



**SUBMISSION NO. 103**

WWF- Australia  
World Wide Fund  
For Nature

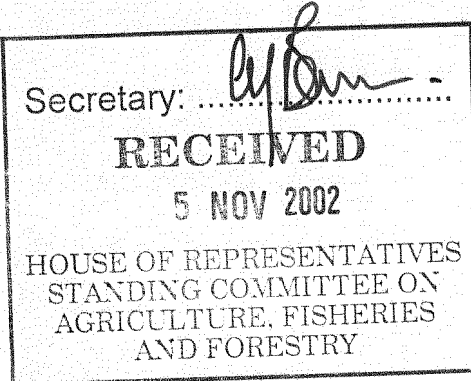
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November 4, 2002

Attention: Andrew Brien  
Inquiry Secretary to the Standing Committee,  
Agriculture, Fisheries and Forestry,  
Parliament House,  
Canberra ACT 2600



**Re: Inquiry into future supplies for Australia's rural industries and communities**

Dear Andrew,

This submission is provided by the combined environment groups of WWF, Australian Conservation Foundation (ACF), the Inland Rivers Network (IRN) and the Nature Conservation Council of NSW (NCC). Our groups welcome the opportunity to participate in the inquiry and look forward to being involved in the public hearing process should the Committee consider this necessary.

The Inquiry covers a broad range of issues on a topic which has been of major concern to the combined environment groups for a long period of time. It has not been possible to cover every aspect of the work our groups undertake on this important inquiry. We refer the committee to the many other relevant documents listed in the submission to present a more comprehensive picture of our perspective on water management. If you require copies of any of these documents please do not hesitate to contact me.

Our groups consider the subject matter of the inquiry to be very important for Australia's future, and wish the Committee well in its deliberations.

Yours sincerely,

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WWF Australia

On behalf of:

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**Submission to the  
Standing Committee on Agriculture, Fisheries and Forestry**

**Inquiry into future supplies for Australia's rural industries and  
communities**

**A Submission prepared jointly by the:**

**World Wide Fund for Nature (WWF) – Australia**

**Australian Conservation Foundation (ACF)**

**Nature Conservation Council of NSW (NCC)**

**Inland Rivers Network (IRN)**



**NATURE CONSERVATION COUNCIL OF NSW Inc.**



## Executive Summary

This submission is provided by the combined environment groups of WWF, Australian Conservation Foundation (ACF), the Inland Rivers Network (IRN) and the Nature Conservation Council of NSW (NCC).

The combined environment groups consider that much more needs to be done to ensure the health of rivers and groundwater ecosystems to be able to maintain social, environmental and economic outcomes.

The main recommendations of this submission seek more rapid implementation of important management actions to ensure healthy ecosystems. In particular, the submission expands upon the following:

- The Commonwealth should develop a COAG Water Resources Policy process beyond the formal assessment period ending in 2005.
- The COAG Water Resources Policy needs to be expanded to promote integrated resource management, and to increase the rate of progress in incorporating environmental issues into economic frameworks
- Focus needs to shift away from increasing the quantity of water available, and towards efficient, flexible and sustainable water use as a means of stimulating development
- There needs to be increased recognition of the important economic, social and environmental values associated with healthy ecosystems and the costs of rehabilitation of degraded ecosystems in water management decisions
- There needs to be greater emphasis by Government on protecting the rights and interests of non-extractive water users
- The Government and COAG Water Resource Policy should commit to the recommendations of the World Commission on Dams
- The major elements of the water pricing process still need improved resolution, particularly in terms of full-cost recovery, the inclusion of externalities and use of cost-sharing principles.
- A wide range of mechanisms to reduce the level of extractions from river systems need to be trialed and implemented
- It is imperative that the environmental impacts of water trade are estimated, monitored and appropriately controlled.

It should be noted that the combined environment groups do not support plans to “drought-proof” Australia by reversing the flow of rivers and turning them inland. WWF, as convener of the Wentworth Group, supports the view of that Group that Australia must adapt its agricultural systems to the land and climate, land clearing must be stopped and sensible water allocation arrangements must be put in place as a matter of urgency.

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## 1 Introduction

This submission is provided by the combined environment groups of WWF, Australian Conservation Foundation (ACF), the Inland Rivers Network (IRN) and the Nature Conservation Council of NSW (NCC). The combined environment groups welcome the opportunity to provide a submission to the Standing Committee on Agriculture, Fisheries and Forestry.

This submission provides a brief discussion of the approach environment groups take in relation to total water cycle management. It then addresses the terms of reference and proposes a number of policy suggestions to improve rural water management and achieve better environmental outcomes in Australia. The combined environment groups have provided submissions previously on these policies to the National Competition Council and the New South Wales Government, some of which are listed at the end of this submission should the Committee require further information on any of the points raised.

## 2 General Environment Group Approach to Total Water Cycle Management

The combined environment groups consider that although awareness of the importance of rivers for social, environmental and economic sustainability is growing amongst Government and amongst many in the broader community, much more needs to be done to turn this awareness into sustainable outcomes. Many land and water users are still in denial of the problems associated with current exploitation of water resources in the Murray-Darling Basin, and do not consider the problems as being relevant to their decisions in relation to water management. Further, many take a business as usual approach, with slight modification, as being sufficient to correct water resource problems. A firm recognition of the value of water to dependent ecosystems, communities and agricultural productivity, based on an approach to living within the capacity of natural systems to sustain ecological functions, would lead to the abandonment of many proposed water infrastructure developments, and a significant reduction on the stress placed on water resources by agricultural practice. It is from this basis that the combined environment groups call for a major commitment from the HOR Inquiry to total water cycle management, ESD principles and to the recommendations of the World Commission on Dams Report.

Australian rivers are highly complex ecosystems, and no two are the same. They support, or rather, they *should* support, numerous species of aquatic and semi-aquatic plants, fish, aquatic invertebrates, mammals, reptiles and birds. River frontage vegetation, floodplains, forests and woodlands, billabongs, lakes and many wetlands all depend on rivers and their natural flow regimes. However, a focus on rivers alone fails to recognise the importance of groundwater, groundwater dependent ecosystems and the relationship (connectivity) with surface water. Jurisdictions still compartmentalise groundwater and surface water in their planning. This could have particularly significant impacts on surface water management given the current drought conditions in much of Australia leading to further draw down of groundwater resources.

The combined environment groups have provided many submissions and reports on the topic of water management and why an holistic approach should be taken. Some of these are listed at the end of this submission (section 7). In summary, the key issues that must be further considered and managed with greater emphasis if water is to be appropriately managed are:

- Access to and use of rivers must more broadly consider all uses, including in-stream (boating, fishing) and cultural uses, in determining how water will be used;
- Current actions to manage rivers are not preventing further degradation, let alone achieving enhancement. The scale of repair and improvement of rivers needs to be increased significantly.
- Problems associated with dams and weirs are increasingly recognised, particularly impacts on fish passage, changes in quantity and timing of flows, changes in quality (including temperature) of flows, and insufficient capacity of valves in storages to deliver environmental flows. These need to become a major focus of river improvement efforts. New dam proposals need to be thoroughly scrutinised by the Commonwealth Government, and no financial support should be provided for development of new dams.
- Increased effort needs to be applied to improving the quality and quantity of riparian vegetation, as well as the reintroduction of woody debris to watercourses.
- Increased effort needs to be applied to managing introduced species in and around waterways, including the development of systems to prevent further introduction of species, and rapid response measures to eradicate newly emerging introduced species.
- Ensuring that groundwater usage is within sustainable yield, and better ensuring the relationship between groundwater and surface water is maintained in an integrated fashion needs to be increased in priority to avoid transferring problems from one area to another.

In essence, it is crucial that the restoration and protection of our river and groundwater dependent ecosystems underpins any Commonwealth policy regarding water management.

The remainder of this submission addresses each of the terms of reference for the inquiry, and Appendix One provides further information in relation to the general points above.

### **3 The role of the Commonwealth in ensuring adequate and sustainable supply of water in rural and regional Australia**

The combined environment groups believe that the Commonwealth has a pivotal role in implementing the national water resources reform process, as it is responsible for setting the current water management framework through the development of the COAG water reform agenda. It is therefore imperative that the Commonwealth develops a process beyond the formal assessment period ending in 2005. There is a pressing need to revise and update the national water policy agenda by implementing a COAG Water Policy Framework Mark II to take over when the existing policy commitments expire (Fisher, 2000).

The COAG water reform process is an integral part of securing better environmental outcomes. The combined environment groups believe that the complete implementation of the reforms will lead to the better management of Australia's water resources in rural areas, as the focus shifts away from increasing the quantity of water available, and towards efficient, flexible and sustainable water use as a means of stimulating development (Shadwick, 2000).

Although the COAG Water Resources Policy is explicit in terms of 'environmental flows' and water quality, the combined environment groups question whether states have delivered on these two requirements. Further, the Policy does not facilitate the protection and restoration of riverine habitats, nor does it specifically mention wetlands, floodplains, estuaries and groundwater-dependent ecosystems. It does not acknowledge the damage that water can cause on a landscape, such as the impact of stock bores and bore drains in the Great Artesian Basin, or the effect of rising groundwater levels, waterlogging and salinisation. From this broader perspective, it is considered that the 1994 COAG Water Resources Policy does not promote integrated and holistic resource management, and should therefore be expanded accordingly.

The combined environment groups consider that there is a strong imperative to increase the rate of progress made in incorporating environmental issues into the economic frameworks for decision making, as required by Australia's commitment to ESD principles.

The Combined environment groups stress that the political driver behind the development of the 1994 COAG Water Resources Policy was much more to do with financial *efficiency* than with its twin goal of *sustainability*. However, biodiversity conservation is important in its own right, and any future policies in relation to the distribution and use of water in Australia must recognise that the conservation of biological diversity and ecological integrity is a fundamental tenet of Ecologically Sustainable Development.

There is a need for the COAG and the National Competition Council water reform agenda to move towards better integration of ESD principles, as the agenda is presently dominated by economic issues. Water resource management should take an integrated and holistic approach based on the principles of ecologically sustainable development (NCC, 2002). The COAG Water Resources Policy recognises that, in water at least, markets are not perfect. And in relation to the environment in particular, market reforms cannot eliminate externalities on their own. Therefore, Governments have a role in managing water resources and in protecting the range of market and non-market values that freshwater and estuarine systems sustain.

It should be recognised in future Commonwealth policy that healthy freshwater ecosystems provide a very wide range of social and economic services that benefit regional communities and the nation as a whole. For example:

- Commercial and recreational fisheries in rivers and estuaries, plus fish production values in groundwater-dependent coastal mangroves and salt-marshes;
- Supplies of fresh water resources to an acceptable quality for human consumption, industry, stock and irrigated agriculture;

- Residential and commercial property values – holiday settlements around coastal estuaries (e.g. Gippsland Lakes);
- Agricultural pest management services provided by ibis and other wetland-dependent bird life;
- Recreation and tourism values – swimming, boating, camping, bushwalking, passive recreation; and
- Aesthetic and amenity values.

Further, should water policies in Australia fail to halt current patterns of degradation and ensure the sustainability of our water sources and their dependent ecosystems, the values discussed above will continue to be eroded pushing additional costs onto affected regions. These may include:

- Increased water treatment costs – removal of nutrients, pathogens, toxic blue-green algae;
- Effects of salinisation of water supplies – desalination costs; increased corrosion of water pipes appliances; crop damage; and (potentially) making irrigated agriculture non-viable;
- Increased risk of flood damage – resulting from a number of possible factors (see above);
- Increased costs in erosion control and river management and rehabilitation works; and
- Increased bore drilling and water pumping costs associated with aquifer depletion.

#### **4 Commonwealth policies and programs, in rural and regional Australia that could underpin stability of storage and supply of water for domestic consumption and other purposes**

The combined environment groups believe that it is important that the World Commission on Dams (WCD) recommendations are considered by States in decisions related to new infrastructure (WCD, 2000). All dams, existing and proposed, should be assessed to determine their performance against criteria used by the WCD, and on the broader set of cost-benefit issues now readily identified with dams such as environmental and social factors. It is imperative that States comply with the recommendations of the WCD by ensuring that, in deciding to modify a dam, all options for modification of the dam, including decommissioning, are taken into consideration. The sufficient volume and timing of water flows to ensure that ecological processes are maintained or restored is a key component of protecting the stability of storage and supply of water. It is important for the COAG Water Resources Policy to be updated to appropriately reflect these recommendations.

COAG Water Resources Policy requires that water prices factor-in an annual payment to cover the cost of maintaining and refurbishing infrastructure. In rural water resource management, there are few instances where this requirement has been even partially implemented.

One example concerns the Murray, Murrumbidgee and lower Darling river regulatory structures owned by the Murray Darling Basin Commission, including Hume and



Dartmouth dams through to weirs (such as Yarrawonga, Torrumbarry, Redbank and Euston), Menindee Lakes, Lake Victoria, locks, and the barrages at Lake Victoria.

While most of these structures are ageing rapidly, virtually no arrangements are in place at present to recover the costs of their upkeep and (eventual) refurbishment through any annual charge. When Torrumbarry weir was replaced, water users only paid for a small proportion of the capital cost of its construction. And when Hume dam required major repairs in the late 1990s, 100 per cent was paid for by the public sector, including \$12 million from the Natural Heritage Trust (Fisher, 2000). In NSW, assets prior to 1997 are not expected to recover a rate of return, a decision which the environment groups have challenged as being arbitrary and providing a significant subsidy to extractive water users.

The development of water resources in Australia is littered with examples where infrastructure was planned and constructed with the aid of considerable public subsidies. In the last 50 years or so, this government largesse funded large dam projects such as the Ord, Burdekin, Snowy, Eildon and Dartmouth, as well as the development of extensive gravity distribution systems such as the Riverina in NSW and the Goulburn Valley in Victoria. Similar spending has taken place under Queensland's 'Development Incentive Scheme' to promote private off-river storages. It's worth noting that this has contributed substantially to the rapid growth in irrigated development in the northern Murray Darling Basin, flying in the face of commitments to 'Cap' diversions to 1993/94 levels elsewhere in the Basin (Fisher, 2000).

Water should not be provided to users at a cost that is subsidised by the general community. Pricing at below full cost recovery encourages inefficient use and reduces the economic benefits of conservation. As a result, the COAG water reform intention of full cost recovery will play a key role in improving the stability of storage and supply in all of rural and regional Australia.

However, the major elements of the water pricing process still need improved resolution. Price paths for achieving full cost recovery should be completed, and full costs should include an appropriate return to capital and allowance for dividend payments. Those valleys not expected to be able to recover costs should be identified and level of subsidisation computed. Continued supply of water to these valleys should be justified based on cost/benefit analysis including externalities. To assist better implementation of water pricing according to COAG definitions, including pricing of externalities, it would be helpful of the National Competition Council to document the use of these principles by different states, as the current water management framework is highly variable between states.

The Commonwealth Government, through Environment Australia, has made a preliminary attempt to develop guidelines for jurisdictions to manage externalities of water use. This progress has been very slow, and there does not appear to be commitment to finalising this process, and the guidelines are not expected to apply until 2010. This process must be accelerated, and clear commitment by Government should be demonstrated.

There are mechanisms that may be effective in reducing the level of extractions from the river system, increasing water available for the environment. These options need

to be assessed based on their ability to achieve environmental outcomes taking into consideration their costs. However, it is the firm opinion of the combined environment groups that any clarification or strengthening of 'property' rights which entrenches rights to compensation would diminish community rights to healthy rivers and water resources. Further, it must be recognised that with access come responsibilities to ensure river health and sustainable resource use.

Further options are:

- Regulations reducing extraction levels, for example reducing the current MDB Cap;
- Placing reduction factors on traded water;
- Incentive packages to promote implementation of water efficiency measures, with the return of a proportion of the water savings to the environment; and
- Government purchase of allocations either on a one-off basis or over number of years.

Some of these are explored below:

- Purchase or compensation at market value:

Given the relatively small volume of permanent trade between different users, the purchase option would inflate prices, increasing costs to Governments and disenfranchising other market participants. Whilst keeping irrigators happy, these options create a dangerous precedent that will cause adjustments which require financial compensation and the improvement of environmental health being contingent on scarce public funds, and hence is unlikely to take place all that often.

- Public investment in water savings:

This could address both in storage and delivery systems as well as on-farm. Again, a costly option, although one that is perhaps more likely to be employed as a *cost sharing* exercise rather than a *compensatory* one.

- A 'tax' on permanent water trades:

This could be applied as a percentage of water traded is returned to the environment.

This option is unlikely to work, because:

- it discriminates against a small group of water users;
- it will favour temporary trade at the expense of permanent trades; and
- low volumes of trade would mean relatively small increases to environmental flows may take several decades to achieve.

- A levy on water users:

This could be used to fund (or help fund) any or all of the above.

- Reducing reliability of supply:

This option is the only one that has been employed to date. To a point, this is a very effective claw-back mechanism that is relatively easy to implement and does not depend on government funding. However, irrigators will only accept this option up to a point, as in dry years the impacts of reduced reliability can be severe. Furthermore, high security irrigators are shielded from impact, with lower security entitlement holders bearing the full brunt. As such it is probably an option that can be used once or twice in any given system.

- A flat percentage reduction in all water entitlements:

Here, impacts would be flattened-out over all years, rather than falling hardest during dry years. Similarly, this option offers the advantage of impacting on high and low security users equally.

The combined environment groups do not support plans to "drought proof" the inland of Australia by reversing the flow of rivers and turning them inland or attempts to increase rainfall through cloud seeding. These strategies can not be seriously considered as part of a long-term strategy for water management. Recently there has been the announcement of an ambitious "drought proofing" program to be undertaken by Farmhand which involves turning the rivers inland.

In response to this plan, 15 of the countries leading environmental scientists have formed the Wentworth Group. The Wentworth Group argues that Australia must adapt to live within the capacity of the land rather than fighting against it. The Wentworth Group stresses that the current talk of "drought proofing" is nonsensical, environmentally and economically, and that we must adapt our agricultural systems to the land and climate. Land clearing must be stopped and sensible water allocation arrangements agreed as a matter of urgency.

It is the firm opinion of the combined environment groups that proposals such as these would destroy more rivers in Australia, when the need to restore rivers like the Murray Darling should be our focus. History has taught us a very clear lesson - that expensive river engineering projects have very big downsides, both for our environment and our economy. The Snowy scheme for example was an environmental and financial disaster. It all-but destroyed the Snowy River, and failed to recoup its enormous costs.

While Victorian and NSW state governments have committed over \$300 million on restoring the Snowy to minimal health, taxpayers are still paying-off the debts incurred in building the Snowy scheme decades ago.

The focus of water management strategies should be on reducing extractions of water from rivers for irrigation and increasing environmental flows. As an issue of national importance, strong Commonwealth leadership is required on a funded adjustment package that will assist with the reparation of the Murray-Darling Basin system, and in particular the Murray River. This may involve structural adjustment programs to assist restructure rural industries impacted by these changes. The emphasis should be on assisting individuals to exit of the industry as it adjusts to sustainable levels.

Further, to ensure that we don't make the same mistakes in our northern rivers that we have in our southern rivers, we need to protect them through such measures as the Prime Minister's Science, Engineering and Innovation Council's proposed "heritage river" designations.

In relation to the Great Artesian Basin, it is important for the Commonwealth to ensure that sufficient funds are made available to accelerate the capping of bores. Further, the completion and implementation of the GAB springs recovery plan needs to be accelerated as a high priority.

## **5 The effect of Commonwealth policies and programs on current and future water use in rural Australia**

Current pricing policies and programs fail to achieve full cost recovery, as noted in section 4 above. The combined environment groups believe that rural water pricing should be based on a full recovery of costs of supply and resource management. In situations where water cannot be reasonably priced at a level that will achieve full cost recovery, the level of subsidy should be justified by a full cost-benefit analysis including environmental impacts.

The combined environment groups remain concerned about the implications of expanding water trading. It is recognised that water trading presents an important opportunity to increase the economic value associated with water use, and to provide flexibility in meeting needs to reduce entitlements. It is imperative that the environmental impacts of transferring water are fully understood prior to allowing water to be traded. Appropriate safeguards are necessary to prevent the negative environmental impacts due to water trading increasing the total level of water extraction from the river system. At the time of writing this submission, the frameworks for appropriately managing the environmental impacts of water trading are not in place, and water trading rules have not been established within water management plans under State legislation. WWF has prepared a draft water trading policy, and the main recommendations are as follows:

1. Environmental impacts of transferring water use should be fully understood prior to allowing water to be traded. No trades resulting in a net negative environmental impact should be allowed.
2. The opportunities to improve environmental outcomes through water trading should be identified and pursued.
3. Water trading should not increase the total level of water extraction from the river system.
4. Catchment/River Management Plans should be based on the principles of adaptive management underpinned by the periodic review and adjustment of entitlements to water.

## 6 Conclusion

In this submission, the combined environment groups have focused on a number of core water management policies, which support the principles of ecologically sustainable development. It is imperative that the COAG and NCC reform agenda continue beyond 2005 and moves towards better integrating ESD principles. It is also important for the COAG Water Resources policy to be updated and incorporate the key recommendations from the WCD. Water management policies must take into consideration environmental outcomes. The focus of water management strategies should therefore be on reducing extractions of water from rivers for irrigation and increasing environmental flows. In order to promote efficient use of water resources the COAG water reform initiatives of full cost recovery and water trading need to be fully implemented. The combined environment groups have a wide range of comprehensive submissions relating to water management in Australia, some of which are listed in section 7. Should you require detailed information on this submission, please do not hesitate to contact us.

## 7 List of relevant submissions and documents

Australian Conservation Foundation (2000), *Submission to the Select Committee on the Murray River*

Australian Conservation Foundation (2000), *Submission to the Review of the Operation of the Murray Darling Basin Ministerial Council 'Cap'*

Australian Conservation Foundation (2000) *Submission to the Inquiry into the Allocation of Water Resources for Agricultural and Environmental Purposes under the auspices of the Victorian Environment and Natural Resources Committee*

Australian Conservation Foundation (2001), *Submission to Victorian Water Resources Strategy: Planning For The Future of our Water Resources*

Australian Conservation Foundation (2001), *Submission to the National Competition Council regarding its Third Tranche Assessment of Governments' Progress with Implementing National Competition Policy*

Combined Environment Groups (2001) Combined Environment Group Submission to IPART on DLWC Bulk Water Pricing: 2001/02-2003/04.

Combined Environment Groups (2001) Combined Environmental Group Submission to IPART on ACIL's review of Resource Management Expenditure in NSW.

Combined Environment Groups (2001) Combined Environment Group Submission to IPART on DLWC Draft Report: Bulk Water Prices: from October 2001.

Moss W (2002) Costs to Farmers of Protecting Native Vegetation in the Moree Plains: A critique of Sinden J.A (2002). WWF Australia.

Moss W (2002) Why the property rights debate is holding back reforms: A case for a focus on Structural Adjustment, WWF Working Paper

Nature Conservation Council (2002) Concerns over Water Sharing Plans in New South Wales. Nature Conservation Council, Sydney.

Nature Conservation Council (2002). Nature Conservation Council - Water Policy.

Nature Conservation Council (2002) Water Property Rights - Policy Statement.

Nature Conservation Council (2002) NSW State Water Management Outcomes Plan - Position Paper.

Nature Conservation Council (2001) Water Sharing Position Paper.

Whitten S, Bennett J, Moss W, Handley M, and Phillips W (2002) Incentive Measures for Conserving Freshwater Ecosystems: Review and recommendations for Australian policy makers. Environment Australia.

WWF Australia (2001) Submission to the High Level Steering Group on Water "National Approach to Water Trading: Discussion Paper".

WWF Australia (2001) Submission to the High Level Steering Group on Water "Draft Guidelines for Managing Externalities: Restoring the Balance".

WWF Australia (2001) NCC 3<sup>rd</sup> Tranche Assessment Submission One: "Full-cost Pricing of Water in NSW".

WWF Australia (2001) NCC 3<sup>rd</sup> Tranche Assessment Submission Two (comprehensive submission, including assessment of Weir removal and modification issues).

WWF Australia (2001) NCC 3<sup>rd</sup> Tranche Assessment Submission Three: "Queensland and Water".

WWF Australia (2002) NCC 4<sup>th</sup> Tranche Assessment, Submission One (General, NSW and Victoria).

WWF Australia (2002) NCC 4<sup>th</sup> Tranche Assessment Submission Two (Queensland).

## 8 References:

Fisher T (2000) Lessons from Australia's first practical experiment in integrated microeconomic and environmental reform in *Productivity Commission 2000, Microeconomic Reform and the Environment, Workshop Proceedings*. AusInfo, Canberra.

Nature Conservation Council of NSW (2002) *Draft Water Policy*.

Phillips, B. ed (2001), , *Thermal pollution of the Murray-Darling Basin Waterways : workshop held at Lake Hume 18-19 June 2001 : statement and recommendation plus supporting papers*, published by the Inland Rivers Network and WWF.

Shadwick M (2002) *A Viable and Sustainable Water Industry*. National Competition Council Staff Discussion Paper. AusInfo, Canberra.

Sinclair Knight Merz (2000) *Projections of groundwater extraction rates and implications for future demand and competition for surface water*.

The Report of the World Commission on Dams (2000) *Dams and Development : A New Framework For Decision Making*. Earthscan Publication, London.

Victorian Farm Dams (Irrigation) Review Committee (2000) *Fact Sheet 2*, p.2, Dept. of Natural Resources and Environment, Melbourne.

## Appendix One: Background on environmental issues related to riverine and groundwater ecosystems

Australian rivers are highly complex ecosystems, and no two are the same. They support, or rather, they *should* support, numerous species of aquatic and semi-aquatic plants, fish, aquatic invertebrates, mammals, reptiles and birds. River frontage vegetation, floodplains forests and woodlands, billabongs lakes and many wetlands all depend on rivers and their natural flow regimes. It is essential that an holistic approach to water resources is taken which recognises the importance of groundwater, groundwater dependent ecosystems and the relationship (connectivity) with surface water.

Furthermore, rivers – and the life that abounds in and around them – are the engines that drive estuarine productivity. Rivers determine the fluctuations in salinity and nutrients that distinguishes estuaries as an ecological niche. They provide an environment that can efficiently process and use nutrients transported by rivers (Carbon, Phosphorus and Nitrogen, in particular) in ways that are critical to numerous commercial and recreational fisheries in coastal and marine environments.

Many of Australia's rivers and estuaries are in a degraded state. The use and management of water resources has been a dominant factor in this degradation of some river systems, such as the Murray Darling, but changed land use has also been a contributing factor.

Many rivers have been dammed to capture runoff, some of our biggest rivers have been turned into channels for delivering water. In the Murray Darling, over 4,000 dams, weirs and barrages have been constructed, each one representing a barrier to fish passage and migration. Numerous other river systems have suffered a similar fate – the Burdekin, Mary, Williams, Hawkesbury, Snowy, Thomson, Latrobe, Yarra, Ord, Swan/Avon and Peel/Harvey, for instance.

Consumptive demands on scarce surface and ground water resources continue to increase. Currently, demands on the Murray Darling system mean that, in an 'average' year, flows to the sea have been reduced to 20 per cent of "natural", pre European levels.

Small-scale farm dams have their own cumulative impact on stream and river flows. For each megalitre of farm dam storage, evaporation and consumptive demands mean streamflows are typically reduced by 1 to 3 megalitres per year, even higher during dry years (Victorian Farm Dams (Irrigation) Review Committee, 2000).

All this means that natural flow regimes are considerably altered. The capture of flows during wet seasons delays natural high flow periods and suppresses flow peaks at the expense of floodplains, wetlands and lakes. Invariably, rivers are used to deliver high volumes of water during naturally low flow periods, again disrupting river ecology. The effect of large dams in suppressing water temperature – often by over 10 ° C – means that breeding triggers for many native fish are lost for hundreds of kilometres downstream (Phillips, 2001)



Hydro-electricity schemes have also had a considerable impact. At Jindabyne Dam on the Snowy River, average flows have been reduced to a staggering 1 per cent, with the remaining 99 per cent diverted inland to fuel electricity generation and supply irrigated agriculture. Rivers receiving this diverted water – such as the Tumut River – have suffered enormously both from high flows and changed seasonality and variability of flows. In many Tasmanian rivers, rapid rates of rise and fall resulting from switching hydro-electricity generators on and off can devastate both river ecology, and bed and bank structure and stability.

Riverbank vegetation plays a number of roles, including the protection of banks against erosion, the regulation of water temperature, provision of a constant source of food and organic matter, as well as provision of habitat for many species of birds mammals, reptiles, insects and arthropods. Throughout much of the landscape, riverbanks have been cleared of native vegetation, leaving them vulnerable to grazing, trampling and erosion.

Elsewhere, while some remnant vegetation may remain, pressures from grazing ensure a slow and steady decline. In many rivers, snags – fallen timber that provides critical habitat, as well as protecting river beds from erosion, have been systematically removed for boat passage, to improve the delivery of irrigation water supplies, or simply to provide a source of firewood.

In many rivers, introduced exotic fish like carp, mosquito fish, redfin, trout, goldfish, tench, tilapia and loach) now present a major problem in many rivers. Some, like trout, are voracious killers of coldwater fish and frog species, and are deliberately stocked into the wild for recreational fishing.

Many rivers are now choked by literally hundreds of weed species, ranging from trees like willows, ash and camphor laurel to small plants like fog grass, blackberries, mimosa and Bathurst burr. Impacts of urbanisation, vegetation clearance and grazing have contributed to the spread and prevalence of most of these weed species. In other stretches river flow has been affected by de-snagging, removing important habitat and facilitating scour.

Groundwater, too, has its ecological values and these have been seriously impacted by groundwater use and aquifer pollution. Parallel to the development of the surface waters in the Murray-Darling Basin, the groundwater resources have been also extensively developed and are now approaching the upper limit of sustainable development. Extraction in 12 out of 35 groundwater management units in the Great Artesian Basin exceeds sustainable yield. The implications for groundwater resources and their dependent ecosystems of increased surface water regulation and demand for freshwater is significant, and will continue to rise. This highlights the need for an integrated and holistic approach to total water resource management in Australia (SKM, 2000).

It is crucial that the restoration and protection of our river ecosystems underpins any Commonwealth policy regarding water management.

The remainder of this submission addresses each of the terms of reference for the inquiry.