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HOUSE OF REPRESENTATIVES

STANDING COMMITTEE ON SCIENCE AND INNOVATION

Reference: Coordination of the science to combat the nation's salinity problem

WEDNESDAY, 29 OCTOBER 2003

SYDNEY

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HOUSE OF REPRESENTATIVES
STANDING COMMITTEE ON SCIENCE AND INNOVATION

Wednesday, 29 October 2003

Members: Mr Nairn (*Chair*), Ms Corcoran (*Deputy Chair*), Mr Martyn Evans, Mr Forrest, Ms Grierson, Mr Hatton, Mr Lindsay, Mr Tony Smith, Mr Ticehurst and Dr Washer

Members in attendance: Ms Corcoran, Mr Martyn Evans, Mr Lindsay, Mr Nairn and Dr Washer

Terms of reference for the inquiry:

To inquire into and report on:

The Commonwealth's role in managing and coordinating the application of the best science in relation to Australia's salinity programs.

In conducting its inquiry, the Committee will give particular consideration to the:

- a) use of salinity science base and research data (including the development of new scientific, technical and engineering knowledge) in the management, coordination and implementation of salinity programs;
- b) linkages between those conducting research and those implementing salinity solutions, including the coordination and dissemination of research and data across jurisdictions and agencies, and to all relevant decision makers (including catchment management bodies and land holders); and
- c) adequacy of technical and scientific support in applying salinity management options.

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Committee met at 9.24 a.m.**BRADD, Dr John Michael, Founder and National Coordinator, Australian Salinity Action Network**

CHAIR—I am pleased to declare open this public hearing of the House of Representatives Standing Committee on Science and Innovation for its inquiry into coordination of the science to combat the nation's salinity problem. On 13 August the committee was asked by the Minister for Science, the Hon. Peter McGauran, to inquire into this issue and report back to parliament. The committee has advertised the inquiry nationally and sought written submissions from interested departments, organisations and individuals. We are conscious that there has been a great deal of attention paid to the problem of salinity. Our focus is on managing and coordinating the application of the best science in relation to Australia's salinity problems.

I welcome our first witness. Although the committee does not require you to give evidence under oath, I should advise you that the hearing is a formal proceeding of the parliament. I remind you, as I remind all witnesses, that the giving of false or misleading evidence is a serious matter and may be regarded as a contempt of the parliament. I also remind you that the committee prefers all evidence to be given in public. However, at any stage you may request that your evidence be given in camera and the committee will then consider your request. We have received submission No. 39 and also exhibits which we have numbered 29, 30 and 31. They have been authorised for publication. Would you like to make an opening statement before we proceed to questions?

Dr Bradd—Firstly, I would like to say that it is an honour to have been invited to make a submission and now to provide evidence before the committee. I and the Australian Salinity Action Network—ASAN—the community based organisation that I founded and now represent, welcome the opportunity to address this committee. I propose in this opening statement to provide a brief outline of my professional background, describe the function of ASAN, make a brief statement of my understanding of the issues to be addressed, outline the key issues that this committee should consider in its inquiry and, finally, present some of the recommendations outlined in our written submission.

In the 15 years that I have been involved in salinity I have undertaken a range of roles. These have ranged from scientific investigations working in both federal and state government agencies, and for the University of New South Wales for a brief period, through to exploring salinity management and remediation options in regional areas in a state government role as well as involvement in policy development and the New South Wales salinity strategy. In 1996 I was awarded a PhD for my work on the development and assessment of dryland and stream salinity prediction tools, pioneering a salinity hazard mapping methodology and the development of the first salinity hazard map for New South Wales.

In 2001 I created a grassroots organisation, ASAN, which, as I have said, is a national community based salinity initiative. Although I am currently employed by ANSTO, the Australian Nuclear Science and Technology Organisation, as a research scientist and am involved in the application of environmental isotopes to understand salinity processes—amongst other environmental studies that I am involved in—I continue to be the national coordinator of

ASAN. My wide range of experiences in salinity from different perspectives that I have just described gives me, I believe, a unique understanding of the issues at hand.

The Australian Salinity Action Network is Australia's only premier, independent and holistic community based organisation providing a national and central coordinated effort to combat salinity. ASAN aims to work closely with national government programs such as the national action plan. We are also investigating the national perspectives on salinity with a view to identifying innovative solutions for Australia.

ASAN's role in society is to be independent and non-political in approach—a role that seeks to coordinate and share information between all stakeholders involved in addressing the impact of salinity at all levels, including social, economic, environmental, cultural and spiritual. ASAN connects the dots between these different stakeholders impacted by salinity. ASAN has formed a steering committee to guide the direction and initiatives of this organisation and has designated voluntary state coordinator representatives for every state and territory in the absence of funding for these positions. We now have a healthy membership covering all sectors of the community, including those within all levels of government, environmental and community groups, small and large private companies and concerned individuals in every state and territory.

At the same time that ASAN was evolving, the national action plan was created by the Commonwealth government and it has provided a government framework for combating salinity nationally. ASAN commends the work of the Commonwealth in developing this most comprehensive approach to salinity. It also invites the Commonwealth to consider developing a closer relationship with ASAN, as the peak national community representative body aimed at combating salinity. I am convinced that the current federal and state government programs under the national action plan to combat salinity are indeed the most comprehensive and forward thinking that have ever been developed on the issue. Having said this, I think in the 1980s the Victorian government were well advanced in developing strategies for salinity action. These are worth reviewing as well.

The current programs attempt to integrate an understanding of the social, environmental and economic drivers with greater community ownership. The Commonwealth government is to be congratulated for the creation of this plan, including the provision of significant funds to execute it. Indeed, it is difficult to fault the system and processes that are being put into place through the national action plan. Despite our best efforts, however, there is still uncertainty as to whether these programs under the national action plan are effective now or will be effective in the future. The national action plan is just over two years into its program, and we need to review it and ask the hard questions of its ability to deliver the expected outcomes for combating salinity. I believe this is the central issue.

From the perspective of this inquiry I understand that the role of the Commonwealth government is to provide standards across the states and territories; overall coordination of best practice management of salinity; facilitation of partnerships, public funds and resources; and policy and legislation that is the best interests of the nation. ASAN has identified a number of key issues that this inquiry should consider, involving the Commonwealth's role, in order to improve our ability to combat the nation's salinity problem. I would like to highlight some of the key points that cover the three terms of reference. Are we choosing the best salinity science base and research data available? Are government programs utilising data sources and select groups

of scientists and organisations that strategically align their research to the political agendas of the day rather than to the true scientific need, in order to ensure funding for their own survival? As such, good and innovative science can be all too often unrecognised, and second-rate science leads to policy developed upon poor foundations and, ultimately, poor decisions that we have to live with for a long time.

Most natural resource data sets relevant to salinity are held in state government agencies and are often archaic, are difficult to extract information from and have often been collected in an unscientific manner. As such, not only does the analysis of that data become difficult to exercise but also the results and interpretation of that data are often questionable. Once again, the outcome of this is policy and legislation that is poorly conceived. The private sector should be called upon more often to advise on innovative solutions to the salinity problem. It is the private sector that thrives on innovation out of necessity, which is very different to the culture developed in the public sector. Public servants find it difficult to understand the true nature of innovation, which is the basis of commercialisation and wealth for the country.

The sharing of data between agencies is a complex matter, centred on ownership and professional career paths. The community does not generally have access to the databases or, if it does, there is no clear mechanism for understanding how to access the data. Government products, such as the maps that are put out under these different salinity programs, are often irrelevant to the stakeholders who are the primary decision makers—for example, farmers. Local government has potentially one of the greatest mechanisms to influence change on the land through its planning instruments at the local scale required. Often, councils lack the funds and are not briefed sufficiently on salinity matters within their jurisdiction. This issue needs to be addressed. Local government perhaps is a more effective instrument for bringing about change than the catchment management authorities that have been set up as part of the overall process.

Finally, based on these issues ASAN would like to recommend to the committee that it consider the following in its inquiry. Firstly, there are no current methods available that do not require field validation. ASAN recommends that the committee consider the need for allocating a higher proportion of Commonwealth funds to the collection of scientifically valid field, hydrogeological and other data, which will give more credibility to the maps and models being produced and the policies developed from them. ASAN also recommends that the committee consider the value that other science conducted outside the core national action plan projects has to offer, and provide greater opportunities for organisations to access funds for research and even assist them with ways to access funding from other sources in a proactive way.

The need to show organisations how the funding structure works has come across time and time again from a range of stakeholders. There is a need for the Commonwealth government to develop a strong partnership with an independent community based body, such as ASAN, which can assist at all levels with coordination and information dissemination across industry and community sectors, and is independent and non-political in approach. There is a need to access more experienced staff for advising communities and developing a longer term, more secure career structure for young professional technical and scientific staff in the public service. Furthermore, engaging the skills of the private sector in applying salinity options is recommended, since this sector actively deals with developing solutions and is often more credible with land-holders. Finally, councils need to be better informed and provided with more resources by other tiers of government. ASAN invites the Australian government and relevant

departments to consider utilising ASAN as a central community repository of salinity information on behalf of the Australian community and to consider ASAN as an adviser to government.

CHAIR—Could you just explain the network to me? It is just a voluntary group of people, presumably.

Dr Bradd—At this stage, yes.

CHAIR—So you do not have any particular funding or anything like that; what you do is in addition to other jobs that you are all involved in?

Dr Bradd—When I initiated the network I left the state government sector because I felt that there was a need to drive it from the community. Having worked with the New South Wales salinity strategy, I could see that if we really wanted to create action on the ground it needed to come from the community. I was prepared to give that a go, so I left my position to start it up. I spent two years trying to get it off the ground. It is now really taking shape. However, after two years I needed to get some serious money, and so I took on the position at ANSTO.

CHAIR—How many people are involved all up? In your submission you have given us the names and backgrounds of the half a dozen or so people who are part of the steering committee, but beyond that how many people are involved in the network? How extensive is it?

Dr Bradd—Also, as I mentioned, there are state coordinators in each state in addition to the steering committee, so you can add that number. Off the top of my head I cannot think of the membership numbers, but there would be 15 to 20 organisations and then another 30 individuals who have actually applied for membership, as opposed to the distribution list, where we have over 1,000.

CHAIR—You talked about a lot of state data being archaic and not all that useful. A number of submissions have raised the issue of access to data and the cost of data. Do you see that issue, particularly the cost of state data, as one of the inhibiting factors from a research point of view, or for developing different models followed by different organisations?

Dr Bradd—I think cost is secondary. I think the primary issue is how to access the data. Having worked in a state government position where I had access to the data, even trying to extract the data from the software—finding the way to try and pull out data that seemed to be in all different sources and to put it into a meaningful set for a particular project—was incredibly difficult, and that is within the organisation. If an external organisation tries to ask the department for that information, the person within that state organisation first of all has to try to pull that information together, and they think, ‘Well, I don’t have the time because I am doing other things.’ If you want this as a priority, that is where this cost factor may come in: it will cost you \$X. Other organisations will then try to develop collaborative relationships to try and bring ownership from that organisation, and also to reduce the costs, because they have a certain amount of ownership. That whole process is complex, but I think the root cause lies in the difficulty of just extracting the data.

CHAIR—You were with DLWC?

Dr Bradd—I was, yes.

CHAIR—You would have been trying to get data from where—the Land Information Centre?

Dr Bradd—Yes, but also within our own organisation.

CHAIR—So you had difficulties even within your own organisation?

Dr Bradd—Yes.

CHAIR—What about the interoperability of the data as well—was that a problem?

Dr Bradd—Sorry?

CHAIR—The compatibility.

Dr Bradd—Yes, that is a very good point. Different data sets—although I guess it is the software, again—the types of extractions required and compatibility from one set to another, even across states, are a problem. If you are trying to look at a national framework, it is impossible. It is true that compatibility is another issue as well.

Mr MARTYN EVANS—Is there value in the Commonwealth trying to use its funding and influence—in a model which is part voluntary, part carrot-and-stick—to persuade the states to be more cooperative in allowing the Commonwealth to marshal national standards for data compatibility and to publish data standards? These would be coherent standards for the kind of data sets that people would produce, not standards mandating what literal data you would produce.

We could have a common Dewey decimal library cataloguing system across the states, if you like, for the data sets and try to have a national repository for salinity data so the states could collect their own and keep what they like, but at least it would be made available on an electronic basis. We can now share data electronically and the states are making an effort to have a national cataloguing and mapping system. We have AUSLIG and the geophysical survey groups. Is there potential to try and achieve that kind of compatibility and thereby make this data available on a much broader basis to people so that at least the library is available?

Dr Bradd—It would be great to be able to achieve that. The question, from what you have said, would be—

Mr MARTYN EVANS—In your view as a scientist and as someone working in a national organisation already, firstly, is there value in this? Secondly, is it a realistic goal to set out library cataloguing standards that will allow the states to come together around a common data standard? Are such things available? Are we simply encountering bureaucratic resistance or is there legitimate scientific opposition to coming around a common standard?

Dr Bradd—I think it would be a great way to go if that could be achieved. On the question of whether it exists, I do not think it does. However, if it did, there would not be any opposition from a science point of view. A lot of the data sets that were collected, and that possibly are

collected, were not really collected with specific goals in mind like, 'We want to be able to address salinity.' They were collected for the mere sake of collection and quite often they were not collected in a scientific manner. In bringing that data together, and for it to be scientifically valid, we almost need to start afresh. Sure, have these old data sets because they have been valuable. I do not doubt that.

CHAIR—Can you give us an example of one that you was not collected scientifically?

Dr Bradd—Ground water and surface water data, for example. Other examples are the collection of major ion parameters, salinity parameters, pH and eH. You take all these measurements in the field. I know for a fact that field officers may have just gone out and collected a sample like this. If you read through scientific papers, you would know that there are a whole bunch of reasons why you cannot just go and collect a sample from the river or put a bailer down and collect a sample. It needs to be pumped several times to ensure you get the true aquifer water, that it is not just what is in the pipe where all the chemistry is changed. You have to think about that kind of thing. For decades we had data; it is all there, but what does it all mean? Maybe the results imply what was sitting in the bore and had nothing to do with the chemistry of the aquifer, just as an example.

Mr MARTYN EVANS—Even if it is now scientific, for example, it is not consistent, is it?

Dr Bradd—No, it is not.

Mr MARTYN EVANS—The states are still not collecting the data on a consistent basis and they are still not publishing it nationally. It is still being collected state by state.

Dr Bradd—That is right.

Mr MARTYN EVANS—Even if we assume that from 2000 on it has been collected in a more modern and scientific manner, it is still not being published nationally, it is still not being collated nationally and it is still not being published in a nationally consistent way.

Dr Bradd—No. That is right.

Dr WASHER—I thought your submission was terrific, by the way. I thought it was great.

Dr Bradd—Thank you.

Dr WASHER—Based on this—and to follow the data, because I think that is important—there are a few issues. One is that we have \$1 billion sitting on the table and another \$700 million from the feds—put in where they match what is put in by the states. To follow the line of questioning so far, it is a question of whether we lessen state requirements in terms of input of that if they make their data available on some web page setup and they collate it. In other words, they spend the labour costs, and we will take that off the dollar commitment costs. It seems that we do need this national approach because one of the problems you identified is that we have had very little business input into this. You could count on the fingers of one hand the number of businesses of any size I know of that have been involved in salinity in a commercial or profitable way. They would certainly need available data. You would not want to reinvent the wheel.

Would you agree that it is possible to do a deal with the states? You work for a state government; what would motivate it? This is not from a political point of view, but what do you think would be of interest to them?

Dr Bradd—That is a good question. I would like to think that through a bit more.

Dr WASHER—Perhaps I could leave that with you and come back to it later. Just to follow on from that, how much of this data is airborne geophysical data and how much of it is actual proof of drilling and other technologies, or field data?

Dr Bradd—I guess a fair amount of drilling has been done in the past. I am just trying to think through the current examples. I have listed a number of projects that are operating under the national action plan where airborne geophysics is taking place. They do tend to do drilling, but because of the cost of drilling—it is quite expensive—it is limited. They still do not end up always validating their airborne geophysics because they have not really had enough funds to do the amount of drilling that is required to get decent cross-sections and profiles of what is going on underneath.

Dr WASHER—Also, is the mining industry required to report back to governments on what sorts of structures, salinity problems and issues and so on that they interface with in their drilling programs?

Dr Bradd—No, I do not think they do. Do you mean to report that information back to the government?

Dr WASHER—Yes.

Dr Bradd—Most of it is confidential, though, isn't it?

Dr WASHER—They do drill a lot of holes.

Dr Bradd—Yes, but we do not know the results of a lot of that.

Dr WASHER—Would there be some inducement to the mining industry? It is hardly going to break them. I am sure they are not drilling for drilling's sake; they have got to be looking for something else. However, in the process they would know what they are crossing. So I do not see that it would harm them if we requested that information and paid a small amount to the mining industry in all drilling projects to discover what they have found, and also address this problem in the regions.

Dr Bradd—I think that many scientists would certainly welcome that. There is a lot of data out there in the mining sector and we have no access to it.

Dr WASHER—With regard to the relationship between you and the state working with local government in terms of the funding to local government for projects on salinity, what is that relationship like if the council, say, comes up with some scientifically based project to address this issue? Would that be a problem?

Dr Bradd—Do mean if the local government—

Dr WASHER—Yes, because they would have to apply to the states to get the money.

Dr Bradd—Under the bilateral agreements, it needs to fit within—and I will use New South Wales as an example again—the catchment blueprints. So I guess if local government came up with a project that fitted the criteria that was in that blueprint the catchment management authorities would make a decision on the funding. I imagine that is how it works. Once again, there is often politics involved between the two. That might answer your first question as well, in terms of incentives for the states. I cannot help but think that politics come into it all the time.

Ms CORCORAN—You made a comment about government programs often being irrelevant to the stakeholders, who are the primary decision makers. Could you expand a little bit on that? Could you perhaps give me an example and also tell me why that is so?

Dr Bradd—In saying ‘government products’, I am talking about the salinity mapping. I have heard that the government has sent out letters to farmers and so forth with maps of their areas. They are all regional scale. The farmer has absolutely no interest at all in that big scale; they just want to know what is going on on the land that they are farming. Quite often they will ignore the information that comes in that does not matter to them and end up hiring an agricultural consultant or someone who might do a local electromagnetic survey to look at the salt if that is an issue on their property. For example, they might have a vineyard or they might be planning a vineyard and they may want to know what the salinity levels are, and they will hire someone to look at their particular scale. These other maps—the broader regional ones—really do not mean much to them.

Ms CORCORAN—So it is too broadbrush stuff? Is that what you are saying?

Dr Bradd—Yes.

Ms CORCORAN—My second question is about your comment about funding not always necessarily going to the right people. Can you give me an example of that?

Dr Bradd—There are many, but I will mention the one in the submission. I will take the Honeysuckle Creek project that the Bureau of Rural Sciences is involved in—sorry, it is CRC LEME. They are being funded to use the airborne electromagnetics and radiometrics and they are doing all these studies.

Ms CORCORAN—This is the Bureau of Rural Sciences?

Dr Bradd—Yes. They receive funding to do these projects but ANSTO, on the other hand, has not received funding but is inputting into that quite valuable work. In this particular example, airborne EM shows paleochannels where there is potential ground water flow and that sort of thing. It is showing up where the potential salt store is but it does not actually show the dynamics. The salt stores are not an issue unless they are mobilised. How are they mobilised? They are mobilised by hydrologic processes. So we need to understand the hydrologic processes. ANSTO plays a role in identifying, with its technology, the permeability zones which are then flow past for salt. We are providing them with additional information that can help validate that.

We have a number of tools that we use and we show them this additional very important information.

Ms CORCORAN—'Them' meaning the bureau?

Dr Bradd—Yes. We—and I am talking on behalf of ANSTO—get no recognition and no funding for that.

Ms CORCORAN—So you have applied for funding and it has been knocked back, or is it not appropriate for you to apply?

Dr Bradd—No, I think it is appropriate to apply. I just do not think that ANSTO has been recognised as playing a role in this. It has not been recognised and I think it should be, because of the tools that are there. I have been there only a year, but I did work for ANSTO in the early nineties on salinity. I was not involved in applying for funds because it was not around back then, but I will find that out for you. I use that as one example but, through ASAN, I know of many that have tried. The national action plan has a very narrow focus of what it sees as the best science—that being these airborne methods.

Ms CORCORAN—Are those that are not getting the funding government departments or a mix of private and public and community groups?

Dr Bradd—I know several private companies that have good, innovative technologies—even in the airborne methods—but which, I think, are in opposition to the main group that runs this.

Mr MARTYN EVANS—Most science is funded on a competitive grant model. The ARC and NHMRC are funded on a competitive grant model. Would that be better for an element of the salinity based funding, so that you could get more broader based—

Dr Bradd—Yes, I think that would definitely open it up to a lot more people.

Dr WASHER—How is it currently funded? It is run out of Environment Australia and then—

Dr Bradd—AFFA.

Dr WASHER—AFFA, is it?

Dr Bradd—Yes.

Dr WASHER—How do you apply? How does it work?

Dr Bradd—That is a good point, because often it is missed. The funding does not seem to be well promoted.

CHAIR—It is initially predominantly through a negotiated arrangement between the Commonwealth and the states and then states put up projects often via their catchment management boards or authorities or whatever they are called. If the project meets the various criteria of an agreed basis of the NAP, it can get funding that way. That is how I understand it.

We will ask some questions on that of the New South Wales government this afternoon and of the Commonwealth in Canberra next week.

Dr WASHER—So it is a board controlled decision, is it? It has a board, does it?

CHAIR—No, it gets back to the agreement that was originally reached between the Commonwealth and the state. In the case of Western Australia, they came to an agreement only some weeks ago, whereas an agreement with New South Wales, for instance, was reached a couple of years ago. It then shifts from that down to these catchment management board levels in many cases.

Ms CORCORAN—Is that the reason for your third dot point recommendation about the need to show organisations how the funding structure works? Is that what you were getting at there?

Dr Bradd—Yes. Many people have said, ‘Maybe a role of ASAN could be to try to find out how it all comes together.’ I must say that I am struggling with it myself. Many people just do not know.

Mr LINDSAY—During the course of this discussion you have mentioned the words ‘politics’ or ‘political’ a couple of times. You also said in your evidence that scientists, often to follow the political agenda of the day, were doing research in this direction when it really was not where they should be going and you said that it was to ensure their own survival. Can you give us any examples of that? If it is something sensitive, just say so, but can you give us an example of how that might happen or where it happens?

Dr Bradd—It happens in just about every institution. I am wondering whether I should mention organisations.

Mr LINDSAY—I understand that. Do not mention organisations; just talk about fields of research or something.

Dr Bradd—If I read the comment it might jog my memory as to what I was thinking. Where was it?

Mr LINDSAY—I was quoting from your executive summary. It was the first dot point.

Dr Bradd—Keeping it general, years ago scientists tended to have a little bit more control as to where they thought research direction should be. It was probably more pure research. However, I think these days the directive comes from management down as to which way. I guess that directive comes from the minister. I am looking at government research organisations. The directive as to what the national priorities and issues are comes from the minister. The executive of that organisation says, ‘We need to be doing research in this direction; start coming up with ideas in that direction now.’

The direction might be completely different from where a particular scientist is heading, but they are told, ‘No, you are now going this way.’ I guess that is what I mean. For example, their conviction may be, ‘No, we might need to find out a little bit more about the ground water issues relating to salinity,’ but politics is saying, ‘We need to come up with management solutions and

we need them now.’ The scientists might be thinking, ‘How can we come up with management solutions now when we haven’t really understood the processes that will help us manage it better?’

It is an issue, because there is now a group of scientists of a particular school of thought that says that our conceptual model of salinity development is too simple and in fact in many situations wrong. Yet our management options are built around that model. Our mathematical models that help us predict are built around that model.

Mr LINDSAY—How does the nation guard against that scenario that you outlined? What is your recommendation to the committee as to how we report and say, ‘Here is an issue; this is what is happening.’ What do you think we should do?

Dr Bradd—The trouble with what I am about to say is that I know it cannot and will not happen. In many ways, I think that scientists should be allowed to be left as scientists instead of having to toe the political line. They need to follow the directives of their organisation, but I think that scientists should be given a little bit more respect in terms of their ideas and advice.

Mr LINDSAY—But wouldn’t you then get an uncoordinated science effort across the country? Wouldn’t you need some sort of coordination?

Dr Bradd—I agree with that. That is the thing: I do agree with that.

Mr LINDSAY—What would that model be? How would you do it? You are dead right about how the political process works and how with some of these things we need solutions now, but the model is not necessarily right. How do we now feed into that process? We need to be doing other things. Would it be through the Chief Scientist?

Dr Bradd—I agree that the science needs to be coordinated. Maybe through some sort of forum process scientists with their different ideas can get together to come up with a coordinated response. Look at the Wentworth Group as a model, for example. They are a group of scientists getting together and talking about an issue, spending a night writing it all down and coming up with a single statement. That could be a good model on a broader scale.

Mr LINDSAY—This is a pretty rough question—

Ms CORCORAN—As opposed to the last one!

Dr Bradd—They are tough questions!

Mr LINDSAY—I am not a scientist and, for anybody who is reading this transcript, this may be totally 100 per cent unfair, but I have a feeling that a lot of scientists in government labs have a pretty cushy life and do not really produce much output. What I am saying to you is: perhaps we could get much better value for our dollars spent on science if there were some mechanism that drove the boffins along rather than left them in their labs, going to morning tea every morning. Again I stress that this might be very unkind, but I get this feeling when I go to some of the labs in this country that everything is wonderful and beautiful and things just float along. I could be totally wrong. Have you got a view on that?

Dr Bradd—I do. I think that model definitely existed 10 to 20 years ago. These days scientists are fighting for their lives.

Mr LINDSAY—Okay. So, I am wrong. Fantastic! That is good—I am pleased about that. You talk about the private sector being involved. How serious are you about that? Do you really think that is possible?

Dr Bradd—I know they want to be involved. I have many who are knocking on my door. ASAN is probably the biggest sector in terms of people claiming new innovation. Some of the ideas are a bit odd but there are some genuinely very innovative and, I believe, potentially useful solutions to the salinity problems that cannot seem to get anywhere. They cannot get anywhere with government, which is why they end up coming to ASAN—we will listen and see what we can do. So, yes, I know they are serious.

Mr LINDSAY—They are interested in commercialising the innovation that they have—is that right?

Dr Bradd—That is right. They see that anything that has a problem has a commercial possibility. They have recognised that salinity is a big problem in Australia and that therefore there is probably a commercial solution.

Mr LINDSAY—There are significant barriers to all of that at the moment, so some of the science and ideas developed by private people are not getting into the field.

Dr Bradd—Definitely not, and, as I say, I know quite a few in that situation.

CHAIR—A lot of those companies are being fairly entrepreneurial with local government, farmers, farming industry bodies and things like that, aren't they, in helping them to work at the local level?

Dr Bradd—Yes.

CHAIR—There are companies like NRI and Agricom, just to name a couple of many—I do not want to highlight them. So you are saying that there is probably a frustration that they could be more effective and they would probably have a better opportunity to develop that aspect commercially if they were more involved earlier in the process or at the overall or regional level, so to speak?

Dr Bradd—A lot of these companies have no idea of this process we are talking about—the national action plan and how funding is driven. They have got no idea. So they are trying through other doors but not realising the reason they cannot get funding is that they have not approached it through the bilateral agreement to see that it fits the catchment blueprint type model.

Mr LINDSAY—You said that government products are often irrelevant to the primary stakeholders. That is a pretty brave sort of a statement. But that does not surprise me in relation to the other evidence that you have given. What is your proposal for governments to address that?

Dr Bradd—I think this is hard because what they want is more localised information, on a finer scale. That is why I think it will be difficult anyway, because governments are meant to give the bigger picture. These regional maps might be useful to the catchment management authorities. So I guess it does have use to groups like that. The keyword you used was ‘primary’ decision makers—that is, the ones on the ground. It just needs to be more localised information.

CHAIR—Isn’t that the role of the private sector to some extent—to look at the work that has been done and then see how they can take that information plus additional information they might get, such as satellite imagery, and put together some national data and other topographical data and build a localised model for farmers?

Dr Bradd—That is true.

Mr MARTYN EVANS—Can you apply that over flight data, the satellite data, the flown electromagnetic surveys? Can that be drilled down to a single farm?

Dr Bradd—I think they are trying to get to that scale. It is still questionable as to whether it is useful, because in the end it needs to be validated. That is where you need to be able to spend the time and money going out and taking real measurements. That is still the important thing to people. What does this mean on the ground? Does it really mean what it says? As I have pointed out in here, these red marks that are supposed to be salt stores might just be high conductivity geologic materials. So it has to be validated.

Mr LINDSAY—John, you have put in a pretty cheeky bid, if I might say so, about being a central repository of information. How possible is that? Is that a fair dinkum bid? Would you like to do that? Would it be accepted by people and governments around the country? Tell me why you should do it.

Dr Bradd—The basis for saying that is that the general community does have a bit of a distrust, I suppose, of government. There is this general sort of feeling. As an independent organisation that is there to represent the community, we are trying to build on that trust factor—that side of things. ASAN could act as an intermediary. It is independent, so they will trust the organisation more to be able to provide them with the information that they want. I just think it is a better model in order to gain access to community.

Mr LINDSAY—Thank you for that.

Ms CORCORAN—Right towards the end of your submission you were addressing our term of reference 3. You talk about the difficulty landowners and farmers have in accepting advice from these people—you did not say ‘kids in suits’ but that is what is coming out: ‘I’m here from the government. I’m here to help.’ You recommended that there is a need for more experienced staff who should be able to go on longer term contracts with government departments. Then you talk about engaging the private sector to provide that sort of advice. On the face of it, it is a little bit contradictory. I guess you would look, in the long-term contracts, for people to be older before they go out into the field. Can you explain how those two recommendations would work together?

Dr Bradd—That is an example again of where the primary stakeholders trust people from the private sector more, because that is who they will tend to employ for the advice and information specifically for their farm. I have heard many times from various farmers that, when they see someone from a government agency—maybe a salinity extension officer or someone—come out, quite often it takes a while for them to build up—

Ms CORCORAN—Could you explain what a salinity extension officer is?

Dr Bradd—Someone who is meant to try to provide community advice on salinity within their region.

Ms CORCORAN—Thanks.

Dr Bradd—These people are maybe a couple of years out of university. The farmers have been out there on their land for maybe previous generations. They are being advised by someone of that calibre as to what they should do, and they resent it. Hence, that is a reflection on government as well. So there is distrust of government. Whereas someone from the private sector might have decades of experience, and that is why they are a consultant in the private sector. They can go out alone and they have credibility from their years of experience. That is who they will listen to quite often.

Ms CORCORAN—So is the critical point the years of experience, rather than where they are coming from?

Dr Bradd—Yes. That is why I was saying that if we can train them up—

Ms CORCORAN—We need some grey hair. Thank you.

CHAIR—Thanks very much, Dr Bradd. We appreciate your evidence today and certainly your submission. I concur with what Mal Washer said earlier on: it is an excellent submission and a very useful start for us and for the inquiry.

Dr Bradd—Thank you.

[10.23 a.m.]

KANDAN-SMITH, Mr Colin Andrew, Senior Project Officer (Environment), Western Sydney Regional Organisation of Councils

CHAIR—Welcome. Although the committee does not require you to give evidence under oath I should advise you that the hearing is a formal proceeding of parliament. I remind you, as I remind all witnesses, that the giving of false or misleading evidence is a serious matter and may be regarded as a contempt of parliament. I also remind you that the committee prefers all evidence to be given in public. However, at any stage you may request that your evidence be given in camera and the committee will then consider your request. We have the submission from the Western Sydney Regional Organisation of Councils, and that has been authorised for publication. We thank you for that. Would you like to make an opening statement before we proceed to questions?

Mr Kandan-Smith—I will just make a brief introductory statement. Basically, WSROC's mission is to secure—through research, lobbying and fostering cooperation between councils—a sustainable lifestyle for the people of Western Sydney by the provision of infrastructure so that no-one has to leave the region to have access to the sorts of amenities, services and opportunities that other areas of urban Australia take for granted.

Salinity is an issue of great importance for Australia nationally and to address as a national priority. It is also an emerging issue for Western Sydney. The Western Sydney Potential for Salinity Map, which was recently published by the Department of Infrastructure, Planning and Natural Resources, indicates that a vast area of Western Sydney is affected by or is susceptible to salinity. Due to the soil landscape of the entire Western Sydney region, it has the potential to be affected by salinity. There is significant and ongoing pressure for development in Western Sydney and, in particular, for that growth to be fast and affordable, so salinity has to be considered as a landscape feature of Western Sydney which has the capacity to constrain development, affect agriculture and corrode public infrastructure.

WSROC recognises that no one entity or agency has created the problem; however, there is a feeling that the day-to-day hands-on management of salinity-affected land assets in Western Sydney largely falls to local government as the primary land managers in any given area. The cost of managing salinity will be borne largely by local governments and their communities. To effectively plan for and manage issues of salinity in a rapidly developing urban landscape means that there is an urgent need for appropriate tools that land managers and decision makers can use.

Research needs to be directed towards the provision of effective tools that will assist the decision makers, land managers and landowners to manage salinity appropriately and with confidence. This means that the issue of salinity management needs to be supported by robust research that will lead to practical management options. To be effective, research and management must be closely linked by an efficient and timely feedback process that will allow the ongoing development of practical options for managing salinity. Developing solutions to salinity issues at a regional level can be facilitated through a process that brings research and

technical advice to the table with all levels of government, industry groups and community groups.

The issue of salinity management is a nationally significant problem with strong regional contexts. This requires that a national framework supports a process of regional cooperation and investigation of regional solutions, along with input from scientific and technical research. Local government cannot solve this problem alone, and neither can any other level of government. Commitment is needed by all players to achieve better and more effective management of salinity.

CHAIR—Is WSROC involved in any projects at all under the national action plan?

Mr Kandan-Smith—WSROC's primary focus with involvement in salinity to date has probably been driven from the ground up by a sense that urban salinity is an issue that councils need to address. The Western Sydney region is not a priority region under the national action plan and so there is a sense that we must do something. Councils basically got around the table with various government planning and natural resource agencies and said, 'What can we do here?'

Over the last few years they have worked to produce this document—the *Western Sydney Salinity Code of Practice*. That was done with a great deal of assistance, with input from industry peak bodies, housing groups, state government agencies and technical staff and planning staff at councils. It was also supported by NHT funding from the Commonwealth. So, in that sense, it was certainly a collaborative effort, but it was kind of a groundswell. That project has concluded, but the working party that steered that project through still exists and is still working to deal with issues, and it will keep doing so.

Mr LINDSAY—Could I just have a quick scan through that document, please.

Mr Kandan-Smith—Certainly.

CHAIR—But there was no funding from the national action plan?

Mr Kandan-Smith—No, it was NHT funding.

CHAIR—Plus some state funding as well?

Mr Kandan-Smith—Yes, there has been state funding, in-kind collaboration with various bodies and contributions by councils.

CHAIR—What was the total amount of money involved? Do you have any idea?

Mr Kandan-Smith—I cannot remember off the top of my head. Can I take that on notice?

CHAIR—Certainly. I would be interested to make some comparisons with some of the NAP projects that are being done.

Mr Kandan-Smith—I came into the picture with WSROC a bit over halfway through the project, so some of my remarks will be based on what I know from speaking to other people and my involvement subsequent to events.

CHAIR—How many councils are involved in WSROC? Ten?

Mr Kandan-Smith—Eleven now.

CHAIR—What is the additional council?

Mr Kandan-Smith—Bankstown council is the most recent addition.

CHAIR—Which areas are most affected by salinity, or do they all have potential problems?

Mr Kandan-Smith—All areas have the potential for salinity. It may be better to address that question to the state government this afternoon. I refer to a map, which is on the public record, that shows the greater Western Sydney area, including all of the WSROC area. The area shaded in pale yellow has the potential for salinity. The orange areas are areas of higher potential for salinity and red sections marked on the map are areas of known salinity. But this is a very broad, regional scale map. Basically, most areas in the WSROC region have susceptibility to salinity.

CHAIR—Will we be able to get a copy of that map?

Mr Kandan-Smith—Yes. I believe you are speaking with my colleagues in state government this afternoon, and they might be able to provide that. If not, we certainly can.

CHAIR—A number of the submissions have raised the issues of access to data and cost of data. This is something that presumably your council members find as well. How limiting a factor is getting hold of the sort of data you would need, plus the cost of it, for work you might be doing in this area?

Mr Kandan-Smith—The question of data acquisition and some of the points raised by my predecessor here are very important. There is a need for a consistency in data that currently is not there. There is certainly a need for more data and information, relating to building materials and life cycles, that the councils might need to use for asset management. There are questions about building materials, engineering science and material science: how long will this last in a salinity affected environment if we use a salinity resistant material versus a standard material? What is going to be the life cycle cost of doing this? There is a feeling that this is a gap that needs to be addressed because decisions councils make are based, in a sense, on risk management. And the information to manage the salinity risk is not there. I think some councils are reluctant to move forward; there is variance in approaches.

CHAIR—Isn't it almost an admission of defeat if you are looking at extensive work in using the right sort of materials to resist the salt problem? Shouldn't we be doing more to solve the salt problem so that then it will not matter?

Mr Kandan-Smith—Certainly. I do not think it is an admission of defeat. We have this problem—it is real—so we need to deal with it and work with it. Development is taking place

quickly. There is agricultural industry in Western Sydney. The research is certainly continuing on how we can solve the problem. No-one is denying that. But account also needs to be taken of what we can do now. It is planning for the worst and working to achieve the best so that we do not end up paying more down the track for repairing damaged infrastructure or playing fields or for lost productivity of agricultural land.

Ms CORCORAN—For my own education, can you give an example of how salinity is affecting the WSROC area? I always think of salinity as affecting farms and things like that. I must admit that I had not thought of it this way until I read your submission, but it is logical. An example to bring me up to speed would be good. You made a comment a few minutes ago about councils being reluctant to move forward. As a separate question, I want to explore that too.

Mr Kandan-Smith—I will answer the second question first. It is not councils generally. I would say that different councils have different approaches as to how they are going to deal with salinity. They have all had input and access to the information in the Salinity Code of Practice. Some councils are very proactive in adopting the code of practice or working information into their DCPs—development control plans. Other councils are, for various reasons, taking the position that it is not such an important issue for them. That is what I meant by that statement. In terms of examples, there are a number, such as that of St Marys in the western suburbs, where I have seen for myself the evidence of corrosion of curb, guttering and roads, where it looks like it is crumbling or flaking away. Under particular conditions, you can get what they call an inflorescence of salt across a surface, and it can be quite dramatic. It looks like a white powder. You also see it in the crumbling mortar of bricks, on piers and under houses or buildings, where you get this hourglass shape and where stuff is crumbling away. But you can also get scalds or bare patches on playing fields, in parks and in other areas. They are the kind of examples I mean, and certainly there are photographs. It is well documented.

CHAIR—You have pavement failure in roads as well, don't you?

Mr Kandan-Smith—Yes, certainly. I am sure the council would have examples.

Ms CORCORAN—You are implying that there is a mismatch between what the scientists are doing and what people on the ground are trying to do to fix salinity. Am I correct in thinking that?

Mr Kandan-Smith—It is a mismatch in the sense that there is a gap between what science is doing and the direction it is moving in and what management is trying to do now. It may more be a case that we are speaking different languages and not communicating properly. Perhaps the feedback from both directions is not as timely as it could be. I think that creates a sense of a gap or a misunderstanding about what is happening and what needs to be done.

Ms CORCORAN—I am interested in your point that it might be communication more than anything else.

Mr Kandan-Smith—What I am getting at is that, when I speak to people in councils, I think they are aware that research is happening, but they wonder how they can access that information, what is happening and how they can apply that research in their day-to-day, real-world management. Where can they get that information, who can they talk to and who can facilitate

that process of bringing that research information and translating it into practical tools for management? I think that people working in local and state government and people working with policy are speaking a different language and are in different time frames to scientists. They are both perfectly valid, but there is a lack of understanding on both sides of what the other is trying to do.

I sort of have a foot in each world. I have a background in science, but I have also spent some time working in the local government area. I have seen situations where a scientist or a person with a scientific background is trying to explain something and is very evidently being misunderstood by local or state government managers. They are just talking a different language, and it is hard to bring them together sometimes. We need a process that gets our scientists and technical people together with our land managers, policy makers and industry and gets them speaking a common language—saying, ‘What can we do? How can we turn this research to account?’ Does that answer your question?

Ms CORCORAN—Yes, it does. There are some new thoughts there.

Dr WASHER—Thanks, Colin. I thought some of your statements were good—that science is problem orientated; government is service orientated. You also said that salinity is a problem because it is produced by a variety of distinctly different land management ground water flow systems, and no one approach will work in all cases. I agree with that. I have not read this, but a lot of the interesting science you have brought up is to address the problem that salinity is a reality and, as the chair said, sometimes we might have to live with that reality from a cost-effective point of view. A lot of science needs to be directed towards salt tolerant infrastructure development, whether that be in a biological or a material sense in terms of constructing that. For example, your playing fields could need salt tolerant grasses, and you could need salt tolerant concrete, bitumen et cetera. It broadens the field of science and salinity beyond what I first thought. That reality is there. A lot of these problems are going to be with us, so we might as well build saline resistant cities and infrastructure. However, I need to ask you then: seeing that you seem to accept that a lot of these areas are going to be saline affected, what level of science has gone into this infrastructure development? You must be using it.

Mr Kandan-Smith—I probably cannot comprehensively answer that question about what level of science has gone into the development of materials. I am aware that there are saline resistant materials. It is not just the management those materials and saying, ‘Let’s put in all of this salinity resistant stuff—plants, concrete, whatever—and that will avoid the problem.’ It has to work hand in hand with the management of salinity to try and mitigate and minimise the impacts in the first place and, ideally, resolve it if we can. But, as you say, there are places affected by urban salinity where they need to deal with it now. It is going to be a long time coming before they are able to overcome or resolve that, so we need to put measures into place now. I am aware that there is not research but discussion by groups such as the building council of Australia. There is also the Concrete and Cement Users Review Group, which I believe is also looking at issues of material science and saline resistant or capable materials and how they can be applied. I am not privy to exactly what is going on there, but there is certainly a perception amongst councils that the hard data and the hard information is not there, so they cannot determine what standards they need to be planning for.

Dr WASHER—I do not know these areas all that well, but I guess there are new developments in some of these regions where you have new housing developments. Are they being developed on areas where salinity is less likely to affect them? You showed a map where some are less likely than others, so I guess a new subdivision would not be allowed on areas at high risk from salinity.

Mr Kandan-Smith—It is a hard question to answer. There is a lot of development of various kinds, and it is not just that the development is proceeding in different places at different rates; it is also that salinity is a mobile problem. Your salinity affected landscape affects the form of development that you can do, but the form of development will also feed back and have an effect on how that salinity process occurs and how the ground water moves with the landscape. It is an interactive feedback process. One is affecting the other and they feed off each other. Certainly some developers are taking the issue of salinity into account, and I think most councils are taking the issue of salinity into account and are saying ‘Okay, we’ll put these options in place and try to manage the salinity.’ But, given that the potential for salinity resides right across the Western Sydney landscape, its development is happening and has happened on areas where there is salinity or where there is the potential for salinity.

Dr WASHER—Is there a good level of cooperation with the state for information and science? Are all their facilities at your disposal?

Mr Kandan-Smith—Largely it has been good. In our particular case, yes—and that is probably because it was a sort of ground up approach, where councils pulled together and got together with state government and other stakeholders and said: ‘This is an issue. Is there something we can do about it in agreeing to deal with it?’ The relationship has been very good, on the whole.

Mr LINDSAY—How effective have science, governments and, indeed, councils been in communicating information and issues about salinity to ratepayers? Do the ratepayers of today think of salinity as an issue? Are they largely uninformed? Should they be better informed?

Mr Kandan-Smith—The short answer is that I think the community is largely uninformed and they should be better informed. I do not think that is the fault of anyone in particular; it is just a process where this is a fairly recent and emerging issue for Western Sydney. I know we are talking years here but, in terms of getting that information out, information is just starting to be prepared and go out now. I know that the Department of Infrastructure, Planning and Natural Resources—it is very difficult to get used to their new name—is producing a series of booklets which are fairly simple and straightforward: ‘Salinity and roads’, and *Indicators of Urban Salinity*. One in preparation is ‘Good housekeeping’, which could be aimed at householders. But, by and large, I do not think the information is in the general public domain yet.

Mr LINDSAY—Is a typical councillor on a council better informed than a ratepayer, or are they still pretty representative of the ratepayer base, in terms of salinity issues? Is it not on their radar?

Mr Kandan-Smith—I would have to say yes and no. It is a very Humphrey Appleby kind of answer. Some councillors are certainly well informed, and through the process of developing this code of practice with WSROC—because we have councillors who sit on the WSROC board—

this code of practice was presented to them over and over. Presentations were made over and over directly to various individual councils by the project officers who were coordinating this, so it has certainly been brought to the attention of councils.

Mr LINDSAY—So there is a better flow of information from science through to councillors?

Mr Kandan-Smith—I do not think there is a flow of information directly from science through to councils, but through this project there was a flow of information about what salinity means to councils in terms of asset management and what to do about it.

Mr LINDSAY—Thinking of the staff of councils, the people who need to know do know—they are well informed and have access to all of the information. Is that the situation in Western Sydney?

Mr Kandan-Smith—Yes. There was an awareness-raising and training program for council staff as part of this process, and that included training not only for people from the natural resource or science area of councils, where they do have them, but also for planners, legal people and, of course, councillors, as I have mentioned. It was directed at managers, where that could be done, and to parks and garden staff. It was a fairly comprehensive training program and, on the whole, it received some very good feedback. I am sure it reached many thousands of council staff across Western Sydney, but across those member councils we reached well over 200 key staff who might have to be making decisions about salinity.

Mr LINDSAY—When you developed this code of practice, one of your aims was to encourage a proactive approach to salinity management. How many of your member councils have done that, and are you getting resistance from some?

Mr Kandan-Smith—Some are taking a very proactive approach. I should add that not just the WSROC councils but also the MACROC councils—the three councils to the south of WSROC: Campbelltown, Camden and Wollondilly—were involved.

Mr LINDSAY—So half of them are proactive?

Mr Kandan-Smith—Probably half are proactive. I would not say that the others are resistant—there is just an inertia there.

Mr LINDSAY—What is causing them not to be proactive? Are they not getting enough information to say, 'Hey, guys, this is a problem'?

Mr Kandan-Smith—It is not that there is not enough information but that there is a perception, for whatever reason—and it could be driven by many reasons; it could be for political or other reasons, I do not know—that salinity is not a major or primary issue for their council areas so it is not going to be very high on their list of priorities to deal with. There could be a lot of reasons.

Mr LINDSAY—How many councils would have put salinity issues in their DCPs?

Mr Kandan-Smith—I cannot answer that question.

Mr LINDSAY—A small number?

Mr Kandan-Smith—Yes.

Mr LINDSAY—Is the development community opposed to that? Are there political problems in doing it?

Mr Kandan-Smith—I am not aware of any. Potentially there could be. But industry peak bodies, such as the Housing Industry Association and the Urban Development Industry Association, were involved with the salinity working party and provided consistent and continuous feedback on various concerns. So while problems arose or concerns were made known to us during this project, as far as I know they have been resolved.

Mr LINDSAY—Would you agree that, when Mr and Mrs Suburbia talk about salinity, they think of it as a problem that is out in Western New South Wales and not in their backyard?

Mr Kandan-Smith—Absolutely. I think that would go for most people from any walk of life or profession. Most people think that salinity is an issue that happens out there. I certainly did before I started working with WSROC.

Mr LINDSAY—Is that because the science community is not translating the information down to the grassroots?

Mr Kandan-Smith—I think it is more that there is not a process that allows what the scientists are doing and saying to be brought to the grassroots level, and I think we are talking about a process here rather than what scientists or land managers are necessarily doing. But we need a process that brings them together to get that information across.

Mr MARTYN EVANS—I think you were agreeing earlier with our previous witness that, so far as state and local data collection is concerned, what is available is pretty much the kind of thing that is encapsulated in that regional map that you showed us earlier. Would I be right in assuming that that regional map represents some of the current available information?

Mr Kandan-Smith—That map would represent the current available information about the potential for salinity on a very broad scale. You certainly could not use that map to drill down to a single property level, but at a regional level it is probably indicative of the scale of and potential for risk in given regions.

Mr MARTYN EVANS—Do you have access to better and finer information than that if you want it?

Mr Kandan-Smith—Yes, we have access to some information and data. However, referring back to what the gentleman before me said, the data that is collected by state government, by local government and by many other bodies—private or government—is collected for their own reasons and purposes, and I do not think there has been any consistency to date. We have a lot of great information which is good indicative information, but it is not broadly consistent, and for that reason it can sometimes be difficult to compare sets of information. This would be true for all sorts of environmental data, not just that which is salinity based.

Mr MARTYN EVANS—So generally you do not make any particular use of the information at a local level?

Mr Kandan-Smith—At the local government level, no. Individual councils might have staff collecting data for various reasons. I know that the Department of Infrastructure, Planning and Natural Resources does ground water monitoring across Western Sydney, and we are looking at maybe accessing that data down the track to see what the trends are, but on the whole we do not make use of it. I think councils and council staff are relying on intermediary organisations or individuals such as WSROC or the project officer who did this to give them something that says, 'Here is what you can do,' and they need to be confident that the information that backs that up is robust and sound.

Mr MARTYN EVANS—You were also talking about the available research on urban materials, roadworks, infrastructure and building materials and the knowledge of its salinity resistance and the like. At the moment you are not really aware of anyone who is doing that much work on that kind of material and its resistance to salinity and the like. There does not seem to be anything in that area like a CRC or a CSIRO approach or anyone promoting common information throughout local government and the building industry, broadly discussing the longevity of that kind of material.

Mr Kandan-Smith—There may be research happening and, if there is, that is great, but local government is not aware of it. Who knows how accessible that data is, how long that research has been going for and how meaningful that data is—if, indeed, there is something happening. There is a feeling out there that we would really love some more information about this so that we can make some concrete decisions about what we are going to do in managing and developing this area, because it is going to affect our council and our ratepayers.

Mr MARTYN EVANS—How many other councils are you aware of that would be in a WSROC kind of position in or beyond New South Wales? WSROC is obviously one of the most prominent regions in Australia. You are a major urban region of Sydney, and a well-reputed one throughout the country. Salinity is obviously not the most overriding problem for the area, but it is an underlying problem which affects your urban development. Are you aware of other councils in urban New South Wales, and perhaps beyond New South Wales, that have this as an underlying issue in their ultimate development? Are you aware of this in the background of other councils' decision making processes? You must share this with other councils.

Mr Kandan-Smith—Yes, I agree. Of course I am aware of Wagga, which I think is almost a pioneer in urban salinity in New South Wales. I believe there are issues in the Hunter and Newcastle. I am not aware of other areas in New South Wales off the top of my head. I know that work has been done on urban salinity in towns in Western Australia, and it is certainly an issue there.

Mr MARTYN EVANS—So there is no real network even amongst local government?

Mr Kandan-Smith—No.

Mr MARTYN EVANS—I believe that if WSROC is not plugged into a network then probably no such network exists.

Mr Kandan-Smith—That would be right. There does not seem to be a coherent network, if that makes sense. There are loose networks, and certainly there is an email network—saltlist—which throws up some interesting information from time to time. Incidentally, that definition of salinity enclosed in here was from a gentleman in, I think, Tasmania—Colin Bastick—who sought feedback on what would be a good working definition of salinity. There are loose networks like that, but they are not directed. They are useful but they are not directed.

Mr MARTYN EVANS—I assume that the cost of salinity in the agricultural districts has always been cited as very high. The cost to Australia and the nation's GDP has always been assumed to be very high, which is why the country is investing so much in attempting to ameliorate it. I assume that there is in fact a very high hidden cost in urban areas which is rarely guessed at because we have always focused on the agricultural industries. I assume that salt attacks on urban infrastructure—roads, footpaths and various things like that—and on residential properties—undermining such things as the foundations—and the need for early replacement, in effect accelerating the depreciation of these assets, must have a significant cost in urban areas, not just in terms of undermining them immediately but also in terms of the longer term impact. Has WSROC thought about that, or would you just generally agree with the proposition?

Mr Kandan-Smith—I would generally agree with the proposition. We have not done any directed work on that. I would be—as I think councils, state government and industry groups would be—very interested to see some expertise put into that so we can understand the flow-on costs. You are quite correct: there are substantial hidden or indirect costs that may arise out of, as you say, depreciation of assets. This is an issue not just for local government but also for private land-holders and house owners. We are looking also at utilities—infrastructure for water, sewage and electricity in the ground—and what effect it will have in the longer term for, say, state government utilities. It really is a shared problem. There are Commonwealth land holdings around Western Sydney as well. Recently the Department of Defence asked to get hold of the code of practice so it could look at it and start thinking about what it might need to do to manage that land. So yes, I think there are substantial hidden costs. But again I do not think the hard data is there.

CHAIR—I assume that most councils in WESROC would run fairly extensive geographic information systems.

Mr Kandan-Smith—Yes.

CHAIR—They would get some of their base data from various government departments plus build in their own information.

Mr Kandan-Smith—Yes.

CHAIR—If a private company doing work for a land-holder in the area wants to access that data directly from the local council, is that data available to them? If it is available to them, is it at a significant cost? Do councils try to make money out of it, or do they provide it just at a nominal cost to cover its provision?

Mr Kandan-Smith—There is no simple answer to that question. It would vary a little from council to council. It would depend on the sort of information that was being sought by a private

individual or a private corporation. I am sure that some information would be accessible and I am also sure that there might be instances where a council might just say, 'That information is confidential and we can't release it'—for whatever reason.

This is not simply about outsiders coming in and asking for information; it also brings up the issue of consistent data-sharing between councils across a region and between different agencies at state, local and Commonwealth levels. Not only are there issues of consistency but also there are issues of confidentiality, proprietary information and intellectual property. It all starts to become a bit of a minefield once you start looking into it. I cannot answer that question adequately for you; there is no single simple answer.

CHAIR—Do councils have to purchase the data they get from government agencies?

Mr Kandan-Smith—Sometimes, yes.

CHAIR—Give me an example of when they have to. By 'data' I mean topographical information from the IC—

Mr Kandan-Smith—Yes; some spatial data sets.

CHAIR—They would be paying for that?

Mr Kandan-Smith—They might have to pay for that. For example, you might agree to having a 12-month licence for access to certain types of spatial data sets or database information from, say, the National Parks and Wildlife Service. That licence would have to be renewed, and there would be a nominal fee for that as well. There are different mechanisms with different agencies. It is certainly possible to share that information, but I think everyone has their own way of sharing and allowing access to it.

Dr WASHER—I have a question on the data factor that has been brought up a couple of times here. Let us say that I go into a new development and I build a house that eventually gets concrete cancer. It falls down 10 years instead of 30 years from now—because the problem of salinity will probably get worse, and once it gets into concrete infrastructure that starts blowing apart literally, with the expansion of the metal components. The playground surrounding it that I bought because of the environment has collapsed. The infrastructure coming to the house, such as powerlines, sewerage and water supply, has also fallen down. In that situation, I would have thought that a lawyer would get involved somewhere, as naturally happens. Obviously I have got no resale value: the house is bugged and the property is not going to have a lot of attraction to the next borrower to build on either. I would say that local councils have had a look at the problem. If public bodies had information to suggest that was going to happen to me and they did not tell me or if public organisations knew full well that that was a possibility but withheld that information, litigation could be a possibility. Has that been considered?

Mr Kandan-Smith—It has been considered.

Dr WASHER—I do not want you to get litigated, I hasten to say. But you know what I am saying: it is a reality of life these days.

Mr Kandan-Smith—Absolutely; I agree completely. It has been discussed; that issue has been brought up. To my knowledge there is no answer or direction on that yet. But the issue of risk associated with not passing on information about salinity and the question of liability that that raises—

Dr WASHER—I am emphasising that I would not have been warned. I am assuming I have not been told that this would happen.

Mr Kandan-Smith—Yes. That is a possibility. I cannot answer that. I know that the question has been discussed but I do not know what direction those discussions might be taking now or what individual councils might be doing about seeking advice on these issues. I think it is being sought on an individual, council-by-council basis, rather than in a consistent way. I am not privy to that information.

CHAIR—Councils issue a section 146—

Mr Kandan-Smith—149.

CHAIR—A 149 certificate usually goes through a number of issues—for instance, if you were building near an airport that might be subject to aircraft noise. They tick off on a number of those sorts of things when a development happens. That could be the area that Mal is talking about. A litigant can come back and say, ‘I have got a section 149 certificate that says it is all okay,’ and it has not been highlighted by the council. I guess that is where they leave themselves potentially open.

Mr Kandan-Smith—Yes. The question of how to incorporate salinity into section 149 was certainly discussed. I know that a great deal of thought went into that by individual councils. My latest understanding of that is that the councils are seeking their own particular, separate advice on those issues. It was certainly a question that loomed very large fairly early on in the piece.

CHAIR—Thank you very much for your submission and your evidence this morning. We appreciate you taking the time to appear before the committee today. It has been very worth while. If there is anything else that we require we will contact you.

Mr Kandan-Smith—Certainly.

Proceedings suspended from 11.08 a.m. to 11.15 a.m.

CREELMAN, Dr Robert Auchterlonie, Project Manager, Nanotechnology Project, University of Western Sydney

JANKOWSKI, Dr Jerzy, Senior Lecturer, University of New South Wales

CHAIR—Welcome. Do you have any comments about the capacity in which you appear?

Dr Creelman—I am an Associate Professor at the University of Western Sydney. I am appearing to comment on the way we view the science of salinity at the present time. My credentials in this area are that I have now been involved for more than a decade looking at this problem from the point of view of a geochemist, which I am professionally.

Dr Jankowski—I have more than 15 years experience in dryland salinity. I would like to submit my view, a very important hydro-geochemical point of view, as well as background information about the source of salt and the origin of salinity.

CHAIR—Welcome. Although the committee does not require you to give evidence under oath, I advise you that the hearing is a formal proceeding of the parliament. I remind you, as I remind all witnesses, that the giving of false or misleading evidence is a serious matter and may be regarded as a contempt of parliament. I also remind you that the committee prefers all evidence to be given in public. However, at any stage you may request that your evidence be given in camera and the committee will then consider your request.

We have your submissions to the inquiry—submission 16 from Dr Creelman and also exhibit No. 19, which was a joint review of the science of salinity provided by you. We have also received this morning an additional submission. We will not put a number on it at the moment, but we will accept the submission and authorise its publication. We have those submissions. They are authorised and are therefore on the public record. But to start this morning, in addition to those submissions, would you like to make some opening comments or a statement before we move to questions?

Dr Creelman—Basically, we are here to express the view that salinity is so complex a problem that we have not really addressed it fully as yet. There are a number of reasons why this has occurred. For a start, we think that the people who have worked on this have seen it as a surficial problem. It has been a problem that has appeared in the rural landscape particularly. Now of course it is emerging very heavily in the urban landscape as well, although I would argue that it has always been there and that we are now just a lot more aware of it. It has been seen as what I call a surficial problem—that is, a problem of the surface, not a problem of the depth at which it has been studied. As such, we have had people from various disciplines address it, like agriculturalists, geomorphologists, ecologists et cetera. Missing from that have been hard rock geochemists and geologists—the people who take the ‘whole earth’ type of view.

In this country the experience has been that it has appeared in a lot of our large basins where there is a lot of horticultural and agricultural activity and, as these are farm type areas, the leads have come from people who had agricultural soil science and that type of thing. Those, like me, who have had experience in other areas and have worked in the Hunter Valley—which I might

say is probably the second most prone area; it is showing up strongly in certain areas now—have a different view and look more at the whole earth because mining is involved there. We really have to look at this in a much broader sense. There are a lot of contentions within the science that are just that, and there needs to be a lot more fundamental work done. There is a lot of work being done in salinity, but fundamental work needs to be done also to back it up. I think we will find, as we start doing this, that some of our models will change.

I predict that instead of having one theory fitting most places we will have a number. The theory that we have at the present time mainly comes out of Western Australia and it is quite valid there. The Western Australian peninsula is hit by storms that come from literally both sides, so there is a large marine influence and a lot of chlorine coming through onto what is essentially a sandy type environment, and that expresses itself. It is also marginal to the desert, so there is climate change and different climatic conditions. Those from South Australia know well the story of Goyder's line where the climate literally changes: you can put one foot on one climatic area and the other foot on another. There is a bit of that in Western Australia too. It works well. In south-eastern Australia it is another story altogether.

We claim that the scientific community is now breaking itself down, because of the influences, funding and the complexities of the way in which we work in science, into three camps: two major and one minor. Those who adhere to the orthodox models of rising watertables, aeolian parna and that type of thing are what I call the surficial camp. The second camp are those who are looking at the salt inputs from connate salt. Papers are written with one camp putting down the other. Salt and ancient sediment, salt from rock weathering are what we call the whole earth camp. We see some shifts from camp number one through into the other camp, who are those that accept that ground waters spilling themselves onto the surface are the source of a lot of the salt, in addition to the salt that is coming from the cyclical salts, the weather systems and the ancient parna et cetera. These are the vertical fractured rock aquifers, but then we have to ask them: where does the salt in that fault come from and why is it in equilibrium with the rocks in which it lives? In our explanation is water-rock interaction.

Dr WASHER—What does aeolian parna mean? I read it last night but I did not have a dictionary.

Dr Creelman—We just had it last night. We had a great fall of dust that came from the wind that was blowing across from the west carrying dust. The salt is carried on these particles and falls. Getting closer to the areas, in the desert—in South Australia again, Pernatty Lagoon is a beautiful example of this—all the dunes are red until you get to Pernatty and then they are white afterwards. They are red because of the iron oxides. The gypsum which has flown off the lake makes the dunes white on the other side, so everything is moving from the west to the east due to the wind currents. It can be a lot more extreme and lifted into the atmosphere, which drops it back down again. That is certainly an input, but we do not know how much. We need to quantify it a lot better than we are doing, but it is not the only input.

We need to broaden the way in which the science is funded. I am suggesting something perhaps like the ARC, the Australian research grant system or ACARP, which I have had a lot to do with—that is a private coal industry one. Perhaps we should have something like that that grants on scientific merit and fundamentals. We should start moving on that rather than putting

grants through, say, the Murray-Darling Commission or to alleviate problems in specific areas. Perhaps we should take one step back and fund fundamental science a little more directly.

Dr Jankowski—I would like to add a few sentences about this issue. Dryland salinity is very complex; it is not a simple problem. Dryland salinity occurs if we have salt which is stored in rock, ground water transporting the salt and when we have the positional environment of clay. If one of these factors is missing, we will have no development of dryland salinity. We are not looking for the origin of salinity or the source of salt; we are simply looking for the visual effects of salinity. This means that if we have very simple origins, the simple origins will give us visual effects. The visual effects are: waterlogging, trees that are dying and efflorescent salt that is on the ground's surface. Often wrong management options are developed later on simply because we have problems which we can see. However, what we cannot see is where this salt is present and why this dryland salinity has developed.

Another issue is funding. Bob has mentioned already that we probably need a granting body like a CRC that will only be responsible for granting funding to study salinisation problems in Australia. This problem is not new; this problem is very old—30-plus years—but it is not solved yet. Why? For more than 30 years federal governments have provided millions of dollars for this study, but the problem was not solved because very simple solutions were sought for what was thought to be a simple problem up until now. However, this problem is very complex and most scientists do not completely understand it and, because of this, we have this simple approach. To solve this problem we must start fundamental background studies. If it is not solved in the near future we will not only lose soil but also water, because the water will become more and more saline and our waterways will not be able to be used as effectively as they have been up until now. The problem we have with agriculture and irrigation is exactly the same problem that we have with dryland salinity.

Mr LINDSAY—Gentlemen, you have access to scientific knowledge about salinity. You say there are three camps; how does that fit into what happens in the world? Is it the same across the world, or is this three camp arrangement something that is just in Australia?

Dr Creelman—I think it is something that has developed here. If you read about the American experience of 15 or 20 years ago with Imperial Valley, you will find they made big distinctions between the irrigation areas which were being reduced by carbonate precipitation versus chloride. Here there is a real belief that salinity means chlorine. At the launch of the salt action group, a person stood up and said, 'This is dreadful salinity,' and he had pictures of one of the canals with all this white efflorescence. Most of that is carbonate. It is bad if it gets to high total dissolved solids, but it is nowhere near as bad as having chlorine. You do not often see chlorine. It is greasy, it is in puddles that are very clear and you think, 'What beautiful water.' Do not try to drink it because it is very chloride rich, and that is the thing that kills. That is why Western Australia is so bad—it has high chloride inputs.

Mr LINDSAY—As science practitioners, do you feel you have adequate access in Australia to the body of scientific knowledge on salinity that exists in Australia?

Dr Creelman—Here in Australia or around the world?

Mr LINDSAY—First of all in Australia, then in the world.

Dr Creelman—I think that if we press ourselves to get it, yes, we have access.

Mr LINDSAY—You have adequate access?

Dr Creelman—Yes. If we fail to get it, it is because it is locked up in proprietary stuff—and there is a little bit of that.

Mr LINDSAY—What about access to the world body of knowledge on salinity? Is that relatively easy for you to get?

Dr Creelman—With global knowledge—the Internet and things like that—and our scientific connections, while it is not always easy, with an effort you can often find what you need. I would ask my colleague here to comment on that as well.

Dr Jankowski—It is already recognised in other countries where dryland salinity is present, like Spain, Canada, the United States, some South American countries and South Africa, that salt which is present on the ground in some places not only originates from the dissolution of sodium chloride but also is associated with completely different minerals. This was recognised a long time ago in Canada and the United States. However, in Australia some scientists still think that salinity problems are associated only with sodium chloride, which is very wrong.

Mr LINDSAY—You are not answering the question. The question was: do you have access to overseas experience—easy access?

Dr Jankowski—Yes, we have access because there is a lot of published data at the moment.

Mr LINDSAY—I know what you were talking about a minute ago, and I accept what you were saying; that was the thrust of your submission. Do you feel as practitioners that you have relatively good contact with decision makers in this country in relation to our approach to salinity, or do you feel there is no contact?

Dr Creelman—I think there is some contact. It is not as good as one would like. I have done a lot of work with what was previously the Department of Land and Water Conservation in New South Wales. I have just finished working through a minor grant that was given by the Australian Coal Association. I did have some disappointment in that because I got caught between the warring camps and they wanted to give an answer that was akin to the remediation rather than the fundamentals. We finally got something out that was reasonable, but I am certainly not satisfied with the work that we did in that, because of those constraints.

Mr LINDSAY—So are you saying that, whoever the decision makers are, they want management solutions now—

Dr Creelman—Exactly.

Mr LINDSAY—and they are trying to base it on perhaps science that is not correct, or are there other models that could be causing the problem which are not being taken into account?

Dr Creelman—It is the latter rather than the former. There are very few that are wrong. It is a half-truth that hurts, it really is. I had a desk calendar once that said, 'Be careful of half-truths; you might have the wrong half,' and to a degree I think that is sometimes the case when you are trying to apply these models to specific areas.

Mr LINDSAY—You talk about the alternative explanations of salinity; is there some difficulty in getting that information out in the broader picture?

Dr Creelman—No. Some of it has been published, and a lot more needs to be published in this country. For instance, if I could use an example here, a lot of the surficial people are using as evidence chlorine-36, a cosmogenic isotope of chlorine which has a half-life of about 300,000 years and is used for dating aquifers and things like that. There is a paper that has just appeared in the US that says that this has a huge 'regional' impact on the US continent and that it is to do with the climatic conditions across the US and North America generally. This means that you have to correct the values that you see in the ground water to what the regional value is, and that is not really being done. We have had published papers here—I think I referred to some of them in our submission—where they have just plotted the raw data and there is a scatter in it. I do not think the work has been done on a continental basis for chlorine-36 yet. I am not aware of it. So that is work that has not been done.

Mr LINDSAY—You mentioned academic rivalry in this part of science. Would you care to expand on that—the problems that causes and how they might be addressed?

Dr Creelman—By not having human beings do science! It is a natural thing. We all protect our patch, and we all like to think we are right. That is why we try to look at ways of the grants being put to a referee or a tribunal. The ARC tries to do that, very much. It is not too bad. It is still not perfect but neither are we as human beings.

Mr MARTYN EVANS—I asked a witness earlier, before you came, whether there was a basis for having an ARC-NHMRC competitive grant model for refereeing independently the more pure science side of salinity research grants. I take it that is basically what you are suggesting in your proposal.

Dr Creelman—That is one way, yes.

Mr MARTYN EVANS—I take it you are not much concerned whether that is a more specialised group, along the lines of a salinity research grant group, or a subset of the ARC, so long as it is an independent group rather than, say, CSIRO, which, as you say, has a bit of a conflict in this.

Dr Creelman—Robin Batterham, the Chief Scientist, who was one of my chiefs of division when I was working with CSIRO, made a very nice submission to the NSW Legislative Assembly Select Committee on Salinity. Their final report was published in December 2002. Dr Batterham made a submission to them that I thought was excellent. In that, he said that the model used now to fund CSIRO, where they have minimal recurrent funding and they have to get their own moneys—varying all the way from 30 per cent through to 60 per cent, depending on division—has advantages but has real problems too. There is a tendency to say, 'This afternoon's problems are not next week's.'

CHAIR—That has been changed since then though.

Dr Creelman—I hope so. I do not know if that is entirely so.

CHAIR—The requirement to raise a certain percentage has gone.

Dr Creelman—I am very happy to hear that. I know that CSIRO in recent months has been through some very dramatic changes.

Mr MARTYN EVANS—It was a grant funding agency, and that is not entirely appropriate. I think there are grounds for having independent referees, regardless of how one funds CSIRO. It is not really the relevant case, probably. What would be your view of some kind of independent pure research agency in respect of salinity itself? We have a lot of independent research groups. What is your view about some kind of small research unit looking at salinity? Are there grounds for having some kind of permanent or semipermanent model for basic research on salinity, or should that be done through separate independent research grants or a CRC type model? As you say, there is a lot of basic research to be done on salinity, so how would that best be tackled? We could have a small independent research unit—a small AIMS or ANSTO—we could have a program of independent basic research grants which get scattered across the country, as we do with the NHMRC and ARC and as we are doing now, or we could put a unit with CSIRO. Is there a basis for having some permanent, ongoing unit as a basic research unit, or should we continue with a grant funded model and just have scattered papers? What is your view on that?

Dr Jankowski—I think that we need a granting body which will be responsible only for salinity. Probably a CRC model would be best. Why? Because grants from this government or the ARC to research salinity problems are very difficult to obtain because several people have already said that the salinity problem is solved. Because of this, this type of granting body will not fund studies into dryland salinity. This means that we have to have a granting body which will be responsible only for salinity—starting with basic background information and fundamental research into it. This granting body will only be responsible for dryland salinity.

Dr Creelman—It depends on who you source. If you make a special body and a group of people get together, which I presume might be a dozen or something like that, you run the risk of taking in an unrepresentative sample of people's views. If you have a CSIRO division, everything we have said about CSIRO applies again. Let me be very quick to say that I have the deepest respect for CSIRO, and they are doing extremely good work. What I am talking about are problems of human foibles not the integrity of the people we are dealing with—that is very high in CSIRO. We are liable to fall into that too.

So what I think you are looking to do in a case like this is to involve as many scientific disciplines as you possibly can and not have it defined as, say, people who are working in the surficial sciences—like geomorphology, climatology, or the things to do with the surface of the earth—but to also involve the geologists. They are virtually not there. There are a few geologists who have gone more from the surficial side, but the deep-rock geochemists and the hydro geochemists are really not there. So we need to involve them. They are the two big holes, and there are probably more. So I would favour something like a special CRC. I have had experience with the coal CRCs. That model also has its problems, but it tends at least to spread the tentacles

into all the sciences and draw on what is available. That can only be to the advantage of the problem being studied.

Mr MARTYN EVANS—Would that also be a good way of gathering together some of the data sets which are out in the various state government agencies and Commonwealth agencies? We have had evidence that some of these data sets are incompatible and not currently available collectively on a national basis. Some of the data sets seem to be inconsistent: the data does not seem to be held on a compatible computer basis so the data is not easily accessible.

Dr Creelman—That is always a problem.

Mr MARTYN EVANS—Perhaps some sort of effort needs to be put into ensuring that it can be accessed on a compatible and national basis.

Dr Creelman—I can only speak from my experiences with the NSW authority responsible for water. They have had a very hard time over the last 10 years in terms of the shifting responsibility. Most of their scientific effort has been whittled away and they have become policy makers, licence granters and managers. They used to be very good in terms of backup investigations—they had geophysicists, hydrogeologists and hydrographers. That skill base has been eroded.

You are right: in a lot of these areas there is a tremendous lot of data that needs to be gathered together and made compatible and put together in the context of salinity. A lot of it was collected for other things. There is a lot of chemistry out of the mineral exploration world. I did some of this. My PhD thesis was on Pernatty Lagoon so I had to look at the waters—that is how I got involved in this—and their ability to carry metals, which is what it was all about. So there is a lot of information in there too, which we should be able to access, from all the companies. That is held with the mines department. That is just one which I do not think anybody has accessed. If the body that we are talking about is set up, perhaps in its early years it should have a set of temporary employees or consultants or whatever to actually go and do the getting. There is a lot of information already available. People do not know they have got it, some of them.

Dr Jankowski—It is a lot of information but the exchange of knowledge is very poor really, and we have no national database. Because of this, we simply do not know what work has been done in South Australia or Victoria. Also, a lot of this work is unpublished work. It is technical reports or university students' theses. Because of this it is very difficult to obtain this information. This means we need a national database. Somebody should collect all this information because it is really good data collected over more than 20 or 30 years. There is no access to it.

Dr Creelman—It needs a bit of editing.

CHAIR—Fine.

Ms CORCORAN—You talk about the three warring camps. I am not a scientist. Do you mean that there are three different theories, if you like, for why salinity is occurring, of which the first is what I would call dryland salinity and the other two are two different reasons for salinity occurring? Am I correct?

Dr Creelman—Yes, but they tend to argue with each other and try and put each other down in both the literature—

Ms CORCORAN—Can you explain what the connate salt theory and the third theory are? I understand how the dryland salinity theory works.

Dr Creelman—I view it a little bit more broadly than just dryland. You will see salinity and you will have expressions of salt in the landscape when you reach an imbalance between precipitation and evaporation or between the ground waters discharging onto the surface. In many ways the observations made in South Australia and Western Australia, where in the very early days before we started to farm ‘on the margins of the good earth’—which was the title of a brilliant book—we did have a balance where there were trees et cetera that were often almost overhangs from a much wetter time in Pleistocene history. Once they are gone, of course, we do get changes in the watertable and therefore a whole lot of land is wiped out and, let me tell you, it is wiped out forever. What has happened is this overhang from desertification. We have just accelerated it for a short time. You can see it now. We are probably still going into a dryer period after the Pleistocene, and the march of the Sahara across into Ethiopia and places like that now is extremely rapid. All man is doing is accelerating it. But it is there and it is happening. There were camel routes going across to Western Africa that, 2,000, 3,000, 4,000 years ago, went from grassland to oases which were not salty at all. We are going into a desiccated time in the earth’s history anyway and this corresponds with it. All these things are interconnected.

Ms CORCORAN—Does that mean that the connate salt and the salt that comes out of cracks in fractured rock are another source of the salt that is in the soil?

Dr Creelman—But then we have to ask ourselves the next question: where did that salt come from? And that salt comes from water-rock interaction. There was some very good work done by a fellow called Kellett back in 1989—he described what he called hydrogeochemical facies in the Hunter Valley, where you could actually see the marine based rocks reflected in the types of ground waters—that we really could agree with. Therefore anything that has these rocks is going to produce this sort of water, which happens to be high chlorine. That is one of the problems. With mining, because you are breaching these rocks, increasing the weathering and releasing this material, the voids in the coalmines have to be very carefully managed, and that is what we were doing with ACARP.

Ms CORCORAN—So presumably we need to understand why—and I have to be careful with the words that I use here—salinity, or the expression of salt, as I think you are putting it, is occurring in order to work out how best to deal with it.

Dr Creelman—Yes.

Dr Jankowski—Yes. We need simply to find the source of the salt—where the salt is present in the rock mass. If we find where the salt is located, it will be much easier later on to find the origin of salinity. At the moment the most common and popular origin of salinity is when ground water is discharging and later on evaporating. But that is only the effect. It is not the origin; it is only the effect of this water discharging and later on salinity is built up. Put simply, water is evaporating and salt is left on the ground surface. But this is a visual problem. This means we have to go deeper to find where the source of the salt is. If we understand the source, we will

also understand the origin of the salinity, and the solution to the problem and management of options will be much better.

Dr Creelman—Jerzy has a beautiful model which I often plagiarise off him whereby there is a mountain and two rock units coming together. Trees were on top of the hill, they were all cut down, and salinity then appears down on the flat area. One solution offered is to plant all the trees back on the hill—no, that is not going to work at all, because what has happened is that, yes, you have by influx lifted the watertable, but as you have lifted the watertable the hydrostatic pressure has pressed and lifted the watertable that has got the salinity into it, the salinity probably arising from the base in itself and it is starting to express itself. So planting the trees back on the hill is not going to help you at all. What you have to do is face the problem where in this case it appears, and that is to do something about the watertable which is rising to the surface there.

CHAIR—So planting trees there is not necessarily the solution either.

Dr Creelman—It certainly is not. It is a waste of time.

Dr Jankowski—Of course not.

CHAIR—It is definitely not the solution.

Dr Creelman—That is right.

Dr Jankowski—It is not the solution. We postulated engineering options in the early nineties. However, nobody really picked up the engineering options because there is a very poor understanding again of the origin of salinity. Because of the lack of implementation of engineering options it is also not properly understood how we can, for example, tap the water aquifer. This means we reduce the watertable and the saline water will not discharge to the ground surface. There are a lot of engineering options. However, they are not implemented because there is not enough funding. What are we looking at? We are looking at a very short period to study, find a solution and implement management options. And the problem is not solved because the research was not deep enough to understand the origins of salinity.

Dr Creelman—I want to add something to what you said. You were talking about the warring camps. I am going into my second house—I have a different history, so I am using literary terms. What I really mean is that, as you said, there is not good exchange of information. People are sitting on their dignity and starting to argue that they are right. They will not debate or accept what a lot have said. There is not good communication between the various groups. Of course that is wrong. You hear this reflected in some of the policy makers: ‘You are silly if you do not believe that.’ I have heard on the ABC—forgive me—‘If you don’t believe in greenhouse, then you are pretty thick.’ Well, greenhouse is having a lot of counterargument now appearing in the literature, and that is the way it should be. It may prove to be correct, but let us not stifle the debate. And we are starting to stifle the debate at this particular stage. All I am asking is that we do not stifle debate.

Ms CORCORAN—That leads me to my second question.

Dr Creelman—I am sorry.

Ms CORCORAN—No, that is fine. You said before that there is not the exchange of information. I assumed that you meant there was not an exchange of information between the scientists and those who were implementing cures—or whatever the word is. I was going to ask you why there is no exchange of information, but you are actually saying it is also a problem of a lack of exchange of information between the scientists themselves, because of this natural inclination to protect their own patch.

Dr Creelman—Yes, that is correct—and coming from different disciplines.

Ms CORCORAN—Is there a lack of information exchange between the scientists and those who are trying to do something about implementing Landcare?

Dr Creelman—A lot of ecologists are doing it, who are more generalist, and there are some very specific problems that have to be addressed before you can generalise. And this has not been done in its entirety. That is what we are presenting to you.

Ms CORCORAN—So how do we fix that?

Dr Creelman—We go back to the fundamentals.

Dr Jankowski—There is a very poor exchange of knowledge between scientists and managers. It is this way because science is growing very fast and we have new knowledge about our region. However, managers are only implementing management options and they are not really at the same level of understanding of the problem. If, for example, we submit some new proposals, they do not understand the problem. This is simply lack of knowledge about the fundamental and background problem of salinity at this moment—because they are mostly managers and they do not have enough knowledge about the background. This is the problem.

Ms CORCORAN—I think that is part of the reason we are here today. What we have to do is find out how to overcome that.

Dr Creelman—Let's make it an important problem—not just in management, in environmental management and in what we have to do. Let's go back and understand this fundamentally a lot better than we do.

Dr WASHER—I enjoyed your presentation. I thought the science was fantastic. I grow avocados on the west coast, so I know about salinity and chloride. You say chlorides are a problem to us. As you pointed out carefully, it is not just the rising of the watertable. It is not a problem where I am—I am in a sandy area—but the quality of our water underneath is degenerating rapidly in the west, and of course we have the salt-laden winds. We have 50 kilograms per hectare of salt precipitated every year, and we are getting a drier climate. Even now we still get that. You talked about the dust. I had not even thought of the dust the carries the salt. It is not so much a problem, although sometimes the east wind blowing off those land surfaces could be a problem. Basically it is the leaching of salt containing rocks, you say, when watertables come up. I am putting it simply, but this is what you are saying. All these things are factors of rising water levels dissolving the salts, clays and various soils as they are left.

So lowering water—which is just the basic principle of what is happening currently for the management of this problem—alone does not solve the problem unless you know where you are going to lower it, and this has been a waste of time. In the west we used, exclusively, tree planting to lower the watertable by using trees to pump. We spent millions in the west. Unfortunately, we should have known what you already said: that will turn to desert. I would say in excess of 90 per cent of those trees are now dead or are in the process of dying. You fly over WA now and it is just mass destruction of trees, and now there is research going on to reinforce this—whether it is a hydrological problem, which I am sure it is, or whether it is a pathological problem, because there are all sorts of fungus, borers and all these things in these rotting and decaying trees. Unless we know the science—I guess I am making a statement, and I want you contradict this if I am wrong—and understand these things, we can waste countless of millions of dollars and just increase our desert areas. If you look at WA, you can see that planting trees has failed. Those hydrological pumps have failed. Maybe you would like to flesh that out.

Dr Creelman—Once it has gone too far and that water is beyond what the tree can take, it will live for a little while. As soon as it gets its roots down in that heavily salinated water, it is dead.

Dr WASHER—That is what has happened.

Dr Creelman—I can give you another example here in the east where at a place call Mount Costigan they made a big effort to try to rehabilitate an old 19th century mine. It still had an awful lot of pyrite in it, which gave acidity. The trees were beautiful. They went from this height to this height—and then they went down to this height, because they hit the acid underlay and it just killed them. It is the same thing—we have not solved the problem at all. I do not know what you would call it. It is not even window dressing, is it?

Dr WASHER—No. I put to both of you this proposal: it would seem that if we were going to get good science into this—I guess this is what we are all about—we really need to have a massive conference of people, including those involved with climate expertise, because climate is an important part; those specialised in plants, horticulture or silviculture, if you are going to deal with trees; geologists like you; and people who are experts in water flow and management issues. It would include the whole spectrum of people right across the board. From that we could identify what science is necessary from areas that we do not comprehend so that we can actually do something about this. Would you say that is a good proposal?

Dr Jankowski—Yes, it would be a very good proposal. We simply need people from different fields of investigation—geologists; geomorphologists; hydrogeologists, hydrologists, people who have excellent knowledge about soil, including the physics and chemistry of soil; geochemists; and hydrochemists. Different fields of science should be put together and then this problem can be solved—not only from one angle, not from very narrow knowledge. This problem never will be solved if we undertake, for example, studies related only to water or only to rock or only to soil. We have to link all these problems together. Water which is carrying salt is moving from rock through another environment and finally is discharging on the ground's surface and soil is affected. This means that we need people who will trace this water as it is moving from the source, to the visual effects assigned to what we can see. This means it is necessary to undertake very detailed background investigations from different fields of science.

Dr Creelman—I think you can prioritise it too. I think the ecologists and the plant scientists and the soil people are a little bit further down the road. What I do not think I have put in here in detail is that salinity in the salt cycle is in fact a natural phenomenon. It is part of the rock cycle, in fact. It is just a subset of it. We have to take that broad view, which is the geological view. Everything in the earth is cycling. We have to get the salt or the soluble components of rock weathering right before we can then go off into the next one. So I really am saying: yes, I agree entirely with what you say, but let's put an emphasis back into the cycle, then it will shift automatically into the plant ecology—that type of thing. We have actually begun back here. We are having a bit of trouble getting back.

Dr WASHER—If you were an irrigator today, in relation to the parna issue that you described, after last night, should I irrigate to flush that down?

Dr Creelman—Yes, you can do that.

Dr WASHER—At the moment people are saying minimise irrigation, because you look at the watertable. What I am saying is that I will just precipitate a lot of salt; maybe I ought to flush this down and save my trees or plants.

Dr Creelman—Yes, we do lift the watertable when we irrigate, and we do it a lot. It is not the watertable itself; it is that area where it goes up and down, the Varnos zone, where you get the salts. I have relatives from Burra in South Australia who are out beyond the Goyder line. Whenever you go to a sheep tank there, you find huge gypsum crystals. The reason for that is that it is only in a wet couple of years that you can actually use that underground water. Almost daily, bang, the thing goes across to highly saline water—usually sulphate based. That just sits and evaporates. The fresh water sits on top of the salt water. You are in very marginal land there. It is where you irrigate, how you irrigate, what amount you have to put on it. There are studies to this effect, warning us not to overdo it. Overdoing it is the problem.

Dr Jankowski—Whether you irrigate or not is another big problem because you have to know if any salt is in the soil. You can use fresh water for irrigation; however, if the landscape on the top is saline, you will have a very big problem with salinity. If the soil is fresh but the water you are using for irrigation is saline, you will have exactly the same problem because of the built-up salinity on the ground surface. This means the problem is to understand what is going on in the bedrock and on the surface.

Dr Creelman—I would add that when we say 'salinity' we need to be a lot more surgical about what we mean. Chlorine salinity is the thing we worry about a lot but there is another one—for instance, if you take granite like we have in the central west and weather it, you can get as much sodium as you like because of the orthoclase that is in the rock and the weathering away of the rock. But you do not have enough chlorine; therefore the chlorine is pulled from the atmosphere as the water percolates through. So the salts will be dominated in that area by sodium carbonates and bicarbonates and in fact by sulphates if there is some sulphur present.

There is not a lot published yet on the type of salinity, yet many farmers know about these issues. I remember in 1995 we had a colloquium at Sydney University. The Murray-Darling Basin people presented and got taken to by a couple of farmers from down there, who said, 'What do you mean? I'm getting all this carbonate stuff.' And that is very different; that is not as

bad as your chlorine. I did not have an answer to that and I do not think there would be an answer to the question yet. I have a couple of students racing around at the moment doing a little pilot study for me in Western Sydney to collect the salt and tell me what the proportions of the various salts are—following up on your work, Dr Jankowski.

Dr Jankowski—For example, in the southern tablelands like the Yass area, which has very big problems with dryland salinity, it is not sodium chloride salt but magnesium sulphate salt or sodium bicarbonate salt because of the ground water chemical composition. It is not a sodium chloride problem; it is an efflorescent salt—a white salt—but it is not sodium chloride.

Dr Creelman—When you have magnesium in the salt it is a lay-down misere against the people who were talking about cyclical salt. There is only one source of magnesium and that is out of rock, and it is usually basalts.

Dr Jankowski—Yes.

CHAIR—Have you finished your questions, Mal?

Dr WASHER—Yes.

CHAIR—We have gone a bit over time. Is there a danger that many of the projects under the national action plan are being implemented to address a salinity problem in generic terms rather than a salinity problem of chlorine salts as opposed to carbonate salts as opposed to magnesium salts?

Dr Creelman—I would address that in another way. I would say that it is being implemented with the same model in a whole lot of different areas and those different areas are going to have different solutions. Let's characterise our catchments a lot more carefully.

CHAIR—In talking about those projects, I noticed that in 2002-03 the federal government has provided about \$14 million for 17 projects across New South Wales. That does not include stuff for 2003-04; I am just looking at things that supposedly have been funded in the past financial year. Have you had any involvement or input in any of those, or are you aware of any of the work that many of these projects have done?

Dr Creelman—I am aware of it, yes. A lot of it is very specific. A lot of it is attached to CSIRO, which is one of the problems, too. But we are talking about more fundamental things. I have used the ACARP funding—that is the one we have just finished. As I said, I am dissatisfied with that because the coal industry gave us the money and the coal industry are worried about those voids and how they are going to handle it—not now, but in 100 years time. I wanted to do a lot more regional work and I could not in conscience do that because they wanted an applied answer. Really, what I am saying is: can we please do some of the fundamental stuff in a more unhooked, unstrung manner? That will help.

CHAIR—I understand. Finally, you were talking about the fact that we see salinity come to the surface when water comes to the surface and evaporates et cetera but we have to get to the source. Is the airborne geophysical work that BRS has been doing to identify salt deposits and

also underground drainage systems and things like that good work? Do you have any comments about the work that they are doing and any problems with that particular work?

Dr Jankowski—There has been a lot of geophysical work done across Victoria and New South Wales. It is very good work. However, this work is not linked to background studies. We will have excellent maps about where salt is present. However, we will still have no knowledge about the origin of this salt and the source of this salt. This is excellent as a background study for target studies. For example, if we have a problem in an area we can base the full science on the background through different disciplines of science.

CHAIR—So that airborne geophysical stuff is appropriate to act as some sort of input into that but the additional work that needs to be done is more on the ground work?

Dr Jankowski—Yes, of course.

CHAIR—Drilling?

Dr Jankowski—Drilling and sampling of water and soil because we do not know what the chemical composition of the water is. Is it sodium chloride or is it carbonate water or sulphate water? We will only have the information that salt is present; nothing else.

CHAIR—We now have 20-odd years of satellite data, actually, a large amount of data and covering a large period of time such that you could possibly start to identify changes. Is that archived remote sensing information a useful tool that could be combined with some of the geophysical work?

Dr Jankowski—It is a very useful tool. However, it must be linked with other sciences because from this one thing we will not find a solution.

Dr Creelman—Can I give you an analogy here? I am a creature of the mining industry. We never do exploration without having multiple inputs from our geology, from our field mapping and from our geophysics. To use a military analogy, you cannot win a war using your aircraft alone. You have to put the poor bloody infantry in there. These are the people who go on to the ground, walk it, map it and take the samples. On your last question, there is a wealth of information—particularly sitting with the stuff that has accompanied the magnetics in the mining industry—which will be very useful.

Dr WASHER—Based on that, would the mining industry be reluctant to give that information across to governments if they had some payment for it or whatever for the cost of collating it? There would be no reason why they should be reluctant, in terms of salinity, to give away information on that basis. Or can you think of reasons? You have been with the mining industry.

Dr Creelman—If you have a lease, when you relinquish that lease you relinquish the data. After a while—I am not sure how long; it varies from state to state—that becomes public information. So there is a huge amount of stuff available for people to go and get. If we are talking about an authority, these are the go getters who have to get that stuff.

Dr Jankowski—It is not a problem to obtain this data from mining organisations because at this moment my PhD student—who is working on a dryland salinity problem near Dubbo—has asked for satellite and aerial information from mining companies and there was no problem obtaining this data. If it is said that the data will only be used for scientific and research work there is no problem.

CHAIR—Thank you very much for coming this morning and for your submissions. It has been very useful for us. We appreciate it very much. If we have any further follow-up queries we will be in touch.

Proceedings suspended from 12.15 p.m. to 1.02 p.m.

HUCKEL, Mr Andrew, Senior Analyst, New South Wales Farmers Association

STREAT, Mr Jonathan Russell, Policy Manager, Conservation and Resource Management, New South Wales Farmers Association

CHAIR—Welcome. Although the committee does not require you to give evidence under oath, I should advise you that the hearing is a formal proceeding of the parliament. I remind you, as I remind all witnesses, that the giving of false or misleading evidence is a serious matter and may be regarded as a contempt of parliament. I also remind you that the committee prefers all evidence to be given in public. However, at any stage you may request that your evidence be given in camera and the committee will then consider your request. We have the New South Wales Farmers Association submission, No. 45. It has been authorised for publication, so it is now on the record. Would you like to make some opening comments or a statement before we go to questions?

Mr Streat—I would like to start by thanking the committee for the opportunity for New South Wales farmers to comment on what we consider to be one of the most important issues with regard to natural resource management within New South Wales and the rest of the country. Something that is often overlooked is how the science is coordinated within research institutions and how that information is presented to the end users, which obviously represents our membership of some 13,000 in New South Wales. It is pleasing to see that there are obviously some efforts at hand to help to coordinate things a little bit better. That will also impact on funding arrangements, I am sure.

This is a timely inquiry, particularly in relation to some recent developments within New South Wales which you may be familiar with or aware of. Just recently, the state government here in New South Wales announced a fairly fundamental change in the way in which natural resource management will be dealt with over the next couple of years and, hopefully, well into the future. In particular, there is the establishment of so-called catchment management authorities to replace the existing catchment management boards. Members of those authorities will reside locally and will have authority to dedicate or allocate funds to natural resource management issues. Obviously, salinity would fall into that category as well. The state government is trying to reduce the bureaucratic red tape which has enveloped many natural resource management issues, including salinity, over the last 10 years. Hopefully, through those catchment management authorities, funding from the National Action Plan for Salinity and Water Quality and the NHT mark 2 will be better directed at on-farm conservation techniques.

The association represents graziers, dryland farmers and irrigators. As I mentioned in the submission, we have an inherent interest in making sure that funds flow to the right people and to the right projects on the ground and that research in terms of assessing, mapping or monitoring salinity, both soil and water, is done efficiently with the minimum duplication possible and that that information is readily accessible and clearly given to farmers on the ground. Those are my opening remarks.

Mr Streat—A crucial element of the reforms is the proposal to introduce four state-wide standards. One of those standards is salinity. The coordination, application and availability of

research to CMAs and, ultimately, to land managers is going to be a crucial element in achieving the application of that standard to the landscape. At the moment it is in the conceptual stage; the standards have not been defined. I believe that the Natural Resources Commission is to look at achieving some definition of what those standards would be but the importance to this inquiry is that those standards be founded on the best available science of the day and that that science be made available. To that end, it rests on the coordination of how the science is undertaken and managed. We think that it will be crucial to effectively delivering a state-wide standard on salinity, which is an inherently complex issue. Although we have learnt a lot in the last 20-odd years, certainly there is no simple transference of models of salinity and concepts of salinity down to an individual farm scale. That is probably one of our key elements when we start to develop and deliver a standard that we try to apply across a state. We hope that this inquiry will be able to contribute to that debate.

CHAIR—I hope so too. Earlier today the committee heard evidence that suggested that some of the current salinity mapping that is done is not really applicable at farm level and that it is too broad. What is the feedback from your members about the information that is available for them to take into account in their farm planning?

Mr Streat—Andrew might be able to add something in a minute, but my understanding is that there is a complexity in mapping salinity. When you map salinity to one or two metres depth, using, I think, EM or radiometric techniques, that allows you to generate a pretty localised map; you can go across and develop a paddock scale map. The more regional scale mappings tend to look at the deeper hydrogeological features. They may have a significant role in terms of the catchment but, at a land management scale—at the farmer's scale—they do not really allow the farmer to plan for planting trees in recharge zones, for detecting where discharge zones are likely to arise and, on the irrigation scale, for changes in the watertable and those sorts of issues. At the scale that he has an ability to act on, he cannot really act on a regional scale; he can only act within the boundary of his property.

That is a concern. We would argue pretty strongly that the acceleration of research into producing farm-scale salinity risk mapping would go a long way towards defining problems in areas and allowing managers to take ownership of problems, rather than leaving us with the more nebulous concept that there is salinity at the top of the catchment that might be affecting the Lachlan River or the Murrumbidgee River—and, sorry, I do not know much about Western Australia—without the farmer having the ability to take ownership and get it at a scale that makes sense to him. That is a key issue. We would be arguing for the research to focus towards that—but that is not negating the value of the regional scale efforts that research provides.

Certainly I know from my time in South Australia—it has regional scale mapping—that the regional salinity movements through the Wimmera coming across at between 30 metres and 70 metres underground are part of the real problem for the South Australian area where the Murray River intercepts those natural ground water aquifers. So there is great value in regional mapping but it needs to be accompanied by farm scale mapping, which, as I understand it—and I could be incorrect here—is really related to the depth at which you are starting to assess the salt. So shallow mapping is something that we would encourage.

Mr Huckel—The catchment scale mapping of salinity is worth while in relation to being able to identify the areas in the catchment which are most at risk of further salinity problems or which

are beginning to develop salinity problems. Our members would be seeking a catchment scale salinity map—almost a salinity risk assessment map—for that region, but then you need to burrow into that on a paddock-by-paddock scale. It stands to reason that you have to empower individual land-holders to start changing their practices or to start mitigating some of these problems. The only way that can happen is at the field scale.

I think what happens is that, because a lot of the salinity mapping, reporting and assessment is done on such a large scale, the problem for the individual land-holder seems insurmountable. But in looking at a catchment salinity risk assessment map and so on, if you can identify those areas that are most at risk or that are suffering quite severe salinity you can really target those individual land-holders that need the assistance—whether it be assistance with regard to the best science or incentives through funding sources from the Commonwealth through the NAP and the NHT—to start developing strategies at the farm level to start combating some of these problems. I think that a lot of the focus has been at the catchment scale, but it needs to start coming down to the field scale level.

CHAIR—As to the very on-the-ball farmers who today say, ‘I’m not going to do any more with my farm until I absolutely know exactly what’s going on and what’s likely to go on and I can see the bigger picture from the regional area’—and there are plenty of them out there now—what are they doing?

Mr Huckel—Probably a good experience I have had, in terms of the field scale level, is that of an irrigation farmer. You might have some open channels, which are leaky. The channel may have been positioned on sandy soil types or whatever. That is the level they want to operate at, so they would like to be able to contact an agency, organisation or research institution and basically say: ‘Look, mate, I think I’ve got a problem here with regard to leaky storage. I think it might be leading to rising ground water tables on my property, which could lead to salinity’—or ‘I am actually seeing signs of salinity’—and so what are the best mapping or assessment techniques that you can recommend to me to really get my head around this issue and understand it at that field scale so that I can put into place some strategies to help mitigate or prevent it?’ For example, he could do some field scale mapping with electromagnetic induction techniques or something like that, which will identify those areas that have sandy soil types that are quite permeable and leaking. Then he can sit down with the scientist or whoever and say: ‘Right, we have identified the soil types which are causing this problem. What if I line a certain section of this channel or take out of production this particular area of the paddock, because the sandier soil type is just causing problems, and I develop more country in another area with a heavier soil type that is more conducive to intensive irrigation?’

So you have something happening on the farm and the farmer can see the merits in it. He can get stuck into it, roll up his sleeves and hopefully provide it with some funding through the catchment management authority via NHT and NAP, and he can start to actually do some on-ground works which will help the problem on his farm. Importantly, if you get a dozen of those farmers in that area all doing the same thing and thinking in the same way, that is going to have an impact on how the problem is going to be managed within the catchment as well. Farmers live, work and breathe on their properties. They are aware of the issues within the catchment but, as I said to you before, I think that at times I get the feeling from our members that salinity is just such a huge issue that, as individual farmers, they are asking what they can do. If you do not provide them with stuff on their farm at the field scale, you are going to find it very difficult.

Mr Streat—That is particularly true of dryland salinity. Irrigation salinity or irrigation induced salinity is probably a more tangible issue for particular land-holders. Dryland salinity really becomes tangible when you have a discharge area on your property. If you start to see evidence of salination, you can then take action to fence it off and plant it out, and you can apply through Landcare or NAP or whatever. In recharge areas, because of the way the mapping has been provided and done and because of the scale, it becomes much more difficult for them to get an understanding of how their hill slope is contributing to their neighbour's salinity problems.

In Western Australia they have probably made more advances on this—Western Australia is certainly at the forefront of salinity research. When a farmer does not have that information it makes it much harder for him or her to say, 'I will fence off this hill area and I will start planting that back, because I understand that it is causing discharge, not so much on Judy's property next door, but it is affecting Tom Smith's, just down the road, and the creek through the corner.' When he looks at his regional catchment scale map, it just has an area that is shaded purple for high risk and it might encompass his whole property. He obviously feels limited in his ability reafforest his property because of the social and economic constraints that exist.

Mr Huckel—What we are proposing is pretty much a bottom-up approach.

Mr Streat—Yes, exactly.

Mr Huckel—So you get action on the ground; you get action where it is happening.

Mr Streat—It is going to be crucial for the state wide standards to be applied. If you suggest that you do not want individual land-holders contributing to additional salinity as one of your standards, how do you then implement that or generate the information that that farmer can then take action on? He needs to know what areas on his farm are going to cause salinity and whether it is a recharge issue or a discharge issue. Then he can implement strategies to resolve those issues.

Mr Huckel—The best way to look at it is by laying down a catchment map with the salinity areas marked out on it in front of a group of land-holders and seeing where they first go to. The first thing they will look at is their property boundary and ask, 'What is happening at my level?'

CHAIR—Ann wanted to follow up on some of those issues.

Ms CORCORAN—I want to refer to some evidence we heard this morning—and I pick up your point of the fictitious farmer. It was along the lines of someone saying: 'If I am a farmer, I would not be interested in talking to the scientists because I know my land'—and you have made that point yourself—'and the young chap from the government department actually does not know very much at all.' I have two areas of questioning for you. Firstly, I want to test that bit of evidence we heard this morning. Secondly, if I am the farmer, am I going to pick up the phone and, given that I have a good relationship with the government department, ask for advice about not only the mapping of my farm but what to do about it, or do I think I know the solutions?

Mr Huckel—In terms of how farmers deal with scientists, it is just a communication issue. Sometimes scientists forget that they are talking to lay people. They may have been studying salinity for the last 15 years but the person they are talking to has been dealing with it for the last

15 years, although they have not been studying all the complexities of it. If the farmers are talking to the scientists they want to be told the extent of the problem. But, most importantly—and you just touched on this—they need some options in terms of solutions. It is no good just taking a problem to the farmers without some feasible options.

Take the example of turkey's-nest storage up in the Gwydir. It has been positioned on a prior stream formation because you get that head of water so that you can irrigate your crops, but obviously the soil is quite sandy. It is leaking. You want somebody to come out, map that site and tell you where the leakages are happening, but most importantly you want someone to provide you with some solutions to that. Do you clay line it? How much is that going to cost you? Can you have different levels of water within the storage, which slows up the leakage rate?

Ms CORCORAN—Am I hearing here that there is a reasonable relationship between people who are managing the land and the scientists?

Mr Huckel—From my experience—and I was based at the Australian Cotton Research Institute for a while—if you have scientists working closely with industry, and that generally happens through CRCs, the land-holders and farmers will be more receptive to what they have to say.

Mr Streat—I would suggest that probably over the last little while the extension officer role is that area of natural resource management that has been neglected through funding arrangements and structures—three-year terms and such approaches. It does not allow an option for an extension officer to settle in an area. He or she has uncertainty of tenure, which means that they do not build a relationship with the land-holder and a relationship with the scientist. This has been compounded by the move in a lot of science based programs to revolving funding, which means you have instability in your science capital. Then you have a further instability in your extension capital, which means the farmer has no real ability to build up a relationship. He is presented with a continuous rotation of ideas and personalities whereas, as a farmer, he rests in one location, looks at and manages a defined area and is typically not a person who seeks out and is comfortable with change.

So if you break down those links it makes it very hard for science which needs to sit in specialisation, needs to have debate within a language and a framework that is often separate from the layman's experience. Taking out the middle man breaks that relationship. I think that was one of the key successes in, for example, the Soil Conservation Service of NSW over the 1970s through to the 1980s. It seems to have been an approach taken by government to move to this rotational funding type arrangement, no doubt for good reasons. I think that is one of the impacts in that you have broken the link that provides that knowledge capital and, as a consequence of that, a fair bit of trust has been lost.

When it comes down do it, a lot of farmers communicate orally—by word of mouth. They like the adviser to come out and talk to them. As Andrew pointed out, and most importantly, they like the adviser to present them with a solution. When they come onto the land, farmers are not really interested in understanding the mechanics of water filtration, hydrogeological mapping or how an ERM survey works. They need an explanation of a problem and a solution and most importantly that needs to be achieved through a relationship of trust; that is how they communicate.

I think only 30 per cent of our members have email. Most farmers hear news by listening to *Country Hour* on the radio and talking to their next door neighbours. I would argue that probably most people in society communicate that way but that is a different argument. So breaking that trust I think has been one of the failures of the current policy approach. I would argue strongly that that is as much about the coordination of science as it is about the role of natural resource management agencies. If the really scientific institutions like CRCs had extension staff attached to them rather than having extension staff sitting out in other agencies, I think that would build a stronger link between the two things.

Mr Huckel—You need continuity.

Mr Streat—Yes, absolutely; it is crucial.

Dr WASHER—I was just wondering about the mentality of the fence boundary concept. As you said, even though the farmer is going to look at his farm as his special patch, often the problem is not on the farm but adjacent to it. How is that usually addressed? Do you get the kind of cooperation you expect?

Mr Streat—I would have to say that farming is a funny game because you are always competing against your neighbour—that is the fundamental part of it—but when it comes to issues like that, my experience is that farmers are very good at conceptualising the need to work with their neighbours. Landcare is probably a great example of that. It is achievable. They do have that inherent shared community. It has probably been fragmented a bit by social and economic changes over the last decade or so but it is still strong. I really think it is not so much their inability or unwillingness to go over the boundary, at the moment it is their inability to access in a sufficient manner trusted people that will provide them with the key bits of information.

Mr Huckel—I think we provide an example in the submission where, if you are a cotton grower in the Liverpool plains of north-western NSW, at the end of the day who do you turn to for that coordinated science? You have numerous government agencies, you have several CRCs and you have a whole bevy of people—scientists and extension officers. Personally I think the Liverpool plains is the most mapped area in the world. So basically who is doing what, where and when and are they collaborating between each other? Does the CRC for sustainable cotton know what the Department of Infrastructure, Planning and Natural Resources are doing down at Gunnedah? Are they using the same techniques? Are they using different techniques? Are they swapping their results and sharing their data? I think you will find that is not happening.

Mr Streat—The classic is—and I think we put this in the submission too—is it a deciSiemen or an EC? Everyone uses a different measurement. There is not even a standard, so a lot of farmers are out there saying, ‘How do I convert this to that?’ You could argue that they need to be more involved in this issue, and perhaps they are being handfed a little bit, and ask, ‘Goodness, should we be pandering to them?’ But, if you look at what a farmer does in his day-to-day activities, natural resource management and those sorts of issues are not really part of his daily domain. He is looking at markets, production issues, moving stock from one paddock to another, boundary maintenance—all those sorts of issues. These broader biophysical issues of biodiversity, salinity and whatever really are the domain of the people who spend their days looking at that.

Mr Huckel—You have to break it down to a farm level. If I am a farmer, I want to be able to make a phone call or access the Internet to know who is doing what in my catchment and who is best suited to carrying out scientific assessment, mapping, monitoring or what have you of this issue that I have on my property.

Dr WASHER—Which is really the second question. We went to the very micro level, but at the macro level in terms of the collation of information that is scattered across the country, from Commonwealth to state to local government to private industry, like mining et cetera, in the opinion of the Farmers Association, who should be responsible for that collation? Which organisation out of all these—obviously not the mining industry—or which tier of government should say, ‘The buck stops here. We’ll collate this and present it’?

Mr Huckel—Obviously the Commonwealth are devoting a lot of funds to this issue. Maybe they could look at developing some sort of central or national registry so you know who is doing what and where, and then that information could be filtered down to the states, and the states could filter it out on a catchment-by-catchment basis. You would have a complete national register of all the research that is being carried out and by whom. That information would be provided to the states, who could then send that information out to the relevant catchment management authorities. I think you would find that a lot of catchment management boards have no idea of the amount of salinity research that is going on within their valley or within their basin. If you were the chairman of a catchment management authority then you could say, ‘Okay, here we’ve got the University of Sydney doing some work; here we have the CRC for hydrology—I wasn’t aware of that.’

Ms CORCORAN—Why aren’t they aware of that?

Mr Huckel—Because the information has not been collated.

Mr Streat—And also principally because, again—I do not want to harp on this—there has been a move to fragment, decentralise and start a lot of small CRCs all over the place. Research used to be conducted in one or two key institutions. You used to have the CSIRO based in a few places; now they have dismantled the Griffith land and water section, they have moved bits here, they have moved bits over there, and they have gone on an annual funding rotation. They have taken the key elements of stability out of the knowledge-producing sectors. Now, there is value in attaching it to industry. There is value in getting industry involvement, but why split it up across different locations? We need to have two or three key national repositories of salinity research—one in the west, one in the east; it might be that simple—which would be the bodies responsible for coordinating those research programs. You could then farm it out to universities or whatever.

At the moment it is so fragmented because it is done in different physical locations: at the agriculture department in Wagga, the agriculture department somewhere else, the CRC for cotton research out in the Liverpool plains. Then there is the CSIRO in South Australia, there is a land and water place in Griffith. Even within a state there are five or six different places. There are department of agriculture salinity research programs. There are DIPNR salinity research programs at Wellington. Instead of having a coordinated effort, with an overseeing body that says, ‘These are our targets, this is where we are going and this is where you can come and get research information,’ it is fragmented. It is an evolutionary thing.

Mr Huckel—What we would be calling for is a national register to collate all this. Then that information could be filtered down to the states.

Mr Streat—Probably a coordinating body would be good.

Mr Huckel—The state government could then hand it across to the Natural Resources Commission—I do not know if you are familiar with that—which will be established under this new regime to set environmental targets and standards, based on the best scientific, economic and social information available. The Natural Resources Commission would be an ideal location for that type of information. They supervise the catchment management authorities. So the CMAs can go to the Natural Resources Commission and say: ‘We have a salinity problem. Who is best to approach from a scientific point of view?’ They say: ‘Excellent. We will have a look at our database here, with which the Commonwealth has provided us. These are the groups doing research in that particular area—this is who you need to contact.’

Mr Streat—It would be good to have one body doling out the research funds, as you do with the national research grants system. It is coordinated and it works.

Mr Huckel—As an example, if you are a farmer in California with a salinity problem, you contact the US Salinity Laboratory.

Mr Streat—More importantly, it is probably not so much the farmer, it is the extension officer on the catchment management board who is communicating with the farmer. He can go to one source, rather than having to go to the agriculture department.

Mr Huckel—After you have made three or four phone calls!

Dr WASHER—You mentioned measurement. You have total dissolved salts, total soluble salts and electroconductivity. For the Farmers Association, that is good but, as we have heard, there are different types of salts. There are chlorides, sulphates, bicarbonates, carbonates et cetera. It is the chlorides that are bad, and this does not identify the chlorides. As a farmers’ federation, where we are dealing with plants and animals as the main problem here, what would you like to see as the measurement?

Mr Huckel—This is how you need to do the measurement: in the north of the state, you need to say that, with soil salinity, the measurement of unit is deciSiemens per metre. If you are growing cotton, and that gets to 7.7—above that you are going to be in trouble. You can relate the measurement to how it impacts on the crop—that is what the farmer is interested in—and say: ‘Guys, you are getting up to 6½, or what have you. It is now time to look at some of the practices you are using on your farm, because we are estimating that you are going to have a salinity problem above that particular unit in the next couple of years. You had better do something about it, otherwise the yields are going to suffer.’

Mr Streat—In the south, they use ECs—in the Murrumbidgee, they use ECs. I was working in South Australia and it is all ECs. That is what they measure the river in—they publish the daily Murray water levels in ECs. I think you would need to have a debate about that. You could make it common, or strictly identify what you would use each one for. If you use deciSiemens

for soil and ECs for measuring water then everyone knows it is a standard, and it is well understood.

Mr Huckel—It has to be applied across the agencies. You can pull out five maps and they will all have different units on them in respect of soil and water salinity. It is just not good enough. Our farmers do not understand when you say: ‘Here it is 100 Siemens; I am looking at another map and it is 10 Siemens.’ What does it all mean? There needs to be a standardisation of units amongst the agencies and research institutes, with everyone singing from the same hymn sheet as to how they report their scientific results.

Mr MARTYN EVANS—We have talked about the problem of lack of continuity of employment of the extension officers and so on. As to the value of having people out in the field talking to farmers, who would be ideally placed to employ extension officers on an ongoing basis, to give them continuity and training? You have the catchment management boards in most of the states, or an equivalent authority. Are they a good group to do this, or should it be an ongoing research agency?

I notice the US federal agency research group—the Salinity Laboratory in California—employs the leading extension officers. If we are looking to give a credible science-based continuity to them, what about local government? Where would we be best placed to give science credibility and an ongoing employment base, so there is a bit of a career structure, and also some trust that farmers will relate to these people on an ongoing basis?

Mr Huckel—In terms of New South Wales, as I mentioned before, some of the changes are happening as we speak. Probably the catchment management authority, based on advice from the Natural Resources Commission, could acquire funding to employ suitable extension officers. People in the catchment management authority will be local residents, they will be skill based authorities, and they can allocate funds to employ suitable people. They can interview them, they can look at their qualifications, and say, ‘You would be suitable for this particular reason.’

Mr Streat—I think you are right. It would be best to have the higher level extension officers attached to your key research institutions because they would build the daily interaction with the people doing the research. They would then be able to interact with the extension officers in the CMAs. I think that by having someone with good employment prospects and a good career path living within the community—as it used to be with Soilcon—allows them to build the contact with the farmers. They end up knowing the landscape. When the farmer rings up, they can say: ‘Yes, I know your property, Mr Brown. I’m off—I can come over.’ That is how it should work. I think there is great value in having that higher level extension officer attached to your research, and that forms a conduit between the two.

Mr Huckel—It is a bit of a revolving door at the moment in terms of keeping the people on the ground in the regions.

Mr Streat—That is one of the key problems.

Mr Huckel—It is because of the funding arrangements. It comes up to three years and people do not have any job security after that; hence they move on.

Mr Streat—Even three years is a long time. It is all annually based, and you are never really certain. I came out of that system. When I was at university, in the late eighties and early nineties, I wanted to become a soil conservation officer. By the time I had finished my master's degree at university it was all dismantled; it was all NHT based funding. For the first six years of my working life I was on four-month renewal contracts. You try and get a loan from a bank under those circumstances! You were doing your PhD, you were a knowledge based person, you were interested in living in rural communities, you were interested in natural resource management, but the system did not provide any structure for you to build relationships and stay there, which meant that inevitably you would move back to a city; you would go to where there is consistency. It had advantages.

Mr LINDSAY—In your view, what is the role for industry associations in translating the science available to the farmer or the user on the ground?

Mr Huckel—I think it is incredibly important. Speaking from experience with regard to the Cotton Research and Development Corporation and whatnot, if you were a cotton farmer on the Liverpool plains, out of the number of people that you can contact, you would probably contact your industry organisation because the cotton growers have an input in how the funds are allocated; they have an input in terms of the researchers based in the CRC. That would be the first port of call, without a doubt.

Mr LINDSAY—Thinking about the New South Wales Farmers Association, do you find that you are doing nearly enough in that regard in servicing your members or are they not asking you for information?

Mr Huckel—They expect us to point them in the right direction, if I could put it that way. We are not a research institute, we are not an extension organisation; we are there to lobby politicians and develop policy. We do get calls when people might have a salinity problem. They ask the association: 'Who do I need to contact within my area? Who is around this issue?'

Mr LINDSAY—We are coming around to this concept of the one stop shop, which you put in your submission. What do you think is the best concept of a one stop shop? Is it in fact a single national something, or does that not work in practice? Would the farmer on the ground not contact a single national entity to find the information that he or she needs? The one stop shop in your model is supposed to be the knower of everything, to collate the database and whatever. If it were based in Canberra, would it become bureaucratic and be unable to relate to the person on the ground on the Liverpool Plains? What is your response to that?

Mr Huckel—Our thought was for someone to bring it all together and for the national register to then say: 'Okay, this is the number of people doing salinity research within the Liverpool Plains. We need to send that information to the catchment management authority within that area.' So the land-holder would contact the catchment management authority, but it would take someone higher up to actually pull it all together. The information would have to reside at that regional level, without a doubt.

Mr LINDSAY—Do you see any difficulty in mandating that the science community report to this one stop shop what it is doing?

Mr Huckel—If they are operating on public funds, they should be accountable to someone.

Mr Streat—I would not run it in that form; I would pursue it more like the Research Council system. I would probably go for two bodies, one in Western Australia and one in the east, because of the geographic distance. Western Australia is 4,000 miles away and has so much knowledge. The reality is that Western Australia is leading that research debate anyway.

Mr LINDSAY—Why do you say that when this body could be in Iceland and still be just as effective?

Mr Streat—It could be. What I was proposing was that you would have this body and, attached to that, you would have that research extension high-level component which would then devolve down to the CMAs. I think it would be difficult to have just one. I think it would be handy to have two or three—perhaps one in the north—because there are logistical problems with the higher-level extension people, the people who are working with the scientists all the time but whose key role is disseminating that message. It would be more functional for them to get to catchment areas and all those sorts of things.

Mr Huckel—If you are a scientist and you are carrying out research, I would hope that you would want to communicate what you are doing and what some of the results have been. You would obviously publish information, but I personally think there needs to be some sort of reporting structure, without a doubt.

Mr Streat—To do the research, the scientist needs to be in an area where there is some salinity, so I think there is value in having two or three key institutions.

Mr LINDSAY—Okay, I get your point. What is the role of private enterprise in the model that we are talking about? Do you see a role for private enterprise doing that? Should the government contract somebody to say, ‘Righto, you’re going to do it and you’re going to do it on a cost-recovery basis’?

Mr Streat—As long as there was free—

Mr LINDSAY—You want the information to be free? Is that right? Is it a can of worms?

Mr Huckel—Maybe private enterprise would have more interest in participating in this issue if they actually knew who was doing what, where and when and if they were generating good results and coming out with good research techniques, the things that private industry could perhaps commercialise. I suppose the main point in our submission is that in a lot of catchments you do not know who is doing what at the moment, so private industry probably would not be very interested. They would need to know who the players were and how their work was going. If the players were doing a good job on the ground and providing good information to end users who are prepared to pay for that, private industry might see an opportunity.

Mr Streat—That type of private enterprise model may be of value in the delivery side. As long as they are accredited or approved, they could act as a conduit from the CMA down to the farmer—it is at that sort of level. But, again, I see those cost recovery principles going against the idea of having consistent, steady, reliable, long-term extension and research programs.

Mr LINDSAY—I think I read your body language.

CHAIR—About 17 projects in New South Wales were funded in 2002-03 under the national action plan, making total Commonwealth funding of about \$14 million. Presumably, close to the same amount of money, or the equivalent in kind, would have come out of the states. What role has New South Wales Farmers Association or any of your members had in developing any of those projects?

Mr Huckel—Our members at the local level may have helped draft the application to the NHT.

CHAIR—Not the NHT; I am referring to the national action plan.

Mr Huckel—I would argue that there would not be a great many.

Mr Streat—We would have to go back and contact individual members and find out if they are on Landcare groups and those types of projects.

Mr Huckel—I can tell you why that probably happened: once again, it is about how we access that information.

CHAIR—That is what this committee is trying to get to. There have been agreements between the Commonwealth and the states about what is funded under the NAP, but who is really having the ultimate input into some of these projects and are they based on the best science?

Mr Streat—I would have to look at the individual projects and make an assessment.

CHAIR—When they are dealing with the Namoi-Gwydir catchment of the border rivers, ground water data collection and interpretation or stock-watering points—a central key to environment management—one would hope that the farming sector has had some input into these things.

Mr Huckel—That would have been happening via the catchment management boards. They would have decided on what projects they would like to see funded within the region. On those catchment management boards, you have farmer representatives, many of whom would be members of the New South Wales Farmers Association.

Mr Streat—Many of the farmers very likely would have been involved in the initial project application that went to the board. I think that is how that process works.

Mr Huckel—I could probably safely say that, in regard to the Namoi which you mentioned, the farmer who was on the catchment management board would know what projects were happening and what research was going on in the area, but the rank and file would have no idea.

CHAIR—Thank you very much for your evidence this afternoon and for your submission.

[1.54 p.m.]

COPELAND, Professor Les, Director, Centre of Salinity Assessment and Management; and Dean, Faculty of Agriculture, Food and Natural Resources, University of Sydney

ODEH, Dr Inakwu Ominyi Akots, Senior Research Fellow, Centre for Salinity Assessment and Management, University of Sydney

TRIAANTAFILIS, Dr John, Senior Research Fellow, Centre for Salinity Assessment and Management, University of Sydney

WRIGHT, Mr Kim, General Manager, Earth Resources Foundation, University of Sydney

CHAIR—Welcome. Although the committee does not require you to give evidence under oath, I should advise you that the hearing is a formal proceeding of the parliament. I remind you, as I remind all witnesses, that the giving of false or misleading evidence is a serious matter and may be regarded as a contempt of parliament. I also remind you that the committee prefers all evidence to be given in public. However, at any stage you may request that your evidence be given in camera and the committee will then consider your request.

The committee has your submission, No. 19. It has been authorised for publication so that is on the record. Would one or several of you like to make some opening comments before we proceed to questions?

Prof. Copeland—I will start, if that is okay. I will take the submission as having been read but I might pick up a few points and amplify those.

CHAIR—My committee members have been very diligent, I am sure.

Prof. Copeland—The most important point that I would like to make initially is that salinity is a long-term problem. It has taken 30 to 50 years and in some cases longer to reach the stage where it is really evident in many parts of Australia. It has been there since prehistoric times but the intensification of agriculture in the last 50 years or so has exacerbated this problem. One has to recognise that a similar sort of time frame would be required to reverse the process, so we are not looking at something that is going to be reversible in a short time. The planning horizon needs to take that into account.

I will make a few comments that pick up on some of the particular points of reference that the inquiry is addressing and make them in a slightly different way to how we have made them in the submission. The balance between the competing interests of the private sector and the public good is something that has not been correctly found. This does not only apply to salinity; it is a generic problem. It is not only in Australia that this problem is being grappled with; it is an international problem.

How can we give the private sector protection for its investment? This investment of course is absolutely essential and in most technology driven sectors I guess the investment of the private

sector would be about 80 per cent—or would need to get to that sort of level. How does one provide that investment with the protection that it needs for investors to gain the benefit from that investment, but at the same time allow public good projects to have access to information and technology that is generated from that investment at a cost that is reasonable? I do not think that balance point has been found and it is something that will need to be grappled with in this area.

Another point relating to the first issue is the apparent paradox between organisations such as universities and government departments and the private sector being at the same time required to collaborate but also required to compete. This paradox between competitors and collaborators is another issue that has not been resolved.

In the case of salinity, because it is a long-term problem which requires long-term solutions there is a greater need for community awareness. That means educational programs, going right back to a primary school level, need to be incorporated into our training and the community. An area that I have highlighted in my submission relates to the training of the next generation of leaders and researchers and policy makers. The career path for people who enter this area is not very clear. It is a long-term problem again, so there needs to be some sort of long-term commitment to working in this area.

That does not necessarily mean making long-term appointments. For example, we have had the Australian Cereal Rust Control Program in our faculty for over 50 years. Cereal rust control is a major part of all cereal breeding programs. The program has been established and there is a strong expectation that this will continue; but within the program people get clear messages that, if they perform well and put forward projects that are likely to lead to improvements and advancements, they will receive funding. They do not have the uncertainty of getting an appointment and then straightaway having to look for their next appointment. That lack of continuity in career structure is a really important component.

The implementation of the national action plan is excellent at the level of getting ownership and engagement with the community but it has the potential for fragmentation and creating difficulties for transferring information—how do the people who work at that level get access to the latest research technologies that have been adopted? That is an issue that needs to be addressed. The other aspect of the national action plan that, to my mind, does not come out as strongly as it might is: what are the processes for monitoring implementation? What is the follow up? There is a good plan there, and there is clear direction as to how to set off, but then what happens? How does one measure that the actions being implemented are actually going to be effective? I think that is something that needs to be incorporated in some sort of revised version. Those are the points I wanted to make. I do not know whether it is up to me to ask others in my group to comment.

CHAIR—If no-one else wants to add anything we will go to questions. In your submission, one of the things you raised was access to data and the cost of it. You are not the only ones who have raised this. You would probably be aware that at a federal level there has in the last year been a change in policy with respect to the data held by federal agencies—you can either download it for nothing over the Internet or pay to get it on a CD. Do you see that as a model that ought to be extended to the states?

Prof. Copeland—I think the term used in some contexts is ‘freedom to operate’—people who are going to do public good and are not going to commercialise it need to have access to data that is collected. There are many organisations collecting different sorts of data, and perhaps they might want to expand on that.

CHAIR—In answering my question you might like to comment on some of the barriers you have come across and how current procedures and costs are stopping work being done.

Dr Odeh—I think you are right that, until recently, it was fairly difficult to obtain some of those data from federal agencies, but as recently as last year those data are increasingly being made available. With respect to the states, that is not fully the case.

Mr Wright—In my experience it is fairly patchy. In the states—speaking about New South Wales—some data is readily available but it tends to come from sources that are not always easy to find. Some of the data will be available in a data package, somewhere, which is available to the public but not publicised as such.

A comprehensive regional assessment of part of New South Wales will have an enormous amount of data in it. That data is freely available but nobody knows to go there unless they have actually been on the committee. That data is available. There is an enormous amount of data. So there is that sort of thing that happens. The coordination of where the data is and who holds it within government generally is not well documented and is not easily available. That is the bigger problem. A lot of it is available—sometimes free and sometimes at a relatively small cost—but knowing where it is and who holds it can be a real problem.

Dr Odeh—The other point associated with that is that some of the state data is actually more detailed than data at the Commonwealth level because of the size. A few years ago, data which we call elevation data—height above sea level data—for maybe 50 kilometres by 50 kilometres cost a huge amount of money to obtain from the state agencies. This detailed data is useful for the type of research we do. I am not sure whether the state is changing in terms of making that data available free of charge or at least at a small cost.

CHAIR—As far as we understand, they are not. This committee made a recommendation in its last report on research and development that that ought to be the case.

Prof. Copeland—In this area, it is necessary to collect data with a number of different techniques. No single organisation has the capacity to do all of that, so it is essential that there is this collaboration. Some people have methods to collect aerial data and some people have methods to collect ground based data, and there are various other methods. There is just not enough resources, both human and physical, for that to be available in one organisation.

Mr Wright—I think one of the things we were alluding to is that somewhere there needs to be a repository of where this data is available—in other words, an index someplace which says, for example, ‘This particular data is held by the New South Wales Department of Mineral Resources.’ They happen to be collecting digital terrain data as part of their airborne geophysical surveys. It is there and is available—and may be freely available—but, if you do not know it is there, it is difficult.

CHAIR—Datalink.gov.au sounds like a good name for a web site, doesn't it?

Mr Wright—Something like that, yes—and everybody has to put it on that web site.

Prof. Copeland—This actually works very well in the biotechnology area. It is part of the ethos of the scientists who work in this area that, if you discover a gene, to have a paper accepted when you write about that you lodge the description of that in a database. Any scientist can search those databases. That works very well.

Ms CORCORAN—I have a couple of questions. We are particularly interested in the link, or the lack thereof, between people such as yourselves who are discovering all of these things and the person on the land who has to manage the land. I hope that there is a link. Do you think that researchers have a feel for what farmers need and want and do they have an idea of what you are doing? That is really what we are after. If you have any comments on the terms of reference that we have laid down, I would be interested in hearing them.

Prof. Copeland—In our faculty, because we are a faculty of agriculture, we do have very good links with the rural sector. We travel a lot and our work is based in the rural sector. We attend growers meetings, meetings of natural resources managers and so on. I think that we have good contact, but we have contact with those who want to have contact with researchers. That is probably not the majority. Maybe 20 per cent of the producers and growers are really switched on to technology and see it as a business rather as a lifestyle. They probably produce 80 per cent of the agricultural products anyway.

CHAIR—The 20-80 rule.

Prof. Copeland—Yes. I think we might be a little bit unusual. We take our students out and we talk to the farmers; so we do get feedback. In terms of formal interactions and processes where researchers—and there is of course a much wider research community than our centre and the faculty—I am not sure that there are those opportunities. I believe those sorts of things should be set up on more or less a standing basis—a forum or some sort of roundtable that provides this interchange on a regular basis. It is really driven by the individual researchers wanting to do that, but there is no—

Ms CORCORAN—Is it driven by the farmers as well?

Prof. Copeland—Not really. I think many farmers might be a bit overawed.

Ms CORCORAN—In the ideal world would it be driven by farmers?

Prof. Copeland—I think it should be an equal partnership. A good researcher can put a problem into a meaningful format so that it can produce an output in a reasonable time with the resources available, but I think they always have to look at the context—what is the bigger picture and where am I working.

Ms CORCORAN—Why isn't that happening now? Why is it still a one-way street?

Prof. Copeland—I do not really believe I have the answer to that. I am actually involved in a number of these sorts of inquiries. The grains industry is going down this track as well. What is the link between research and adoption and between needs and research? It seems quite coincidental that many organisations are asking this question. Why is there this gap in the middle? Partly because we do not have any formal mechanism—it is not something that is promoted—perhaps the government agencies need to indicate that this is an important part of doing business, which is what agriculturalists do in the modern era. People are very busy. Times that are convenient for us are not necessarily convenient for farmers. We have time now that the students have gone, but it is harvest time so it is not convenient for the farmers. There are many factors.

Ms CORCORAN—I have another question because this is really what we are all about. This is really why we are here. We are trying to get a feel for it and the fact that you have no answer is probably the right answer. Is it because it is not promoted and people are busy and all that sort of stuff or is there a real element of one hand not thinking the other hand can actually be of assistance? Or is it more in not knowing what is available?

Prof. Copeland—We are living in a world where things are changing so quickly. To learn what resources are available is quite a difficult thing. Once you know what is available you can tap into it but, if you do not know what you do not know, it is hard to really deal with it. I think the response that we are too busy is really pretty facile. I think you can overcome those sorts of problems. But there is this gap: we are very good in this country at doing basic research; we are not so good at transferring the results of that research to the users. That is not only in this sector; it is widespread.

Dr Odeh—I think there is also a positive side to it. A lot of us do some work for the cotton industry—the Australian Cotton Cooperative Research Centre. They have devised a mechanism whereby there will be interaction between researchers and farmers. They normally have a biannual conference with the farmers association and research association, where the farmers and researchers actually interact. Maybe that is one way, but for a single industry it is very difficult to generalise that sort of thing. On the other hand, some of our research is farmer driven too because, as Les said, before you put out the proposal some of the corporations, especially the rule based ones, decide their priorities. It is based on those priorities that we submit research proposals if we are intending to do that research. On the basis of that, in many cases farmers participate in drawing out those priorities. So there is some input from the farmers there as well.

Dr Triantafilis—I would like to add something there. Odeh and I pretty much owe our existence at the university to external grants. Part of the basis of getting these grants is that you must collaborate with a farmer, get an idea of what their research priorities are and then tailor your research to delivering on those types of issues. With my own research I am looking at understanding the salinity threat. In each of the areas that we have been working—and there are quite a few areas that we work in—we consult with the different Landcare groups in those areas and the executives of those groups to get an idea of what issue they want addressed, and we tailor our research to address that issue. It is really up to the individual researcher or academic to make that effort. It is an effort you have to make. Once you do make the contact, you do have their support when you go for, say, NHT money. You can collaborate with them and help them formulate an application which tailors your research expertise in their area and in addressing their particular issue.

Prof. Copeland—We need to develop mechanisms that will promote the establishment of mutual respect between two very different groups. I think farmers tend to be very wary of researchers, and perhaps the same can be said vice versa.

Dr Triantafilis—But if you actively engage with these farmers they are much more confident with the results that you give them as well. I think Andrew, from the New South Wales Farmers Association, made the point that there is a tendency with government agencies to have difficulty delivering on research and development type projects, whereas universities are in a better position to do that. If you can engage farmers early on and get their support and confidence, your research results are much more easily applied and accepted.

Prof. Copeland—One thing that works well in the United States and is part of the historical development of the land grant universities is that they have in those universities people who have appointments for research and extension or teaching and extension, whereas we only have teaching and research appointments or research-only appointments. Extension has never been part of the university scene in Australia. It has been a role of the state departments, but they have withdrawn from that, so the private sector has taken that up more and it has become more like consulting—providing of a service on a fee basis. But in the United States the evolution of the land grant system has served that community very well. There would be people who have an appointment where they do normal academic activities for 50 per cent of their time and spend the other 50 per cent of their time actually in the community with farmers.

Mr MARTYN EVANS—Do we do enough basic research, though, in the salinity area? I agree that we should be very much driven in our research by the demands and needs of those out on the land, but are we doing enough basic research in this area to ensure that we understand the fundamental problems?

Prof. Copeland—I think the key to understanding the problem and addressing it is to map the salinity and to get good data or risk assessment on where the salinity problems are greatest and where the opportunities for management are greatest. In some areas the cost of management is just too great and so you lock up the land and let it remediate itself. I think that is an area that we probably do not have anywhere near enough data on. Perhaps Odeh, John and Kim might comment on that as well. What we lack is the mapping of the risk of salinity and where we can best invest to reverse it.

Dr WASHER—Just on the mapping—before we go on—it is stated in here that a lot of the mapping is unsatisfactory, or is felt to be unsatisfactory. I did not mean to interrupt.

Mr Wright—That is fine. From an earth science point of view, we really do not know the distribution of salt in the subsurface. Where it comes to the surface you can see it—you see the salt scalds and these are mapped in great detail—but, as for what is happening below the surface, I suspect you are a bit like me; I cannot see any further underground than those few millimetres. But there are techniques available to be able to do it at varying degrees of accuracy and varying degrees of cost.

We need to do more of that and we need to understand some of the geological controls in the migration of water and salt. Then we can much more effectively handle its management. If we want to put an extension into a town in a given area, we have techniques available to help with

that decision-making process. At the moment it is very spotty in its application. Sometimes we just do not have the data and we have to get it. We are somewhere down the road; it is by no means complete.

Mr MARTYN EVANS—My question goes beyond the mapping; it goes to the basic research underlying the science of salinity.

Dr Odeh—One of the fundamental problems of salinity is to know what it will do in future. We have done a little work on that but we need to do more. We need to ask what-if questions. That requires some fundamental research whereby you have to do scenario studies. To do scenario studies you need more accurate data, which comes back to mapping, so it is somehow interlinked.

Mr Wright—There is more work that can be done to understand the accumulation of salt in the soils and the rocks and how it is released. I am quite certain that we do not have all the answers yet. At the end of the day we may never have them all—it is a matter of diminishing returns—but I suspect that we are about halfway there.

Prof. Copeland—Also, there is the movement of water through the soil profile and where it goes, whether it really does have the potential to contaminate ground water and so on. Those questions are a long way from being answered.

Dr Triantafilis—The important thing is that the process of salinisation is fairly well understood. It is a function of lots of things: land use, geology, hydrology and some other things. Once you can map all those different things independently and bring all that information together—perhaps on a GIS type of system—you can see, as Dr Odeh was saying, some what-if scenarios. For example, if you change your land use, how will that change the hydrology and how is that going to impact on how salts then might move through different geological strata? That type of research needs to be done. It is quite easily applied in particular areas as well.

Prof. Copeland—You need to do that at a generic level to understand how you can extract information from models, and then you can apply that in particular locations.

CHAIR—Just going back to the mapping point, is there confidence in the airborne geophysical work that the BRS has been doing in identifying salt storage areas, salt depositories and underground channels?

Mr Wright—Yes, you can do that. Some of the data is quite interesting and extremely useful. Some of the airborne electromagnetic techniques in particular are expensive and you have to say: ‘Okay, fine; it is going to cost X dollars to do this. If you don’t do it and you get the answer wrong, what is the cost of that?’ A cost-benefit analysis needs to be done in the exercise, depending on what you want to get. A range of techniques can help you with that. You do not always need the expensive one in the first instance. Some of it you can do on the ground, which again sometimes can be cheaper as well. The techniques to map that are available. It is a matter of what you are prepared to pay for it in a given area. If you are looking at a very expensive new extension to a town or a city, you may well be justified in doing so as part of the total cost, to make sure you get it in the right place. But if you are doing a low-cost development, you are looking for other techniques which will give you that guidance.

Prof. Copeland—I think it also relates to the level of resolution you want. Just like there are different types of microscopes that give different fields of view, it is the same with techniques for collecting data. You can collect data over a wide range but perhaps not in great depth. So you need to have more than one technique. I do not think there is one method that will give you a map.

Mr Wright—I said to someone the other day that, for argument's sake, if you were going to develop the city of Wagga and you had the opportunity to first look to see whether there was a storage of salt underneath it, you would not have put Wagga where it is now. You would have moved it somewhere else—maybe only a few kilometres away, but it would not be where it is now.

Dr Triantafilis—My main concern with the airborne system, and the reason why I have not adopted it in my own research, is that the depth of measurement is quite large and the resolution at different depths is not quite as accurate as you would like. When you are talking about salinisation, you are interested in the expression of salts in the root zone. Clearly, these instruments are geared to look at much deeper stores of salts, as Kim was saying, which may or may not ever get to the surface. You are spending a lot of money, at something like \$10 a hectare, to get information which may or may not be of real interest to you. In my own research, where we have been doing stuff in cotton-growing areas, we have covered about 400,000 hectares at 50c a hectare doing more extensive ground based surveys and getting information about the surface type of soil—which is where you really want a lot of information. No-one was going to give me \$4 million to go and do airborne surveys across the 400,000 hectares that I have covered, so we had to look for a cheaper methodology to get equivalent information.

CHAIR—But don't you run the risk of overlooking deep-rooted storage areas that might ultimately come to the surface? You are dealing with what is getting near the surface by ground methods.

Dr Triantafilis—There are a variety of different instruments you can use, and some of them are designed to go down to two metres, and some of them are designed to go down seven, 15 or 30 metres. Depending on what you are actually interested in trying to map and measure, you adopt your use of those instruments accordingly. You do not get the resolution of the plane and you do not get the speed of the plane. However, you get a fairly good reconnaissance idea of where you might want to go and take some more measurements and get the detailed survey you require.

CHAIR—Do you get into detail of underground drainage as well?

Dr Triantafilis—You can get broad paleochannel information, which is just as important as getting where the salt is stored, because the old stream channels are where water moves a lot more readily in landscape. You also want to know where the salts are stored and what the chance of mobilisation is. You do get that information, and both types of information are equally important. In some landscapes where you have no salt the bigger issue might be excessive ground water recharge through old riverbeds.

Mr Wright—One of the other things, just before we get away from this, is that there are a lot of airborne surveys done from time to time around Australia. They are done for different

purposes. There are a whole batch being done in New South Wales for minerals reasons. If all the techniques could be put together in the one flight system, it would make sense—even if you do not use the data immediately—to collect all the data. It would then be available for use if it were needed. If there could be some cooperation in collecting magnetics, radiometrics, electromagnetics and whatever else is in the plane, if you had a few more techniques available at the time when you were flying anyway, we would be a lot better off.

CHAIR—And that is feasible?

Mr Wright—Yes, it is feasible. Again, it needs a cost-benefit analysis, but it is something that should be considered.

Dr WASHER—The importance of data collection was mentioned before. In your opinion, what should we do about data collection? How should we collate all the data that is scattered everywhere out there?

Prof. Copeland—Perhaps I will start off. The idea is to have some sort of national repository or place where people know they can go to find out what there is. It is a matter of knowing what is there. As I said, it works well in the biological area, where enormous databases from all the genome projects, and other projects as well, are freely available. They are held on different web sites, but search tools have been developed. Some are better than others. Some are freely available, or you can pay for very good ones. The data is accessible to all researchers. The IP comes from how you use that, not from the actual data. It is a bit like having a phone book, which anyone can use. It is the use that you make of it that gives the value. We do not have that in this area.

Dr WASHER—The problem that we are also presented with is that a lot of people do not know what is being done. I guess that would apply to researchers too: you would not know all the research that is being carried out in this country—be it in WA or whatever state or territory.

Prof. Copeland—That comes down to that paradox between collaborators and competitors. I think that is an area that really ought to be addressed.

Dr Odeh—I think a good example is the recent project by the Murray-Darling Basin Commission, where the commission tried to generate GIS for the whole basin. They were able to negotiate with state agencies. They negotiated with us too; they got some data from us. By being able to bring together all the data that was known to be available then, they were able to generate the GIS for the basin. It was during that process that they knew that data was lacking within the whole basin. You can see a few start-up points here and there where there are concentrated surveys, and in between them are blank spaces. I see that as a good example of how the Commonwealth can contribute to that sort of collaboration.

Dr WASHER—I agree that we need to also monitor outcomes. The big question is that, under the national action plan, I do not think we have budgeted to look at outcomes. What do you really mean by that? If I put a project forward to resolve a situation based on good science, should I as part of that project say at what date—10 or 20 years from now—I would anticipate a result and allow some budgetary process to go and monitor the results, so we get outcome driven science?

Prof. Copeland—With a problem as long term as this, one needs to be careful how one defines outcomes. Certainly in the budgeting process there should be some way of monitoring whether local groups are delivering what their plans say they will. I think accountability is important for researchers as well. I am not sure that I can give you a nice simple answer as to what that accountability might be, but I think that any serious researcher would be quite happy to have accountability built into any sort of research program. That is an area in which research funders and government agencies probably do need to be a bit more active. They need to ask: ‘What is the follow-up? What value are we really getting?’ Perhaps it is another area that is a little bit weak in our overall research environment. Maybe we need to come back to the question that was asked before: ‘How do we better link the research providers with the users of that research?’

Dr WASHER—How would you measure salinity? As we have heard before, there are various ways of measuring it, but what units would you measure it in?

Dr Triantafilis—I would measure it in deciSiemens per metre, which is the international standard. It is usually what is reported in the literature, so that is the one I would go with. Although the instruments that you usually use as surrogates measure in millisiemens per metre, you calibrate those anyway to work out what the instruments are really telling you. They are the two units that I would use, simply because it is convention to do so. It is not the standard one, but it is the one that I would use.

Dr WASHER—From my point of view, it seems that salinity is a multidisciplinary problem that crosses all fields of science, from atmospheric science to hydrology to geology and almost every ‘-ology’ you would want to include. Should we, as part of this national action plan, convene an annual conference with national and perhaps international guests from all these various fields looking to contribute in some way to keep the science—as I said—as it should be: multidisciplinary?

Dr Triantafilis—That is not a bad idea. They actually have what is called the productive use and rehabilitation of saline lands conference. I think that is every year, but it might be every two years. That just finished in Yeppoon in Queensland. The focus there seems to be more on dryland salinity and those sorts of things, but what you are suggesting is not a bad idea. As long as you can get a good roll-up of people at these things, you can get collaboration.

Prof. Copeland—I would say that there are a number of those types of fora that could be worth exploring. One is a research showcase type conference—the traditional type of conference where people get up and give presentations on what they have been doing. Another valuable thing to explore might be something like a roundtable, which could include a lot more discussion of issues, how things are going and what progress has been made, refining of strategic plans and even looking at the national action plan or whatever might follow. The issue is ongoing. It has to be built into our culture. The other important discipline that needs to be included, if you include it as a science, is economics. Resource economics is critical to this. There are many technical solutions, technical aspects, but how those are best applied is something that we do need economic analysis, economic modelling, of.

Mr LINDSAY—Gentlemen, you have said in your submission and you have said today that the causes of salinity are generally well understood. We had two witnesses earlier today who

said what appears to be the reverse. They said that basically science falls into three camps and they gave some technical explanation of that. These words were used in that submission:

More tragic is the fact that the Scientific community is steadily entrenching itself in what are warring camps and the chances of collaboration are shrinking when they should be expanding.

Would you like to offer the committee a comment on that?

Prof. Copeland—As I said, I agree somewhat with those comments. I would not put it anywhere near as strongly as that. This is a paradox. The model of competition is good, and I think some level of competition is very healthy and essential. But I think we have to get that balance between when people collaborate and when they act as competitors. Maybe that person is feeling that competitive aspect a bit more than others are. It is something that needs to be looked at at a bigger picture level.

Mr LINDSAY—But you stand by your comments today that you think the causes of salinity are generally well understood.

Prof. Copeland—Salinity is caused by land and water use patterns not being matched to the landscape. One can go further than that in particular landscapes where one understands more about the movement of water and the redistribution of salts, and that when those salts are left in a different place from the water it either is used or evaporates. I think that level of understanding is pretty well generic.

Mr LINDSAY—John, you made a comment that your research was linked to the needs of farmers on the ground. But we had evidence earlier today of the concerns of some in the science community that your research—what you do—is really determined by the issues of the day, today, the funding of that research and the need for academics to secure that funding rather than being determined by what you people think should be looked into—that is, emerging issues that perhaps people on the ground do not even know about. How do you reconcile the need to keep your funding going—and, therefore, you are a captive of others—against the need to do the real thinking research which nobody probably at this point in time is interested in but could have major ramifications?

Dr Triantafilis—That is a big question.

Mr LINDSAY—You could just say yes!

Dr Triantafilis—I am totally funded externally. This year was quite difficult, because the cotton industry is facing a drought at the moment and their R&D funding is not that great. Fortunately, the faculty has decided to match the funding that they have given. However, next year there is no security for my position. When you look at all the work we have done over the last six or seven years, you see that we have collected about \$2 million worth of data that is just sitting there, really, doing nothing. My major concern is about securing my future. You have this all the way through the extension—and other early career scientists in other disciplines do to. You are looking over your shoulder for a better opportunity somewhere else. So what happens to the huge amount of information and work that has gone into collecting that data? It might just sit in a pile of disks somewhere for the next five years. I hope it does not. I hope I can get

something else, and I am working towards that. But, unless I do something about it, it is not going to actually happen. I do not know if that answers your question. That is a big issue in this particular area.

Prof. Copeland—I might butt in there. I do not think John would mind me saying that he was awarded the cotton researcher of the year award in 2001. The future he is looking at is short-term funding and where the next year's funding is going to come from.

Mr LINDSAY—It is scary to think that you have several years of data that may just never surface.

Dr Triantafilis—It may never surface. It would be a shame, because the way we have gone about collecting this information has been very cost-effective. We have covered a large area and we have a lot of calibration data to go with all the EM data that we have collected. It is a tremendous data set. However, in my position as a reasonably purely research scientist, you also have difficulties in trying to attract students to come and do research work. You do not have access to attracting those types of students. If you were an academic, it would be even harder again. I do not think you can really look to university academics—it is very competitive for them too. Universities and faculties look to them to get research grants—and large research grants too. Academics are even more inhibited by the fact that they have large teaching workloads as well as administrative loads, the supervision of postgraduate students and the administering of grants.

Mr LINDSAY—The issue you raise leads into something in your submission where you said that there is a need to make databases more available between research organisations, particularly for modelling purposes. You went on to talk about how certain sorts of data are made available free of charge in the US. Have you had any problems? Can you give us any examples of where you have not been able to access other people's data when you reasonably felt you should be able to?

Dr Odeh—I will give an example from a couple of years ago when we wanted to do some research in the northern part of New South Wales. We needed some elevation data which was available in New South Wales. When we requested the research data, the huge amount of money they requested was a bit too high. It was not provided for in the research, so we could not obtain it. According to Kim, that is changing. I do not know whether that data is now being made available. I am not sure.

Mr LINDSAY—That is an issue that holds back the country, isn't it?

Mr Wright—That is true. It can.

Dr Triantafilis—The problem that I see—though a little selfish I guess, and Dr Odeh is in a similar position—is that we have spent the last six years collecting a huge database with no security and tenure and now people are coming to us saying, 'Let's have that data.' They want it for their own databases and so on. You do all the hard work and somebody else is going to really benefit from having that information. That is not quite right, I know, but it is the position in which a lot of non-tenured staff are going to find themselves. I am not quite sure what the fairness in that is or how we reconcile those types of issues.

Dr Odeh—Even some of our data are going to be made available publicly. We are CRC funded and we are going to put it on the Internet.

Ms CORCORAN—I want to get back to this link between the work that researchers are doing and what people on the land are trying to do. In your submission you talk about a natural resource manager going out in the field somehow to provide that link. Could you expand on that?

Prof. Copeland—I think there is probably a need in many instances for a person to take the research results and make them more accessible in less technical terms to the people who are actually going to use them. Sometimes it is not part of the researcher's background or training to communicate at that level. So there is a need for someone who may have journalistic skills to capture accurately what is in the research and to transfer it in an accessible way without all the technical jargon and without the need for a detailed explanation but also so that the person who is receiving that information can trust the accuracy of what is there. The message that I sometimes get when I talk to people is that there is always that uncertainty about information coming from private consultants and whether they are tied to a particular interest.

Ms CORCORAN—Thank you.

CHAIR—Thank you once again for your evidence this afternoon and for your submission. We appreciate it greatly.

[2.50 p.m.]

HOWARD, Mrs Mary, Deputy Chair, Hawkesbury-Nepean Catchment Management Board

NICHOLS, Mr Stephen James, Senior Natural Resources Officer, Department of Infrastructure, Planning and Natural Resources

CHAIR—Welcome. Do you have any comment to make on the capacity in which you appear?

Mr Nichols—My role is to coordinate the provision of executive and administrative support to the Hawkesbury-Nepean Catchment Management Board and the Hawkesbury-Nepean River Management Forum.

CHAIR—You were both here before when I outlined to other witnesses the instructions with respect to the giving of evidence, so I will not repeat that. The committee has received your submission as submission No. 21; it has been authorised and is therefore publicly available and on the record. I invite you to make some initial opening comments, then we will proceed to questions.

Mrs Howard—Dryland salinity affects rural areas in the upper catchment areas and urban areas in Western Sydney. Recent DIPNR salinity mapping shows significant areas of Western Sydney—that is, the non-sandstone areas—as being at higher risk to salinity. The Hawkesbury-Nepean salinity hazard is commonly caused by depleted vegetation conditions on the discharge areas of shallow ground water systems in soil landscapes of high salt content. This differs to other areas of the state, where salinity may be driven by water leakage from rivers, irrigation areas and water supply systems in irrigated landscapes and rising regional watertables and dryland farming areas.

Science and technology—through mapping, soils, geology and watertables—can provide important information to managing and monitoring irrigation and dryland salinity. Recognition of socioeconomic issues is important in identifying anthropogenic links to emerging salinity problems and for developing sustainable national resource management systems. In Western Sydney, science can also be applied to develop new building and infrastructure management technologies that are needed to adapt urban salination.

Federal NHT funding is managed through the national action plan. As the majority of NAP funding is directed to the Murray-Darling Basin, the Hawkesbury-Nepean must rely on NHT and other funding sources for salt management programs. Current policy severely disadvantages the Hawkesbury-Nepean, with its large population and significant salinity problems. This lack of funding will severely limit the region's ability to use science to manage salinity. Current programs are funded by other private investment, other NHT component programs and the Catchment Protection Scheme in the upper catchment.

In the future Hawkesbury-Nepean catchment management authorities will need other funding to manage salinity and build partnerships with the scientific community and industry. This

challenge highlights the future role of all the CMAs in integrating science with community programs to promote future integrated national resource management programs and facilitate the development of new investment in environmental services and research. The views of the Wentworth Group of Concerned Scientists on specific issues may not be shared by other groups of scientists or the community in general. The true scientific view of the landscape is not owned by any one person or science organisation. The CMAs will need to develop a consensus scientific view of the national resource management resource base between research, providers and community in general and have the capacity to engage non-aligned scientifically and technically qualified people in the development and implementation of local strategies.

CMAs will need to promote community debate on key issues to facilitate key actions. Current knowledge and technical capacity is not perfect. Existing knowledge and skills need to be applied in an adaptive management context so that program monitoring and emerging knowledge gaps can be used to identify new research technical needs. Such an approach will require ongoing financial support to commission new science and the committed support by appropriate Commonwealth and state bodies.

We have a list of recommendations: that the scope of science include social and economic disciplines, that science be integrated through catchment blueprints by the catchment management authorities and promoted by national resource management extension officers with multidisciplinary skills who are able to promote the implementation of salinity management strategies through group extension programs and that each CMA establish and chair a science subcommittee. These subcommittees need to be coordinated with appropriate Commonwealth-state bodies and provide expert advice to the CMAs on all issues of national resource management science and any need to commission new research and monitoring.

A further recommendation is that the CMAs facilitate the development of community based regional salinity management strategies that integrate best science. The CMAs should promote the implementation of these strategies by facilitating the development of integrated subcatchment and subregional plans, and promote the development of accredited property plans that are supported by property agreements linked to adequate environmental service and investment funds. The CMAs should promote the implementation of the salinity strategies in urban areas through local government LEPs and related partnership programs. The CMAs should promote the implementation of existing scientific knowledge through an adaptive management context so that the monitoring of existing programs can be used to refine existing scientific advice and/or identify the need for new research. Each CMA should actively promote salinity national research management science by prioritising extension programs and matching these resources in areas of greatest need. Such an approach could promote routine regional salinity forums where research extension staff, together with the community, can workshop contemporary issues and appropriate new research for extension collaborations.

CHAIR—Mr Nichols, is there anything you want to add at this stage?

Mr Nichols—No, I will let Mary do most of the presentation and I will support her as needed.

CHAIR—How has the Hawkesbury-Nepean Catchment Management Board changed with the announcement last week or the week before—whenever it was—of the new catchment management authorities?

Mrs Howard—Given that the board only came into being this year and is essentially behind other boards, to say that we are all shell shocked is putting it mildly. But, nonetheless, we are looking forward to the implementation of the CMAs and having them working effectively. The board has not really had the time to get itself up and running and get a handle on the whole thing before suddenly realising it has been terminated.

CHAIR—Is the area that the board had responsibility for the same—has it changed?

Mrs Howard—Sorry, I misunderstood your question. It is the same.

CHAIR—So there will effectively be a catchment management authority covering the same area that the board currently covers?

Mrs Howard—That is correct.

Dr WASHER—There is a level of knowledge required—I understand that. Is this is a new authority that covers all catchment management boards in New South Wales?

CHAIR—Yes, the New South Wales government—in conjunction with the federal government and with the support of the New South Wales farmers and the Nature Conservation Council, which is a rare agreement altogether—announced a change about two weeks ago. Where there were a certain number of catchment management boards covering New South Wales, there will be a reduced number of catchment management authorities. In this case it is not going to change.

Mrs Howard—There will be 13 catchment management authorities in New South Wales.

CHAIR—There were originally 19 catchment management boards, I think, so it is a sort of new structure—

Dr WASHER—But not a greatly—

CHAIR—and those authorities will have, I think, three appointed people—

Mrs Howard—Five.

Mr Nichols—Eight, I think.

Mrs Howard—It has changed. There were five to seven in the initial consultation but there was a suggestion, through lobbying, that it be increased. The last we heard was there would be a maximum of eight.

CHAIR—Okay, so maybe it is at least three.

Mr Nichols—Ads were placed in last Saturday's *Sydney Morning Herald* and will be in tomorrow's *The Land* for the positions of chairs, so things are starting to roll on. To answer Dr Washer's question, the big difference is that the authorities will be charged with the

responsibility of implementing all on-ground programs, whereas the boards had to facilitate that through other players.

Dr WASHER—I understand.

Mr Nichols—In saying that, the board have probably framed their recommendations in the knowledge of a new authority and are looking at the way an authority could use science to drive salinity outcomes.

CHAIR—The timing is quite interesting from this inquiry's point of view. In some of the evidence we are taking about how some of these things will work, which will help us understand exactly what the new structure is going to be.

Mr MARTYN EVANS—The new authorities will have more power to act locally and will perhaps form stronger relationships with farmers on the ground, because they are going to be able to directly manage projects, in effect. Do you think they would be suitable agencies to employ extension officers to work directly with farmers and form long-term relationships? One of the messages we have been hearing from witnesses, including farmers, is that there is a lack of continuity with extension officers, which leads to an inability to form trust and long-term relationships with farmers. One of the problems in delivering messages about science to the farmers on the ground in relation to their properties has been this constant state of flux that the advisers are in. There are no long-term appointments, so the farmers see a new person every time. But if it were perhaps a local agency, like the new authorities, which will have an on-the-ground role in their catchment area, it might be longer term. Given this new role, is it possible for an agency like the new authority to employ extension officers, for example? Do you see that as an option?

Mrs Howard—From what has been explained to the board about the vision for the CMAs, it is my understanding that it will be part of its overall responsibilities. It will have staff appointed to it, and part of what it is to do is to deliver on the ground. It will be able to resource how it delivers on the ground.

Mr MARTYN EVANS—Including people like extension officers?

Mrs Howard—Yes. And, given the catchment area that the Hawkesbury-Nepean board looks after, it is not just farmers; it is more than just the farming community.

Mr MARTYN EVANS—It would include urban areas as well?

Mrs Howard—Yes, definitely.

Mr MARTYN EVANS—In your experience to date—which, obviously, would not have included the new authority—you would have had more of an advisory role, more of a coordinating role. What experience have you had with regard to the science, the research, the data collection? How have you seen that being coordinated and delivered from the science agencies, the researchers? We have CSIRO, we have individual research groups, we have the universities and then we have the individual councils—which, in the urban areas, are trying to cope with the impact of salinity on roads, on infrastructure, on housing—and the farming

community and so on, who are trying to deal with the impact of dryland salinity, irrigation salinity. As a catchment management board, have you seen the impact of these in a positive way, or have you seen some discontinuities in the attempts to deliver them?

Mrs Howard—Keep in mind that the board's existence has been—

Mr MARTYN EVANS—very limited.

Mrs Howard—Yes.

Mr MARTYN EVANS—I know; you do talk about that in your submission.

Mrs Howard—To give you my position in this, I picked up this *Salinity Potential in Western Sydney 2002* document from the Department of Infrastructure, Planning and Natural Resources probably within three months of becoming a member of the board. I picked it up when I was attending a presentation on NHT funding, and part of that was a discussion on salinity. From where I am sitting, the science is being brought to the community, because that is what I was: I was representing stakeholders at that forum, and science was being brought across to me.

Mr Nichols—Mary, we should probably talk about how the two blueprints that have given us a strategic framework have been developed.

Mrs Howard—In the Hawkesbury, for overall management, blueprints have been established through the LGAG, which is a local government advisory group comprising 21 councils. They have developed their blueprint. For the Hawkesbury catchment we have two blueprints, not one. There are two catchment management committees. The upper end of the catchment has developed the second blueprint. We now have that blueprint model, which has been developed through community consultation, to take it further. That proposal will be handed by the LGAG to the board and on to the CMAs, so the CMAs will have a blueprint to go by. Part of the science will be used in that.

Mr Nichols—Those two processes drew together scientific representations from the key agencies and community players, and that underlying scientific data formed the background to the priority programs and strategies within each blueprint. There is a link there. We have gone from catchment committees to the board to the authorities, and it will be passed on to the new body.

Mr LINDSAY—Mrs Howard, would it be fair to say that salinity is only rarely discussed at your board meetings?

Mrs Howard—Only because of time. It would be unfair to say that salinity is not an issue. Keep in mind that we really did not get up and running until May. We had a lot to do in our first couple of meetings in establishing our structure. We are thinking long term—not 12 months—in terms of the structure, and so there were meetings to develop that. Then you had NHT funding for the year, which had to be dealt with. Then, really, the next meeting we had was: 'You're not going to be around after 31 December and neither are boards.' It is not a case of whether salinity is an issue and whether it should be discussed; it is a case of the timing.

Mr LINDSAY—With the NHT funding that you have applied for, what are the strategies that you have in mind there for your catchment?

Mrs Howard—It is employing extension officers that have been previously employed, as I comprehend it.

Mr Nichols—The priorities would be the continued Landcare support funding for coordinators and facilitators. There have been the biodiversity management programs and a number of other initiatives in the lower catchment in terms of partnerships with local government.

Mr LINDSAY—Does your board get enough local information coming from the science community down into your catchment to satisfy the concerns of those who live in your catchment area? It may be too early to ask you that question.

Mrs Howard—No, because I sit in two forums. I sit on the board, but I also sit on the Hawkesbury-Nepean River Management Forum. Because I sit on that forum, I have had access to an expert panel providing us with extensive advice over the last two years. So scientific advice has been conveyed to that forum. That forum's information is available to the board. There are members from the forum on the board. I believe the information is there. We have had presentations from both—

Mr LINDSAY—Is it readily available?

Mrs Howard—Yes.

Mr LINDSAY—Then is information from the forum to individuals in the community available? Does it flow?

Mrs Howard—Yes, it is. But—and this is a comment I made to Steve—because you have a diverse nationality population, especially in the catchment, it is about people's knowledge of where to go for that information. It is about knowing where to go for it.

Mr LINDSAY—But you think it is available?

Mrs Howard—Yes.

Mr LINDSAY—In your submission you have recommended:

... better access to scientific information in a format that can be used by Local Government to make landuse decisions...

What sort of format are you talking about?

Mr Nichols—Basically, it is information that can support local government with broadscale planning—land use planning, the development of local environment plans and whatever—so they can drive development within their areas that is compatible with land capabilities, soil conditions and so on.

Mr LINDSAY—And who should that information be available from?

Mr Nichols—That is currently the responsibility of the key state agencies. Our organisation, the Department of Infrastructure, Planning and and Natural Resources, has been developing soil landscape mapping for Western Sydney. There is a range of other information out there that is coming from other agencies as well, but there is probably no single conduit at the moment.

Mr LINDSAY—Would you like to expand on this comment in your submission:

... good science and the possession of appropriate scientific knowledge ... is not the sole province of University academics and other professional research workers. Considerable relevant knowledge and skills are held at a community level ...

That is in your patch!

Mrs Howard—Exactly. It comes down to knowing where to go to get scientific information and knowing how to use science and it being available to you at that point. It is about the community's knowledge about where to go. Often you know that it is because of your inadequacies in knowing where to find the information—apart from agencies with the information that do not have the ability to convey it. So it is a two-way street, I think.

Mr Nichols—I will add a little bit more to that. Gary, you may remember coming to a field day many years ago at Braidwood, where we went to Bombay Creek. That Landcare group was a little bit atypical: the chairman had been the assistant chief of the former Division of Soils at CSIRO and they had within the group a salinity expert, ex-CSIRO, and a research agronomist. There are a range of skills within communities; if we ignore them, we do so at our peril. What we have to do is engage those people and their networks with our other, formal science providers and develop a consensus model, but also use some of the community people to help explain the science to their neighbours and compatriots. Without doing that, we run the risk of not being able to empower the community to understand the science, and if we cannot do that we cannot apply the science. We have people out there—some of them are retired, some of them are active—and a lot of them want to play an active role in taking the model forward.

Mr LINDSAY—That is a good example that you have provided.

CHAIR—Yes, but it is in the wrong electorate! One of the things that this committee is looking at is the flow of information from when the research is done down to the grassroots. But you are raising an interesting situation where the grassroots information is going the other way. I am not so certain how the community gets to do that.

Mr Nichols—The other issue too, Peter, is the Indigenous knowledge.

Mr LINDSAY—Yes.

Mr Nichols—How do we bring that Aboriginal knowledge in? That is quite an important perspective in terms of cultural values and longstanding cultural knowledge of the landscape and how the landscape works. We have to have a model that we recognise in academic science and use that, but how do we build in the community and all these other components?

Mr LINDSAY—To tie up this issue, do you think the scientific community are taking advantage of local community knowledge to the best of their ability?

Mrs Howard—No.

Mr Nichols—We are damned if we do and damned if we don't—if we say one side is right and one side is wrong. There are probably research workers who go out and do research for the sake of their own careers, but there are other research workers who are industry based, have community support and are developing or delivering products that their peer group wants. What we need to do—and probably the catchment management authority model is one of the ways to do it—is to develop a research strategy through a regional blueprint or whatever so that the community again has some say in defining and refining the priorities, and then put some transparent processing into commissioning that science with Commonwealth, state or private money.

Mr LINDSAY—I think that is a good answer.

Ms CORCORAN—I think you have probably answered my question. I want to talk to you about one of your recommendations—the need to develop an integrated communications strategy. That recommendation talks about scientific knowledge coming down to the community. I was going to get your response to a suggestion that that would also be a good way of having communication going the other way, that the community could talk to the scientists about what they needed, but I think we have probably had the discussion.

Mrs Howard—I will just take you off the track a little and give you a first-hand impression. I come from a commercial fishing background and, when sitting in a forum and conveying to experts what a commercial fisherman does and how a commercial fisherman catches his product, people just do not comprehend what is involved in commercial fishing and how a fisherman's day is spent and how he catches his product. It can only come from a fisherman.

But in terms of salinity, salinity in my comprehension is just not a matter of where the salt is. It is what is under there that you cannot see. While you have the first-hand knowledge of the layman, the person who perhaps owns the property and can see what is going on, you still need the science behind what the layman knows and the communication between the two. I guess it only goes so far but you need both.

Ms CORCORAN—That is what I am getting at.

Dr WASHER—Mrs Howard, you mentioned the Wentworth Group of scientists, and that is the second time today I have heard that mentioned. I do not know anything about them, but you did not seem too happy about them. Can you elaborate?

Mr Nichols—I could probably say something there, Mal. The Wentworth Group is a group of scientists that have been advising the state government on the development of catchment management authority policy. It consists of a number of very eminent scientists. I have mentioned the Wentworth science people to the people on our river management forum expert panel and the comment was that they do not always agree with their views. It points out that there are many factions within the scientific community. We need science, but all people will not

give us the same answer to the same data set. They are going to interpret that data in different ways.

Mrs Howard—We need to recognise that there are lots of people out there with lots of scientific views—but do they collaborate on those views to get the right outcomes and are we getting the right outcomes? In our particular case for the Hawkesbury-Nepean the impression is that we are not getting the share of the outcomes from that science base in terms of funding and deliverance of what is needed overall. Even though we have got stuff there to say that we exist and that salinity is an issue, we need more. It is growing and it is changing and it is going to continue to grow and change and we are going to have to fund it. How do we fund it in our structure? With the LGAG we have 21 councils. Eight of those councils have an environmental levy on their ratepayers and are raising funds. The aim is to get more funds.

The right knowledge in the right area for the right purpose, I guess, is a significant need. We have the broad scale, but what applies for developments that are going to happen in our metropolitan area and what is needed to determine what can be built and what structures are appropriate? Is there a salinity issue there and are we getting things happening on the ground. Will our CMAs deliver that and should they deliver that? Yes, they should, because they are supposed to be in place by 1 January.

If the state government has gone down a road where CMAs are going to be the way we go, we need to know that those CMAs are aware of the salinity issue. We know they will be, because we are passing on that information, but it is about what is going to happen in the next major development and whether there needs to be action taken with developers to see that they develop their roads and infrastructure according to what is needed to see that we do not have problems down the track which then develop the socioeconomic problems. I hope I have not totally confused the answer.

CHAIR—I just want to take up on something you were saying there—that you cannot access some of the funding et cetera. You do say in your submission that, under current guidelines for the national action plan funding, this catchment cannot benefit. The NAP was negotiated between Commonwealth and state levels. One would assume that who was going to be involved from a state point of view and what areas would be covered would have been something that the state would have put to the Commonwealth. Is that something that you are continuing to take up with the state government? This national action plan is going to go on for seven years—it is a seven-year funding thing.

Mr Nichols—I think the board recognise the national action plan is in place. What I think they are suggesting is that there is a need to look at broader funding and investment models. What Mary suggested—the partnerships with local government—is probably one of the issues the board/authority will look at in promoting greater outcomes in Western Sydney. But I think they were just saying that, under the current rules, we do not have access to that level of funding through the NAP.

Mrs Howard—The next meeting of the board is to prepare its recommendations to the CMA and categorise them so that we can workshop what we see the CMA needs to take on board, given the limited time that the board has actually been in existence. Unlike other boards in the state, our existence has been quite short-term.

CHAIR—So you might be making a recommendation to the incoming CMA to go back and talk to the state government about being involved in the national action plan?

Mrs Howard—Yes, but I think that, from what I have understood from the DG, funding is limited. They have fairly well made up their minds about how funding is going to happen and how it is going to go.

Dr WASHER—We will be talking with the state government next. I guess regional government is what you really cover—is that right? The board really covers various local government authorities. You alluded to the fact that you do get Natural Heritage Trust funding but the national action plan funding—although I guess it is a little early—seemed elusive. From what you said to the chair, you suggest that that would have been difficult to access as a board.

Mrs Howard—Yes. Given the time frame, and keeping our time frame for being put in place, we went straight into NHT funding. As far as any other funding goes, as a board we were battling, in our time frame, to actually get our NHT funding applications in. New people sitting at the table as a community organisation had to absorb it, put it into a document and then apply for it without the knowledge of the NAP funding. A lot of people are needing to understand the NAP funding. So I have to be guided by Steve on the fact that we could not access that funding.

Dr WASHER—Steve, could you flesh this out? I am sure that the state always gives it slightly differently compared to local authorities. I am not picking on the states, but I guess that, because they put 50 per cent of the money in—the national action plan is fifty-fifty—the guy who has the dollars is God. But it would appear that, if you are not part of the state government and you are a local authority, getting that money out is not necessarily overly easy. How would you access or apply for it? Who judges whether it is a worthy cause? How do you get funded if you are not state government controlled?

Mr Nichols—Are you looking at where the model is going in terms of the authorities?

Dr WASHER—Say I am not a state government organisation but I want to apply to get national action plan funding, how would I progress that?

Mr Nichols—I am not sure of the details. I have not had much to do with the funding in the last year or so. You would have to comply with the program guidelines and details and write your application according to the key strategic objectives of whatever the priorities were for the funding. With the priorities being in the Murray-Darling Basin area, that probably makes it a bit difficult for us to access in the Hawkesbury-Nepean area. That is as good an answer as I can give at the moment.

Mrs Howard—In terms of the CMAs, I do not how helpful this is but it says:

Over the next five years the Commonwealth will contribute \$200 million, New South Wales and Victoria \$115 million, South Australia \$65 million and the ACT \$5 million; a total of \$500 million. You would have seen both the Prime Minister and Deputy Prime Minister congratulate our minister for his role in this initiative. We too can be proud of our work on this historic agreement.

From where I sit, when you divide all that up over five years, even for the new CMAs there seems to be a very low funding base, really. It is not a lot of dollars in terms of what I see as the enormity of the overall management of catchments, including salinity, or even water management just on its own, and that is part and parcel of the salinity problem.

CHAIR—What were you quoting from?

Mrs Howard—I was quoting from advice from Jennifer.

Mr Nichols—It is an internal staff newsletter from the Director-General of the Department of Infrastructure, Planning and Natural Resources on the establishment of the new department and some of the policy background of structuring the catchment management authorities.

CHAIR—Thank you. I just wanted to put that in context. Thank you for your evidence this afternoon and for your submission. It has been very useful to have the information you have provided to help put this complex picture together.

Mrs Howard—You can have a copy if this newsletter if it would be of use to you.

CHAIR—Yes, we will take that as an exhibit. Thank you.

Proceedings suspended from 3.28 p.m. to 3.48 p.m.

BLACK, Dr Dugald, Manager, Resource Processes Branch, Centre for Natural Resources, Department of Infrastructure, Planning and Natural Resources

CURLL, Dr Michael Lawrence, Deputy Director-General, New South Wales Agriculture

CHAIR—Welcome. Although the committee does not require you to give evidence under oath, I advise you that the hearing is a formal proceeding of the parliament. I remind you, as I remind all witnesses, that the giving of false or misleading evidence is a serious matter and may be regarded as a contempt of parliament. The committee prefers all evidence to be given in public; however, at any stage you may request that your evidence be given in camera and the committee will then consider your request.

We have received this afternoon the submission from the New South Wales government. We thank you for getting that to us prior to this afternoon's hearing. As you would appreciate, we have not had a chance to go through that in any detail, but certainly we have gone through a variety of documentation—nearly 50 submissions—prior to starting the conduct of the hearings. Is it the wish of the committee to receive the submission and authorise it for publication? There being no objection, it is so ordered. The last witnesses we had provided some documents, one of which was *Salinity Potential in Western Sydney 2002* from the Department of Infrastructure, Planning and Natural Resources. Dr Black, these would be publicly available documents, one would presume.

Dr Black—That is right. I have not actually sighted them but, just by the look of them, I would say yes.

CHAIR—They are guidelines for the mapping of salinity potential in Western Sydney and site investigations for urban salinity et cetera.

Dr Black—Yes, they are in the public domain.

CHAIR—So there is no problem authorising the acceptance of these as an exhibit provided by the Hawkesbury-Nepean Catchment Management Board. Is it the wish of the committee that we accept these documents as an exhibit? There being no objection, it is so ordered. Would you like to make some opening comments?

Dr Curll—Thank you very much. I must apologise for the committee getting the submission at this late point, but these things were a little bit beyond the control of mere mortals. At the outset, I would like to thank the committee for the opportunity to make a submission to the inquiry.

I will sequentially address in a generic sense the terms of reference. You will get a feel from me that I talk particularly from an agricultural perspective. My colleague Dugald will clearly be a little bit more comprehensive in terms of going beyond just the agricultural issues and on to the general natural resource issues of urban communities. Dugald is also quite knowledgeable in terms of answering questions about the modelling programs that DIPNR has quite astutely put together, which are seen as major tools for tackling the problem in New South Wales.

By way of introduction it is worth while pointing out that the government's framework for managing salinity was generated out of a community summit several years ago—in 2000—at Dubbo, where a whole range of stakeholder groups, not only government, got together and tried to sort out a smart way of going forward with salinity generally. One of the outcomes of that summit was the establishment of a salinity research and development coordinating committee, which I will talk a little bit more fully about later.

By way of setting the ground rules, we see that research in this state—the science in this state—underpins the natural resource planning and processes and specifically what we have come to call the catchment blueprints, which really form the basis of the both the communities' involvement and the government's commitment to managing a whole range of salinity issues across the state. There is a significant level of reform going into that community delivery process at the moment which Minister Knowles and, federally, Minister Anderson, Minister Truss and Minister Kemp are negotiating through, which is good.

But just by way of putting the emphasis on my portfolio—that is, agriculture—I would like to make the point that agriculture, both dryland and irrigated, is the dominant land use activity where salinity is a problem. We believe that any activity that we undertake and any decision making we do must be based on good scientific evidence—hence the importance of your inquiry.

We believe a broad knowledge base exists that describes the basic processes that lead to salinity: problems in the landscape. That knowledge base has prompted development of theoretical solutions to dryland salinity problems in state landscapes. However, I think it is very important to realise that one size does not fit all. That is a particular problem for national R&D providers such as CSIRO and even BRS. Theoretical solutions—perennial based farming systems, farm forestry, land capability planning, engineering, interventions and the like—need to be tailored for particular catchments, subcatchments and properties. That is because research has shown that the expressions of salinity will change with land use, irrigated water use, geology, soil type, topography, rainfall and climate.

Comparisons between what happens in Western Australia, for instance, and what happens in New South Wales where the geology and the soils and the like are quite different and the solutions are quite different pays testament to the fact that local solutions are an imperative. In New South Wales scientific knowledge on salinity is generated primarily through the work of government and university R&D agencies with major funding support from national R&D corporations. We cannot understate the importance of that partnership—it is essential to getting solutions, because those R&D corporations, as you would appreciate, are funded by levies from farmers matched by levies from the federal government. So that is a really good way of getting the involvement of the industries and a commitment from the government in terms of the financial part of it.

In the case of state agencies, the knowledge that we generate is usually transferred to farmers, rural communities and industry groups through a range of processes, including formal and informal extension education programs—in particular, what we call experiential learning activities, publications, field days and demonstrations. That is the standard stream of information flow. Research results are published in scientific journals and a lot of the material has been put onto Internet access sites. In particular, in New South Wales we have a thing called CANRI, which may have been mentioned to you. It is Community Access to Natural Resources

Information, and it is a community based access system where maps, descriptions of soils and biophysical information, research results and a whole range of things are either directly there or can be accessed through state government agency web sites through that process. It is a very useful tool.

Regarding the Australia-wide data on salinity and related biophysical data that has been generated out of the national land and resources audit, to be blunt, at a federal level this is seen as a very useful tool and a very useful process. I guess I cannot argue about that, because the job that it is doing is one where the Commonwealth has advised as a consequence of those audits where things might be going. But the point needs to be made that as far as we in the states are concerned, tackling this issue on a catchment, subcatchment and property scale, that information is not all that useful. We have taken the information, tried to put it into a model context and it has fallen over a bit, so we have had to go out and redo it. So I am not arguing with the fact that it is great from the national perspective—in terms of where we are moving towards national targets. But, in terms of usable information at the scale that state agencies and CMAs might need to use it, it ain't all that good. Anyway, we have other ways of getting that information.

Moving to the linkages between researchers and those using research, I had the privilege of chairing the NSW Salinity Research and Development Coordinating Committee. I only have several documents which I will table. I will get more if they are needed. But that is the document, and you can see the logos at the bottom. The committee was a structure established comprising the key research providers in this state and nationally. So we had the Murray-Darling Basin Commission, CSIRO and BRS as a member of that committee.

CHAIR—For the record, the document you have referred to is *The Strategic Framework for Salinity Research and Development in NSW*.

Dr Curll—That framework document identifies the key knowledge questions that need to be answered for effective salinity solutions. It also identifies criteria that could be used by the funders or providers of research to assess and evaluate the potential for particular research proposals to answer those key knowledge questions.

The committee also compiled a register of current research activities, which again are accessible through that CANRI network that I mentioned. We tend to update that register frequently so that any agency or authority can see what research is going on and where, what the contact is, and whether it is Commonwealth or state research. It also went through the process of identifying and analysing knowledge gaps that exist, recognising that we have a database of what is going on and the key knowledge questions to determine 'where are the gaps?'. We have looked at that and we have developed an R&D investment portfolio, which I have 10 copies of and which I table for the consideration of the committee. That information, in terms of where the 'low-hanging fruit' is or the priorities for R&D, was passed on to catchment management boards, the CEOs of state and federal natural resource agencies, universities, the CSIRO and the like. Those organisations were encouraged to use it in the manner that was most appropriate to their particular needs. You will note that the final page contains a list of what we think are the important issues that need tackling.

I might add also that a lot of material that was developed by the committee formed the basis of what was put together as a position paper to support the National Action Plan for Salinity and

Water Quality by the science and information subcommittee of the Natural Resource Management Ministerial Council. That information is fed into Commonwealth decision-making processes through that subcommittee of NRMCC.

Actions to ensure effective information flow from research to the end user are many and varied. In New South Wales we put particular store in the operation of what we call our specialist salt action teams. They are teams of agency specialists, scattered strategically across the state. One focuses on urban matters and five focus mostly on rural matters. Those teams have some pretty smart operators in them. They get out there, they channel the best science into CMA thinking and they channel the best science into private sector provider activities. We do a lot of work in training private sector providers so that the Elders and the CRTs of this world are up to speed with the science and the best available options. The Department of Infrastructure, Planning and Natural Resources and New South Wales Agriculture have a very extensive network of extension officers, and these people bounce off what we call our centres of excellence for research. Again, they are scattered throughout the state. We think that the process works pretty well.

It is important to make the point that we believe that the information flow from science to the user is very appropriately managed by particular cooperative research centres, particularly the salinity cooperative research centre and the CRC for catchment hydrology. As far as I am concerned—I am sure that DIPNR would agree—they are very useful instruments which encompass the best science, the best education and the best information transfer processes. It is a very good initiative that was set up by the federal government some years ago.

There is one more point that I need to make: we believe that the essential elements of a successful knowledge transfer and awareness-building process is that it needs to be tailored to local needs. Importantly, we believe that centralised, top-down messages just do not work. We need local solutions and we need messages to be generated locally. We believe that the AFFAs and the EAs of this world should leave that implementation activity to state networks—but what would you expect from a state proponent?

Finally, in terms of the adequacy of technical and scientific data to support management options, my colleague Dugald may have some pretty useful information to talk about with the models that he has got for a whole range of catchment, subcatchment and property scale activities. But it is probably worth while making the point again that in New South Wales there is 15 million hectares of country on the western slopes of the Great Dividing Range, 85 per cent of which is owned by farmers. That is our primary problem area. We believe that commercial agriculture is the key to fixing the salinity problem.

Asking farmers to change their land use or their property system means a major and daunting change to their property management, requiring new skills, possibly a change in lifestyle, and major new investments. We think the key principle in persuading farmers to make changes of the magnitude required is that they must be involved in the process. That is what we call experiential learning action. The challenge that we believe we must meet, particularly from agriculture's perspective, is to establish research trials and demonstrations that involve farmers in their design and implementation, are on a scale that is believable and realistic, explore a range of land uses and farming systems that are appropriate to their particular subcatchments and environments,

provide good data on water use, productivity and profitability, and recognise the long-term nature of research that covers variations in seasons and the effect of salinity solutions.

It is important—we believe it is essential, in fact—that the biophysical models that are being used to set targets, to measure progress and to make some judgments about what might be a good option have got to be underpinned by good science and good data. That is where we think the two major agencies in New South Wales have got the most to offer to the authorities. With that lengthy dissertation, I will hand over to my colleague.

CHAIR—That is useful material.

Dr Black—I would like to talk for a moment, if I may, about some of the modelling activities that we are undertaking in New South Wales. As Mike said, these are providing critical information to support the decision making that is required to undertake or support the investment decisions that are being made at catchment, regional and individual levels, so there is a great deal of interest in this. The modelling that we are doing is specifically designed to support the implementation of the NAP, the implementation of catchment management blueprints and the delivery of the New South Wales salinity strategy, which is one of the main drivers for the work that we are doing. Really our involvement in this from a modelling perspective goes back to the Murray-Darling Basin Ministerial Council salinity audit. We had a major involvement in providing the analysis that went into that for New South Wales. That was really the start of our involvement, and that goes back to 1998. We have been active in this since then.

The focus of our work has been very much on the eastern third of New South Wales, from the western slopes of the Great Dividing Range eastwards, and it is in this area that the bulk of the problem with man-induced dryland salinity is occurring. It is in this area that most of the problem—not all of it—is caused by interactions between land use and the behaviour of fractured rock aquifers. We are talking about local scale aquifers with fairly rapid responses and fairly highly variable water level behaviour and so on. They are the sorts of areas that we are most interested in.

What we are trying to do at the moment is to progressively deliver an integrated suite of modelling products to support that property scale, landscape scale and catchment and basin scale decision making. We are doing it collaboratively. We are doing it collaboratively not only within New South Wales but also with groups nationally. I think it is important to emphasise the point that Mike made that, in doing this, the Department of Infrastructure, Planning and Natural Resources is collaborating with New South Wales Agriculture and with State Forests and the National Parks and Wildlife Service, now within the Department of Environment and Conservation.

We are also collaborating with the CSIRO, in particular. Most of that collaboration is occurring through the CRC for Catchment Hydrology, but we are also collaborating with them directly on a number of issues. This is primarily with the CSIRO Division of Land and Water. We are also contributing where we can to the activities of CRC LEME in the work that they are doing with the use of remote sensing to try to improve the datasets that we have to underpin the modelling. So there is collaboration happening there, and we are also collaborating with agencies in other states. We are collaborating with the Queensland Department of Natural

Resources and Mines and with the Victorian DSE and DPI. That collaboration is largely being driven through the CRC for Catchment Hydrology; we are using that CRC to provide the glue, if you like, to get that interstate collaboration happening.

We all agree that collaboration is necessary, and what we are looking to do is to get consistent methodology for evaluating or predicting dryland salinity outcomes not only within New South Wales but across the eastern states, where the causes of the problems are similar, so that we can at least compare an action in the Goulburn Broken in Victoria with an action in the Macquarie in New South Wales and know that we are comparing apples with apples. We are trying to get that sort of consistency. That will address a few issues that came up with the National Land and Water Resources Audit, where there was no consistency between the states, particularly in relation to the maps that were in there, about the dryland salinity issues. So we are trying to overcome all that. I would also point out that we outsource whenever that is appropriate and cost effective. So we will bring in the private sector for doing work where it is useful.

The sorts of questions we are addressing, in a predictive sense, are things like where in the landscape will salinity management actions work and what salinity management actions will work and where—and this comes back to this tailoring to local issues and local needs. We are developing a system that enables us to pull together information from a variety of sources to help advise on that. We are trying to predict what the salinity impacts of management actions are likely to be, and they could be good and they could be bad. We are acutely conscious that in some cases there is a trade-off being made between a beneficial salinity impact and perhaps a reduction in water yields from catchments. We are aware that that is an issue, so we are developing models to use that will help us to understand what that trade-off might be.

One of the other issues is when we can expect to see the impact occurring. We are using tools that will help advise us on that as well, and I will touch on that in a minute. Essentially, for the issue of when we can expect to see impacts occurring, we rely on products coming from the CSIRO. That is where we complement one another very nicely: they have a strength in that area and we do not, but as it happens we have more strength on the surface side. So we try to work as an integrated team, and that is working quite well. We are also starting to look at what some of the other biophysical impacts might be in a fairly crude sense—the impact of terrestrial biodiversity, carbon sequestration, soil health and that kind of thing—in an integrated fashion.

With all of that, the objectives are to provide that scientific and technical support that we need to the reviewing and monitoring of end of valley and within valley targets, particularly the salinity targets. The first round of targets, which are in the catchment management blueprints, were based on the results of the MDB salinity audit—at least in the Murray-Darling Basin they were. Outside that we had to come up with some other techniques, but basically the same sort of methodology was used. The modelling will also provide information to enable us to refine those blueprints as we go and to evaluate onsite and offsite impacts of individual actions and groups of actions, and particularly the impacts of those on end of valley targets. People want to know what the contributions of their actions might be to an end of valley target, so we are providing the tools that can do that. There is also the issue of targeting salinity management so that we get the best value for money, so the tools that we are developing and implementing deliver on that as well.

The way we are going about this is that we are progressively developing our knowledge base on models and on natural resource processes, so what we are doing is rolling out these models based on the best available data on the day and we are progressively improving these as new data and other information come to hand. We are trying to ensure that the model complexity is commensurate with the data available and the scale of application. When you get down to property scale, for example, we have a tool, which is mentioned in our submission, called the land use options simulator. That tool is designed to give a prediction of the impacts of a land use change at a site on the salt loads and the water exported from the catchment that that site is located in. That tool is designed to be used by extension people to advise land-holders directly. It can support that investment decision making to see what the salinity and water benefits or impacts might be if people invest a certain amount of money.

That tool relies on a digital elevation model which has a 25-metre grid square on it, so for the eastern third of New South Wales we have that available with a 25-metre grid square and we can operate within that. By contrast, the National Land and Water Resources Audit operated with, I think, a grid square of about a square kilometre, which is not satisfactory for doing that. So the modelling and analysis that we are talking about is going down significantly in terms of an order of detail and an order of complexity in what we are trying to do. We are not only trying to look at the impacts on averages but also, because the targets are expressed in percentages, we have to provide the information on those.

To satisfy our commitments to the Murray-Darling Basin Agreement we also need to provide for 25 years of daily data. That adds further complexity to the sort of analysis that we have to do because we have to look at the impacts of daily rainfall climate on how the salinity moves in the landscape and we are having to do that at a variety of scales. So what we are doing is delivering an integrated set of modelling tools that enables us to go from the property scale to the catchment scale to the river basin scale. With these tools we can effectively track the impacts of an action at a property all the way down to Morgan in South Australia. That is the aim of the game, so that we can look at that. The numbers might be pretty small but in theory we can do it.

CHAIR—If I can interrupt there, at which point in time do you think you will achieve that?

Dr Black—I was going to get to that. We are in the process at the moment of rolling out a delivery of this land use options simulator essentially across the catchments in eastern New South Wales where salinity is an issue. There are about 150 of them, and we are talking about catchments of around 500 square kilometres in area—that sort of dimension. There will be more detailed modelling underpinning that. We can put that into our river system models, which are scheduled to be ready in December this year. We can then start to look at the impacts down to the ends of our catchments—so we are talking about the Murrumbidgee at Balranald and the Darling at Menindee Lakes—and then it is over to the Murray-Darling Basin Commission office. It is up to them how it goes from there. They have got a modelling system that does that now, so basically as soon as we are ready we can take it all through. We are talking about months for this.

We have just set up a training schedule to start rolling out some of that immediate roll-out with a land use options simulator. That is happening in the second half of November and the beginning of December. That, in a nutshell, is where we are going with that. That is quite solid, and we are set to deliver it. From there we will go forward, as we can, to further refine and

improve that. One of the things we are conscious of needing to do is to connect this more closely with the property scale economics, which is something that New South Wales Agriculture does. We have a loose kind of connection, but we concede that that can be refined and improved. Also, state forests have economic analysis tools for their forestry operations, so we can connect those things together as well. It is already done in a first cut kind of way, but we need to do more work there. With that, I will conclude.

CHAIR—When the land manager or the farmer in the middle of this area thinks, ‘I can see certain things happening on my property; what should I be doing; how should I be doing it and when should I be doing it?’ who does he or she get on the phone to ask, ‘Tell me what’s going on’?

Dr Curll—He or she would more than likely get on the phone to the nearest officer—in locations across the state we have collectively between us about 200 frontline extension advisory officers and specialists—who would obviously be a well-known person to them, and ask them the question. The question would more than likely be referred on to the salt team groups, and they would make a judgment about it.

I guess the point that should be made is that we cannot wait until we get the science perfectly right. In the meantime we have to make some judgments about what is a reasonable option and what is not. Therefore we can certainly, collectively through our specialists, provide that inquiry with a response. We could say, ‘You should stop putting this annual cropping regime on this particular paddock, change this annual cropping regime to an opportunity cropping regime, or move to a perennial pasture base. We need to talk about whether or not some form of agroforestry might be an option for you, depending on where the leaky part of the property might be.’ That is the sort of information they can pick up, if they get to the salt teams. In relation to their access to those salt teams, because there are only six of them—five of them in the real bush—they will need to go through the local officers from the Department of Infrastructure, Planning and Natural Resources, New South Wales Agriculture and, when the CMAs are set up, the CMAs.

CHAIR—With the CMAs in operation from next year, they will become the key contact.

Dr Curll—They will not be the only contact. Again, there are 18 or 19 CMAs—

CHAIR—There are 15.

Dr Curll—Whatever. By definition they are not going to cover every situation. A person somewhere near Cowra might first contact his local DIPNR or ag office and then be directed. There are a whole range of processes in place to make sure that an inquiry is triggered and that it gets to the right person. The expertise might not be in the CMA. The expertise may well be with DIPNR or with New South Wales Agriculture, but the conduit to getting that information is going to be well set up. It might be through the CMA initially; it might not be.

In New South Wales we went through a process in the last couple of years looking at a one-stop-shop process where all the natural resource agencies got together and set up a single office. Everybody who had an inquiry about natural resource issues came to that office and was redirected to a special agency, whether it be Agriculture or DIPNR. Interestingly enough, people

still went to the Agriculture and DIPNR offices, so it did not work as well as some people would have thought, but the point is that it made sure that a DIPNR officer, an Agriculture officer or a CMA or CMB office knew where to go or where to direct that inquiry.

CHAIR—How do you publicise the Community Access to Natural Resources Information? From the evidence that we have taken today I would have to say that none of the people whom we saw today knew of its existence. I cannot say that categorically, because we did not ask the question, but people have said that, because of shortcomings, there was nowhere to access information. Nobody knew what research was going on from one place to the next. I can only assume they knew nothing about that particular site.

Dr Curll—Dugald probably knows a bit more about the specific operations of CANRI, but that is disappointing because basically I do know that New South Wales farmers have had a representative here today and there have been other catchment authorities here today. We had a very large launch where all these people were invited and turned up to CANRI several years ago. What we have not done is keep beating people around the head about it, and I guess that is what we need to do. But certainly, in terms of the documentation and the database that came out of the coordinating committee, again universities, the CMBs and all the players that should have known—certainly New South Wales farmers—were told where to access that stuff. I guess it is at the back of their minds. Perhaps we should do a better job of publicising that. It is very important. It came out of the fact that there was recognition—this is a national issue as well—that there is a significant amount of information in various agencies' data storages and it was an initiative that the walls be broken down and that it all be collapsed into one access point. If it is not being used as much as it should be, we should do something about that.

Ms CORCORAN—What we have heard from you today is very different from what we have been hearing all day long. Gary has already made that point. The farmers made the comment that about 30 per cent of farmers actually have Internet access at home.

Dr Curll—I am sorry?

Ms CORCORAN—They might have said that they communicate by email, which I interpreted to mean that they had access to the Internet—maybe I am wrong; it does not mean they cannot go to the local library and so on—and maybe that is why CANRI is not being picked up. Has the work that you are doing now been road tested with—

Dr Curll—The modelling work or the other work?

Ms CORCORAN—I am referring to the land use simulator. There are many questions that I want to ask you. Has that work been road tested with people who are going to be the end users, such as farmers or land managers? You talk a lot about getting information out there to them. Is there capacity for them to get information or questions back to the system? Is it going to be a two-way street?

Dr Black—Yes, the land use option simulator has been tested with end users in our Murrumbidgee region. According to the reports that I have been given it has been quite well received. Certainly, some real decisions have been made about that based on it. We also used it when we were implementing the environmental services scheme to select the sites where that

scheme would be implemented. That was the end point of a tendering process in response to a public advertisement. So it has been used in that context, and out of that we learnt quite a lot about what we could do to improve it and make it more acceptable and so on, but it is intended to be used by an extension officer with the use of the land-holder.

Ms CORCORAN—So if I was a farmer I would go in there and see the extension officer.

Dr Black—Or the extension officer would come to you and work with it. I guess it is analogous to a bank manager sitting down with a mortgage maximiser. The person applying for the loan does not usually run it; I think the bank manager does. Certainly if new information comes up that people want to put in, they will be able to use a tool that we are developing that we call a management options register, which will allow for that two-way interaction. People will be able to put information into that system, look at what is in there, decide whether they like it or not and put an upgrade in. That will go through some sort of quality assurance process because we want to be sure that what we are putting up there is reasonable. That will then be available for everybody else to use. That system is only at the prototype stage at the moment. We are starting to road-test it. We are very conscious that the information is accessible to varying degrees and we would like to redress the problem of some of it being a bit hidden.

Ms CORCORAN—This is the first bit of good news we have had all day on this whole issue.

Dr Curll—I think it is important to make the point that with any simulation modelling there is a tool and it is never perfect. It is all about the dynamic, serial improvement. As we get more information, it gets better and better. I think I made the point earlier that certainly our agency and DIPNR see that experiential learning underpins improvement in this area. If you want to get outcomes, you have to have the people that are going to implement those outcomes as part of the process. We set up, in the early stages of the state strategy, a series of demonstrations where we had farmers asking: ‘How would you do this? How would you fix this problem?’ and the scientists saying: ‘We’ll do our bit over here and you do your bit.’ They learnt from each other. This experiential learning cannot be overstated. It works really well.

We have a program called PROGRAZE, which started off in New South Wales and went national. It is supported by R&D corporations. It is about teaching farmers to look at one of their paddocks and see how they are going to keep ground cover on that paddock and how they are going to keep enough feed for their animals. It teaches them how to assess dry matter in kilograms per hectare and how much that is going to do for the growth of a sheep, a cow or whatever. The thing has gone berserk. Everybody is using it—private providers and everybody else—because the farmers learn while we learn. We have another thing called LANDSCAN, which is an experiential learning package. Farmers come along and ask what the capacity of their farm might be. They might ask: ‘How can I use that area versus that area, recognising that the soil type, the geology and everything is quite different?’ Experiential learning is so important. It works both ways. Learned knowledge we accept as very important to refining the models and making sure that we are making the right decisions.

Ms CORCORAN—I think you are preaching to the converted on that sort of stuff. If I ring up and say: ‘I have a problem. I think the solution is X, Y and Z. How can I do X, Y and Z?’ I am asking a different question to: ‘I have a problem. What are the potential solutions?’ I assume there is the capacity to answer both those sorts of questions.

Dr Curll—One is a subset of the other.

Ms CORCORAN—Sometimes they jump, don't they?

Dr Curll—Yes. You can put an option forward and go through all these hoops to see how well it is going to work. Maybe it will have to be redefined, maybe some bits of it will have to be thrown away altogether or maybe it can be adopted holus-bolus; it depends on how it all looks.

Ms CORCORAN—It would be really good if, before we finish—maybe time is going to be a problem—you could come back and see how this is going once it is implemented, for the purposes of our inquiry. But I think we are going to run out of weeks and months. I do not want to hold this up, so I will come back it at a later time.

Dr WASHER—Thanks for your time and thanks for the presentation. It was great. It was a pleasant surprise to me, as it was to everyone else around this table, that CANRI exists. We never heard about this before. Seeing that it is a new document and it is a web site, so it is easy to access, could I anticipate all the science of importance from New South Wales relating to salinity—that has been released anyway—being in this web site?

Dr Curll—Yes. I do not want to oversell this, but—

Dr WASHER—I am sorry, but I have not had time to flesh it out.

Dr Curll—CANRI is a database of all natural resource information or a database where you might get access to natural resource information.

Ms CORCORAN—State stuff or Commonwealth stuff?

Dr Curll—Both. In terms of the salinity issue particularly, it is what came out of the audit of all the preliminary research and development that had application in New South Wales. That included a lot of CSIRO and BRS stuff. I do not think it actually sits in the CANRI web site, but you can go in via CANRI to the web site that we have established that has this information listed. It details the research project, with a little description of what the research is about, who the contact person is—phone number, email access—and what agency that person is involved with. That database is accessible via CANRI. CANRI can be just a shell to access web pages of other agencies. Otherwise, it becomes so enormous that it becomes quite unwieldy.

Dr WASHER—So, in summary, the collation of scientific information to date, as it relates to New South Wales, is all most accessible there.

Dr Curll—In fact, the listing in the database is against the key knowledge questions that were identified by the expert group. That is the way it lists the information—research done in this key knowledge area or in that key knowledge area. By analysing that, we were able to find where the gaps were.

Dr WASHER—We had a presentation early on from the Western Sydney Regional Organisation of Councils, which is quite a number of councils. The first time today that I heard about the Urban Salt Action Team was from you folk. There was some fascinating stuff. You put

out booklets on things like urban salinity, roads and salinity, building and the saline environment et cetera. You have even got building codes out. The building codes 2001 national technical summit included some of these urban salinity problems. It goes on here to say that you can look up Australian standards, by the Australian building codes, for construction specifics, including the salinity regions. The presentation of this by the Western Sydney Regional Organisation of Councils was absolutely missing, to the point that they were asked by me about the litigation possibilities if you did not make people aware of a site they were building on and they built some multimillion dollar complex that fell down. I would get a little unhappy if that happened and would probably be looking for a lawyer. They ducked that. In these booklets, which I have not seen—

CHAIR—They are here.

Dr WASHER—We have not had time to look at them. Unfortunately I cannot go tomorrow to see the destruction in Wagga, but we do see it in WA. What level of research has been done on infrastructure destruction by salt and on the chemical mechanisms and accurate scientific ways of preventing or avoiding damage and choosing materials that should be used? How detailed are these booklets? In other words, can you tell me how to build a house in a saline spot and not have it fall down?

Dr Black—That is in the domain of the universities. I am aware they are doing—

Dr WASHER—I do not mean to be difficult, but you have produced booklets and obviously you have read them. What do they tell us?

Dr Black—Some of the universities—for example, the University of Sydney, the University of Western Sydney, the CSIRO building research division, and those sorts of organisations—have been researching this; it is more in their bailiwick than ours. We are a natural resource management agency, so we are not going to get into that. Their information then gets distilled into documents like those. I have occasionally seen information in the engineering literature about this.

Dr Curll—The frankest answer to the question is that we cannot give you the detail of what is underpinning those products.

Dr WASHER—No.

Dr Curll—Our people have taken the best science they got from various sources and packaged it into these guidelines. Clearly, more needs to be done on that. The point made in our submission is that, by putting it back in the federal sphere, we will get some consistency across all the states on some of these issues relating to both best practice in road building and to building codes generally.

Dr WASHER—I was not really trying to put it onto the states that this was their fault. We are looking at it from the concern that this information was not available and published. What you are saying in these booklets basically is that any research that has been released relating to urban salinity and construction would be available and accessible, so there is up-to-date information available. Is that right?

Dr Curll—Yes. If you want us to take the question on notice about pursuing just exactly—

Dr WASHER—I do not want to chase you too much. I am just disappointed that these people who came to see us did not know this or, if they did, they did not tell us. I would have thought that, with those types of questions, you would involve them and they would come out. I am not blaming them; it just got missed. The other thing, though, is that it comes back to the national action plan, which is now the funding commitment from federal and state governments in unison and with equality. You had some criticism, which you illustrated. I would like to explore that on the issue of roads, for example. The problem of roads is a federal problem. We have a lot of roads and investment in roads. Where do you see the failure in this and how is that money organised and distributed? Where does the buck stop with this? You put in money and we put in money. Who administers this?

Dr Curll—With the national action plan, it is a fifty-fifty split; with the NHT, of course, it is in kind. The issue has staggered a bit, but the new Minister for Natural Resources has sorted out a really good way forward with it. He has taken the bureaucrats out of the link, which included me, I might add. But I would argue, of course, that I was never obstructive! But he has taken the bureaucrats out of the link, and basically it has been handed back to the people who are responsible for implementing the solutions. The new CMA arrangement and the money announced by both federal and state ministers which is going straight to the authorities will put a significant element of local government decision making onto them. The agencies and the bureaucrats are off them, so local government will be there to argue their case.

Dr WASHER—Are you talking about the catchment management authorities?

Dr Curll—Yes. They are the ones that are going to have the money and to be calling the shots, according to the sets of actions that they are currently working on and refining from these blueprints which were initially the bible, if you like, for delivering regional and local solutions. Those blueprints were signed off by both federal and state ministers, but because the job has got bigger they are going to have to refine exactly what the priorities might be. These action plans are going to pick up on water issues as well other issues which also relate to NAP and NHT funding. In driving a national perspective on this in terms of road grants and the like, basically in the states we have to work with money to address state issues. If there needs to be some national approach to building codes and road codes best practice, I think that has to be pursued at the federal level. That can be pursued through various ministerial council processes or standard communications that spin off from those. Does that go anywhere near to answering the question?

Dr WASHER—Yes. But the impression you give me is that that is not happening.

Dr Curll—Do you mean nationally?

Dr WASHER—Yes.

Dr Curll—I do not know how much has happened in relation to the road and building issues. I know it has happened with the agricultural and natural resource issues. From now on it is going to be driven by local authorities. Up until now it has been driven significantly by bureaucrats, but that has been sorted out by ministers of both persuasions. I cannot answer the question about the roads and building issues.

Mr LINDSAY—Do both of you use and collate international data and research and place links on your system to that material?

Dr Black—Yes. First of all, from the modelling perspective, we have been using international experts to help us with the development of the models. We have also been using them to help us with peer reviewing of what we are doing so we can get some assurance that what we are doing is scientifically correct—or as correct as we can get it within the constraints of the data that we have available. We are also publishing the results of our research in international scientific peer review journals. That is part of our quality assurance process so we and everybody can have some reassurance that what we are doing is scientifically valid—and that is not only for modelling; I think it is fair to say that it applies across the board with all the research we are doing.

International data is a different issue. In a large number of countries, dryland salinity is not the major issue it is in Australia. I suppose there is some in the west of the US; that is one area that springs to mind. Also there are issues in Central Asia and so on, but data there is available even less than it is here. We tend not to use the data so much but to pick up key information. You can pick up key information about, say, the impacts of plant water use on recharge and all that sort of thing. If that is what you mean by ‘data’ then, yes, we can take that and we can use it to the extent that it applies in Australia’s climatic scene and with its soils and so on.

Mr LINDSAY—Are you saying that you are not having any difficulty in accessing information?

Dr Black—Certainly you can access, without difficulty, information published in journals and so on. You can get that from libraries or from our own subscription. By and large, that is okay.

Mr LINDSAY—You have mentioned that your web site tells people where they can find information.

Dr Black—Yes.

Mr LINDSAY—What is it called?

Dr Curll—CANRI.

Mr LINDSAY—Witnesses earlier today suggested a one-stop shop that would be people based rather than electronically accessed. Have you considered that? Do you think that a one-stop people based shop would work for Australia, or is that just an idealistic suggestion?

Dr Curll—For this particular issue?

Mr LINDSAY—For the science of salinity, yes.

Dr Curll—As I said earlier, in the last couple of years, interestingly enough, we went through a pilot looking at that—not specifically for salinity. In setting that up, we first went to some of our primary stakeholders such as New South Wales farmers—because they were rurally based one-stop shops—and asked, ‘What questions do you think primary members might ask the most

frequently?’ A lot of the questions they told us of were to do with regulation and approvals and the like for a whole range of agricultural development type activities, and we put a whole series of questions and answers down for people in these one-stop shops. It worked all right. But the bottom line, as I said earlier, was that they kept going back to what they were comfortable with going to—and that was the local DIPNR office or the local Ag office.

We set up the salt teams to get over having a shortage of resources and with the need to have some level of specialist. They are the hot shots. If there is a one-stop shop, it is probably them. They will feed into CMAs and local offices. As I said earlier, we still have this significant and extensive network of private agricultural and rural advisers, and they need to be aware of what is around. So I suppose the one-stop shop is fine as an idea but, because one size does not fit all, we think it is better to do it in the way we are structured—that is, with the specialist teams feeding into this whole myriad of outlets. One farmer might want to go and see Elders or CRT and another might want to go and see the local district agronomist or the local landscape advisory officer at DIPNR.

Mr LINDSAY—How could we capture all the data that is available on the science of salinity and ensure that people know about it? A previous witness said that he had done seven years work in New South Wales and he looked like being defunded, so all his data was going to sit on a shelf somewhere and no-one would be able to access it. I do not know whether that goes right across the Commonwealth of Australia, but how would you suggest that sort of data be captured?

Dr Curll—My colleague, who is of course a science manager, manages scientists, and I used to manage scientists. It worries me that you had that comment because it begs two questions. If the person was successful with research and has got a lot of data, he should have published it. If he has published it, it is on the record. If it is on the record, it is accessible. The issue may be that he does not think it is easily accessible. A farmer is not going to be interested in a scientific journal—he needs to have it distilled. That is a job for the specialists in the salt action teams. If his stuff has been done in New South Wales about salinity—and I might add that the committee canvassed all universities in New South Wales and said, ‘If you have got information on salinity, please tell us what you have got and we will register it’—I guess the question is: is it unpublished information? Unpublished information is not information. He should have published it. If it is not published, he should get around to publishing it—and it will be used.

CHAIR—Just to clarify that, I suspect it is data that has been collected but not worked on, so to speak, and, hopefully, in the future, further research will be done on that data. I suspect the issue is, ‘I have been responsible for the collection of all that data and I haven’t got to use it all, so why should somebody else use it?’

Dr Curll—Exactly. Scientists are supposed to be not particularly precious about that. In most scientific institutions, promotion is based on your capacity to do work, to publish it and to get it reviewed by peers. The information he has collected has not been published and has not been reviewed by his peers. That does not mean it is useless information, but it is disappointing that he has not followed through and got it into the system by either publishing it or talking to the people—the modellers—that might be working in that area and could use the information. I do not know what the information is about.

CHAIR—It would be base data of some sort.

Dr Curll—So that is disappointing, but a fair bit of the responsibility for doing something with that information rests on that gentleman's or that lady's shoulders.

Mr LINDSAY—Let me now challenge you with a statement from another witness. This is a bit more sensitive, but it was just a statement from a witness. He said that public servants find it difficult to understand the true nature of innovation, which is the basis of commercialisation and the wealth of the nation. Do you want to comment on that?

Dr Curll—I believe in the second part of that phrase. People that are long in the tooth, like me, and that have got to a senior management position keep looking around to see where the young, the enthusiastic and the innovators are in their organisation. We want them to feed in from the bottom—really smart, hot shot, good people. Good people are those that are innovators. Frankly, I would be really worried if any agency took the position that it did not accept, take up and use innovative developments and options for these sorts of solutions. We are always looking for innovation. Regarding the part about public servants, I do not mind being beaten up on as a public servant—that is my job. But I would argue strongly that agencies in this day and age, when the public purse is smaller and smaller, need to do things smarter, and if innovation is a way of doing things smarter, we will take it up.

Mr LINDSAY—I think I accept your view, rather than the view given by this other witness.

Mr MARTYN EVANS—I know you have got the database now that references where the information is, but of course that does not make the information necessarily available. It just points to it. Do you think that there is still any residual problem of actually extracting that data? You can often have mining data out there; you can have incompatible data; you can have data which is too expensive. Agencies can still charge prices that other people—researchers, whatever—maybe cannot afford to pay. Even if data has an arrow pointing at it, is there still an issue of actually extracting it?

Dr Curll—Nothing is perfect. If we actually have to go back and start tooling up, we generally charge for the cost of doing that. It is a worry that a lot of rural people do not have access to computer based knowledge databases. That is a worry to us. I guess we try to get over that. You can see what a great solution these salt teams were. Basically, whilst the individual stakeholder out there might not have access to all this data, the salt teams people do. They can track through and get it out and put it into a hard copy form. I might add that most agencies, particularly DIPNR and Agriculture, put a lot of energy into putting out these little facts documents—we call them Agfacts; DIPNR calls them something else. They are information leaflets which are hard copy versions of the best options, the best information. So we get through it that way. Was there another part to your question?

Mr MARTYN EVANS—No, I think you have covered the cost recovery and the availability, if not by an individual then via a translation through the extension process. Providing people can actually get at that, then having it pointed to is a legitimate process.

Dr Curll—Yes.

CHAIR—The committee will be escorted by one of the salt teams tomorrow in Wagga.

Mr MARTYN EVANS—We can talk about that in depth.

CHAIR—Maybe you are not in a position to answer the question, but there is significant data held by the state government. In particular, Dr Black was talking before about DTMs—digital terrain models. That sort of data is not data that needs any particular work done on it. That work has been done. But it comes at a fair cost—a pretty substantial cost. Is there any debate within the bureaucracy of government to put up to the political level that this data ought to be made available either at a lesser cost or similar to what the Commonwealth has done in the last 12 months in making their spatial data available either free, if you can download it, or for the cost of a CD or something?

Dr Curll—I am not privy to that. All I can really say is that there has been a continual drive by the primary agency in this area, which was the Information Technology Agency, to try to reduce the costs of access and certainly to ensure, as far as possible, free exchange of data. I cannot make a judgment or even answer a question about how far we are going to go down this path. It is a call that other CEOs and ministers, on advice, are going to make; so I have to dodge the question—or pass on the question.

CHAIR—That is all right. I take every opportunity to raise the question. It was a recommendation of this committee's report on R&D that the states get a lot more data out there, which will generate economic activity and which will give the rebate in another way, rather than purchasing it. About 17 projects were funded in 2002-03 under the national action plan. I have a list here from our federal department, AFFA. In New South Wales those programs that were funded in 2002-03 totalled about \$14 million. I presume that is Commonwealth money, then it would be equivalent for the state, but I am not absolutely certain about that.

Dr Curll—It depends on the amount with the fifty-fifty split. If they are listed there as projects, half of that is probably state money.

CHAIR—So it is probably the total amount?

Dr Curll—Yes.

CHAIR—Can you explain to me the process of these projects getting funded in the first place? There was an original agreement between the states and the Commonwealth about the principles of where this money was going to go.

Dr Curll—Yes.

CHAIR—How did each one of these actually get up?

Dr Curll—Basically there was a recognition very early in the piece by the steering committee of bureaucrats, of which I was a member, and AFFA, EA, New South Wales Agriculture and DIPNR—DIPNR was the lead in New South Wales—that the process was going to take time before we got it bedded down, so there was a call for what we called priority projects. The priority projects were projects that catchment management boards and agencies collectively felt were the 'low hanging fruit', the ones that should be started now, the ones that we really had a

priority to get going, recognising there was a time frame problem here. We had five or six years of NAP and NHT funding.

CHAIR—So it was a joint selection by the Commonwealth and state departments?

Dr Curll—Yes. The states came up with the suite of projects, and that process involved talking to catchment management boards at the time and asking them what they saw as their priority and, if they had one or two projects, what they would be. They were collected and there were a number of projects that both the Commonwealth and the state agencies felt were important as well and they were all packaged up and a decision was made through a very tortuous negotiation process with the Commonwealth. They were very rigorous about what they felt was appropriate to fund as a priority project coming from a state. So it was a collective decision. It was signed off by the steering committee, recommended to the ministers and the ministers gave it the tick.

CHAIR—And the science behind each of those projects—what it is all about—came from where?

Dr Curll—I think one of those projects was probably one of Agriculture's projects that related to the appointment of economists to work with the salt teams. These economists were trying to apply some socioeconomic impact analysis to some of the options that might have been from time to time considered as salinity options. That, for instance, was generated by discussions within the agency and with other agencies, and then we went and spoke to CMB chairs. We then went and spoke to Canberra and put up a very detailed proposal about what this was going to do, what the outcomes were and how it was going to address the targets that the Commonwealth had as well as the targets that we had. That process is pretty much the process that we went through for all of those projects. If there were particular science based projects, they would have been generated through agencies—specialist researchers talking to catchment management boards and working out what bit of science they needed to be done. That then had to be sieved through the BRS, Environment Australia, CSIRO and AFFA science people—specialists in Canberra. It was not an easy process. Everybody had to have their time in the sun and their pet issue to cover off. It was tough going. And we ended up with that suite of priority projects.

CHAIR—You might be able to provide us with something else as a follow-up; I do not expect you to know it now. You mentioned the 25-metre square DEMs and stuff. Would you be able to give us some sort of example of the cost to somebody of acquiring that data?

Dr Black—We would have to get back to you on that.

CHAIR—Yes, it would be good if you could provide that. It would be interesting to start to do some comparisons, not only within the state but also between states. The committee could look at what some of the barriers actually are. Thank you for appearing today. Because we only received your submission today if the committee subsequently have any particular questions or require clarification of what is in the submission, we will write to you.

The committee receives, accepts and authorises for publication the documents *A Strategic Framework for Salinity in NSW* from the New South Wales government and *NSW Salinity R and D Investment Portfolio*.

Resolved (on motion by **Mr Lindsay**):

That this committee authorises publication of the transcript of the evidence given before it at public hearing this day.

Committee adjourned at 5.06 p.m.