New Water Allocation Systems For Irrigators

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Background

Competition for scarce water resources in northern inland New South Wales has raised concerns among irrigations about the specification of water property rights and the efficiency of use of water resources within and between sectors of the water industry.

Recent severe drought conditions, questions concerning the extent to which water allocations are required for environmental management purposes, and speculation about long term urban and industrial demands for water, have fuelled these concerns.

Release Sharing

At present irrigation water from regulated flows is made available as volumetric entitlements or licenses under a system known as Release Sharing. These licences are for nominal annual allocations of water. The actual amount of water that licence holders receive varies annually according to a number of factors. Water is made available to irrigators as a percentage of their nominal licensed allocation. Factors affecting their percentage allocation at any time include the pattern of previous seasonal conditions affecting catchment yield, the overall demand for water, and the way in which water in major storages in the supply system are managed. Irrigators recognise the vagaries of water

supply, and have an expectation that they will receive an approximate reliability of supply for irrigation in their catchment.

'Supply reliability' has traditionally been measured as the percentage of years in which irrigators will receive their entire nominal licensed allocation. For example, in the Namoi Valley since the commissioning of Split Rock Dam, irrigation supply reliability has been estimated at approximately 80% (Bryant et al 1989). In some other river valleys supply reliabilities are significantly lower.

Unregulated Flows

In addition to regulated flow allocations, irrigators have also come to depend heavily on unrelated flows to meet their water demands. The extent of this dependence varies between irrigators and between valleys.

For example, because of low supply reliabilities from regulated flows in the Gwydir and Macintyre rivers, and because of the greater natural availability of unregulated flows, irrigators in these valleys have structured their operations to receive a greater proportion of their supplies from unregulated flows. This has meant that they have had to incur considerable additional capital expenditure for harvesting and storing water on-farm.

Variations between irrigators within valleys have also occurred, as some have sought to harness greater volumes of unregulated flows in proportion to their regulated flow allocations than have others.

Up until the 1990's irrigators were encouraged to develop water storage facilities for harnessing unregulated flows, but without rules or guidelines about the extent to which this practice should have been pursued. Rules are now in various stages of formulation to manage or restrict access to unregulated flows for irrigation. The need for management rules was recognised because in many valleys;

a) irrigators' use of water had increased towards a point where the availability of unregulated flows appeared threatened by the increased collective demand on those flows for irrigation, and
b) the availability of flows in the river to meet particular environmental needs was thought to be compromised.

Unfortunately, it may be found that in some situations the use of unregulated flows for irrigation has exceeded the desirable level in terms of leaving water for environmental purposes. In such situations irrigators are now to be faced with reduced access to these flows.

Some Problems with Existing Arrangements

Because property rights for accessing unregulated flows have not been established, irrigators are unlikely to be able to preserve their level of access to them, or receive any compensation where their access is reduced. Irrigators in some valleys have already suffered small but tangible reductions in their access to these flows. They are now concerned that unless property rights for water supplied are better specified, they will remain vulnerable to suffering more significant uncompensated losses in the future. With respect to regulated flow

licenses, these too are vulnerable, but loss of access to these is usually more subtle, and therefore even more difficult to quantify.

There are several examples of ways that reliability of supply can be affected. Even though there is a general embargo in NSW on the total volumetric allocations for irrigation from surface water supplies, development of further storages on river systems could occur for meeting new urban, industrial or other demands. If such development occurred, the reliability of regulated flows and/or the availability of unregulated flows will be reduced. Another example of loss of supply reliability is when new operating rules are introduced, such as for 'Environmental Contingency' allowances.

Even rules designed for assist irrigators, such as those designed to permit 'carry-over' and 'over-draws' on storage reserves, affect reliability of supply. This is because the presence of such 'carry-overs' or 'over-draws' reduces or increases the reservoir air space in which to store new inflows, and hence increases or reduces unusable spills. In the case of a river system where the major water use is for a single crop, irrigators in general may benefit from such changes to storage operation rules. If, however, another water use became predominant, changes to rules to better suit that use may adversely affect other water users.

What Are Desirable Features For A Water Allocation Mechanism?

Ideally, a water allocation system should clearly identify each users entitlement to access specific quantities (and qualities) of water, and users should be able to withdraw their shares without impacting on

others. Each water user, or group of users, should be able to adjust the reliability of supplies independently of other users. A well described water entitlement system should also be able to identify the precise nature of losses incurred by water users, if new water allocations were to be made for other purposes, such as environmental management. Finally, water rights should be transferable, to the extent that physical constraints permit, in order that it can be allowed to move to more productive uses as socio-economic demands for it change. There is widespread agreement that the use of controlled market mechanisms can provide an efficient means for negotiating permanent and temporary water transfers.

Can The Present Water Allocation System Be Improved?

Researchers at the Centre for Water Policy Research, some water agency staff and many irrigated cotton producers believe that a mechanism called Capacity Sharing could offer significant benefits to all water users. Because of the highly variable nature of water supplies in northern river systems, and the fugitive nature of water, it is not possible to devise a mechanism which can guarantee particular volumes of water or completely eliminate impacts between users. Under a Capacity Sharing scheme, however, water rights could be fully described in terms of each users share of access to surface water resources in a catchment and their capacity to store those shares in instream storages. Impacts between different types of users could also be minimised, and all water entitlements should be able to be traded between users (as is presently the case).

It should be clarified, however, that Capacity sharing represents a new water allocation and water accounting mechanism. Nevertheless, sovereignty over water rights and administrative responsibilities of Government water agencies would remain unchanged.

Capacity Sharing Explained

The principle of Capacity Sharing is that the volumetric capacity in storages, and quantities of water from tributary inflows are shared by users (Bryant 1993). This means that two types of shares would be issued; volumetric capacity shares in instream storages, and percentage shares in tributary inflows. With Capacity Sharing there would be a guarantee of receiving fixed percentages of shares in any water that flows from particular tributaries.

The concept of Capacity Sharing is very simple. Essentially is operates as though each user or group of users have their own slices of catchment areas from which they receive rainfall runoff, and their own portions within instream storages in which to store their water. A computerised accounting system would credit users Storage Capacity share accounts as they received water from their Tributary Inflow shares. Storage Capacity share accounts would be debited as users made withdrawals, and incurred evaporation and seepage losses.

Capacity Sharing can be applied at either a bulk supply level, or to individual users. In order to capture the important and immediately obvious benefits of this mechanism for irrigators, it is suggested that Capacity Shares should be determined for bulk irrigation entitlements should be determined for each river system. The existing Release

Sharing mechanism would then continue to be used to allocate water from bulk irrigation Capacity Shares. Later, some irrigators may wish to manage their own Capacity Shares. Those who elected to do this would not cause any adverse impacts on irrigators who continued to operate under the Release Sharing mechanism.

Irrigators who elected to manage their own Capacity Shares would need to become familiar with aspects of river operation such as the time it takes for their water to reach the farm after being released from a storage, expected seepage losses, and evaporative losses from their water when it is held in a storage. Learning this information may be alien and be considered an additional management burden at first, but there should be important benefits in terms of greatly increased management flexibility. From a strategic perspective, irrigators could buy and sell Storage Capacity shares and Tributary Inflow shares to adjust both their reliability of supply, and their level of access to surface water resources. Another important strategic benefit would be complete flexibility about when to make withdrawals from Storage Capacity shares. For example, in the light of expectations about future commodity prices, growers may choose to defer using some or all of the water they held in Storage Capacity shares until another year.

It is proposed that to start a capacity sharing system, irrigators and other water users, would be allocated portfolios of Storage Capacity shares and Tributary Inflow shares that would provide them with access to an equivalent volume of water at a similar reliability of supply to what they receive under the current volumetric licensing system. Once this has been done, either at the bulk or individual capacity share level, it is

envisaged that where further encroachments on irrigation supplies are sought, these should be purchased on the open market. Alternatively, if Government decided to commandeer water for other purposes, irrigators would be able to clearly identify the extent of the loss, which should simplify negotiations for compensation.

Future Developments

The concept of Capacity Sharing has been rigorously tested from a theoretical viewpoint (Dudley & Musgrave 1988), but the practical feasibility of implementing it has yet to be evaluated. A new applied research project is to be conducted by the Centre for Water Policy Research to take the concept through this next critical phase. The project is jointly funded by the Cooperative Centre for Sustainable Cotton Production, and the Cotton Research and Development Corporation (CRDC), in conjunction with support from the New South Wales Department of Water Resources. The project will use the Namoi valley as a case study, and has the following broad aims.

I To determine how existing irrigation water rights would translate into Capacity Shares.

II To develop a water accounting system to manage Capacity Shares for irrigators who elect to adopt this property right and management system.

III To develop an education and management advisory service package for Capacity Share holders.

The first aim is perhaps of most critical interest to irrigated cotton producers, and the following ten questions posed by the CRDC related to this aim as follows;

1. What are the benefits and disadvantages of capacity sharing over current systems of water allocation?

2. How would a capacity sharing system operate? What are the mechanics of such a system?

3. What changes would occur to the water quantity currently available to each irrigator if capacity sharing was used? Would there be any trade offs in the amount or reliability of water available to an irrigator?

4. How secure is a capacity share? Can it be impacted on by other users or institutions?

5. Who are the people and institutions most likely to be considered as capacity share holders and what are the likely proportions of water held by these various groups?

6. What would be the best mechanisms for managing the implementation of such a system from the current system?

7. How would water transfers take place under capacity sharing?

8. How would off allocation flows be incorporated into capacity sharing?

9. How would inflows into the dam be allocated to share-holders and would any share-holders have priority?

10. What other costs would share-holders bear in such a system?

The project is planned to run until December 1996, and it is anticipated that answers to the first aim and associated ten questions should be available by mid 1995. The cotton industry is to be congratulated for being far-sighted in supporting this research, which has the potential to provide very important benefits, not only for the irrigated cotton industry, but also for other water users.

References

Bryant M.J., (1993) "Capacity Sharing: A New Approach To Water Allocation", Cotton Yearbook, The Australian Cotton Grower. pp 32-36. August 1993.

Bryant, M.J., Davidson B., Evans M., and Morrison J., (1989) "A Study of Reliability of Water Supply For Irrigated Cotton in The Namoi Valley". A Centre for Water Policy Research, University of New England, research report prepared for the NSW Department of Water Resources, Auscott Limited, and the Namoi Cotton Co-operative. March 1989.

Dudley N.J., and Musgrave W. F., (1988) "Capacity Sharing of Water Reservoirs". Water Resources Research, 24;5 pp 649-658. May 1988.