

Submission from Jeff Camkin
Inquiry into Water Licensing and Services
Economics and Industry Standing Committee
Legislative Assembly of Western Australia



19/12/07

Thank you for the invitation to make a submission to the Inquiry into Water Licensing and Services.

I make this submission as a private citizen and not in any other current or previous capacity, which includes policy development, administration and research in water and fisheries resource management over the past 15 years. I have also undertaken two international study tours to look at strategic approaches to water resource management, visiting South Africa, USA and Brazil on a Churchill Fellowship in 2004 and various South American countries, USA and France in 2002 under an Australian Committee on Irrigation and Drainage Travel Fellowship.

I note that the terms of reference for this inquiry are broad and have relevance to many aspects of water management in Western Australia. Matters relating to licence fees, for example, go to standards of service, policy on cost recover, national agreements, principles of sustainability etc, which I examined during my study tours. The report of my 2004 Churchill Fellowship study, which focussed on the needs for Western Australia at the time, included 38 conclusions and 23 recommendations covering strategic water management, community and government partnerships, capacity building, legislation and management flexibility, documentation of experiences, data management and research. The report was published on the Winston Churchill Memorial Trust website in 2004 and is a public document.

Rather than specifically address each of the Terms of Reference I have attached a summary of the Churchill Fellowship report, which includes a hotlink to the full report. I would be willing to provide further evidence in response to specific questions relating to the terms of reference if the Committee determines that it may be useful for its purposes.

Regards

Jeff Camkin
19/12/07

STRATEGIC APPROACHES TO WATER RESOURCE MANAGEMENT IN SOUTH AFRICA, USA AND BRAZIL

2003 CHURCHILL FELLOWSHIP REPORT - JEFF CAMKIN

SUMMARY DOCUMENT

This document contains excerpts from a 2003 Churchill Fellowship report, published on the Winston Churchill Memorial Trust website in 2004. The full report, which provides more detailed information and hotlinks to important documents and websites, is available at http://www.churchilltrust.com.au/res/File/Fellow_Reports/Camkin%20Jeff%202003.pdf.

EXCERPTS FROM INTRODUCTION AND EXECUTIVE SUMMARY

The findings from a 2003 Churchill Fellowship Award to study strategic approaches to water resource management in South Africa, USA and Brazil are documented in this report. The study tour took place during the periods 21 March to 20 April and 20 May to 28 June 2004.

This report provides a catalogue of information, conclusions and recommendations from a 2004 Churchill Fellowship to study strategic water resource management in South Africa, USA and Brazil. In preparing the report the author has also drawn from knowledge gained during a 2002 Australian National Committee on Irrigation and Drainage Fellowship study of approaches to water allocation in Argentina, Chile, Peru, Mexico and the US.

Water allocation and management is one of the most contentious issues facing Australians today. Exacerbated by recent widespread droughts, Australia has been increasingly challenged by the need to balance its growing demand for water with expectations of a clean and healthy environment. Within this context, Western Australia has a remarkable and perhaps unique opportunity. Pressure on the State's water resources has generally lagged behind that experienced in many parts of Australia and the world, and Western Australian water resource managers have typically been cautious in allocating water resources in the past. Consequently, Western Australia is in a very favorable position to learn from the successes, and the failures, of those jurisdictions that have already had to contend with heavy pressure on their water resources.

But the window of opportunity for Western Australia is closing fast. Water use across the state doubled between 1985 and 2000, and current use is running ahead of predictions that it will double again by 2020. The climate in the populated southwest of the state appears to have changed and a 10 to 15% decline in rainfall over the last 30 years has contributed to a 40% to 50% decline stream runoff. Most climate models are predicting a continuation of this pattern or an additional decline in average rainfall and run-off. As more of our water resources approach the limit to sustainable use there are symptomatic increases in competition and disputes over water. The challenge for Western Australia is to take the great opportunity it has to get its water resource management right.

A fundamental conclusion from this study tour was that there is no right or wrong system for the allocation and management of water resources. The challenge is to tailor an approach that

is most suited to the specific needs of each community and, as situations or community values change, adapt management accordingly.

Having successfully undertaken major reform over the last ten years, South Africa and Brazil are now amongst the world's leaders in water resource management. Both countries have established an impressive strategic water framework consisting of unambiguous policy, modern comprehensive legislation, and clear strategies and governance arrangements for implementation. Both countries will have their challenges in implementation, but only because they have set such high standards to achieve. And both countries provide valuable lessons in water resource management.

A visit to five western states of the USA provided a very different but equally rewarding experience. With a focus on individual and collective rights, and a history of litigation over water at the federal, state and individual level, US water resource managers have needed to develop very rigorous policies and procedures, and build up strong technical capacity. It is not necessary for Australia to reach the same level of litigation, nor manage to the same doctrine of prior appropriation, to benefit greatly from their experience.

Key findings from this study tour include:

- Despite recent challenges, water resource management in Western Australia is relatively simple in comparison with many jurisdictions;
- There are major benefits in developing a strategic water management framework that typically consists of a Government statement of philosophy and intent, modern water legislation, and a State Water Plan which documents implementation mechanisms;
- To ensure sufficient long-term focus, strategic and long-term functions need to be separated from short-term implementation functions within water agencies;
- Good stakeholder representation is critical to negotiating outcomes that have longevity;
- Community-based water organizations help develop a collective sense of responsibility and are important contributors to effective water resource management;
- A strategic framework that clarifies decision-making responsibilities is essential;
- Programs are needed for sustainable growth in capability to meet future water challenges;
- National and international experience provides major opportunities for learning;
- Isolated locations such as Western Australia need to make an extra effort to capture that experience; and
- Good documentation of policies, plans and processes increases certainty for the community on how Government and its agencies will exercise their discretionary powers.

SUMMARY – SOUTH AFRICA

South Africa has made extraordinary progress in water resource management over the last 10 years. It has in place a strategic framework of modern water policy, legislation and planning that provides clear direction for the country and its people. South Africa appears to have reached a balance between the need to make decisions that are in the best interests of the nation and the need to increase the level of local involvement in decisions.

The strength of community support for the water policy direction is a credit to those involved and reflects the high level of commitment to ensuring that known stakeholders are actively engaged in the country's water resource management. South Africa will not be without its challenges in implementation, primarily because it has set itself such a high standard to achieve, but a strong sense of a positive future exists.

SUMMARY - USA

The doctrine of prior appropriation is at the core of water resources law and management in the western states of the US, but the strength of its influence on modern water resource management varies and several patterns emerge. Firstly, there is increasing recognition of the importance of conjunctive management of ground and surface water resources. Secondly, there is increasing focus on the important contribution that local and regional communities and solutions can play in resolving statewide water problems. Thirdly, there is increasing emphasis on the development of solutions through negotiation and collaboration rather than lengthy litigation with inherently uncertain outcomes. Fourthly, most states have in place a State Water Plan to provide an overarching policy and planning framework for their water resources.

Considerable pressure from the threat of and actual litigation over water issues appears to have contributed to strong water policy, rigorous processes and excellent technical skills across the western US. Although there tends to be less litigation over water issues in Australia, there is considerable opportunity to benefit from western US experiences.

SUMMARY - BRAZIL

Brazil has made extraordinary progress in water resource management over the last 10 years. It has a well thought-out and well documented strategic direction and strong technical capacity for implementation. It is particularly impressive that Brazil is looking even further ahead and, in partnership with other countries, addressing national and international water resource management issues that are only just beginning to emerge but have the potential to later become major issues. There are clearly opportunities for Australia to learn from Brazil's success.

CONCLUSIONS

The primary purpose of this study was to obtain information relevant to the future management of the water resources of Western Australia. Consequently, the conclusions are primarily related to the Western Australian context.

Conclusions Relating to Western Australia's Water Resource Management Status

Conclusion 1 – Increasing complexity of water resource management

Until recently Western Australia was in a relatively comfortable water situation but this is changing rapidly because of the dual challenges of increasing demand and a drying climate in

the populated south west of the state. As this trend continues water management will become more complex, and more contentious, consistent with experiences throughout Australia and internationally.

Conclusion 2 – Physical water availability is a poor indicator of the challenges faced

The total quantity of water available to Western Australia and other jurisdiction is not a true indicator of the challenges faced. Water resources of suitable quality are often remote from demand centres and transporting water is expensive. While iconic development projects are frequently proposed, the social, economic and environmental considerations mean that such proposals often take a long time to be developed, if ever.

Conclusion 3 – Water resource management in Western Australia is relatively simple

Despite rapidly increasing demand and reduced water availability through climate impacts, water resource management in Western Australia is relatively simple. Few of the State's water resources are significantly over-allocated, very few cross state borders, none cross international borders and the community is, in general, capable of paying for good management of its water resources.

Conclusion 4 – Increasing numbers of water organizations

As the complexity of water resource management rises, an increase in the number of water organizations can be expected and planned for. This trend will be both a challenge and a significant opportunity for Western Australia.

Conclusions Relating to Strategic Water Resource Management Frameworks

Conclusion 5 – The benefits of a clear strategic water management framework

A clear strategic water management framework is essential to developing community understanding and support for water resource management actions. Water resource managers and stakeholders should be able to track management proposals and actions back through comprehensive water plans, including a jurisdiction-wide framework plan, and the relevant water legislation to a clear Government policy position.

Conclusion 6 – Maintaining a long-term focus

Water resource management is a dynamic field but water managers and Governments are often so busy addressing current issues that there is insufficient attention being paid to long-term direction. There is a general need for better analysis of long-term policy options and better coordination of policy at the strategic level.

Conclusion 7 – Current problems may indicate future trends

Current problems, issues and opportunities are often indicators of future trends. It is important to take a step back to reflect on and analyse current issues and determine whether they are the 'canary in the cage' for the future.

Conclusion 8 – Balancing planning and implementation

There is a dynamic balance between policy and planning development, and implementation. It is important to have systems of oversight and review to maintain the right balance of focus and the best allocation of management resources.

Conclusions Relating to Community and Government Partnerships

Conclusion 9 – A trend towards negotiated regional solutions

There is a noticeable trend away from the resolution of water problems through litigation and a trend towards negotiating local and regional solutions based on integrated management of the entire water cycle. A primary driver is the greater certainty of outcomes provided through negotiated solutions.

Conclusion 10 – Community-based organizations are a key to success

The establishment of community-based organisations that promote a collective sense of responsibility and provide opportunities for local communities to develop solutions to water problems, rather than just relying on direct relationships between water users and Government, are a key to success.

Conclusion 11 – Engaging the community

There is a common trend of increasing local and regional responsibility for water resource management, for example through River Basin Committees or Catchment Management Committees. Increasing delegation of decisions to regional and local communities greatly improves the engagement of stakeholders in water resource management.

Conclusion 12 – Clarifying decision-making roles

The delegation of water resource management functions to local and regional entities operates best if supported by a strategic framework that clarifies the decision-making roles of the committees and those of central agencies, and provides guidance on the relative weighting of local and regional benefits versus statewide benefits.

Conclusion 13 – Engaging stakeholders properly

There is a fundamental difference between providing the opportunity for stakeholders to comment on proposals and approaching known stakeholders to ensure they are engaged in the process. While the latter approach often takes considerably longer and can be significantly more expensive, experience in some jurisdictions suggest there are major long-term benefits through the development of stronger partnerships.

Conclusion 14 – The importance of good representation

Good representation of all parties is important to achieving agreements that have longevity. Without good representation for all parties negotiated agreements will be unbalanced and short-lived.

Conclusion 15 – The need for sound representative structures

Representative and consultative structures for water users in Western Australia are as yet underdeveloped by comparison with other jurisdictions. The continued development of water expertise within representative bodies and the building of strong professional relationships and partnerships between those organizations and government is vital to ensuring negotiated solutions have longevity.

Conclusion 16 – The need for champions

Strong champions in executive Government, agencies and the community are a characteristic of those jurisdictions that have made substantial and rapid progress in water resource management. Of these, the most critical is to have strong political advocates capable of

raising water resource management to the point that it is recognized as a major contributor to the strength of the economy, health and welfare.

Conclusions Relating to Capacity Building and Learning from Experience

Conclusion 17 – Aging water expertise

Much of the existing water expertise in many jurisdictions is nearing retirement and the need for succession planning is generally recognised.

Conclusion 18 – Building management capacity

Water resource management capacity in Western Australia will need to increase to match the growing complexity of the task.

Conclusion 19 – Water resource management issues are similar the world over

The issues being faced in Western Australia are the same as those being faced in many other jurisdictions, irrespective of some fundamental differences in water laws. Major opportunities exist for national and international exchanges on management solutions and technical skills development.

Conclusion 20 – Western Australia's isolation is limiting the transfer of knowledge

Western Australia's isolation from the rest of Australia and the world means that water management expertise and technology transfer is more difficult than for many other jurisdictions. Deliberate steps are required to overcome this isolation to ensure that Western Australia has the opportunity to learn from national and international experience.

Conclusion 21 – Learning from internationally funded projects

Water resource management projects funded through international organizations such as the World Bank provide a substantial opportunity to access modern thinking on water policy.

Conclusions Relating to Legislative and Management Flexibility

Conclusion 22 – Horses for courses

In establishing regimes for the allocation and management of access to water there is no right or wrong system. The challenge is to tailor a system most suited to the specific needs of that particular community. As the community's needs and attitudes change, the same principle applies. The system needs to be updated and adapted to the current and future needs of the community.

Conclusion 23 – Frequency of legislative changes

The rate of change in water issues is very high and unless water legislation has inbuilt flexibility frequent legislative changes may be required.

Conclusion 24 – Managing the entire water cycle

Modern water legislation and management tends to incorporate the entire water cycle and all water use. Flexible mechanisms to remove the need for active management of particular sectors or levels of usage (such as small farm dams) are provided in policy and legislation but their impacts are still included in calculations.

Conclusion 25 – The development of sector specific policy

Legislative capacity to formally separate water use sectors can provide major benefits by allowing sector specific policy to be developed without interfering with or having interference from other water users.

Conclusions Relating to Data and Documentation**Conclusion 26 – Improving certainty through documentation**

Proper documentation and publication of policies, plans and processes is a characteristic of successful water resource management agencies. Documentation develops rigor in management approaches and provides increased certainty for the community on how Government and its agencies will exercise their discretionary powers.

Conclusion 27 – Learning through documentation of experiences

Excellent documentation of the evolution of water resource management in jurisdictions such as Brazil and South Africa provides an important ongoing tool for developing community understanding. That documentation also provides an important opportunity for Western Australia to learn from recent international experience.

Conclusion 28 – Increasing certainty for water users

Strong water planning and the provision of information on how Government will apply its discretionary decision-making powers encourage private investment in water based industries by increasing certainty.

Conclusion 29 – The importance of good databases

Community confidence in supporting data is critical to achieving acceptance of the need to change and without good data the rate of change will typically be very slow. Maintaining good databases can provide important flexibility for quick decisions if and when they are required.

Conclusion 30 – Developing rigor through documentation

Documenting and publishing available information and expert opinion develops strength in water management regimes. It keeps stakeholders informed, assists in addressing challenges to administrative decisions and develops support for decisions taken because they are seen to be open and transparent.

Conclusions Relating to Water Research**Conclusion 31 – Collaboration between resource managers and researchers**

Collaboration between water resource managers and water research institutions makes a substantial contribution to ensuring that water research meets management needs and that resource managers have access to a broad range of thinking.

Conclusion 32 – Coordination of water research

Many jurisdictions, including South Africa and the US States, have in place organizations to coordinate water research. The organizations, which typically also have a significant role in community education and training of water resource managers, are highly regarded contributors to water resource management.

Other Conclusions

Conclusion 33 – The increasing importance of groundwater and conjunctive management

The importance of managing groundwater use and incorporating it into conjunctive management of all water resources is generally recognized, although increasing the level of groundwater management is proving difficult in some jurisdictions.

Conclusion 34 – International funding opportunities

International funding opportunities may exist for demonstration projects within Western Australia, for example through the UN Hydrology Environment Life and Policy (HELP) Program.

Conclusion 35 – Water education

Independent organizations can play an important role in bringing researcher and water manager views together and into the public arena for improved community and stakeholder education.

Conclusion 36 – Government involvement in water trading

Western Australia has tended to take a hands-off approach to water trading but in some jurisdictions the direct involvement of government is central to the movement of water to higher value uses.

Conclusion 37 – The relationship between water rights and water use efficiency

The relationship between water rights and water use efficiency is generally unclear and is currently being debated in many jurisdictions. The key question is what responsibilities, if any, do water users have to improve their efficiency over time?

Conclusion 38 – Attitudes to water use fees

Where they have been implemented, water use fees are typically insufficient to cover all the costs of management but are seen as an important educational tool. Acceptance of water use fees increases if the funds are used for management in the area they are collected, if the setting of fees and decisions on expenditure of revenue are made locally and with stakeholder involvement, and if the fees are introduced slowly as community understanding of the benefits and support for the fees increases.

RECOMMENDATIONS

The primary purpose of this study was to obtain information relevant to the future management of the water resources of Western Australia. Consequently, the recommendations are primarily related to the Western Australian context.

Recommendations Relating to Strategic Water Management

Recommendation 1 – Develop a new strategic water management framework

To provide greater guidance and context to decision-makers and the community on water resource use and management, a comprehensive review of the strategic water management

framework should be undertaken. A new strategic water management framework should be developed to document Government's philosophy and intent, put in place the legal and institutional arrangements necessary to carry out that intent, and detail the management approaches for implementation.

The new strategic water management framework should consist of:

- A State Water Policy to document Government's intent and philosophy for water;
- A Water Resources Act to consolidate and update legislation and implement the Policy; and
- A State Water Plan to provide detail on the methods of implementing the Policy and the Act.

Each component of the new strategic water management framework should be developed through proper consultative processes and utilize expertise within the Government, non-government technical organizations, stakeholders and the broader community.

Recommendation 2 – Document a State Water Policy

A State Water Policy should be prepared for adoption by Government as its pre-eminent statement of philosophy and intent for water. The policy should document Government's high-order goals such as water availability, rational and integrated use, and mitigation of the impacts of droughts and floods. The policy should state Government's fundamental principles and outline the primary mechanisms for implementation such as:

- Governance arrangements;
- Water legislation;
- Water planning including the State Water Plan;
- Water rights administration;
- Security for water users;
- Water pricing; and
- The role of Water Resource Management Committees.

Recommendation 3 – Prepare a comprehensive State Water Resources Bill

Western Australia's water laws should be modernized and consolidated into a single Water Resources Act. Key objectives of the new legislation would be to:

- Incorporate the State Water Policy into legislation;
- Clarify water resource management objectives and fundamental principles;
- Clarify the powers relating to conservation, allocation and management of water resources and the processes by which the powers are to be exercised;
- Remove unnecessary duplication and complexity; and
- Ensure that legislation reflects contemporary management principles and practice.

Recommendation 4 – Prepare a State Water Plan

To provide detail on the mechanisms for implementation of the proposed State Water Policy and Water Resources Act, a State Water Plan should be prepared for adoption by Government. The plan would provide statewide context for decisions by:

- Compiling knowledge on the State's water resources and identify gaps in knowledge;
- Documenting key water resource management strategies;
- Defining water management areas;
- Presenting current and future water requirements statewide and by water management areas;

- Quantify the water resources available in each water management area;
- Identifying likely management areas with current and future water deficiencies and surpluses;
- Identifying actions to be taken to meet future water needs in each area;
- Identifying inter-regional transfer needs from areas of surplus to areas of deficiency;
- Classifying all water resources according to proposed or anticipated uses;
- Establishing water quality objectives to meet the proposed or anticipated use;
- Clarifying the roles of the various water institutions; and
- Providing a roll out plan for implementation.

Recommendation 5 – Separate strategic and implementation roles within water agencies

To ensure sufficient focus on the identification and analysis of long-term policy options, strategic water resource management roles should be clearly separated from implementation roles within water agencies.

Recommendation 6 – Give due consideration to future scenarios

Processes for investigating and reporting to Government and water managers on possible long-term future scenarios relating to water resources should be established and operate on an ongoing basis. The scenarios should be fed into current decision-making processes to ensure sufficient management flexibility is retained. Consideration should be given to establishing a body that has no implementation functions to carry out this specific task.

Recommendation 7 – Establish processes to provide strategic oversight and balance

Clear responsibilities should be established to monitor water resource management outcomes at the local, regional and statewide level, and to ensure an appropriate dynamic balance exists between planning, implementation and review.

Recommendations Relating to Community and Government Partnerships

Recommendation 8 – Embrace the growth in new water organizations

Western Australia should accept that water resource management will become more complex and that there will be a greater number of organizations involved. This trend should be embraced, and actively guided and supported, to achieve the optimum outcome for existing conditions and possible future scenarios.

Recommendation 9 – Accelerate the establishment of Water Resource Management Committees

Western Australia should accelerate the establishment of Water Resource Management Committees to increase the level of community participation in water resource management. Clear guidance on the expectations of the Committees, including which decisions they will be empowered to make and expected linkages with other natural resource management activities, should be provided through the strategic water management framework. Programs and funding should be established for building capacity within the Committees.

Recommendation 10 – Use flexible approaches to developing a collective sense of responsibility

Community-based bodies, such as local groundwater committees, promote a collective sense of responsibility amongst water users for water resource management outcomes. Support for the establishment of these organizations should be considered for priority areas, such as those

nearing full allocation. The structure and function of such organizations should be documented through the strategic water management framework.

Recommendation 11 – Develop stakeholder representation structures

A peak stakeholder reference group should be established to provide direct advice to Government on statewide water resource management issues and to provide a forum for key stakeholders to share their views. The appropriateness of establishing representative organizations to assist the development of government-industry partnerships, such as a WA Water Users Association, should be discussed with stakeholders.

Recommendations Relating to Capacity Building

Recommendation 12 – Build technical capacity within water agencies

Western Australia will need to build its water resource management capacity to meet the growing challenges. An immediate boost in capacity may be possible by obtaining existing practitioners from other jurisdictions. To ensure sustainable growth in capacity, however, programs and partnerships should be established to develop skills and experience within the state.

Recommendation 13 – Build capacity within stakeholder organizations and the community

Good representation of all parties is critical to achieving agreements that have longevity. Programs which develop water resource management knowledge and expertise within stakeholder organizations should be established and actively supported.

Recommendation 14 – Improve transfer of knowledge and expertise by addressing isolation

Programs to capture national and international knowledge and expertise, and determine its relevance to the local conditions, should be actively pursued to compensate for Western Australia's physical isolation. This should include:

- Formal and informal technical and personnel exchange programs with national and international institutions;
- Attracting national and international experts to conferences on key issues of relevance to Western Australia;
- Reviewing major water resource management projects funded through international aid organizations; and
- Dedicating resources to the analysis of national and international experience.

Recommendations Relating to Legislative and Management Flexibility

Recommendation 15 – Maintain contemporary water legislation

Water resource management is always dynamic and contemporary legislation provides flexibility to adapt to a changing environment or community values. However, water legislation may now need more frequent updating than in the past and processes should be established to keep abreast of significant changes to water law in Australia and internationally.

Recommendation 16 – Provide for sector specific policy and management

The principle of integrated management is broadly accepted but the difference between consideration of the impacts and active management of every water use is often missed, leading to unnecessary concern amongst some water users. Modern water legislation should define the different water uses and formally support the development of policy and management arrangements for individual uses, or groups of uses, without impacting other stakeholders.

Recommendation 17 – Establish flexible, but formal, management arrangements for hot-spots

More flexible, but also more formal, approaches should be adopted to address water management hot-spots such as the Gnangara Mound. Management approaches should be tailored for the specific location or issue, including formalizing triggers for escalating management activity, defining timeframes for resolution and resolution pathways, determining roles and responsibilities in ensuring whole-of-government solutions, establishing problem specific government-community taskforces and community reference groups, and formalizing Government and legal support to set aside existing policy to free up options for management solutions. The arrangements for managing hot-spots should be documented in the strategic water management framework.

Recommendations Relating to Documentation and Databases**Recommendation 18 – Develop management strength through documentation of knowledge**

Current knowledge and expert opinion on Western Australia's water resources should be progressively and cyclically documented and published on the internet as the best available information.

Recommendation 19– Improve community certainty through documentation of policies, plans and processes

Policies, plans and processes should be properly documented and published to increase community knowledge about how Government and its agencies will exercise their discretionary powers. Stakeholder and community education programs should be implemented to raise awareness of the availability of this information through self-help mechanisms such as the internet.

Recommendation 20 – Share learning by documenting experiences

Other jurisdictions are in the position to learn from countries such as South Africa and Brazil that have documented their rapid progress in water resource management reform over the last ten years. Australia should contribute to the international pool of knowledge and experience by raising its level of documentation and publication of the significant reforms that have taken place in this country over the same timeframe.

Recommendation 21 – Develop community confidence and management flexibility through good data

Maintaining good databases is critical to developing community support and poor data can block acceptance of change, or seriously reduce flexibility, when urgent action is required. Processes should be established to strongly and directly link data quality and database management into water resource risk assessments.

Recommendations Relating to Water Research

Recommendation 22 – Encourage debate and collaboration between government and research organizations

More formal opportunities should be developed to encourage debate and collaboration between water resource managers and research organizations on general and specific water resource policy options, and the associated research needs.

Recommendation 23 – Investigate water research coordination

The establishment of a body to coordinate water research, stimulate research funding, promote the effective transfer of information and technology, and enhance capacity building within the water sector should be investigated.