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Official Committee Hansard

**HOUSE OF
REPRESENTATIVES**

STANDING COMMITTEE ON SCIENCE AND INNOVATION

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

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HOUSE OF REPRESENTATIVES
STANDING COMMITTEE ON SCIENCE AND INNOVATION

Monday, 24 November 2003

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

Members in attendance: Ms Corcoran, Mr Martyn Evans, Mr Forrest, Ms Grierson, Mr Hatton, Mr Lindsay, Mr Nairn, Mr Ticehurst 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.

WITNESSES

BATTERHAM, Dr Robin John, Chief Scientist15
FARRELL, Mr Paul James, Director, Australian Spatial Information Business Association1
**HOCKING, Mr David Norman, Chief Executive Officer, Australian Spatial Information
Business Association1**
HOXLEY, Mr Greg Peter, Member, Australian Spatial Information Business Association1
MOODY, Mr James Bradfield, Director, Australian Spatial Information Business Association1

Committee met at 4.47 p.m.

FARRELL, Mr Paul James, Director, Australian Spatial Information Business Association

HOCKING, Mr David Norman, Chief Executive Officer, Australian Spatial Information Business Association

HOXLEY, Mr Greg Peter, Member, Australian Spatial Information Business Association

MOODY, Mr James Bradfield, Director, Australian Spatial Information Business Association

CHAIR—I declare open this public hearing of the House of Representatives Standing Committee on Science and Innovation in its inquiry into the coordination of the science to combat the nation's salinity problem. On 13 August the committee was asked by the minister, Peter McGauran, to inquire into this issue. It was advertised nationally and we sought written submissions from interested parties, organisations and individuals.

Our focus is on managing and coordinating the application of the science in relation to Australia's salinity programs. We have now held a number of public hearings and inspections in New South Wales, Victoria and Western Australia, as well as other public hearings here in Canberra. This hearing follows on from those in order to seek some additional information. I welcome the witnesses representing ASIBA. Does anyone have a comment to make on the capacity in which they appear?

Mr Hoxley—I represent Sinclair Knight Merz as an industry member of the association.

CHAIR—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 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 your evidence to be given in camera, and the committee will then consider your request. We have your submission to the inquiry, which has been authorised for publication, so it is on the public record. Would you like to start by making some opening remarks? Then we will go to questions.

Mr Hocking—Thank you very much for inviting us along to speak. The Australian Spatial Information Business Association was founded approximately 2½ years ago and arose out of a response to the Spatial Information Industry Action Agenda. The action agenda identified a number of impediments to growth of the spatial information industry in Australia, one of which was the lack of a single industry voice, hence the formation of our organisation.

For those of you who do not know, spatial information describes a location or any information that can be linked to a location. A subset of spatial information that many people would deal with on a daily basis would be described as geographical information, which relates to the location of something on the earth's surface. The most common encounter with this type would be with things such as tourist maps, nautical charts and street directories. It also records maps of infrastructure, such as water, sewerage and a wide range of other information.

The industry has demonstrated its diversity of interests and the valuable contribution it can make to policy debate. This is why we have written to you. Late last year ASIBA was commissioned by the Australian government to develop a definition of a property right in water. Similarly, the association is working with a range of key stakeholder groups, including the pharmaceutical industry, to propose a property right in biota, which is flora and fauna. Earlier this year, the association also provided expert technical advice on the recent Australian bushfires. As you can see, we have a fairly diverse interest, but it all ties together to what you are looking at in this inquiry.

While this is an important infrastructure—it is used in many areas, from aircraft navigation to emergency management and from environmental management to security—there is little recognition of the need to ensure that the data is properly maintained. Spatial information and its technologies are important tools in the management of the environment and its natural resources. It is also an infrastructure, just like a bridge or a road, and must be maintained. Without maintenance, the information with which organisations make important decisions, such as in salinity mitigation, will be corrupted, inferior and wasted.

ASIBA believes that there is a role for the Commonwealth government to coordinate investment in salinity programs. The danger with extending that role to one of coordination of the application of best science is that there is a risk that research and development will be retarded. To accept that the science related to salinity mitigation is concentrated in national science agencies is to accept that no other scientific outcome is possible outside that framework. This is a dangerous presumption that will only serve to hold back creative endeavour within the private sector, and it will stifle economic growth and limit Australia's ability to develop export markets in salinity based solutions.

I will make a statement that there is no place for government controlled scientific endeavour any more than we can accept a commercial monopoly. The role of government in the salinity program is most valuable in identifying the extent of the salinity problem, such as in a very detailed national salinity audit; maintaining a register of salinity mitigation programs, both public and private; establishing a salinity action plan that is based on sound science; carrying out program evaluation to ensure that the science is working; ensuring that data that is collected by disparate groups is not duplicated; and building on that knowledge base through an effective salinity data atlas.

We should invest in salinity mitigation projects; eliminate the restrictive criteria for implementing salinity projects, which currently favour federal or state government agencies or science bodies; involve the private sector to ensure that government-held IP is commercialised; and ensure that there is an appropriate mechanism in place to transfer science and technology to the private sector from government agencies.

Through COAG, we should establish a national salinity action committee to take responsibility for a national salinity strategy, for the identification of priority actions, for funding of research and development and for project funding. The committee should also represent key stakeholder groups, including the private sector, which is far too often excluded from that type of organisation. Rather than take up any more of your time with propaganda, I would like to hand over to the experts in this area to answer any questions you might have.

CHAIR—Thanks. Can I ask first about data. Presumably, a number of your members are involved in some of the projects that might be being done related to the national action plan on salinity. Can you give us some information on where your members are acquiring data, how easy that is, the quality of it and the consistency between states, if you are getting information from different states?

Mr Hocking—Greg has had a lot of experience in this area.

Mr Hoxley—Yes, there is a variety of existing data out there, which needs to be built on as part of the national action plan. A lot of it comes from state agencies. Some of it is developed and held with the Commonwealth. One thing that is really apparent is that it is a bit of a mess. There is a variety of different data sources out there. They are done to a variety of standards and it is not always easy to try and find out which ones are comparable or useable.

Conversely, when members are involved in generating data, there is often no place you can go back to that is then accessible immediately afterwards. In many cases, there is the problem that databases do not exist or, if they do exist, they are fairly tightly held and it is not possible to get data or knowledge that is generated as part of those projects back into a system that can then be built on. It is the constant evolution of the data sets and the need to build on them that, at the moment, we feel is probably not being well served in the program.

CHAIR—Are you suggesting that coordination is needed of that data that has been developed specifically for salinity projects?

Mr Hoxley—Yes. I think that coordination could take a number of different forms. When some people hear the word ‘coordination’, they think ‘central repository’ and that everything goes in there—all in, all out. That is not necessarily the way it has to be done. As long as there are fairly clear standards for the way in which data can be exchanged and used at different levels—regions often have a need for their own information on quite a detailed scale—and as long as they can be transparently linked backwards to, say, a national land and water audit to look at national things that can roll up out of the regionally held data, those types of frameworks can really help decision making at a variety of levels.

It does not matter from which of those levels you come in to add information. As long as the way in which they can move up and down through those levels is clear, it can be used effectively. That is a coordinating role that says, ‘This is how we are going to manage that information overall—where it is going to reside and, if you like, the data models and the structures in which it can sit.’

CHAIR—Have you got any suggestions as to who would be best to try to put in place that sort of cooperation?

Mr Hoxley—There are some good examples of where that has worked, without trying to finger one particular department or group. Paul, I think you were going to mention the Greenhouse Office and some work that has been done there where the private and government sectors have worked together on a data set that resides halfway between the two. Would you like to expand on that?

Mr Farrell—I would love to because I think it provides a really good model for how this could work. You may be thinking, ‘How can the private sector and the public sector work together?’ In the case of the Australian Greenhouse Office, they had a project as part of their national carbon accounting system development to develop an audit of the areas that have been cleared of vegetation over the last 30 years. Traditionally, this sort of work had been done by the state based agencies—coordinated by the central body but done by the state based agencies.

I will read from a document from the August-September 2002 issue of *GIS User* magazine. It is an article written by Gary Richards, whose title is Manager and Principal Scientist of the National Carbon Accounting System, and it perhaps alludes to how the two work together. It reads:

Development of an ambitious remote sensing program of land cover change was fundamental to the development of the National Carbon Accounting System by the Australian Greenhouse Office.

It then says that the program involved 11 national coverages, consistently registered and calibrated against a year 2000 satellite image. The project involved some 3,000 individual satellite images and is the largest of its type known to have been completed in the world. It was an amazingly detailed project. The article continues:

The unprecedented scale and complexity of the program demanded reconsideration of both the technical methods and procurement of services for data processing.

A consistent national methodology was required, as was the fostering of private sector participation as the scale of task was beyond that of any previous large-scale government remote sensing project.

It says that the project methodology was based on procedures developed by the CSIRO maths and science unit—especially in Western Australia—with some operational refinements. They developed the manuals, the software, the processing sequences and the naming conventions. The work then went out in a production facility to the private sector. When the information came back, it was QAed by the CSIRO. The article goes on to say:

As the project progressed, familiarity led to more confident pricing and improved quality assurance performance. By the project’s end, the operating environment was far more stable than it had been at the outset. Such an evolution was anticipated, and was largely unavoidable given the time-pressured environment ...

Significant achievements, beyond the data products, were the ability to generate quality assured products at around 20-25% of former costs, and the move from public sector to private sector operation.

That is a snapshot of that project. In terms of the benefits to the project, it was delivered on time—a high-quality deliverable was delivered; there were enormous cost savings of 20 to 25 per cent; and the capacity building of people able to do this work in Australia was growing significantly outside the public sector. An interesting by-product, especially for our company, who were involved in it, is that we are now able to export the expertise we have developed in-house. We have been exporting this to places like Cambodia and Hong Kong, using similar methodologies.

CHAIR—Would Land and Water Australia potentially be the right sort of organisation to fit into that type of model?

Mr Farrell—Quite possibly. The other guys might be able to comment on that. It might need a collaborative approach.

Mr Moody—It is interesting. The AGO model is a really good one in the sense that it was one of the first that was set up as a greenhouse office altogether. From talking to Gary, I know that one of the biggest things is that Australia can now do maps of the entire continent cheaper than anywhere else in the world. We are getting interest from America, and we are getting interest from a whole lot of places overseas, and the companies in Australia are exporting.

I am not sure what the coordinating mechanism would be for salinity in Australia. Land and Water Australia could be a good potential one. If we are looking at where a lot of expertise is, there is some in the MDBC, for example. They are looking just at that region, and maybe that could be broadened. Or they could be working out what the different protocols could be, although it might not apply to Western Australia. Finding an organisation that could organise that in the same sort of model would be a good idea.

Ms CORCORAN—In your submission, you talked about the haphazardness of data, but maybe you also mean research. You also talk about the fact that information is siloed. I am not a scientist; I am going to use the wrong terminology. But I distinguish between data—there is a water tank on that paddock, or there is water 10 feet under the ground here—and research—somebody sitting down thinking, ‘Maybe this is the cause of the problem.’ Are you talking about data being stored haphazardly in silos or research or both?

Mr Hocking—In a data sense, the data is held in silos. Within the Commonwealth, you would find it in agencies, where nobody is fully aware of what is being held. For example, if an agency does a project, it seeks funding, it gets funding for the project, it collects data, it finds out what it wants to find out and that is the end of it. The data over time loses its value because it is not updated. If it is going to be done again in another five years, they will have to start all over again and do it again. By having it in silos, we have had no mechanism in place to know that it is there and can be used elsewhere and updated with information that is coming from other projects.

It happens within the Commonwealth, and it happens within the states. That is where we get the data. The issue with our data is when you are talking about science. The data that is produced that we are dealing with—spatial data—is scientific as well. It is simply information about something in a particular area. It is all about relating information to a location on, above or below the earth’s surface. When we talk about spatial information, it is putting a location on that information. That information can be health information; it can be information about water. It just gives it a location so that we mere mortals can actually identify where it is.

Ms CORCORAN—We have also heard in evidence that the New South Wales government has a system, CANRI. You are aware of that. Does that provide some of the solution to this? Does that de-silo some of this stuff?

Mr Hoxley—In part. There is a variety of uses. If you are a land-holder user who would like to see a snapshot of where current information might be for your region, that type of system can

be quite useful. If you are trying to evaluate or work from that information, it is not necessarily in the right style or format that would enable you to take it, work on it, add value to it and put it back. That type of mechanism—taking out and putting back—just does not exist there. The information is there, and you can look at it or get from it but not interact with it.

The issue of data versus process is what you were talking about—the science. You were talking about water table levels and knowing where those are kept and, on one level, understanding what a water table measurement is, how one measures it and where it is. Then you bring those together in another sense and say, ‘We’ve got a map of a water table.’ But as soon as you do that, you add a level of interpretation. So, although it looks like data, in some cases there are some underlying concepts that are built into that information. It is often not so straightforward as to be able to say, ‘This is a map of water table level. Therefore, it must be data,’ because the way it was put together might mean it has a model underneath it that goes in. So it is important to be clear about when you are dealing with a raw piece of information versus when you are dealing with something that is more interpreted, particularly when you come to the interpretation. That is often siloed and, regionally, there are often differences in the way in which that data is collected. That also leads to barriers to entry.

There are a number of good systems for getting one-way information, but the real challenge here is how we, for the benefit of the whole nation, get information out that can be built on, put backwards and forwards and worked on without having to have the key to get at it. I understand that there are data security issues and so on. Nonetheless, I think that these can be overcome. This is a clear coordinating role; there is an opportunity there.

I will expand on your previous question about Land and Water Australia. There is a fundamental model where Land and Water Australia, as a research organisation, come in. They have an interest in developing IP, which can then be commercialised. I would suggest that perhaps the AGO was a better model because they did not need to commercialise a product.

The challenge that is facing the nation over salinity means that we ought to be broadening the information out, making it more freely available and overlooking some of the commercial return internally within Australia—opportunities that might be incumbent on Land and Water Australia or one of these research groups. I think we would be pushing for a model that is more open, more enabling and recognises more the size of the challenge, rather than one that is focused on getting a return on that investment directly through that organisation.

CHAIR—Would Geoscience Australia or BRS be better placed?

Mr Hoxley—All of these organisations have history and baggage associated with them. There are a number of examples of data collection exercises where it has been necessary for people within those organisations to continue with their groups going in certain areas. To highlight one of those runs the risk of bringing their baggage into the organisation. Again, in the way in which the Greenhouse Office was set up, there is an opportunity—perhaps I am speculating here—through the Natural Resources Ministerial Council to identify a focal group.

Something that is new and which does not have that baggage can bring together a number of players in a way that is a bit more open. It is something Geoscience Australia or BRS can

contribute and bring their knowledge to but that does not get everybody's hackles up the minute they mention or highlight it.

CHAIR—It is trying to prevent another bureaucracy; that's all.

Mr Hoxley—Yes. But how can you do that without saying to the nation, 'This is a problem that we want to focus on. It is not a side activity of an existing group. It is something that we really want to focus on'? That is the challenge with the salinity problem that faces us.

Mr Farrell—What I noticed with the AGO is that they tended to avoid bureaucracy as much as other people do—from the appearance, anyway. They were keeping a skeleton staff and outsourcing to the private sector. It did not seem like a big bureaucracy there.

Mr MARTYN EVANS—In the first instance, what we are really looking for is someone to develop a framework about the data in consultation with the other state-federal agencies—but also with the private sector—to establish standards and consistent data specifications which others will contribute to. We are looking for something more like an IEEE standard or some coding framework where others will say, 'Yes, that's how we'll contribute to this.' So you are looking for a standard specification rather than people who will go out and do data mining themselves. Is that more the kind of thing you are talking about—where you get people together on a national basis?

Mr Hoxley—For certain, yes, that is a genuine coordinating role. Some good examples of this came out of the national land and water audit, where some quite innovative work was done early on about getting the data exchange agreements together so that, if a range of people contributed using the standards, you did not suddenly end up with licensing issues.

Some good work was done, for example, with the topographic map overlays and so on. They were available for a number of people to use once they had been contributed to the system. It is not just a matter of saying, 'You shall have data of this type of structure.' But when it goes in there, this is how people can get access to it, and this is how they can really use it. There are a couple of different layers of standards.

Mr MARTYN EVANS—David, going back to your initial statement—and tell me if I am wrong about the interpretation of this—some of your comments seemed to be saying that there was an understanding, from what the committee had put forward initially, that we were moving towards a position where there was an imposition on the part of national science agencies dictating a view of how salinity would move, at the exclusion of the private sector. I do not think that is in anyone's mind here, but was that the feeling I was getting from you?

Mr Hocking—It was not so much an accusation that you were moving down that path, but our experience has been that that has been the case. For example, in one government agency, which has been mentioned here, approximately two-thirds of the staff survives on what we call 'external earnings', which means direct competition with the private sector. From our perspective, if we are going to achieve what we have been talking about here, it is very difficult if we as an industry sector are being choked by none of this going out to the private sector.

There are always examples, such as the one Paul has given, of success stories. So we should not say that they are all bad, and we do not say that. But I did provide that warning to the committee that we are concerned that there are elements within government science agencies in particular that are directly competing with the private sector and excluding the private sector from the process, despite our best intentions to break down those barriers.

Mr Moody—I have been to a number of presentations and panel meetings, and from a personal perspective it seems like salinity is all a lot of voodoo. People have their magical method with which they can create some sort of salinity hazard map. Then you put on the magic powder and it turns into a risk, and then you find some way of mitigating. Because of that, it is very hard for a private sector business to work out which bit of voodoo they should be having.

You can try to specify what the data is and how that data might be combined, so that the private sector and the public sector can talk to each other on a level playing field and people know they are talking about the same thing. I think this would be a very major step forward. Then, if you are using the powder with the private sector, the same as the AGO model, you will start to do it cost effectively and also maybe even connect it to the people who are going to do the mitigation, who are also mostly going to be in the private sector. That is one of the things that we can do.

Mr Hocking—There is a push by the private sector in this industry to get involved in standards to some degree. There is a worldwide organisation called the Open GIS Consortium, which is setting up a series of standards on what we call ‘interoperability’. This became particularly evident as a problem with the fires that surrounded Canberra last year. The chairman will understand what I am talking about.

With all these silos of data, even if you had access to it, it does not necessarily make sense when you bring it all together, because it is all in different formats and structures—exactly what you are talking about. Unless we solve that problem, emergencies such as fires happen and we cannot deal with them. When we talk about something as enormous as salinity, which is growing every day, we cannot communicate across states, across local governments or within agencies within the same government. Unless we break those barriers down, we are certainly not going to solve the problem. We can talk like this all day and we are just not going to break it down. There must be motivation for everybody to start working on those issues.

We have just put in a project, which we hope will succeed, on interoperability. We will have a number of examples of this working. State governments and federal government agencies are all working together, which is quite a rare thing. We are now going to go through a series of test beds to prove what needs to be done to make this work. So I think in that sense we will be helping this committee enormously.

CHAIR—Get the states to read my bushfire report, and we might solve some of these problems!

Ms CORCORAN—I want to go back to the point that Martyn was making—and the point you were making in response, and I am struggling to understand exactly the point you were making—about this problem of the government almost holding information to itself and not being prepared to share it.

Mr Hocking—Exactly.

Ms CORCORAN—Is the real issue a tendency by an organisation to hang on to what it has got and not share it? If that had been a private organisation that was bigger than everybody else, it would still be an existing problem. It is not an innate trait of government; it is this behaviour that is the problem.

Mr Hocking—Yes. It is a behaviour. It has always been the case with government agencies, as it has been with some private organisations, that they think, ‘We have got this information. It is ours. It is proprietary, and we do not want to let it out.’

Ms CORCORAN—So it is this inability or unwillingness to share that is the problem?

Mr Hocking—Yes. The private sector will always throw up commercial reasons for why they cannot let data out, but with government it is public information for the public good.

Ms CORCORAN—So would you be equally cross with a private organisation that said, ‘No, sorry. Commercial-in-confidence. Can’t have it’?

Mr Hocking—Absolutely. If it was private good.

Ms CORCORAN—Are you saying that all this stuff should just be out in the public arena?

Mr Hocking—I suspect that was pretty much what Greg was saying. It is the ability to put information in. The private sector at the moment can be criticised for not contributing, but then there is no mechanism for it to contribute to that.

Mr Moody—It is not just an unwillingness to share in some cases. It is the point that Greg made earlier: it is an inability to share because people are not talking the same language. You have got different standards, you have got different methodologies and you have got different storages. It can be distributed through; there can be holes in it; it can be all these different things. Even if you wanted to share it, it might not be able to get out.

Mr Hoxley—There is a tension between the people who generate this information and their need to get a return of some sort from it and the public good of having it out in the open domain. This is not unique to salinity data. There are a number of data sets out there that sit on this border between the value of having it freely accessible to the community as a whole and making sure that the agency that actually generates it gets some type of return on it.

The argument we have is that, if we want to progress salinity science and salinity information, there are clear advantages in making that information more open. As a private sector organisation, we will just respond to that. If the contracts say it is all open, when it gets generated, it is all open and it goes back. It is done on that basis and, commercially, everyone can operate that way. If the statements are made, that is not a barrier. That won’t keep private industry out. It is where we are not quite sure where the boundary lies that people start to look after their own fiefdoms.

Mr TICEHURST—In your submission you say that a lot of your members are small to medium enterprises and they need reasonable access to tendering for various projects. Then you go on to say that the government departments, where they have direct competition, are exploiting an unfair advantage over these smaller companies and it is having a detrimental effect. Do you have any examples of that sort of thing?

Mr Hocking—A report was put out about a year ago by the Chief Scientist, who was asked to review the operations of the CSIRO in our area. He found a number of interesting things. When CSIRO found that they had underestimated on a commercial project, they used government funding to prop up their work. They also found that the average for the projects that the CSIRO competed for was \$10,000—obviously in the SME category. That is a particular case that has been well documented by the Chief Scientist, and we have other instances.

CHAIR—That has been substantially fixed now, though?

Mr Hocking—Yes. As a result of that, the minister removed the external earnings targets for CSIRO, which we were very supportive of. But there are other agencies that still compete on that basis. The Bureau of Rural Sciences, dare I mention one, is a particularly aggressive group in the private arena.

Mr TICEHURST—Have you found many examples of where a federal department might offer a tender to a private company and then that combination has a detrimental effect on competitors in the same field?

Mr Hocking—Not personally. We are not trying to suggest that CSIRO is not a good organisation and that it does not do good science. What we have been saying all along is that, if there is a need for CSIRO and other research agencies to earn money, they should never be the prime contractor. In other words, they can go in with any number of private sector firms. That suggests that the science will then be transferred down to the private sector and there will be a value added to that particular project. We would encourage a closer working relationship. Certainly CSIRO—James has had some experience in this area—has been much more willing to work with the private sector since our work on removing the external earnings targets. But there are barriers out there that still exist.

Mr TICEHURST—How many members do you have in your organisation, and what major fields do they operate in?

Mr Hocking—We have about 400 companies. They operate in a number of areas: traditional surveying, remote sensing, photogrammetry, mapping, aerial surveying and aerial photography, geographic information systems, software and everything else in between. We have companies that are as large as Oracle, British Aerospace and Raytheon right down to one-person operations and a lot in between. We have some very creative companies as well.

CHAIR—Excellent.

Dr WASHER—David, I think we are all of the same opinion that we have a national disaster of monumental proportions, almost like a war. The old ideologies of playing games with intellectual property would evaporate under those sorts of circumstances. We will also soon have

a large bucket of money. It is well over \$2 billion if you add the states' contribution to it. You get a horrible feeling that somewhere we are going to spill that and it is going to go to waste. There are cities now that are in literal water famine—not because of lack of water, but because of lack of quality—and it is going to get worse. When there is a national disaster, we are responsible for it federally, and I do not think we can duck it. We have put in a lot of taxpayers' money.

I would imagine that it is our responsibility to get an agency, or a group, married with private enterprise, as it should be. This country has a lot of very good private enterprises, as well as our organisations. Get some massive web site and pay people for their intellectual property. It is cheaper for us to buy intellectual property from people, if it is of value and they can demonstrate that it is a commercial-in-confidence sort of trading.

Unfortunately, we now have to almost nationalise this and use private enterprise to assist us. I do not mean exclude them but involve them—make it inclusive—and then have an interactive type site that is accessible to everyone. If they want to value add and it has to be monitored and they have staff to add, maybe we can pay them for it. Did you imagine something like that? This solves a monumental problem. Or am I taking it too far?

Mr Hocking—How we go about it is something that needs to be discussed. What is the best way? As Mr Evans said, the important thing we have to look at is to start to get the standards in place so that people know what they are doing. The government is doing some good work in that area, particularly in the Australian spatial data infrastructure. There is a concept there, but I do not think we have the enthusiasm to push it.

My job is primarily to educate politicians and bureaucrats about the importance of spatial information as an infrastructure. Very few governments, if any, have ever looked at spatial information as the critical infrastructure. When we find out it is a critical infrastructure is when something goes horribly wrong, like the fires that hit Canberra. If you go back through everything that happened, you will see a failing in that one single area. That is always the root cause of every major catastrophe that we have.

With the salinity issue, if we had been collecting data from the first day it started to show up as a problem, it probably would not be a problem today, because we could have used this technology to predict what would have happened. We need to start taking spatial information seriously. Just because we cannot see it, it does not mean that every single thing we do every day does not, in some way or another, involve spatial information. I do not think it is the case that you are going overboard. What we have to do, though, is think about what process we have to put in place and then move towards the ideal. But we start with getting the data right.

Dr WASHER—Why I have some level of anxiety is that already hundreds of millions of dollars have been allotted to water catchment areas, and there seems to be a sense of confusion about access to good data to enact good, state-of-the-art scientific management. There is not a lack of enthusiasm, but there is a lack of skills because they lack the tools. While that has been shelved, a lot of it is available and could be dragged out. I guess we will have to pay some money, but it would seem wiser to spend our money initially to diagnose, identify and scientifically address the problem so that, when we actually spend the money on the ground, it will work.

We are running out of time. If we spend two billion dollars-odd and it is a basket case—as it has been: in Western Australia they have spent hundreds of millions of dollars and it is still extending, with all the best efforts they are putting in—people are going to get despondent. Taxpayers are going to jack up. I think the time has come when we cannot afford to talk any more. This is an essential thing.

We have got to thump the table and say, ‘There is no point spending money if we do not have the ability to involve private enterprise in a cooperative way with our government enterprises and collate information and identify what is working and what is not working and spend some time and money.’ If it takes two years to touch the ground and, when we touch the ground, it works, that is better than killing the patient.

Mr Hocking—I think you are absolutely right. With the water issue, the point that we have made to the government is that you cannot make good quality decisions about water until you know where it is, how much you have got and the quality of that water. The same thing must apply to this issue. At the moment, we could find ourselves giving out money, a bit over here and a bit over there. But who is managing it? Who is putting it all together? Who is saying that what has been done over here has not caused a problem further downstream?

If we have the whole thing down and have a full audit of what we have got as a problem and then logically decide to work through that problem and monitor it, that is the key to it. It is fine to go out and spend money on doing things. We may or may not be successful. But how do you know, unless you have money set aside to monitor whether it has actually worked?

Dr WASHER—I have one other comment I want to run past you. Our historical reluctance to have government departments work enthusiastically with private enterprise has to be dropped—critically. This is a different mindset. As you say, on the ground at the end of the day, most of the people are in business, in some way or other, trying to utilise the water or do something constructive with it that involves a lot of private enterprise. We need to change this mindset rapidly.

Mr Hocking—I would say that this organisation and this industry are probably unique in their dealings with government agencies. I would confidently say that we have exceptional relationships with a number of the key agencies dealing in this area. We have an exceptional relationship with many of the state agencies in this area. We are building on that. We do not have an attitude where we are going to destroy a government department we work with. We are very positive in the way we approach government agencies and governments generally.

Mr Farrell—As a bare minimum we need to have an Australia-wide audit of some sort that says, ‘That’s where we’re at right now.’ There is the capacity, with technology as it is, to go back in history and say, ‘That is how it’s been over the last 30 years. You’ve got a picture for now, and you’ve got a picture of the last 30 years, so you’ve got some idea of the change for the whole of Australia and a basis for monitoring and evaluating mitigation strategies into the future.’ I do not dislike your vision. I would like to see that vision in the future, whether it is for the farmer out on the land—although I am probably safe in saying that he knows where the salt is on his land—for people who are trying to manage it or for other organisations. I think that would be tremendously useful.

CHAIR—But isn't that being done? Isn't that part of the national action plan and the agreements between the Commonwealth and the states?

Mr Hoxley—Yes, it is to some extent, but not so well in the spatial information and in the fundamental data sets. Some elements of this—data sharing and so on—are alluded to in the bilaterals. But the level of exchange and the ability to work backwards and forwards are not well laid out. The national land and water audit had a salinity theme. It mapped through salinity. Perhaps the best thing that did was bring up the different ways in which it is classified in different areas.

You may have seen some of the discussion about the way Western Australia or New South Wales mapped their salinity. Yes, there is a salinity map produced as part of the audit, but the fundamentals on which that was based are quite different in the different jurisdictions. That in itself can lead to some difficulty in working out whether we are comparing apples with apples. That is a major issue that can warrant some investment—productive investment, we would suggest.

Mr Moody—I totally agree that this vision is a really good one. But there are three pitfalls that you have to be very aware of, and perhaps private industries can help to address these. The first is one of scale. I was talking to a person who was on a catchment management board a while ago. They had been there doing their blueprint for the catchment. I asked him if that had any effect on how you manage your farm. It had absolutely none. Applying these large catchment goals on that small scale was extremely difficult, so we need to find a way of tunnelling that right down to the user.

The second pitfall is accessibility of the data: we have to be very careful not to create bottlenecks in the system. For example, if it is all locked within one institution, or one whatever it might be, how do people ask the questions? How do they get access to that information so that they can actually start doing mitigation or find out what the techniques are?

The third one is that we need to look for new approaches. If we start understanding the problem, we have a common baseline and then we can start looking at some innovative approaches. Banks are foreclosing on farms because they have this sort of problem. Could some of that money be used to start addressing that problem? What are the new approaches we could be using to change the system so that it becomes one which is a virtual cycle, with everybody working together? It is all of our problem. It is a national problem, and we have to find some national solutions. That means engaging all of society, not just the government, not just the private sector, not just small industry and farms. But how do we find those solutions?

CHAIR—In that respect, many of the members of ASIBA are probably doing work for farmers, doing work for local government and, presumably, doing work for catchment management authorities or boards or whatever they might be called. What is the experience of being in that role trying to fill some of these gaps?

One of the concerns of the committee and this inquiry is that the best science is here somewhere, and down here is a farmer at the bottom end of the catchment trying to work out what he is going to do on his property, either to prevent salinity becoming a problem or to solve it. Theoretically, the catchment management authority is the mechanism to get these things

happening in the region. Is that occurring, and what role do firms such as the members of ASIBA play in that regard?

Mr Moody—Some may see it as a problem; business probably sees it as an opportunity. If we do not start solving the problem, people are not going to come back to us and the word is going to get around. I know that, from some of the other businesses, that is what businesses are trying to do. They are trying to go out there and solve those problems because that is what they are there for. I am not sure whether we want to give any specific examples or whether you have some.

CHAIR—Is the system of catchment management authorities working in that respect?

Mr Moody—NRI had done work all the way from the catchment management board.

CHAIR—Can you explain NRI?

Mr Moody—That was the company I—

CHAIR—Your business?

Mr Moody—Yes, but I am no longer with them. They had done work—and this is available on the web site—with catchment management boards, all the way down to small farms. It found that with these businesses you could transfer some of the things you learned from one level to another.

Mr Hoxley—The catchment is a useful management size that you can work at. For example, state governments are often quite broad—local government in particular—and natural resource management of salinity is perhaps not quite as effective in different regions as may be wished, whereas catchment management authorities seem to provide a good balance between focus and breadth. They cover enough area to be interested in it, but in enough detail to know what is going on. In their ability to draw different groups together they provide quite a valuable service.

The way of dealing with a catchment based on a water catchment, which tends to lump all of the processes together, is quite valuable. Our experience is that you need a grouping of about that size to be effective in getting that balance. Where you have catchment authorities—say, embryonic ones in Western Australia, some of the ones in Queensland, and more mature ones in Victoria—they are starting to work well in bringing a level of focus and also providing a level of overview.

CHAIR—Thank you very much for your submission and for the evidence this afternoon. It was very useful.

[5.40 p.m.]

BATTERHAM, Dr Robin John, Chief Scientist

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 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 your evidence to be given in camera, and the committee will consider your request.

Thank you very much for coming along this afternoon to appear before the committee. I know you have not made a submission as such, but the committee felt that, as the Chief Scientist, you may be able to impart to us some wisdom on some of the issues and matters that are relevant to this inquiry. It is a fairly focused inquiry—or we are trying to keep it as focused as possible without going into the general issues of salinity. It is more to ensure that the science is being properly coordinated and is finding its way to the ground and that the projects on which money is expended by both the Commonwealth and states are being based on the best possible science. In general terms, that is what the terms of reference are all about. Would you like to make some opening comments about our inquiry and the terms of reference? We will then continue with some questions.

Dr Batterham—Thank you, Mr Nairn. I am delighted to have the opportunity to comment to the inquiry. I have to say at the outset that the Chief Scientist's real area of expertise is definitely mathematical modelling, not salinity or dryland salinity or ensuring that the best science is being implemented. I am coming at it from the general proposition and from what I understand of what is happening. I will take you up on that offer and make a few points first.

Salinity is being recognised as part of one of the national research priorities. It is very much on the agenda to look at the whole science expenditure to see that it is targeting the most appropriate areas. Of course, it is not a priority in its own right. It is part of *An Environmentally Sustainable Australia*, part 3—'Overcoming soil loss, salinity and acidity', 'identifying causes and solutions to land degradation' and soil degradation. It is clearly an important part of it. The idea of the national priorities is that we can get a more coordinated approach across the whole of government. That is the whole purpose behind these research priorities.

I recognise—and applaud, I might add—the 10 years that we have had of the MDBC looking at the area. I would like to make this comment about the general science: the science has shifted largely from a one-dimensional, vertical paradigm. It understands what happens with drainage, rising water tables and water flows and what brings the salt to the surface, and the like. It has shifted from that sort of paradigm, and a lot of the science being driven by that—for example, what species might be more deeply rooted or more tolerant—to one that says, 'Actually, it is all of that, but it is particularly a catchment problem.'

I think there is still quite a way to go on the catchment side. There is still science that needs to be done, and I would like to make that point fairly strongly. I look at the work that the Bureau of

Rural Sciences, in conjunction with some others, did with their airborne mapping of where salt is. I will make two points about that. First, this is a classic example of the way science is emerging, which is that cross-cutting work, where two disciplines or more work together on some area, tends to have more deliverables than that which is singularly focused. That is a lesson in the way in which the nature of science is changing. We have to have more collaboration rather than less. It does not say that all work must be cross-cutting, by the way; it just says that, if there is an accelerator pedal to be pressed, it is the one on cross-cutting work.

I use that BRS work as a classic example. Airborne TEM was an exploration technique. In trying to figure out where the sulphidic ore bodies are, the signals are terribly masked by reflections you get from conducting layers, in this case, from salt. So people have spent an awful lot of effort trying to figure out how you can back-calculate to get rid of the effect of how the salt is upsetting the signals.

Of course, that is of no interest to the exploration industry in terms of the value of the salt, but it is of enormous value in terms of catchment management in telling you what salt is where, from which the hydrogeological calculations could be done on what is more mobile than not. The reality is that an awful lot of salt that is close to the surface does not matter. It is going to stay there for a good long time, depending on what the surface is and what the hydrogeology is, and so forth.

I use that example to say that cross-cutting work is still delivering, especially on the catchment side, and I think there is still an ongoing need. That is the sort of thing that is one of these conundrums. Such research is best done at the national level because you need a program that is going to be looking at more than just one catchment, but you have then got to apply the knowledge at catchment level.

That is the key thing with this paradigm shift. It has gone from a vertical, general treatment of salinity, to catchment-by-catchment treatment, to being able to say, 'Actually, even more specific than that: farm lot by farm lot,' or whatever the area is that feeds into agricultural communities, be it for their livelihood or predicting what damage you are going to get to infrastructure—bridges and so on.

There is plenty of work still to be done to justify a focus there. Looking at it from quite some distance, my comment is that the cross-cutting appeals to me as the area of favour, but the nub of the challenge is how you drive catchment level implementation. Even if we get another generation of tools—beyond this airborne TEM, for example—and I am sure it will come in time, how do you drive implementation?

Let us look, for example, at some data provided by the Murray-Darling Basin Commission on water usage. This is not targeting salinity per se; it is targeting water usage in dairy farming. If I recall what Don Blackmore presented to the Academy of Technological Sciences and Engineering meeting on water last week, it showed, within one catchment area, the efficiency of usage or, if you like, the amount of milk produced for the amount of water used in irrigation. And I realise that is not dryland salinity.

My point is that that showed a typical bell-shaped curve distribution of number versus efficiency. You have to look at that and say, 'There is an area where the science is known. It is

within one catchment. Why is it that we are not seeing best performance out of every farm lot? That is one of the key questions with dryland salinity. A lot is known and, of course, more will become known, even within catchments. But how do you connect it? How do individuals tap into that, especially against a background where extension services, out-of-state instrumentalities, tend to be a lot less than what they were in the past?

In some areas this is being taken up. I am aware that in the grains area you tend to get these groupings of 100 or so farmers in one locality, grouping together to pay for extension services targeted at their individual needs. That, you can say, is a market response to the decline in extension services. That is still just one part of the puzzle of how you get the knowledge that is there and the knowledge that is emerging into use. I do not have an easy answer to that.

That is my opening comment. There is still science to be done. The nature of the science has changed quite a lot in 10 years, from this one-dimensional approach, through to a catchment approach. There are still chapters to be unfolded, but the overarching problem is: how do you, as an individual, decide at what point on the triage—I do not like the word, but I have seen it in some of the material that is around—spectrum you are? Are you in the business of improving what you have got, are you undertaking engineering works or are you saying, ‘That is it for that. We will just leave it to be’?

CHAIR—Thank you for those interesting opening comments. Do you think there is a need, at a Commonwealth level, to pull together all of the science that is out there and the data and various other things and say, ‘If you’re applying some science to solve a problem and you’re taking data from state or federal and you’re value adding it and producing something else that could be useful to someone in another area, it should come back so that we know it exists and we know it’s here’? Is there a role for something like that? If so, do you have any ideas about how that could best be done and which organisation it could grow out of?

Dr Batterham—I think there is a role, whether this is an ongoing role for something like the National Dryland Salinity Program, as opposed to doing research per se, or whether this is a role to give to an organisation—and there are not too many of them around. A couple of obvious contenders line up. Whether that is CSIRO territory, because they are spread around, they are out in the field and they are used to handling national data and the like, or whether it is one of the instrumentalities that has been involved in the various audit programs that we have had, or whether it is BRS or what have you, I am not sure.

First, my response is that there is a need to have easily accessible repository data covering the generalities, so that those who are working on implementation in the catchment area know that what they are dealing with is the best that is available, because the best that is available is a changing scene. Even if there were no other national R&D program, for various reasons, including the fact that salinity is up there as a national research priority, there are going to be ongoing developments along the lines of the one that I specifically mentioned: the airborne survey work. How do you capture the benefits of that? Conversely, if you are working at a catchment level, one of the tools, or supports, that you have is to say that you are actually using the best information available.

CHAIR—One of the criticisms of the BRS, with respect to that airborne work, is that they are not making it all that freely available, because they are involved in a semi-commercial capacity.

A lot of their funding is coming from outside normal government funding. Therefore, involving them too much, other than with the data that ultimately becomes public, creates a bit of a problem. The National Dryland Salinity Program has some concern about the potential ongoing funding of that organisation. Probably, if you line up all the organisations, it is currently the organisation with the most information with respect to the salinity issue, even though it is dryland salinity. Would that seem correct to you?

Dr Batterham—I think so. My response to what you touch on is that this is one of the classics of funding. Do you fund work for the public good, in which case somebody has to pay for it? Do you fund the development of the technique, proving it up as a public good because no individual company can get full benefit of it, and then rely on more commercial forces to spread it out? I make a generality, but it applies here and it certainly applies to CSIRO as well. The path we are on is one where the development of the techniques—the development of the base intellectual property—tends to get funded largely from the public purse. Thereafter, unless it is seen that there is a strong element of public good outcome, one expects more and more and is seeing private enterprise—whether it is through a spin-off, or fly-off in this particular case, from the instrumentality concerned—picking up the intellectual property, running with it and applying it.

What we are seeing there is pretty typical of the research system. The only reason you would argue that you might backtrack from that position would be that the application of that data had a public good element in it such that the public ought to be funding it or that the end users—or some of them, such as farmers or agricultural producers—were not able to access the data in a reasonable manner because their particular bit of it was too small and they did not have the mechanism to club together.

That said, I point to what the Grains RDC is encouraging with these groupings—one might call them ‘self-help’ groups, but I think they have a proper name for them—and that is the 100 or so people within one region actually clubbing together to help pay for the cost of extension services. The problem of diminishing extension services has come out very clearly in this inquiry. A gap is occurring in some areas regarding somebody being able to take the information through to the farmer on the ground.

Mr TICEHURST—The other day I visited a company producing biofuels. Down the line, they were looking at finding a plant type that was salt tolerant. You could put this crop in and it would absorb salt out of the particular area. The spin-off was that you could then use it as an input into biofuel. Have you come across any plants that might fit that? How can these people tap into science to get a bit of further information on that?

Dr Batterham—There is science in this area. I am not claiming to be the expert in this area, but I am aware of work going on that looks at the use of a mallee species. It is quite an interesting one because it is reasonably salt tolerant. It stores the hydrocarbon and carbohydrate components in a root system, which does not have that much foliage, and it is very slow-growing, so that, if ever there are greenhouse credits around, you will have something with quite some longevity. A 30- to 50-year growth is better than a 20- to 30-year growth before it comes over, and whatever the content is goes back into the greenhouse cycle. There is that sort of activity. I have heard that people are looking at species of plant which are more salt tolerant and

which might be harvested for their oils. I cannot tell you the name of the species. I am aware of the mallee one because I have seen a little of the detail of it.

CHAIR—The committee saw that in Western Australia—the oil mallee. They are looking at it as a biofuel for electricity generation.

Dr Batterham—One leg, however, of this triage approach is that one of the things you can do to adapt is to have much more salt tolerant species that you can still get reasonable returns from. It does not get you away from the point that what the science is now telling us is that you cannot simply rely on having farmers in one area planting out more deeply rooted species or some single, what I would call ‘vertical thinking approach’ for one area. You have to worry about what the whole catchment is doing. If 200 years of certain agricultural practices have brought salt up to a certain level, you are not going to push it down in a twinkling of an eye with one cash crop over the next 10 years.

Dr WASHER—Dr Batterham, thank you for coming along today. One of the senses I have picked up is that people in the city do not perceive this as a city problem; it is more a rural, regional, agricultural, outer metropolitan, in the country type thing. Yet now in Perth we are facing a crisis in water management. I think it is the same in Adelaide. I guess we have to make people in cities more aware that we lack quality fresh water. The only way I can see it happening in the short term—and I ask if this is being researched—is that they will need to desalinate to some degree. I cannot see us burning up Western Australia to get quality water into the Perth metropolitan area, where there is expansion in fresh water demand. Is part of the research program now on desalination and cheaper and more efficient methods of getting fresher water?

Dr Batterham—Worldwide there are plenty of people working on desalination. I will not try and rehearse some of the leading-edge stuff because, as always—when I say ‘as always’, I support a few of them quite solidly—there are programs that, if they come through, are really going to change the face of desalination. I would mention one only, just for the flavour of it. People are looking at a method of taking brackish water and putting a bit of energy into it to turn it into tiny little droplets. These are so tiny that they evaporate, leaving the salt behind. Before the whole lot has time to combine again and give you brackish water back again, the water is separated off and the salt falls to the bottom and is scraped out. The energy transfer from the condensing vapour heats the evaporating droplets, so that the thing sits in energy balance other than the energy required to atomise it, which happens to equal the energy of mixing salt into the water.

It is a brilliant concept in terms of getting the energy costs of desalination way down. It does not matter whether you are using reverse osmosis, distillation or whatever; a lot of it is energy cost. There are people chipping away at this, and you would have to say that, as they succeed, they will be servicing quite an extraordinary world market and world interest in it. We wish them lots of luck.

Meanwhile, the cost of desalination keeps coming down. Of course, the more concentrated it is—tackling seawater costs you more because it is high pressure reverse osmosis, or whatever—the more it costs. We do not have, particularly in Perth, the advantage of copious quantities of relatively low-grade heat, such as you might get from capabilities used in a district heating

system in the cold climates of Europe. We do not have that sort of heat available to help get the energy costs down.

Coming back to your point about the urban-rural balance, there seems little doubt that the urban side has not yet really got the same awareness as there is for people on the land. Interestingly, this coming Friday, there is a Prime Minister's Science, Engineering and Innovation Council meeting, which will include a topic on urban water, looking at this very issue and what the options are. It will be suggesting for the urban side that significant recycling becomes the way of the future, and it will be offering options on that.

To my way of thinking, that is highly desirable because it heightens the whole profile of the importance of water. In some ways, Perth has been lucky, which is perhaps not what you want to hear, because you have had 20 years of a changed rainfall pattern compared with the last 100. That has raised the matter in everybody's awareness, so that two by 12-minute watering cycles for the garden are now known about—although I would not say readily accepted. This has raised the whole profile. But if I recall my figures, 90 per cent of the water supply in Perth does not go to the urban users; it goes for irrigation. Tackling that end with the efficiency type things and catchment management, which I mentioned in the dairy example, is just as important.

A nirvana for Perth would be to get into engineering works, which raises this triage question that engineering works are going to be required. Dig the deep ditches, or whatever is required, to drain some of the wheat belts. Desalinate that material and provide fresh water for Perth and less infrastructure damage in the wheat belts. But the costs of that one are not cheap.

Ms CORCORAN—We have heard lots of evidence saying lots of different things. The witnesses who appeared before you used the word 'haphazard' when it came to describing where data is, people's access to it and an overall plan for putting science to salinity. They paint a quite despairing picture of where we are not going. Are you equally pessimistic?

Dr Batterham—I am not an end user; I am an urban dweller and pay my water rates. I try to minimise my water usage. When you live in a Victorian terrace house, essentially without gardens, that is not too hard to do. I do not have good knowledge to respond to that. I have heard the comments that it is not that easy to get the data into a local area, and I am aware of the difficulty of moving from catchment to individual farm.

To me there are two challenges. Firstly, I cannot comment authoritatively on the question, other than to say that I have heard that comment made. It seems to me that there is this necessity to be able to take catchment and get it down to a local farm level. I do not think the mechanisms are good enough there yet. It is very area-specific data that is needed in the long run. Secondly, I am interested in how, as we make developments, which then have national application, that gets out into, first, the surveys being done and, second, the data becoming broadly available. I can but agree, but it is only on what I hear.

Ms CORCORAN—The other question is a little sideways to our terms of reference. We are also getting conflicting evidence about where science is in terms of understanding the cause of salinity and what we can do about it. One or two witnesses have said that what we generally understand is all rubbish and it is actually something quite different. Do you have any feel for

where we are in terms of understanding? Have we pretty much got our heads around the causes, or is there still a bit of unknown stuff happening out there?

Dr Batterham—I have not heard too much comment; nor have I seen much personally to justify a position of ‘We know nothing about nothing,’ to paraphrase what you mentioned in this area. A lot of work has actually been done. I accept the generality that the whole point about science is that you hypothesise, you take some measurements, you make some predictions and, if the predictions and measurements stack up, you have a good working hypothesis.

I mentioned how we have moved from a more vertical approach to a more catchment based approach, and new measurements are now telling us that we do not have to worry about the total salt in the catchment; it is the bits that are mobile. So I think it is fair to say that our knowledge of mobility is going to change. I do not think we are in a know-nothing-about-nothing type state, though. The next point is that, as we start to undertake more engineering works—and we are—the efficacy of that is going to become clearer. We do not have the long track record, certainly for all catchments, on the efficacy of engineering works.

CHAIR—Taking that point a bit further, of the two conflicts that hit me that seem to be out there, which are actually related, one is the pro use of aerial magnetics, as opposed to the ‘that’s not really applicable to our area’ argument. It is partly based on the cost to get it, but not necessarily. Quite specific people in Western Australia have said that it was all right for certain situations, but they did not think it told them much more than what they already knew for their particular area. That is one conflict. Perhaps the conflict is there partly because at one point in time that work was being sold as the silver bullet and should not have been.

The second conflict, which is related, is the pro engineering works as opposed to, well, anti engineering. Solve it by vegetating 80 per cent of our catchment and recognise that that is not viable because you will have farms that cannot make money any more. So if we are going to vegetate it that much, we will have to vegetate it with something the farmer can make money from. Therefore, we need to do some more work to come up with a species that is profitable.

Those two separate conflicts are related in some way. Usually, when these things occur, the natural tendency is to say that a solution is somewhere in the middle—that it could be a combination of engineering and other things and it is finding the best combination in the right place. That is more, for your benefit, an assessment of some of the evidence that we have got over the last couple of months. But when we do have those conflicts, how do we resolve them? How do we say: this is a body or this is something that will look at all these conflicts and then give a reasonable assessment of where we should go?

Dr Batterham—Because, in this case, the envelope extends well beyond the science, we get into strife fairly quickly with some of these conflicts. It is really about the economics of land use and social options for land-holders and land users. It is hard to resolve some of these without also embracing the question: who bears the cost of change—or who bears the cost of finding out what the cost of change is going to be? That is part of the question. Is it engineering, or is it 80 per cent vegetation? Either way, somebody is paying a fair bit. If it is 80 per cent vegetation, at a minimum that then prevents economic usage at anything like current levels and, if it is planting a 30- to 50-year crop before you can harvest it, it is a very different economic use for that particular area.

Bringing the socioeconomic side into the equation seems worth while. It is something that has to be done within regions where there is some agreement that they are going to move, and people want to know what their options are. In terms of some of the technical sciences, if airborne TEM is too expensive, it is not going to get used in sorting out these questions. That is the short answer. I wish you Solomonian wisdom on that one because there is no straight-ahead answer. It goes out so broadly, past just the science envelope.

CHAIR—To go back to the National Dryland Salinity Program, it seems to be a tool that has a role for the future. Because it is based on dryland, do you see merit in perhaps broadening its scope? If it were to have a role, particularly as some sort of coordinating body for a lot of the science that is around that the catchment management authorities could access to ensure that they are working with the best available science of the day, do you see benefit in broadening the focus of that program to look at the other salinity issues—irrigation, salinity and urban salinity?

Dr Batterham—It seems well worthwhile at least to have a clearing house and a forum for helping to focus on what the needs are, as a minimum. In answer to your question of how far you extend that along the salinity chain before it becomes the Australian total land and water audit targeting sustainability, it is logically hard to stop at any point along that chain because it is actually worthwhile.

We have these major land and water audits, and they have taught us an awful lot about gathering data and whether there is a likeness in the data. I would be quite supportive of the notion of having a broader outreach for salinity than just dryland salinity. That is on the logical basis that you cannot label catchments as being just dryland or dryland plus irrigation, or dryland plus irrigation plus urban as well.

I suspect that the urban side has some of its own peculiarities, which are best addressed—not so much in splendid isolation, anyway. For example, they could be addressed by getting urban dwellers used to the real cost of water and some of the currently indirect impacts of their water usage, which are not costed in, such as once-through usage of water. There is some logic in stopping at some point, but there are certainly catchments in which both dryland and irrigation are important, and it is still the totality of the catchment that matters.

CHAIR—Thank you. That was very useful for us, Dr Batterham.

Dr Batterham—My pleasure. I wish you well with it.

CHAIR—We appreciate your assistance this afternoon. Thank you for coming.

Resolved (on motion by **Ms Corcoran**):

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

Committee adjourned at 6.19 p.m.