically a recap of what the blueprint is about and what our message is. Then, with your indulgence, I will pass to Professor Cullen who will make some specific comments about water reform, the process and what has happened recently on that matter. Then my suggestion is that we open up a dialogue, which is what I understand you would like us to do. I want to start by thanking you very much for inviting us in this period before Christmas—we know this time of year is a very busy period for members of parliament, and we are grateful to you for giving us this time because we are very keen to get our message out. I will briefly introduce the people who have come along today. Not all the members of the Wentworth Group are here. Dr John Williams is the head of CSIRO Land

and Water. John is a specialist in agricultural and landscape systems so, if you have questions about those, I suggest you direct those to John. Peter Cullen is a former director of the CRC for Fresh Water Ecology and has about 63 other hats. Peter, as we all know, is a very high-profile and well-recognised expert in water and river systems and fresh water ecology. Hence, a lot of what Peter has to say will be of great interest to you. Leith Boully is the Chair of the Murray-Darling Basin Commission Community Advisory Committee. Leith has been in that position now for four years and is a very strong advocate for rural people, farmers rights and environmental rights in the Murray-Darling Basin. She is from rural Queensland and has properties there.

Senator HEFFERNAN—Whereabouts?

Mrs Boully—Dirranbandi.

Mr Cosier—To my right is Dr Steve Morton who is the head of CSIRO Sustainable Ecosystems. Steve is a specialist in ecology. From memory, he spent many years in arid rangeland systems in Australia and chaired the recent submission to the Prime Minister's Science, Engineering and Innovation Council on sustainable systems. On biodiversity type matters, Steve is an absolute expert. Then there is Professor Mike Young who is from the CSIRO as well. Mike is a very well-recognised resource economist—I may embarrass him by saying this, but he is an internationally recognised resource economist—and he is a specialist on copyright systems. If you wish to ask questions about copyrights and how they are managed, Mike is definitely the person to speak to today. Other members of the Wentworth Group who are not here today are Professor Tim Flannery from the South Australian Museum. He is a world renowned author and he gave the Australia Day address earlier this year, very much on what we are talking about today. Other members are Dr Denis Saunders, a former chief research scientist from CSIRO, and Professor Bruce Thom who chaired last year's state of the environment report for the Commonwealth. I describe myself as an environmental policy specialist. I am currently working for World Wide Fund for Nature Australia and I have a particular interest at the moment in land-clearing issues and also in institutional reform, which we may or may not get to today.

I would like to briefly recap what the Wentworth Group statement is about. It came about, as we know, from the terrible drought that Australia is currently facing and, at one stage, some calls from very high-profile Australians to divert rivers inland. We thought that would have disastrous consequences, not only for the catchments involved there but for the continent generally, and so we got together and put together what we thought was a better vision and set of solutions for the Australian landscape. Our basic position is that Australia cannot be drought-proofed, that we need to start living sustainably in Australia and that we need to live in harmony with the landscape not fight against it. We believe, and we are very optimistic, that the future is good for Australia. Our blueprint is about providing a new direction. We believe that we have sufficient knowledge now, knowledge that we did not have years ago, to set a new direction that will involve a change of land use that is in harmony with the highly variable climate that we live in.

However, we believe that considerable change is needed, and Australian farmers have demonstrated an extraordinary capacity to change. One of the messages we would like to make very clear is that we are not saying that we need to start from scratch; there have been over the past decade some fantastic reforms in land management in Australia, and we like to give due

recognition to those. The first really seminal one was the establishment of the Landcare movement in 1990 by Prime Minister Hawke. That has had a profound impact on the understanding of Australians, particularly rural Australians, of how we should manage our landscape. The second pillar we think has had profound implications was the establishment of the Natural Heritage Trust, which has provided a huge financial boost to that reform process. The third area we would like to give credit to is the COAG National Action Plan for Salinity and Water Quality, which was signed by the premiers and the Prime Minister in October 2000. That plan was aimed primarily at reforming institutional arrangements for managing the Australian landscape, and we believe it is a very significant advance from where we have been in the past.

Rather than suggesting that we should turn the rivers inland, we thought we should articulate what we think are better solutions. We came up with five solutions and, if you would like, I could briefly take you through those. The first is to clarify water property rights and the obligations associated with those rights to give farmers some certainty and to enable water to be recovered for the environment. That is very much the issue that has been top of mind of the COAG agenda in recent times. The second is that we need to restore environmental flows to stressed rivers such as the River Murray and its tributaries, and there are many senators here today who I am sure have a very good understanding of the needs of that system. The third is the need to immediately end broad scale land clearing of remnant native vegetation and to assist rural communities with the adjustment process. We will probably discuss that and explain what that has to do with water later.

Our fourth solution is that Australians need to think about paying farmers for environmental services. By environmental services, we mean things such as clean water, fresh air and healthy soils. Where we expect farmers to maintain the land in a certain way that is above their duty of care, we strongly advocate that the community pay for those services that are provided by farmers for the rest of Australia. The fifth is the need, in the longer term, to incorporate into the cost of food, fibre and water the hidden subsidies that are currently borne by the environment. That will assist farmers to farm sustainably and profitably in Australia.

We have also said that, to achieve those reforms, there are five fundamental changes we need to make in our institutional arrangements in Australia. The first is to cut the bureaucratic red tape that is strangling on-ground action. The second is that we need a national water plan which focuses on improving the health of our damaged rivers and protecting and maintaining healthy rivers and improving water efficiency use across Australia, and I am sure that will be a significant part of today's conversation. The third is the need to implement these steps—it is vital that Commonwealth and state governments signal an in-principle but long-term commitment to an investment strategy to help this restoration work over the next 10 to 20 years. If we do not do that, regional communities who are asked to face this challenge will not have the confidence that the nation is behind them to do that. We have not set a figure for that because it is an unknown figure, but we do highlight recent studies which suggest that public investment of around $20 billion is required over that sort of time frame.

I would like to conclude by coming back to this inquiry, which is an inquiry into rural water use. There are two messages we would like to leave with this meeting. The first is that the only sustainable solution to restoring the health of our rivers is to restore our catchments. The second is that restoring river health has two core components. The first is providing adequate environmental flows to maintain ecosystem function, and the second is ensuring that water

quality is improved by changing our land and water management practices. I will now hand over to Professor Cullen, who would like to speak in more detail about the water issue.

Prof. Cullen—I think it is a very good time for your committee to be looking at these water issues, because Australia is in the grip of a very extensive drought and people are very focused on water issues at the moment. But, equally, we have just had a COAG meeting to explore the issue of water rights and, frankly, I think the outcomes of that have been very disappointing to virtually all of the stakeholders—the farmer stakeholders and the environmental stakeholders. To go out after a COAG meeting and just say that we are going to have further consultation about a document that has been put on the table is, as I said, a very disappointing outcome. But I think you have some real opportunities, because the water reform agenda, which started in 1994 with COAG, has been partially implemented and has done a number of things—some of them unexpected—for water in this country. I think the time is now ripe to revisit the COAG water agenda, to look at what we have succeeded in, to look at what we have half done and decide whether we want to complete that and to look at the next steps. I intend to run through some of the issues that I think are important to do that.

I remind you that the 1994 COAG agenda had a number of key elements to it. It talked about more effective natural resource management, it talked about pricing, it talked about a more rigorous approach to economic and environmental assessment of new investments, it established a water trading system, it thought it was establishing allocations of water to the environment and it set about institutional reform through the National Competition Council. I think when you evaluate what has happened over the last eight years with the COAG water reforms—and the National Competition Council itself has done some evaluation of this—the economic benefits have been substantially achieved but the environmental benefits have not been achieved. It may be that they will take a lot longer to achieve or it may be that we have not done the hard things that we need to do for the environmental benefits. So they are issues that are still in front of us.

There are still real challenges with the water reform agenda. We have acute problems with degradation of many of our waterways, we have all the stakeholders very focused during a drought on the fact that there is not enough water and we have the tensions between the various groups for those scarce water resources becoming very pointed at the moment. Indeed, this building has come under criticism from the Canberra community for its lavish use of water, and I understand you have made some changes to that in the last couple of weeks that are welcomed. But everyone is starting to appreciate the value of water and the need to stop wasting it—and there is still a lot of waste going on. What we need is a water management system that gives us sustainable agriculture and a sustainable environment and that still meets the growing needs of our cities. You make the distinction of focusing on rural areas, but in some ways you need to keep an eye on that boundary, because the catchments are supplying both rural and urban areas.

In 1994 COAG said that meeting the actual timetable it laid down was going to be difficult and would depend on the availability of financial resources to facilitate structural adjustment, and that is still one of the sticking points as to why COAG did not get to any conclusion last week. But it seems to me that the three big challenges in front of us are to reallocate water to efficient high-value irrigation, to continue growing the wealth-creating agricultural industries that we have and to stop using water in the low-value industries. The market was supposed to have achieved that, and it has started to achieve it, but it has made remarkably modest steps in reality and there are some reasons for that. I think, to advance that we really have to get rid of

some of the impediments that presently exist to the transferring of water. For instance, while we talk about a water market, the rice growers of the Murrumbidgee have basically made a decision that they will not trade water out of their rice growing area. So you cannot really have a market if you have those artificial constraints in the market.

Similarly, interstate trade is bedevilled by the fact that each state is building its own water rights and water trading systems. I have commented before that this is remarkably like the building of railways 100 years ago; each state is building their own and they are not going to connect at the border. One would have hoped that we could have learnt from our railroads fiasco and not be repeating it. I hope that we can get through that. Clearly, we need to have a better balance between consumptive use of water for urban and rural needs and for environmental needs. I have been thinking about the ways you would refresh the 1994 COAG water agenda to take it into the 21st century. I am not in a position to do other than just give you a list at this stage—and I am happy to table this list to make it simpler. Over the next few months I will be developing each one of these a bit more, but I will now run through them to open up the discussion.

It seems to me that we have to sort out the entitlements for access to water. The water rights issue is partially done but it is not adequate, and we can talk much more about that. We need to sort out the water markets to get rid of some of the constraints to trade and to make sure that we have a properly regulated market. Any effective market is going to need quite a strict set of regulations and we have not got those in place. I think it is probably too optimistic to believe we could have one national water market but at least we want to make sure that the state markets all connect up with each other and that the exchange rates between them are adequate.

We need to push ahead with the environmental water allocations. Most jurisdictions have given some lip-service to this but the actual amounts allocated to the environment have been quite modest. That is because they have overallocated water and getting it back from irrigation creates a lot of pain, and New South Wales has made some efforts to start doing that in some of its valleys. More than just getting environmental water, we have to make sure that we can manage it. There has not been a lot of thinking about that in terms of who is going to decide when it is released, how it is released, and the environmental outcomes it is going to give. The irrigators are rightly asking those questions.

As a diversion, I have recently been working on the Lower Balonne for the Queensland government on the tension between irrigation and environmental flows there. That exercise has caused us to identify four ecological assets that need to be protected from the Lower Balonne. There are the river channels of the Lower Balonne itself; there is the Lower Balonne flood plain, which has a couple of national parks that have flood plain vegetation on them that are important. The Narran Lakes have been internationally listed as a Ramsar wetlands site and the fourth asset is the Darling River itself. In the Lower Balonne we are trying to work out how much water each of those assets needs to be maintained. That is a step forward in terms of articulating the environmental assets and their needs. We are going to need to do that right through the system.

We need to have equitable adjustments to achieve reforms at the scale and pace required and we have not reached that pace as yet. We want to enhance productivity and efficiency of water use; we really are still in the dark ages with some of our irrigation technology. Our really good irrigators have some very clever technologies that can grow very productive crops using very

little water and yet we are still splashing water around with flood irrigation in so much of Australia. Not only is it wasting water but it is giving us problems with ground water and salinity, things we should not be doing in the 21st century.

We are going to need some way of stimulating further capitalisation of the irrigation industries so that they can get away from putting a shovel hole in an irrigation bank and invest in some of the technologies that are needed to pipe and distribute water more effectively. There will be a need for private and public investment, probably on private properties as well as at the system level, to create water savings. There is a lot of interest in that with the Pratt proposals to pipe water and reduce seepage and evaporation losses. They are all part of the solution but they are no panacea. What we are seeking there is to invest in irrigation so that we have a globally competitive and highly efficient irrigation industry. We need robust financial arrangements for environmental rehabilitation. In systems such as the Murray, we have grossly overallocated the water and the consequence is that we have lost a lot of our native fish, we have almost permanent algal blooms in the lower Murray and a lot of environmental degradation. That is going to cost money to fix and we need to put that money on the table and start smart restoration.

The last point is that I believe we need to start looking at a more systematic way of planning for the rivers of this country. You could develop quite a simple framework of rivers to identify the rivers that should be protected, the rivers that still have capacity to be developed and the rivers that need to be restored. Each of the states is going about forms of water planning at the moment, but they are not taking it right through to that level of identifying where you can have development and where there are no-go areas.

The National Land and Water Resources Audit has shown that there are very few undamaged rivers in Australia—so it is my view that they are important and we should be protecting them, and I have argued for a heritage river system to do that. But there are other areas where development is possible, and we need to identify those areas. If we are going to have no-go areas, we need to have go areas. We have already made a fair go at identifying the damaged rivers that need restoration—in fact, I have published a simple framework for planning rivers on that basis—and I think that is part of the next stage of reform.

I will stop at that. I think the points we have made about flow and water quality are important—and you cannot drive water quality without the catchment/land use issues that Peter mentioned earlier.

CHAIR—Are there any other members of the Wentworth Group who want to make any comments at this stage?

Mr Cosier—We thought it might be best to go into a conversation here and tease out the issues.

Senator BUCKLAND—I have only just today got the entire brochure, which I look forward to looking at. You were talking about transferring water, and that is important to us. I had a look at the system they want to develop in the Darling Downs and the Lockyer Valley in Queensland, and I cannot believe that we are not investing in that process of transferring Brisbane waste water. You may be able to help me with a question of mine that was never answered. Does transferring that water, particularly to the Darling Downs where the soil is very porous—I do

not know the right term for that but it is pretty thick topsoil—have long-term effects on the environment; that is, that some water gets back to the river systems? Is there any danger of contaminants from that water leaching into the environment and creating a further problem for us?

Dr Williams—A study was done by Sinclair Knight Merz and also the CSIRO to address some of the issues associated with transferring that water from Brisbane's effluent. The answer to your question is that the study shows that there are real issues in contaminating the ground water systems beneath there with the salinity from the effluent, because the effluent is coming with a fairly high salt load—something between 1,500 and 2,500 milligrams per litre. The other issue is that it shows quite clearly that, if the irrigation leads to leakage beneath the root zone of approximately 100 millimetres a year, in a period of five or 10 years, you will have rising watertables if that is not managed with an appropriate subsurface drainage system. So, whilst the concept is important, I think whenever you irrigate you have those two problems that you alluded to that will take place.

Senator BUCKLAND—So it is not the be-all and end-all; it is just another—

Dr Williams—No. There are very few free lunches. When you irrigate, it is very hard to stop water passing the root zone and not being used by the plant. If you can manage to get by with between 50 and 100 millimetres, you can appreciate that that is still a lot of water. We need to collect it in a subsurface drainage and bring it through the system again. That means that, when you irrigate, the infrastructure you need to do it sustainably is substantial. Many parts of the Murrumbidgee Irrigation System do have subsurface drainage and have the capacity to trap that water and reuse it or manage it in an appropriate way, not just let it fill up the ground water and then cause the salination.

I think it is a matter of principle that we always need to establish—that is, that irrigation requires us to manage the water that leaks. In fact, the biggest issue in irrigation is managing the leakage, even the drainage from underneath the root zone or the surface drainage. So it is the management of the losses from irrigation where we get the most benefit in terms of environmental outcomes in the long term.

I have a report that I would be happy to submit. I can submit to the committee the analysis from the report, if you want to me to. There are some studies showing that the re-use of effluent is important but that we need to do it with care and understanding. At the end of the day, you must manage the salt or the contaminant that is in it.

Senator BUCKLAND—Could you provide us with that?

Dr Williams—I will be happy to make some arrangements for that.

Senator BUCKLAND—I think the conversation will broaden, but I am thinking of myself at the moment. In another inquiry, which I was partially involved in, which was looking more at household water use, it consistently came up from all groups—including the water industry, the environmentalists and most of us—that we are not paying enough for our water. Do you think commercial users as well as household users need to be paying a lot more for their water? Would that have a dramatic effect on the better use of water?

Dr Williams—Perhaps, being an economist, Mike Young could pick that up. It is a very important issue.

Prof. Young—It is certainly a very important issue. There are numbers of ways that you send signals about price. You can set the price. You can also actually define licences and rights differently and you can also regulate to foreclose opportunities. The work that is being carried out around Australia generally suggests that people who use water do not pay at the moment for the consequences of its use downstream. After it normally pollutes or changes things downstream it is often used again. At the moment, in urban areas, the price covers the supply cost, which is the cost of actually pumping it and delivering it to the house. In rural areas it is not even that amount, as it is largely still subsidised. We have not yet got to the point of charging the full cost, which includes externalities or the environmental impacts downstream.

Prof. Cullen—I want to point out that that is one of the commitments that the states made in 1994 when they signed the COAG agreement, and it is still not done.

Dr Williams—So the answer to your question is no, in the sense that the water in the urban centres is charged at delivery prices—it is charged at approximately the head works and structural charge, but even that is not always so. In the rural sector that is not so at all.

Senator BUCKLAND—Added onto that you are going to have to have this management system for trapping leaching water as well, and the salts that could be built up in—

Dr Williams—Whenever you irrigate, that is—

Prof. Young—I might come in now—

Senator BUCKLAND—That is not built into the system now, is it?

Prof. Young—The systems that we have for managing water were not designed to handle the problems of today. If you look at the licensing arrangements that were put in place, they were invented at times when there was lots of water around and we rolled them out an area at a time. So we have this railway gauge mess across all of the states. There are lots of different systems with separate philosophies. We have now run out of water that is available for development, and we have been bolting on more and more arrangements. It is like extending a house—you put on more and more rooms and the whole thing gets incredibly inefficient and stressed and groans. That is why we, in our report, have said that it is time to think again about what you need to manage something well and efficiently.

I like to describe it is as like driving a car. At the moment, we have a single system that actually aims to control everything. It is like having a car with a single thing where you can switch it on and go at a fixed speed and you go till you crash. You crash and say ‘oh’ so you fix it up and put it somewhere for a while where is it safe to go. Then you switch it on, you go, and you crash. A long time ago, we worked out that with a car you need an accelerator, a brake and a steering wheel so you can control all the things sensibly. So if you need to turn a corner you control the steering wheel; you do not have to alter everything.

We have never really sat back and asked, ‘How do we separate all the issues we are trying to manage in water use so that we get the whole thing to function through time as circumstances

change?' Particularly, one of the things that is not understood is that when water drains back into a river it goes down and it is allocated to somebody else. A lot of things that are happening in Australia when people say, 'We're going to save water by stopping the drain back into the river,' mean that there is less water in the river, so we have an environmental flow problem. We are all going around and improving water use efficiency but at the same time we are saying that we have to get more water back. If you take water you have to put more water back. It is understanding the hydrology: in water use, it is not the amount you pump, it is the amount that evaporates and transpires, and there are long time delays and we are dealing with something that is very complex. We really have to design systems to manage this, and we do not do that in Australia.

Senator BUCKLAND—I guess there are two things that have to come out of this: one is to get the states to agree on a common regime, which may be reasonably difficult; the second is to get people prepared to pay money to put in some of these preventive measures, such as catchment of leaching water. Just from this conversation so far, it seems to me that this will cost a lot of money, won't it?

Prof. Cullen—If you live in an urban area, you are not allowed to throw your waste over the fence onto the next person's property. There are pollution laws for most of us to stop that, but those pollution laws are not applied in rural Australia. It seems to me that part of the way forward is that people do not have a right to dump their wastes on the next door neighbour's property or into the river. They should be using best management practice to stop that. One of the points that we make in this document is that they should perhaps be charged a pollution fee for what they are discharging.

That is hard to measure so what you would do is this: if they were using accepted best management practice for that industry and for that area, you would probably exempt them from the pollution fee. But if they were not they would pay a fee which would help cover some of the restoration costs. So you can get a price signal into the market in that way.

Mrs Boully—Another way to look at it is that there is a lot of ageing infrastructure out there and a lot of farms that are set up in a way that—

Senator HEFFERNAN—It is not only infrastructure.

Prof. Young—There are some ageing scientists, too!

Mrs Boully—Yes, there are a lot of ageing people. There are a lot of farms that are not set up to utilise farming systems in the way that would best account for the issues that Peter, Mike and John have talked about. There is also the issue of the decline in rural communities—low morale and poor financial outlook. Rather than looking at this as a problem, perhaps we could look at it as an opportunity not to blame farmers for the things they have done in the past in good faith but to look at revitalising the infrastructure that is there and providing assistance to farmers to move from their current irrigation practices and farming practices to something new. The quid pro quo for the general public investing in that is that farmers sign up to best practice, compliance or pollution agreements, or whatever you want to call them. There are wonderful opportunities here if only we look for them rather than simply seeing the problems and issuing blame.

Senator BUCKLAND—I do not think we are looking to blame; it is looking to resolve.

CHAIR—Do you see that blueprint also applying in urban locations? I would imagine that in dealing with both water management and water practices in relation to individuals, farming communities and even companies you would have to look at both parts and somehow get them working together. From what has been said, I envisage that what it comes down to is an economic bottom line. You have to get people to change their behaviours. Presumably, there will be increases in water prices and then a need to look at the incentives.

I note that you talk about a fourth foundation or a fourth pillar. What is that fourth pillar? I know that you have spoken about some attitudes that need to change, but are we also talking about the incentives that lead people, whether they be individuals in metropolitan locations or in farming communities, not only to change behaviour but also to understand that it will benefit them rather than being an impost?

Prof. Young—We also have to state up front that it is a single system. Urban water and rural water are linked and often it is the same supply system. That means, if you increase urban water use, you have to decrease rural water use or else take it from the environment. It is a trade-off all the way through. We have not designed the systems that get the accounts right so that we understand all the connections. The two systems, rural and urban, in Australia are connected in many ways, one being through the water systems. We are only just starting to understand that. Canberra is right at the top as an urban water user, supplying water after it has been treated back into an irrigation system which goes down and then finally off out into Whyalla, Port Augusta, Adelaide and places like that. It is water that is passed from one person through to the next. It is a cycle system that flows through.

Mr Cosier—I just offer two comments. You asked about the fourth foundation, and that is very much what Leith was talking about. We are advocating the need for major structural adjustment reform in the way we manage the landscape. We are saying that you cannot ask farmers to bear that cost. If the Australian community wants its landscape managed differently to the way we are managing it today, all Australians will need to bear the burden of that cost. Our fourth foundation is about designing a system in which the rural communities own that process of reform. At the moment we have bureaucracies trying to impose a reform agenda on rural communities, and it is not working. We need to give those communities ownership of that reform process as well as the science to enable them to make informed decisions, and we need Australians to give them financial resources to help with the adjustment process. That is really what we are talking about with the fourth foundation.

Senator HEFFERNAN—What farmers really want, though, is to make a living with less water. I have had this argument with many rice growers—and they think I am the devil. You put it to them: 'Why do you grow rice?' They will give you some sort of long answer about dad and what happened before dad. But really they grow rice just to pay their bills: to pay off the car and the tractor and to pay the school fees and the tucker bill.

Mr Cosier—But where they are being successful with this process is that the price of water is going up and, if you own that asset—

Senator HEFFERNAN—I understand.

Mr Cosier—you have a lot more flexibility with how you choose to use that asset. If it means going out of rice into some other higher value added crop per litre of water, then there is a self-incentive mechanism—

Senator HEFFERNAN—Allegedly, the market is going to sort that out. Professor Cullen, why do you think Australia has 75 per cent of its irrigation where there is only 6.2 per cent of the run-on?

Prof. Cullen—I guess the history of our development of the Murray-Darling Basin, our biggest single river, has caused us to focus on the Murray-Darling. But you are obviously asking about our northern waters; we have extensive water resources going north. We have already started, in a fairly ineffective way, to harness those waters in the Ord. We have spent considerable public funds and do not appear to be able to make a viable irrigation industry in the Ord. Cotton has failed—

Senator HEFFERNAN—Is that a go zone?

Prof. Cullen—It is one we have already gone in, and it is a pity that we cannot make it pay for itself. Rice, cotton and sugar have all failed there; they are having another go on cotton. There is a lot of water there, if only someone could find out how to use it.

Senator HEFFERNAN—Cotton failed at Hay and Hillston in the sixties too because they had the wrong varieties. The rice failed up there. In my view, it is similar to the two cherry trees I have in my driveway. Every year we get not one cherry because the birds eat the lot—but, if I had 10,000 cherry trees, I would not notice what the birds ate. I think all those things could be solved if we had a change of culture. The best way to change the culture, I think, is for you guys and others to present a picture of where we are going to be in 50 years if we just keep doing what we are doing.

Prof. Cullen—We certainly agree with that. One of the things we have been talking about today and over the last few days is: what would be a vision for Australia's water in 50 years time? I have argued that, in the northern rivers, there are quite extensive water resources, but I do not believe we know very much about them in terms of our stream gauging and our river health. In the northern rivers, in particular, the connections with the estuaries and coastal waters are particularly important. Our prawn industry is dependent on flood flushes that seem to be important for the breeding of prawns. I would hate to meddle with that system until we knew exactly what we were doing and we could make conscious trade-offs. I believe the government should initiate a 10-year program to better understand our northern flowing rivers and to collect that information about stream flow, river health and the estuarine connection. I think the federal government should do it in partnership with Queensland, the Northern Territory and Western Australia. We should set about collecting that information so that, when we have to make decisions, we have some knowledge on which to make them rather than just operating on faith and hope, which has driven so much of our water development to date.

Senator HEFFERNAN—Someone was talking to me the other day about developments in the Territory, out of one of those rivers up there. They put it to the government up there, 'What would be the allocation of water?' The answer was: 'What are you talking about? There's plenty of water. Do what you want.' As I recall from first-hand experience in New South Wales in the fifties and sixties, irrigation was allocated by area of land, then by volumetric allocation and

then we came to tradability of water, which brought alive all the sleeper licences, which then made it abundantly obvious that whoever did it in the fifties and sixties cocked up the whole thing and should probably be in jail for the overallocation. The part of the tradability which bothers me is the water baron prospect. Is that to untie the land so the various bodies can buy back water for the environment? At the same time are we setting a hurdle for ourselves with some water investment vehicles having all the farmers beholden to them?

Prof. Cullen—I think Mike can talk more about that than I can, but the simple logic for the market was to try to get water to go out of crops like rice and into high-value crops like grapes and cotton and so on. In some ways it has not really worked as well as it should have, because we do not have an effective market. But I agree with you that you would not want an unregulated market. I would be very concerned if I thought one or two people were going to own all the water and we were going to have peasant farmers. I hope that we can design a market that will stop that happening.

Prof. Young—Unfortunately, water causes harm in some areas. If you look at things like the salinity load from irrigation back into the river, sometimes it is 10 or 15 higher than the base loads that are going on. One of the big advantages from trading, if it is properly managed, is to use the available water in places where we can use it without harm. There is a lot of restructuring that needs to occur to facilitate that. We have not yet built the market mechanisms to do that. I can table a report that we wrote on a framework for a robust way to define an entire allocation system if we were serious about trying to solve the problem forever.

The Wentworth Group has really tried to step back from where we are today and say, 'What are the fundamental arrangements that you would have to put on the table to fix forever the suite of problems that are around and to get the foundations right?' We have tended to fiddle and to put little bits on and say, 'We have a salinity problem so we have a salinity action plan. We have water overallocation so we are going to get some more water back for the environment.' We go through finding the next problem and what happens is that, every time we find it, we reveal another one because nobody has stepped back and said, 'What are the fundamental foundations of a system which you would expect to function?'

When people built Parliament House here, there was a lot of effort and very great care put into making sure that the foundations were strong enough so that it would stand up for a very long time. We have never done that in the whole area of water resource management. We are saying that we need to get the foundations right in order to put the real arrangements down that are going to solve the problems properly, rather than just gluing more and more on. It is like extending the house because one part is not working so you leave the bit that is not working and you put another bit on and it keeps on going and going. We are suggesting there is a need for a robust way that enables the market to recognise that, if you move water from some areas through to others, you create a whole suite of new problems and that, if you change land use, you can create problems. It all has to be worked out with some very clever design arrangements.

Senator HEFFERNAN—How do you prevent the water barons then?

Prof. Young—If you want to prevent the water baron, should that become a major problem—and there is a question first of all about whether or not it would become a problem—

Senator HEFFERNAN—They are already starting on the Murrumbidgee.

Prof. Young—There are some people doing it. Many of them are actually rural investors. Whether or not the market supplies opportunities to do that, if you look at the transactions that are occurring in the water market at the moment, there is a cross-subsidy. The water barons at the moment are not making lots of money. In fact, there are a couple of companies that I know of which were set up to become water barons but which are discovering the transaction costs when you are disconnected stop it being something that is a lucrative way to invest. That could change if you want—

Senator HEFFERNAN—Is that a South Australian experience?

Prof. Young—Yes, it certainly is a South Australian experience where it is feasible now to own water without owning any land. They have taken that step. It is also occurring in New South Wales. In Victoria it is officially not possible, but there are a lot of taxation structures and ownership structures you can set in place to be able to do that. We also perhaps need to realise that in many cases the water rights are held as a bulk licence by a company. They then pass the rights on to people who use it. But putting that aside, if you wanted to stop it, you can simply require that somebody who owns a water right has to own some land as well. We have to be careful because in many cases it is actually trusts and companies that own water, and certainly the global experience of where states have tried to stop people from owning things like water when they retire have failed because people find ways through company structures and share ownership arrangements to get through it under the table.

Senator HEFFERNAN—We are about to do this in New South Wales. If we do not regulate it, we might have a bunch of carpetbaggers and lurk men in charge of our water.

Prof. Young—Some people are speculating that that is likely to happen. I have not seen a case that suggests it is going to come

Senator HEFFERNAN—But it could happen.

Prof. Young—Hypothetically? Yes, it could under certain circumstances; with certain pricing arrangements and taxation things in place, yes it could happen.

Senator FERRIS—How has the Wentworth Group come about? I notice that a number of you are professors, so I assume that you have other jobs and this is a collective. How did you come about and how are you funded? Could you give me a little bit of information about that?

Mr Cosier—We are funded by nobody. We came about a few weeks ago when some high-profile Australians were proposing diverting coastal rivers inland in a bid to drought-proof Australia. We felt that, if we did not stand up and put an alternative vision, a potentially disastrous public policy had the potential to happen. So we felt an obligation to stand up and put an alternative set of solutions.

Senator FERRIS—So you are not an incorporated group; you are just a group who have come together? Who funded this book?

Mr Cosier—The book was funded by Worldwide Fund For Nature and by some CSIRO assistance. That funding came from a donor who happens to be the President of Worldwide Fund For Nature, Rod Purvis, who has invested money in landscape conservation issues.

Senator FERRIS—I am sorry I have not got long because I have to go back and do my Whip's duty. Quickly looking through this, there does not seem to be any concentration on urban water opportunities for renewal. I have a property in Adelaide that backs onto what is known as a creek but it is really a run-off drain. Within minutes of it beginning to rain in Adelaide—which I admit it does not do terribly often—the creek is filled to the top. That water—and there is an enormous quantity of it picked up very quickly—flows straight down to the Patawalonga and is lost. Have you applied your minds and considerable expertise to looking at how we can recycle water in the cities, which seems to me to be a fantastic resource which as grey water is often totally wasted?

Prof. Cullen—The Senate has just concluded its urban water inquiry, which has explored all those issues. If you look around Canberra you will see stormwater systems that use lakes—not the concrete channels that many of our traditional cities have got, but grassed waterways and so on. There are better ways of doing it, and there is a whole movement now for water efficient urban design. There are experimental areas in a number of our cities where we are trying different approaches to stop that flooding, to keep the water going into the ground, to use it on site with tanks and all sorts of other strategies. It is a very active area. It is not in the Wentworth document because we were really focused on the drought-proofing type issues when we came together and those urban issues were being well canvassed at the Senate inquiry.

Senator LEES—Perhaps the senator may want to have a look at Whyalla in South Australia. That is now basically trapping every drop of stormwater, recycling it and putting it to lots of wonderful uses in parks, on gardens and trees and so on. It is really worth a trip to have a look at what Whyalla is doing.

CHAIR—Dr Williams, did you want to say something?

Dr Williams—I was just going to say that I think the question illustrates that we need to look at urban and rural water as one in many instances. Mike gave the example of Canberra, but Melbourne is a classic example in the sense that water use in Melbourne affects very strongly the water that you can actually put through the Gippsland Lakes system. The management of the Gippsland Lakes also depends on the McAllister River irrigation system. So how you use water in one place determines how you use water elsewhere, and the consequence of the health of those lake systems is dependent on that flow. With respect to the inquiry, I would strongly recommend that, while you have to focus on rural water, you recognise that there is a linkage to urban issues. The issues of water saving in urban areas through recycling, as Professor Cullen has indicated, is becoming more and well established. We recycle or reuse only about 11 per cent of our water in our urban environments, but that is well set out in the previous study. As Senator Lees has said, there are quite a lot of initiatives in storing the actual water flow in the city—in aquifer storage, recharge and a whole lot of processes like that.

The principle of treating water as a whole system is so important and is so often neglected. We think of rivers without the catchments that drive the quality and function of the river and we often think of rivers without the ground water system. We see this, of course, in the COAG analysis—that is, that we have put the emphasis on the surface water flow and regulating the surface extraction. If you look at the ground water extraction, you will find that we have put a cap on one and increased the other. We really need to treat the whole hydrological system as one and to understand the interactions within it. A good example further to that is when we look at irrigation and water use for creating and turning water to wealth—which is what we all want to

do well—and creating social wellbeing in our communities as a consequence, we see that the way we use the water in the irrigation system determines the flow regime in the river and therefore its health.

Understanding the actual linkage between the two is less than adequate in most instances, and I think it is something we need to do a lot better. For example, at the moment, in the Mildura region we have a fairly large adoption of what we call partial drying root zone irrigation in vine. Fairly good research has shown that the actual demand for water under that system, which is continuously supplied, changes the power requirements and supply for the pumping and the flow regime in the Murray. That has happened in the last 18 months.

In looking at rural water and irrigation I think we must treat the system as a whole and recognise, first and foremost, that what you do with that water impacts on the flow regimes of the rivers. It is terribly important to get that understood. At the same time, the ground water is connected to that system. So not only what you put on but also what comes back—the point Mike Young was making—needs to be put into the equation. When we do that, then I think we can start to have some boundaries and principles that can help us design the economic tools that you will use and market regulation that allows you to trade water to get maximum wealth and wellbeing from it. But, if you do not have that framework and the ecological and hydrological boundaries in which you are operating clearly understood, the trading of water can lead to some very unfortunate outcomes.

Dr Morton—Following on from what Dr Williams has just said, I can have a stab at what might be going on in your minds. You are hearing over and over again that, unless we as a society begin to think about our water usage as part of the wider natural resource and urban resource management challenge as a system, we are not going to go anywhere. I can imagine you are thinking, 'My God, they want us to consider everything in this one package: resource use, farming systems, urban water use, the way the water allocation system is run and the whole damn box and dice'. In a way, that is what we are saying. But we are also pointing out that, unless we rise to that challenge as a society, we will finish back where Mike Young spoke of earlier: in a car with a fixed acceleration rate and no steering wheel. That is currently where we are. So we have to use our wits—even though this is a huge challenge—to deal with water as part of a major system in Australia. And unless we rise to that challenge, we are going to go on digging the same hole.

Senator HEFFERNAN—Our terms of reference will allow us to do that.

CHAIR—In the *Blueprint for a living continent*, you talk about a 10- to 20-year lead time. Is that a realistic time frame, given the enormity of what it is that needs to be done? Alternatively, are you trying to give us a concrete time frame in which to get some things done that start the process off for what must follow?

Dr Morton—Absolutely. If you can take a system perspective on this set of problems, that will certainly let you know where the most effective trigger points are for immediate action. In essence, you might decide to postpone action on other things until you have the time and the information to do it properly. But I really like what Senator Heffernan said previously about having a 50-year scenario of where we want to be. That will force us to think about what system we are dealing with in order to bring about the scenario that we choose. My answer is that that system approach would give you those clues as to what you do first, second and a bit later.

Mrs Boully—Before Mike gives his presentation, I have just one comment to make. The importance of this is that a farmer or a rural community has to think in an integrated way anyway. Governments, scientists or anyone else imposing a policy might think about it in a silo, but farmers are expected to integrate all of that policy on the ground, without having the tools to do it. Unless we can start to come at addressing the issues in an integrated way—give farmers something they can get their heads around and understand what they are doing, with some incentives to go forward—we will continue to stumble from problem to problem, seeing incremental damage being done, despite the huge efforts put in to it. It is critical that we sit back and take a big deep breath and say, 'These issues are big and they are difficult; but we have to come at them from a different perspective than in the past.'

Prof. Young—In front of me I have a set of glasses; fortunately, there are 10. At the moment a lot of irrigation systems run at about 50 per cent efficiency. This means that, through ground water and drains et cetera, half of that water goes back into the river. This does not happen everywhere but it does happen in lots of areas. Say I take 50 per cent of the water and 50 per cent goes back—50 per cent evaporates—and the next irrigator gets and uses five glasses. Say we then decide to go to partial route zone, actually drying with the same water, then the first time that irrigator got five glasses but, if we go to 95 per cent, he would get only half a glass—and I have now used all of this water. So this irrigator has actually taken the water that used to go here and made it more efficient. So there is a great gain to this person but not to that person: it has actually been traded from somewhere like Shepparton through to Mildura. But, when it gets to Mildura, they use 9½ glasses of water when previously they used only five. It is understanding the algebra of what is happening from top to bottom in the whole system which is critically important. Our system at the moment allows trades to occur where, through such trade, you actually lose 4½ glasses.

Senator LEES—I would like to interrupt you there to ask a question. The two trades I am concerned about are the one to the Barossa Valley and the one to the Clare Valley in South Australia, because there will be no run-off; there will be nothing at all going back into the river. When I went and had a look at this system in the Barossa, they told me that they would have all these practices in place to make sure that the problems which have occurred elsewhere do not occur there. They are watching salinity levels, waterlogging and everything else. Again, they will, apparently, plant to the absolute maximum—which is what has got them into trouble in the first place. Obviously, come two years or five years time, they will be after even more water from the river because they will be back into a stress situation. Were you talking about how, when trades occur, we are actually taking more from the river than the actual 8,000 gigalitres or whatever it was that just went to the Clare Valley?

Prof. Young—Up in Shepparton for example, at the moment you cannot trade all the way through—not legally anyway. But if the arrangements were in place to enable you to do that—we will not go into that yet—and you were only allowed to trade five through to Clare, there would be no problem. In fact, there would be a gain because the water would flow through. You would have to have even less because along the way there are transmission losses and so forth which have to be managed. But if you take only the five that are used in Shepparton and evaporated and move those down and take them out in Clare then there is no problem, conceptually. There are other things which have to be managed but, essentially, there is no serious problem. However, if you take the five that we used at Shepparton but you say, 'Actually the licence said that you had 10,' and you move the whole 10 through—

Senator LEES—Is that what happened in the Clare Valley a few weeks ago? I cannot find out. I have had someone ask questions in the South Australian parliament on this and I cannot find out where the water has come from.

Prof. Young—There are two things to understand here. It is possible that the water sourced for Clare—and I have not looked at it—came from somewhere that was actually already efficient. So it is the same thing, almost. Unfortunately with the water market we have an invisible hand. So although the water which was actually transferred in the licence system might have gone through from high efficiency to high efficiency, it might be—if you then think through the implications of the market which is operating—that there is this flaw in the underlying logic of the whole system. So you still end up having it because the market transactions go through and every person trades through. So, basically, the invisible hand actually reveals the problem. I am just talking and making this even more complicated. But something that John mentioned is the importance of the linkage from the catchment through to the river. There is a very controversial debate going on at the moment about the problems associated with trees. When you plant trees, lucerne or anything which is a perennial crop then you stop recharge into the river system.

CHAIR—We are doing a plantation forest inquiry at the moment.

Prof. Young—Every time you do this, there is less water available in the rivers, dams et cetera. At the moment, our allocation systems do not actually account for that in the areas where it is a serious problem. It is not a serious problem everywhere, but in some of our irrigation systems around Australia it is a very serious problem. So that is another flaw. We have all these flaws because we started off with systems which were never actually designed to manage something which is mature, complex and hard to manage.

Senator HEFFERNAN—Do you think there ought to be a water allocation made before you can plant a forest?

Prof. Young—We have analysed this very carefully in the report, which I should actually table; it is titled *Robust separation*. As we said in that report, there are two ways you can do it. Basically, you can have a system where when people plant trees they would have to buy back irrigation rights. Alternatively, when governments allow the land use change to occur, they have to inform irrigators that, in the future, basically all the rights will be clawed back because there is going to be less water. There is a duty to inform people about what is happening in the system.

Senator HEFFERNAN—That is not happening now, is it?

Prof. Young—That is not happening now. So there is a choice. You can set up a market mechanism whereby people who plant trees in areas where it is a problem would have to calculate the resultant loss—that is a function of where it is—then buy back the water. It is feasible that they can also produce salinity savings by doing that. So you might have to set up a mechanism whereby they get credit for improving the salinity state of the river but also have to calculate at the same time for the volume. This is like actually driving a car. Why do you have a brake and an accelerator? Because you want things to work properly.

Senator HEFFERNAN—You have only to drive about 60 kilometres out of here to see all this in action, because the streams have dried up.

Dr Williams—In the inquiry you may well want to deal with the issues that you describe there, but it is an easy system because, as you can appreciate, it depends, as Mike clearly said, on where you are and how the rainfall falls. The impacts are location specific and very strongly driven by the nature of the rainfall.

Senator McGAURAN—I just want to understand where the Wentworth Group is coming from. You pose many questions but I am not sure if I have got your answers right. Am I right to understand that the Wentworth Group is advocating, for want of better words, a laissez faire system—a government pullback system—so water will reach its full market value which will bring about a restructure amongst the irrigators, particularly along the Murray. Is that your cornerstone position?

Mr Cosier—Yes, it is, but that is subject to a fundamental caveat that it is underpinned by environmental standards. So you set your environmental standards. Society makes a decision that they want a healthy river at the end of the Murray; they want water flowing into the Coorong being sufficient to provide for the Coorong's needs and of a quality that provides for those needs. That underpins the market. To do that you need regulation of the market, but the principle of allowing the market to trade to its highest and best use is—

Senator McGAURAN—Do you know of any comparable system that we can look at overseas, or is Australia in a unique position?

Mr Cosier—Mike Young will probably explain that our document takes us outside of environmental discussion and into corporate law and corporate trading systems. That is probably a better analogy, Mike.

Prof. Young—Yes. There are no systems in the world that I am aware of that get it right, and I think the group is aware of it. Australia has led the world. One of the things that we have spent a lot of time doing is going back trying to identify systems in the world that have worked for centuries and carefully analysing the reasons why they have worked for centuries and why they will work globally. Markets are excellent servants, though horrible masters. And I think the Wentworth Group is saying that we need to get the constraints very well worked out; we have to design the mechanisms that will enable the market to cope. If you look at water allocation in Perth and the volumes of water flowing into the Perth dam, in the first 63 years of this century the mean amount of water up to about 1974 was higher than the quantity of water which has flowed in the last 25 years. The mean amount of water flowing into the Perth dams—available for urban people in this case, but it could be rural people—is 49 per cent of what it was for the first 60-odd years. If you are going to design a system which is going to cope with a varying future—and Australia has a highly fluctuating climate and a very uncertain climate that keeps on changing—you need to design systems that can cope with those sorts of shocks where the irrigation sector—

Senator McGAURAN—So there is no comparable system overseas?

Senator HEFFERNAN—You cannot have a trip, Julian.

Senator McGAURAN—No. The long and the short of it is: are we in a unique position?

Prof. Young—Yes, we are in a unique situation.

Mrs Boully—I would like to add something here, as the farmer member. I think we are in a unique situation. The uniqueness is that we do not have to fully rely on the market to deliver the outcome. Senator Heffernan earlier asked what the 50-year vision is. The 50-year vision has to be something around vibrant rural communities where people have quality of life and all of the things that they need to go on. One of the foundations of that is a healthy environment. One of the mechanisms you might use to achieve both of those things is a market.

Senator McGAURAN—Do you know of any country that charges the full market value for its water? I guess we can look at the United States.

Mrs Boully—I do not think so. From my understanding, there is not any country that charges the full market value of water, because you cannot cost the externalities. In a country like Australia, it would be very difficult to charge farmers or even urban users for the full cost of water. We cannot even charge the full cost of the delivery of water in most of our systems.

Senator McGAURAN—Aren't you advocating charging the full market value of water?

Mrs Boully—Yes. It is not going to be easy to achieve, though.

CHAIR—Doesn't that come out of costs for farmers? I am not putting a view one way or the other but, if I understand point 5 of your 'key changes that need to be made' and what you describe as 'hidden subsidies', then—following on from Senator McGauran's question—you are really talking about increasing the price so that all those externalities, as I think Professor Young described them, are factored into the cost of food, water and fibre.

Mr Cosier—Yes, but the farmers would not pay the price; the consumers would. That is the first point. The second point is that there is a structural adjustment—

CHAIR—But isn't a farmer a consumer of water?

Mrs Boully—So is the person who buys food in a shop. If I buy an orange here in Canberra, I am actually purchasing water.

CHAIR—I understand that part of it. I am just thinking about the flow-through of costs, particularly in relation to farmers.

Mr Cosier—The second element also is the need for a structural adjustment phase, to go from current practice to best practice. We are saying that the community should be paying their contribution to that change. That is why we are suggesting the need for a public investment into the process as well as a market investment.

CHAIR—In relation to the water reform agenda, has the process that the National Competition Council has been going through put the right drivers in place to lead the thing or

has it really created wrong expectations that are inconsistent with what *Blueprint for a living continent* seeks to achieve?

Prof. Cullen—I think it has put the right drivers in. We have looked at what has happened, and I have identified for you a number of things that now need to be put into the system. I think the idea of moving to a market that lets water move to higher value uses is necessary. The idea of taking the environmental requirements out of that market and specifying them as environmental needs is also a very clear statement from 1994, but it has been remarkably difficult for the state jurisdictions to do it. I think those drivers are correct. They can be revisited and retuned, but some of them have not been seriously tried yet.

Senator LEES—Should we be looking at a percentage of the water staying in the river when a trade is made—maybe five per cent, 10 per cent? Is that one of the mechanisms we can look at to claw back water?

Prof. Cullen—It is one of the things that I am attracted to and I think we need to explore that when we are looking at a market. That is one way of clawing water back. I suspect you could set the clawback rate such that you did not really inhibit trade too much but you could, over time, start to get some water back.

Prof. Young—It is a mechanism that is often used around the world, especially in fisheries. If you look at fishery systems, they have often used that mechanism. The work that has been done carefully looking at that points out, though, that you are often taxing the change, which is good. You want people to use water where it makes sense to use water, not where it causes problems. As soon as you start taxing it, you slow up the adjustment. There is one system that is used for forestry in some of the provinces of Canada, in which all rights are clawed back a certain percentage every year. They take some back and, when it is surplus, they sell it and keep the revenue. But they build in a process that operates right across the entire industry rather than only taxing basically the small number that change.

Senator LEES—Going back to the basics of what Mr Cosier said a moment ago about setting environmental standards, as we try and determine property rights—and I take it this is now happening on a state by state basis; unfortunately we are not looking at a national scheme of property rights—do we have to begin with each catchment? Do we look at the capacity, how much the environment within a catchment needs in terms of run-off and flow, by river, by creek, by stream, and begin from there? Basically I am looking for the benchmark. Where do we begin?

Prof. Cullen—That would be the ideal way of doing it, but the jurisdictions are doing it in different ways. The Victorians looked at the licences they had issued, gave reasonable security to those licences, and said that anything left over for the environment—

Senator HEFFERNAN—That is effectively called ‘arse about face’.

Senator LEES—Who is doing the monitoring of whether or not that is going to work, river by river? Is there some bigger process?

Mr Cosier—That was the intention of the national action plan reform agenda. The intention there was to establish regional institutions, which would be informed by science and

monitoring, and to set standards both at the national and at the catchment scale level that drive the whole process. You underpin the environment by standards, and that standard-setting then drives the reform process. If it is a biodiversity standard it drives the priorities for revegetation or conservation. If it is a water quality standard it will drive the amount of nutrients and phosphates and things going into the river system. If you set the environmental baselines at the region or catchment level, then you can begin putting on top of that the market systems that produce the economic benefits that that healthy environment creates.

Senator LEES—Where are we up to in terms of setting those standards?

Prof. Cullen—New South Wales is looking at a whole lot of river valleys that are well over-allocated. They are trying to find a way through that that is politically acceptable. They have had planning on a river by river basis. They have put a few rules in place. There is only going to be a certain amount clawed back over the coming decade and then they are going to revisit it and they may have to claw more back then. They have set a pace of change. They have also decided not to give licences or water access rights in perpetuity, but to give them for a 10-year period and then revisit them. That gives farmers some investment security for what they are doing, but also a realisation that if we learn more about those rivers and need to take more back, or if the climate changes and we are getting less water, we can adjust. In the Victorian situation, if the climate changes and we are getting less water, it will all come from the environmental allocation which is fairly minuscule anyhow. I think that is not the appropriate way to have gone.

Senator HEFFERNAN—Can I pick up on climate change. It was suggested to me the other day in my office that climate change in the next 50 or 70 years is going to reduce the run-off in the Murray-Darling Basin by 40 per cent. Would you like to comment on that?

Dr Williams—The analysis that I am familiar with from the CSIRO on this matter is that with the modelling of the climate shift in, say, the southern part of the Murray-Darling Basin the winter rainfall in the worst case scenario could decrease by around 10 or 12 per cent. If that were to occur it would probably reduce water yield by 25 to 30 per cent. That is the best estimate that I am aware of.

Senator HEFFERNAN—I want to go back to this 50-year shock. What we are arguing about here is trying to squeeze something and manage something that really is going to have nothing left in it. For instance, there are about 180,000 or 190,000 gigalitres in the Gulf and the Timor catchments and we divert about 100 gigalitres at the moment. Surely, as Professor Cullen said, it is time that, as well as managing all of tomorrow's problems here, we should be actively trying to sort out the future—which may well be in other parts of Australia—or we are all damned. Given the reducing prospects for run-off, aren't we—

Dr Williams—The climate change scenario is that the winter rainfall zones will be most affected. There is the likelihood of some increases elsewhere. It comes back to how best to use the water resources and river systems of northern Australia. I worked in northern Australia for nearly 20 years, in the Burdekin and Fitzroy, so I am fairly familiar with those river systems. I think we do need a systematic analysis of how we might do it. We cannot think that we can just take the water from that system without there being any implications.

Senator HEFFERNAN—No-one is suggesting that.

Dr Williams—As for the possibilities of using those river systems, we need to know which ones we can use and which ones we cannot. As Professor Cullen said earlier, there are some very real differences about our northern rivers. They are usually coastal driven systems and, therefore, the issues of and impacts on fisheries, habitat, tourism and all those important things need to be better understood. They are also rivers with usually extremely large flood plain processes. They are not just channel rivers. They are very peaky; they have probably two flow regimes a year, if that. In many instances, they are very different from a temperate river which usually collects water from the landscape and takes it through. The semiarid, tropical river tends to recharge the landscape. A lot of those large flows are part of the way rivers recharge the landscape and maintain the wetland function. That is clearly true in the Channel Country. Without that recharging of the landscape every one in five years or so, the productivity of the Channel Country would be affected.

There are all those sorts of issues. Most of the rainfall arrives on the plain itself. There is a flatter landscape and there are no simple hills and mountains where you can put dam structures. Cairns, with the Barron River, is a good example. Cairns has a water problem. Where the water can be collected for Cairns, the rainfall goes down to a third of what it is in the city of Cairns. That applies to most of those river systems. So we need to do those analyses, but we need to be realistic in recognising that we are dealing with some very different systems. It is true that 70 per cent of surface flow to the ocean occurs in northern Australia, north of Brisbane.

Senator HEFFERNAN—It would be fair to say, though, that, as complex as all that is, it is no more complex than trying to manage the mess we have down here. One should be as high a priority as the other.

Dr Williams—We need a balance. A very high priority is to avoid the mess we have here. Similarly, I would argue that if we can avoid salination in Queensland by managing water use and by not clearing, that is the best way to go. We need to avoid the problem. Steve Morton's work, which he presented to the Prime Minister's Science, Engineering and Innovation Council, shows that if you can maintain the functionality of a landscape rather than exploiting then repairing it, you gain a public and private investment of a factor of 10 to one. We need to look at how our northern systems work and to learn quietly how to use them properly. That is a major issue that Australia needs to face. When we do that, we can avoid the quick, populist, knee-jerk suggestions, the merits of which, in scientific terms, are very hard to establish.

Prof. Young—What we are really saying is that we have to expect change in the future. If you look back at what has worked in global practice, one of the highly successful things has been the setting up of limited liability companies, which were invented in 1872 and suddenly took off all around the world. One of the great insights in that was the importance of defining risk and what is and is not compensatable. The real insight was to communicate very carefully to people what was going to be at their cost and what they could go to the courts to seek something back for if things failed. One of the things we have not yet been able to do in our water rights systems is to draw the line and say, 'This is your risk,' and 'This is not your risk.' We have debates all over Australia at the moment because we never sat down and properly defined that and informed people about what they had to cope with—that the reality of Australia is that the future is uncertain, that they are taking risks and that some things have to be managed very carefully.

Senator HEFFERNAN—No government wants to own up to the mess though or take ownership of it.

Senator STEPHENS—I have found the discussion very thought provoking, but I want to pursue an issue that was raised about the market and the recommendations of the national competition policy on the introduction of the water market. Has it taken into account social and environmental costings? I presume that it has not. Professor Young, have you done any economic modelling on social and environmental costs? Has the group as a whole done any kind of scenario planning about options? If you have got that far, that would be useful to hear.

Prof. Young—In my case, certainly in the river system for the River Murray, I was responsible for the first assessment of the implications of enhancing environmental flows and led the first pass through that. We have done some of the costings for that. If you go back to the COAG process, the plan was to enable all this to happen and, as we have said, that has not yet happened. We have said that we think the process is the right way forward but there are a lot of problems still to be resolved and processes still to be put in place. We have started a journey and we now need to put the foundations down that enable the next big step to be made to get the social and environmental sides squared away. We have only just started to explore how to do that.

Mr Cosier—COAG mandated it to happen. It said that there should be sufficient environmental flows in river systems as part of the process, but it never defined those because obviously you have to define them river by river in the first place. The step of the national action plan was to put a process in place to start defining those standards. While there has been some progress it really is not happening at the pace that it needs to happen. It is a top-down process at the moment and hence there is no local ownership. We have policy torpor at the moment. One of the great criticisms we make in our document is that the institutional structures are not in place to allow science and communities to talk together and to start setting the standards which underpin everything we are talking about. Until that happens, we will continue to have the same problems over and over again.

Mrs Boully—One of the issues that is being raised in the discussions of the living Murray process for potential recovery of environmental flows is that people who might potentially be giving up water are very concerned that there is no mechanism to manage or account for environmental flows. Professor Cullen alluded to this as being a necessary action for the future mandated by COAG. It is critically important for people to be able to see from a social perspective that, if they are going to give something up, they can see the long-term economic gains sustaining the productivity of their business and that they can also see the environmental gains so that the benefits are clearly articulated as a mechanism to manage that flow and account back to the community for the benefits that have accrued. That goes hand in hand with having a market. The market will account for consumptive use and transfers and we have a whole system that, for all its warts, is being built there. We do not have a similar system or institution for the environmental side.

CHAIR—I want to ask about creating a national commission. Do you know of any examples in any other countries where that has been established, national audits are undertaken and the commission has certain statutory responsibilities? Are they are proving to be successful?

Prof. Cullen—I do not think there are any overseas models, but I think you have to appreciate that Australia, despite the many failings that we have talked about, is probably internationally at the lead in terms of many of these integrated water reforms. Other countries come here and look in wonder at the various things we have put in place. They are all in the international literature and they have all been tried somewhere but they have not been tried as a comprehensive package as much as we have been trying to do with COAG.

The idea of that commission is that, if we are going to take water back from the environment, we need to use it wisely. We need to build the knowledge to use it wisely. I do not think that that knowledge exists in many of our existing agencies. One way through it would be to get an organisation that had the expertise to control the water. The organisation would go to the people who run the pipe or channel systems—the same way that the irrigators do—and say that they want a certain amount of water for this particular period. They would be a customer for the environmental water and the people who run the channels would meet the needs of a number of customers. That was the idea of it.

Senator STEPHENS—You are challenging us to implement some systems thinking in the process and that is something that many people cannot get their heads around. In trying to marry your recommendations and blueprint with things like the greenhouse issue, which Senator Heffernan raised before, and climate change, you wonder if the left hand has thought about what the right hand is doing at this stage.

Mr Cosier—I will offer a comment there. The greenhouse issue is a very good example of what we were talking about with environmental uncertainty. We do not know precisely what greenhouse effects will happen as we do not know a lot of things about the environment and never will. It is an extraordinarily complex system that we are inhabiting on this planet and we need to understand that there is inherent uncertainty. The proposals in the blueprint are saying that you design your market systems to cope with that uncertainty so that the market can adjust when the uncertainty happens. At the moment, the current thinking would be, 'Oh goodness, we now have a greenhouse problem so we will take more water out of the river.' Then it is another Mike Young bolt-on. Then, if we have another problem, we will bolt it on. That is what we have been doing for two centuries and we have got an institutional mess. The solution is to understand that there is inherent environmental uncertainty in the Australian landscape with its highly variable climate systems, and to build the property right mechanisms that recognise that uncertainty.

Senator LEES—So property right mechanisms that are based on the percentage of flow in the river rather than on an absolute amount of water. Is that the sort of thing we are heading to?

Dr Williams—The bottom line is that we need to first of all know how much water we can take from our rivers and still have a healthy river. We all agree on that. But, when you start to look at that a bit more closely, it starts to come back to the probability distribution of reliability—how much you have that will be seasonally dependent. There will be a relationship between reliability, volume and time. When we look at water in this sense, we have to do some of the sorts of things that Peter just said. We have to understand that water volume and right in terms of its probability and uncertainty as well as its volume and time. It can be done.

Senator LEES—So the timing of flood in Chowilla might be when you have a peak flow in winter, and that sort of thing.

Dr Williams—There is all that sort of stuff.

Mr Cosier—It sounds extraordinarily complex but it is not when you boil it down to its environmental basics. Take a wetland for example. One of the key indicators of wetland is waterbirds. Water birds breed and there would be a problem if you took out a certain amount of water and that did not lock into the breeding cycle. For example, if waterbirds breed every six years, and if the traditional flooding regime to allow that event to happen is every three years, if you take most of the water out and you get a flooding event happening every 12 years, you would have no waterbirds left. You would destroy their breeding cycle. You can boil some of these environmental standards down to some very basic principles which nearly every farmer in Australia would intuitively understand. It does not require reams and volumes of data and science. It can be made into a simple mechanism that local communities can relate to.

CHAIR—Are you on time constraints? I was proposing to finish at 6 p.m. I know that there are many questions that can be asked.

Senator LEES—I am afraid I have to go.

CHAIR—You have made yourself available so I want to ensure that you have more time available. If not, then we need to wind up soon.

Senator HEFFERNAN—As long as you need to get on a plane and not go to a Christmas party, we will not mind!

Mr Cosier—Would 10 or 15 more minutes be suitable?

CHAIR—That will be find, but I do know that senators are slowly disappearing.

Senator HEFFERNAN—I am not going to disappear. I want to ask about investment on private property. I was talking to the Australian Conservation Foundation about this the other day. If you put private investment on someone else's private property, who pays it off?

Mr Cosier—What do you mean by private investment?

Senator HEFFERNAN—The foundation talked about fencing off rivers and doing all sorts of environmental work on private land. Who actually pays the bill?

Mr Cosier—It depends if it is a new investment or not. Let us take the example of a property where you wanted to restore the riparian vegetation. You would offer a payment to the property for that service. That is the environmental services—

Senator HEFFERNAN—In this case who is 'you'?

Mr Cosier—'You' would be the taxpayer. If the taxpayer wants a community benefit that is not currently provided by the environment, in other words, if it is a new benefit that the community now wants then you would go and you would buy that benefit as an environmental service. You would pay the farmer for the loss of productive capacity from that part of their

property and you would assist them with fencing. It is actually the model that we are currently using with the Natural Heritage Trust; it is the national action plan.

Senator HEFFERNAN—Take the prospect of the Pratt proposal where you pipe the water to Bullamakanka and somehow an investment vehicle pays for that; I do not know who pays the investment vehicle. A lot of people say it is the government. That is all very well but when you get to the farm gate, the bank is very worried about separating the water right from the land because if there is an increasing capitalisation of water and it is attached to the land, the landowner can say to the bank, 'I want to put in trickle irrigation and do all these other things.' The bank says, 'How are you going to fund it; this is what is going to happen to the value of water.' If you do that and get to the farm gate and you have separated that, how do you fund the infrastructure on the farm?

Mrs Boully—It probably depends on the goal. If the goal is to achieve more water for environmental flows and that is a public benefit, you could argue that the taxpayer funds it. If the water that is saved in that increasing efficiency is used for increased production, you would argue that the benefit is private and that the farmer should pay for it.

Senator HEFFERNAN—I am saying that if you separate the land from the water, I am not too sure that the land-holder is going to have the capacity to do that. I have already talked to the ANZ Bank and they are very unhappy.

Prof. Young—The bank is very unhappy for a different reason. When we had water and land on one title we had a new system title and it could be mortgaged and the whole process was guaranteed. When we separated water titles and land titles, we actually converted the water title from a new system title back to an old system title, which was the reason why the Torrens title system was introduced in 1857 in South Australia. It was because the system was subject to fraud, it was cumbersome and there was a whole pile of problems, which were solved by going to new system. When we separated water title from land title, we forgot the lessons that we learned 140 years ago. We went back 150 years and brought all the old problems back in. So of course the banks are upset about it, because we forgot that you have to have a proper register, formal conveyancers that are licensed, formal settlement procedures, and a mortgage that can be recorded on the water title. We failed to put all of those arrangements in place and that is the reason. Separating the titles means that the water can still be mortgaged but we need to set up the mechanisms to enable that to happen at low cost and we did not do that. Yes, the banks are upset; they are upset because they were not actually handed the same framework back that they had before.

Senator HEFFERNAN—In the tide of history there have been some terrific inequities in the distribution of water rights. The banks are entitled to know what it is that they have as security and the farmer needs to know that he can put in next years' crop. In the 1950s, 1960s and early 1970s it was a Father Christmas arrangement. In fact, they used to refer to one of the water licence blokes as Santa Claus. This is true. You would go down the river and one bloke would have one licence because he was not a wake-up and the property next door would have 10 licences because he was a smarty. They have now all converted into rights.

Mr Cosier—Now they are gold.

Senator HEFFERNAN—It was a pretty unique system of distribution. These were all state government occurrences. Compensation is being talked about. There are two ways to compensate people: you can compensate them to please the bank or you can compensate them to ensure their future, and that is with better infrastructure et cetera. Part of the logic is that we are really compensating them for the mistakes of the government that no-one wants to own up to because they were dreadful mistakes.

Prof. Cullen—There is no doubt that we made some disastrous decisions over that period of water management and we have to find a way through it. I would be arguing that there has probably been too much emphasis on the compensation. Once you can get water rights worked out I would be arguing that they have a right to something only where they have a genuine legal right. There are some farmers who, because they are able to buy water every year on the water market, believe they have a right. I do not see that as a right; that is an annual sale. Rather than focusing on the rights and the compensation, which is part of it, another strategy is for public investment on that private land to put in some of the centre pivot and better irrigation systems and at the same time reduce the farmer's water rights by 50 per cent or whatever so that we take water back for the environment and other users and for the security of users—

Senator HEFFERNAN—Who owns the centre pivot, then?

Prof. Cullen—The farmer would own it, and in return for that he is giving up a percentage of that water.

Senator HEFFERNAN—You will not have an argument with me on that.

CHAIR—To follow on from the discussion I have heard so far, I keep getting the impression that what we are talking about here is, in terms of swings and roundabouts, an integrated energy system where you are exchanging one thing for the other, not just in relation to water. Is that something that you have in mind further down the track? That is, once you define each catchment management area and its value in terms of rainfall, water yield, property rights and so on there is a value given to it as against all the other energy uses in the same area. Is it the case that, if the price of water went up a farmer could trade the rights back or exchange them or get credit in relation to some other energy use that might be used in the same vicinity? Am I going down the right path with this sort of thinking?

Prof. Cullen—You have pushed beyond where I am at. There are some interesting ideas there. We are trying to take that first basic step, but there may be further bits that could be developed in that way. Those trade-offs might emerge. We have not got the fundamental building blocks yet. Farmers do not even know what they have to sell or buy.

Mrs Boully—There is a myth around that we will be able to trade rights in all sorts of things—water, biodiversity and a range of things. The thinking is very immature and not particularly accessible at the moment. The Wentworth Group did not get into that sort of discussion, but there are some debates going on out there about the opportunities that might exist—carbon credits, salinity credits, biodiversity credits, water allocations et cetera.

CHAIR—I see it as a sort of horizontal and vertical integrated energy system where you can have the swings and roundabouts on how one thing is going to be exchanged for the other over

the longer term. I am talking about a long way off. In South Australia, for example, in some cases where households have solar panels in place the metre ticks backwards.

Dr Williams—It is trading energy backwards and forwards.

CHAIR—Yes. Somehow the use of water, looked at as energy, would link into that system. It is probably too early to start talking about those sorts of things. I will stop there.

Senator HEFFERNAN—Thank you for taking us to that; it was a giant leap forward for man.

CHAIR—I am thinking about farmers. If the price of water is going to go up, how do you provide a benefit?

Senator HEFFERNAN—I understand where you are coming from. Going back to this compensation by infrastructure, that has to be part of the solution. Compensation by cash will certainly be needed to satisfy some of the banking requirements but it actually only perpetuates the problem. Would you agree with compensation to apply smart water?

Prof. Cullen—Very much so; I do not think the banks are going to drive that. The banks have been worried because when we split the land and the water, the farmer still had both land and water, but the mortgage was tied to the land and if the farmer chose to sell the water there was no value going back into the mortgage.

Senator HEFFERNAN—There has been talk of compensation in lots of ways for the irrigation side of it, but what about compensation for people like those at Narren Lakes who have lost the water that was a natural flow to them? It is about the downriver rights of landholders versus the rights of irrigation. What about compensation for the Narren Lakes people because of the disaster up there at Cubbie?

Prof. Cullen—It is plain that there are some downstream traditional users that have been disadvantaged by the development of irrigation. I think that is probably true in all of our irrigation districts.

Senator HEFFERNAN—So what rights do they have?

Prof. Cullen—I have not thought through the compensation issue. What I have been asked by the Queensland government to do is to look at some reallocation of the water so that those downstream assets can be protected. That is what will be going into the discussion over the next month or so.

Senator HEFFERNAN—Before we go one more step, I should put on the record that I am a land owner on a river, so I have some sort of an interest.

Prof. Cullen—We all have an interest.

Mrs Boully—I will make a brief response to that and put on the record that I am a downstream land-holder in that system. We have been arguing about this issue for the last

decade or so. In effect, if you look at what Professor Cullen said earlier about rights and people only being compensable for the rights that exist in law, those of us who own flood plain land and rely on beneficial flooding have no rights. So there is a public conscience issue that you might deal with through rearranging water allocations or clawback or any other mechanism that you might want to put in place. I would also like to say that that is not the only area of rights that we have not dealt with well. The area of water rights that I think is going to emerge significantly over coming years is Indigenous rights. These concern people who were dispossessed of their water rights. We are not factoring that into the discussions that we are having about establishing rights regimes for the future.

Senator HEFFERNAN—That would be some sort of riparian right.

Prof. Cullen—It might well be an environmental flow right for certain wetlands and fisheries. It has not been articulated yet, but a number of Indigenous groups are working on it and are feeling very disadvantaged by the present carving up of water in the rights debate.

Senator HEFFERNAN—I would like to conclude by saying that I would like the Wentworth Group to come back when we are better informed. I think we are in for a lively discussion—and the witnesses will find we are a very enthusiastic committee. Our reference is broad enough for us to go wherever it needs to take us.

CHAIR—I agree with those comments. If it had not been for the very busy schedule in trying to finish up by the end of the year, there would have been many more senators here as well. We had initiated the terms of reference well before it became topical in the media. We initiated it out of concern for what we saw as something that needed to be inquired into. On behalf of the committee, I thank you all for coming. It has been a very exciting, worthwhile and interesting discussion, one that we should continue and one in which we have obviously displayed our very early development of ideas about where we should take this inquiry. Your contribution has been very useful to that and we certainly would like to come back and talk to you about some of the things that come to our attention. We will forward a copy of the *Hansard* to you over the coming weeks—I have to say that as part of the formality. Thank you for coming along. I have certainly found that very useful personally. I now conclude today's hearing.

Committee adjourned at 6.14 p.m.