INQUIRY INTO ADEQUACY OF WATER STORAGES IN NSW

Organisation: Water for Rivers
Date received: 31/08/2012
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The Director
Standing Committee on State Development
Parliament House
Macquarie Street
Sydney NSW 2000

Dear Sir / Madam

RE: Standing Committee Inquiry into Adequacy of Water Storages in NSW

“Water for Rivers has demonstrated that there is sufficient water for all sectors if it is managed properly “

On behalf of the Water for Rivers Board I would like to make the following submission to the Standing Committee on State Development, specifically addressing parts a, b and c of the Terms of Reference –

a) The capacity of existing water storages to meet agricultural, urban, industrial and environmental needs;

b) Models for determining water requirements for the agricultural, urban, industrial and environmental sectors; and

c) Storage management practices to optimise water supply to the agricultural, urban, industrial and environmental sectors.

It is not Water for Rivers position to pass judgement on whether or not new dams should or should not be built, but we are of the firm view that implementation of the Computer Aided River Management (CARM) project across all regulated river systems would ensure that NSW could meet its balanced water resource needs well into the future.

It goes without saying that water is a finite resource. Future climate predictions indicate that competition for water will be stronger. However, Australia does need to continue to produce food and fibre and manage the health of its rivers. Water for Rivers has demonstrated that efficiencies gained at all levels of the water usage and delivery system through ‘real time’ management will ensure there is more water available for future use.
What is Water for Rivers?

As a purpose built water recovery vehicle, owned by the NSW, Vic, and Commonwealth Governments, Water for Rivers has developed a wealth of experience and credibility in this sector. Incorporated in December 2003 to deliver a 212 GL of water to the Snowy and 70 GL to the Murray by 2012, Water for Rivers is the longest standing water recovery organisation operating in the Murray Darling Basin. Our 282 GL target has been exceeded by 11%, within the time and budget. Furthermore 80% of this water he been achieved through infrastructure projects.

Water for River realised early that cost effective water recovery requires a ‘whole of valley’ approach. Water saving initiatives can potentially ‘compete’ against each other. However if a whole of valley approach is taken, projects will compound the benefit of individual investments, providing an improved overall outcome.

CARM - Computer Aided River Management

Water for Rivers has worked in partnership with NSW State Water Corporation and Murrumbidgee valley communities to develop and implement a sophisticated river management system that has revolutionised regulated storage management and water delivery on the Murrumbidgee River.

The CARM system applies technology to measure water flow, demand and use and report in ‘real time’ all the inputs required to manage a regulated river system. These inputs include: tributary inflows, water extraction, crop types and crop area including future water demand, soil moisture, long range weather forecasting, and future water orders. All this information is fed, in ‘real time’, into a hydro-dynamic river model that provides the river operator with an extremely powerful tool to deliver the right amount of water to the right place at the right time with minimal wastage.

The environment is becoming the biggest ‘customer’ of water held in storage. We have been able to demonstrate how CARM can precisely deliver environmental water to where it is needed, as well as reducing the volumes of water required to be released to target particular wetlands.

The implementation of CARM has resulted in better matching water releases to meet demands while capturing water previously released and ‘lost’ in the system. This water is often referred to as ‘operational surplus’. Modelling work undertaken by NSW Office of Water (August 2012) has indicated that an annual average of 200 GL of operational surplus is now being kept in storage. This stored operation surplus water is available to be redirected for a specific purpose, eg a credit towards meeting environmental watering targets. This benefit is significant as it has delivered approximately $400 million in value benefit to NSW for minimal cost (compared to the high cost of building new storages). Implementing of CARM in conjunction with other water saving initiatives such as the NSW Metering and on farm efficiencies projects will compound the benefits of these individual projects and provide increased overall water efficiency/saving outcome for NSW’s river systems.
CARM across NSW for improved efficiency and water savings

A feasibility assessment undertaken by Water for Rivers has estimated that it will cost the NSW/Commonwealth Government $41mil to deliver CARM across the Namoi, Gwydir, Macquarie, Lachlan and Border Rivers. It conservatively estimated, based on our Murrumbidgee experience, that this initiative will yield around 80 GL of previously lost operational surplus. There is also an option to include the Barwon-Darling. CARM applied in these valleys will not only provide efficiency savings, it will also provide real service improvement to all customers - irrigators, urban, industrial and the environment.

Regardless of the argument of whether or not new storages should be commissioned, it is imperative that we improve the management of our existing water storages and regulated water delivery systems across the state. CARM is a proven tool, owned by State Water and the NSW Govt, and should be applied across all river valleys, to maximise system efficiencies.

Water for Rivers would welcome the opportunity to provide an oral presentation to your committee to explain further the benefits of CARM in managing and delivering NSW regulated water resources.

Yours faithfully

Richard Bull
Chairman,
Water for Rivers

Attachments: -

1. “CARM across NSW” description document
2. Summary of Murrumbidgee CARM
3. “Integrated river valley approach to water recovery” (diagram)
Computer Aided River Management

The computerised network to be developed is based on established river and catchment computer simulation tools. These simulations can accurately predict water flow travel times (with separate modelling for dry and wet periods).

Using real-time and forecast information to its maximum potential, the network will automatically determine optimal water releases. It will monitor and take into account such variables as the effects of rainfall on tributary inflows and more accurately predict the beginning, extent and end of supplementary flows, all the while “self adjusting” to optimise management of the river.

A better Murrumbidgee will mean we make the best use of every drop of water that we have:
- More security and certainty for every water user
- Vastly improved river management
- More precise control of flows through system-wide connectivity
- Less wastage of water
- A higher percentage of total flow available for allocation
- Fairer distribution of available water
- Improved environmental outcomes
- Historic opportunity for irrigators to leverage technology into on-farm systems
- Improved on-farm water management delivering greater profitability and convenience

Computer Aided River Management will mean:
- Improved modelling
- Better forecasting of inflows
- Redistribution of water to better meet demand
- Less operational surpluses
- Optimal en-route storages
- Greater control over diversions and flow paths
- Improved shepherding and measurement of environmental water
- Minimising losses

CARM | The Murrumbidgee Computer Aided River Management Project
Creating the world’s most efficient natural river system
Making the Murrumbidgee work better for everyone

The Murrumbidgee Computer Aided River Management (CARM) project is a major upgrade of infrastructure and management processes throughout the river system that will make control of water flows throughout the river system much more precise and responsive.

This higher level of control will achieve positive outcomes for all water users – including the environment – along the river: significantly improved levels of service delivery on some parts of the system, more reliable delivery to all water users, greater technology options for irrigators, equity between water users and more confidence in the management and measurement of the Murrumbidgee system.

As (diagram A) below shows, there are currently about 320 GL of water being lost from the system each year.

The CARM project is expected to recover up to 80 GL of those losses annually.

The total cost of the project is over $80 million. In return for investing this money, Water for Rivers will use 40 GL of the water saved through improved conveyance through the system (not water saved at meters) to supplement environmental flows in the Snowy River. The balance of the savings will stay in the system to improve water security for all water users.

The project will encompass the entire Murrumbidgee River and its key tributaries and anabranches.

The Project Encompasses Six Contributing Schemes

There are six areas of work which make up the overall project. Two are major and involve the entirety of the river and the majority of water users; the others are specific works to improve management of waterways and storages. All are designed to improve the management and delivery of water in the Murrumbidgee system and, for the first time on a natural system, monitoring and metering of water will be aided by an extensive computerised management network. Following this work, Australia will have the world’s most efficient natural river system, where water – our most valuable environmental and farming input – will be well managed to the benefit all water users.

Two Major system-wide, enabling technological components:

1. Total river flow monitoring and management software
2. Fully-funded meter upgrade

Four Localised modernisation and management projects in key waterways and storages:

3. Yanco Creek
   - Reducing transmission losses
   - Improving flow management
4. Bundidgerry Creek
   - Improving flow management
   - Reducing surface area to minimise evaporation
5. Old Man Creek
   - Controlling and retaining flows within the stream
   - Reducing surface area to minimise evaporation
6. Tombullen
   - Reducing surface area to minimise evaporation
Smart recovery of water in river valleys
There are 5 key elements to integrated water recovery...

1. **Improved river operations** to manage our rivers better and optimise existing water to meet outcomes

2. **Irrigation district efficiency savings** to promote best practice water delivery in a setting which provides certainty for rationalising current systems

3. **On-farm improvements** to facilitate investment in best practice irrigation to minimise water use and maximise productivity

4. **Efficient environmental delivery** to manage and account for delivery of additional environmental flows to meet specific targets at least cost

5. **CoAG/NWI reform** to ensure that elements 1–4 deliver against the wider reform agenda and promotes real-time online water markets

**ON-GROUND WORK**
- More jobs
- More water
- More productivity
- Healthy communities

**REFORM MEASURES**

- 1. Real Time River Operation and Management and Measurement of Tributary in Flows
- 2. Efficient Delivery Networks
- 3. Efficient Irrigation Farms/Reconfiguration
- 4. Efficient Environmental Delivery
- 5. CoAG/NWI Regulatory Reform
- 6. Real Time Online Water Market

More water retained in dams

Maintain end of system flow targets
By Terry van Vliet and Stefan Styhreki
DHI, North Nachrapa, NSW State Water, and John Skinner: Water for Rivers

Background
As South-Eastern Australia recovers from its worst drought on record, the experience has driven new understandings for achieving water efficiency, reducing better river management. The Murray-Darling River was first highlighted in the Print Water report of 2004 as an example of where major water savings could be realised through infrastructure upgrades and smarter river operations. Murray-Darling means "big water" in the tribal Wiradjuri aboriginal language. The river is one of Australia's largest at 6,900km, and is a major source of irrigation water for the region in NSW as well as an important source of water for the river ecosystems. However, river management is a complicated task. The complex nature of the river system, coupled with the critical need to maintain ecosystems, environmental, and water demands, often results in excess water being released from the headwater storages which are subject to the annual requirements.

New, NSW State Water; the water operation supported by Water for Rivers (www.waterforrivers.org.au), have examined a BDSM upgrade of the river management and operational system that will set a benchmark for efficient river operations in Australia and internationally. The Murray-Darling Computer Aided River Management (CARIM) project will make control of water flows and dam releases more precise and efficient through combination of upgrades to river infrastructures, metering, operational modelling and information systems. Operational improvements will be realised through the integration of river monitoring, executive information, hydrographic river model and optimisation software systems. The system will support efficient and accurate decision making by river operators to ensure that the most efficient operational settings are achieved and that irrigation, environmental and other customers receive the right amount of water at the right location at the right time. The ultimate support system represents water's best practice in river operations.

Current River Management Practice
State Water currently operates the Murray-Darling River system which includes the Yalata-Willungun Crew activities, through dam releases from the headwater storages at Barkersibin and Blooming Dam and through an additional 10 re-regulation storages at two and 28 regulation storages along the river. Irrigation is by the largest user of river water in the basin, with the two largest irrigation supply sub-systems, Murray-Goongerah Irrigation and Cobram Irrigation, accounting for approximately 70% of water use. These are supplied by dedicated irrigation systems located between 5-7 days travel time downstream of the dams. In addition to hundreds of private irrigators, releases from water storages directly from the river by pumping. Releases from the headwaters can take up to 35 days to reach some irrigators at the end of the irrigation. The water supply from the main storages is increasing, and the irrigation account includes significant irrigators, including towns, one of the most important and a breaking points in the region. Large areas that also benefit from the river for water supplies include South Australia, Western Australia and the Northern Territory and Northern Australia.

Current river operations rely heavily on the experience and judgement of the river operator and are based on simple water balance modelling concepts. These methods do not take into account the complexity of the dam operation processes or river flow dynamics. Providing reliable water deliveries to customers located in some cases, many weeks of travel time downstream of the dams is particularly challenging. Consequently, release decisions often contain actual demands, which lead to significant water losses. This is because, once released, water is removed from the basin due to high flow, high water requirements, and irrigation practices. The main barrier leading to the operational surplus has been identified (DIBWIR 2006) as being due to unaccountable changes in channel storage, unaccounted for inflows and outflows, and changes in irrigation water supplies. As a result, almost 12% of the annual 4,000,000m³ of regulated flows is currently unaccounted for (DIBWIR 2006).

The Murray-Darling Computer Aided River Management (CARIM) project will address these problems by developing a hydrodynamic model that will be used to optimise the operation of the river system's dam operations, reducing water losses and improving releases to irrigation water users. The Murray-Darling Computer Aided River Management (CARIM) project will address these problems by developing a hydrodynamic model that will be used to optimise the operation of the river system's dam operations, reducing water losses and improving releases to irrigation water users. The Murray-Darling Computer Aided River Management (CARIM) project will address these problems by developing a hydrodynamic model that will be used to optimise the operation of the river system's dam operations, reducing water losses and improving releases to irrigation water users. The Murray-Darling Computer Aided River Management (CARIM) project will address these problems by developing a hydrodynamic model that will be used to optimise the operation of the river system's dam operations, reducing water losses and improving releases to irrigation water users.