

IPART NSW
Re BULK WATER PRICING INQUIRY

Dear Sir/Madam

Last year's amendments to the Water Management Act 2000 gave the holders of irrigation licences a perpetual title at no additional cost. Any future decision to reduce water access by authorities charged with looking after environmental flows may be constrained by the requirement to pay compensation to irrigators for reduced access.

As a matter of fairness, the bulk water price should reflect the fact that a perpetual right has been conferred at no additional cost, and that access rules governing environmental flows are still educated guesses based on inadequate knowledge. The efficient cost of delivering water services should include a component for the cost of acquiring a knowledge base that is adequate to frame defensible access rules governing environmental flows. This knowledge base is, I believe, an ongoing requirement as the science evolves.

Irrigators have vehemently opposed precautionary reductions in water access, claiming that there is no proof that they are required. At the same time, irrigators have argued against full cost recovery estimates from DLWC/DIPNR/State Water so that studies that might help determine environmental flow requirements have been slow and few.

The Bega Catchment was one of 3 pilot catchments given extra funding by the DLWC in order to develop a Water Sharing Plan. The Bega Catchment has been subject to more environmental studies than mostⁱ, and yet a final (10 year) flow sharing plan has yet to be signed. The likely compromise reached between environmental flows and irrigator access will be based on a trade-off between continued, arguably excessive, extraction at low flows and implementation of a River Health Package. Appended is an early versionⁱⁱ, from which the irrigators have since retreated somewhat, perhaps due to the drought and a realisation of the high cost of fencing flood-prone areas.

One innovative element in the deal over the Bega Catchment flow sharing rules is a "no further pain" clause, whereby low flows for the environment will be increased if this can be done at no further economic discomfort to the irrigators. The Bega Valley Shire Council is administering a \$175,000 grant from the Water Innovation Fund that is intended to explore the best options for high-flow capture and storage in the Bega Valley, including the development of investment options. The successful operation of the arrangement between some members of the Bega Valley Water Users Association and the managers of Cochran Dam (now Eraring Energy?) is a model for how a modest amount (~1000 ML) of water can be stored into the irrigation season each year at a relatively low cost (i.e. zero if the Dam doesn't spill).

A new element in the draft flow sharing plan that might encourage investment in a high-flow capture, storage and release scheme is the proposal to allow irrigators to trade out of "A Class" (low flow) access shares into higher classes at a volumetric premium. The size of the volumetric premium is likely to be informed by the size of the potential "resource" in each flow classⁱⁱⁱ, with an allowance for existing demands^{iv}.

In the past, I have argued that a differential price for water, based on scarcity, would send a pricing signal to users what would encourage them to shift extraction activity away from times of low flow (and high environmental stress) to times of high flow. IPART has, in the past, argued that environmental concerns can be best addressed in other ways. Nevertheless, a pricing structure that recognises the variation in the real value of fresh water between flood times and drought times is

desirable because it gives users a genuine price signal. This may stimulate the adoption of water conservation strategies by the beneficiaries on unregulated streams.

Historically, major water conservation initiatives have been undertaken by governments, and no real attempt has been made to recover construction costs from the beneficiaries of reliable flows for extraction in the irrigation season. This has led to the absurd situation where irrigators feel aggrieved because they are getting less water in a drought year and do not receive an equal reduction in the license fee.

Water sharing plans have been rather slow in their development and do not yet cover many streams. They have been developed mainly by "horse-trading" rather than a well informed understanding of river ecology, in my view.

Past decisions by IPART not to achieve full cost recovery for the administration of water licenses have starved the responsible departments of funds for necessary research and data acquisition. Now that license holders have been given a compensable right at no additional cost, it is time to move rapidly to full cost recovery based on:

1. the need to acquire the knowledge to set environmental flows and develop water sharing plans.
2. the likely future need to reserve more water at low flows and in important freshes for the environment
3. the merits of encouraging investment in sustainable water resource development in order to meet environmental needs and the growing demands of human populations for household and irrigation water

Yours faithfully,

Mick Harewood.

ⁱ The following have been useful and relevant references in arguing the case for increased environmental flows in the Bega Catchment.

AWT (1998) Gowns, I. Baseline ecological study of the Bega River system. Australian Water Technologies Report No 97/251. March, 1998.

Brooks, A, 1995. Vegetation interaction with rivers: Morphodynamics associations-implications for river health. In Geomorphology and River Health in NSW, Brierley G and Nagel F (Eds), Pages 49-66. 1995.

Fryers K and Brierley G J 1998. The use of river styles and their associated sediment storage in the development of a catchment-based river rehabilitation strategy for the Bega/Brogo catchment South coast, NSW. School of Earth Sciences, Macquarie University. June 1998.

GHD (1997) Franklin J. Gutteridge, Haskin & Davey Pty Ltd. Bemboka Catchment. Final Report on interactions between land use and water resource availability and security. Far South Coast Catchment Management Committee, NSW. April 1997

HRC (2000) Independent Inquiry into the Bega River System. Final Report. Healthy Rivers Commission of NSW, May 2000.

Lim-Applegate H and McClintock A. (1999) Bega River catchment: River flow access and irrigated dairy farms. Australian Commodities, vol 6, no. 3, September quarter, 1999, pp331-540.

PBH (2001) Chessman B. "Pressure-Biota-Habitat Stream Assessment: report on field trials in 1999-2000", Review draft January 2001, DLWC.

ii Appendix 3 The Bega River Health Agreement

Preamble

This Heads of Agreement does not form a binding agreement. Instead, it seeks to express the intention of the parties in principle as now agreed and to show a commitment to the integration and implementation of both the Bega River Catchment Water Sharing Plan and delivery of the Bega River Health Package.

A clear agreement of this Heads of Agreement is to negotiate and commit to a memorandum of Understanding which will form a binding agreement in regard to implementation of the targets and milestones within the River Health Agreement.

Background to the Agreement

1. The South Coast Water Management Committee has established this Bega River Health Agreement during the development of the Bega River Catchment Water Sharing Plan.
2. This Agreement is placed at the core of the Bega River Catchment Water Sharing Plan and underlies the consensus for establishment of environmental health water and other water sharing measures in the Plan.
 - (a) A primary objective of the Bega River Catchment Water Sharing Plan is stated in section 11 (a) "to give effect to relevant parts of the Bega River Health Agreement."
 - (b) The Bega River Catchment Water Sharing Plan establishes flow classes and access rules which fulfill the requirements of this River Health Agreement in terms of formally providing clear and secure terms of access to water as agreed by the South Coast Water Management Committee and as recommended by the NSW Healthy Rivers Commission.
 - (c) Sections x, 76 (3) and 83 of the Bega River Catchment Water Sharing Plan create specific linkages between measures in the Water Sharing Plan and the achievement of milestones and commitments under the terms of this Bega River Health Agreement.
3. Of necessity this Agreement extends beyond the Water Sharing Plan to encompass commitments by the parties, as set out below, to the achievement of other aspects of river health as specified.

Purpose

This Heads of Agreement formally:

1. sets out the intent, principles and specific items of the Bega River Health Agreement;
2. outlines the agreed process for implementation of the Bega River Health Agreement and identifies the intended links between this Agreement and other relevant instruments;
3. provides a vehicle for sign-off by the parties to the Agreement

Parties to this Agreement

Parties to this agreement include:

- The Chair of the South Coast Water Management Committee
- The Chair of the Southern Rivers Catchment Management Authority
- The President of the Bega Valley Water Users Association Inc.
- The President of the NSW Nature Conservation Council
- The Chairman of the Bega Cooperative Society
- The Mayor of the Bega Valley Shire Council
- The President of the Far South Coast Landcare Association Inc.
- The Director General of the NSW Department of Infrastructure Planning and Natural Resources
- The Director General of the NSW Department of Primary Industries
- The Director General of the NSW Department of Environment and Conservation

Vision for this Agreement

Objectives and Intent of this Agreement

Principles of this Agreement

All parties:

1. Agree that the South Coast Water Management Committee will prepare a Draft Water Sharing Plan for the Bega River Catchment for the consideration of the Department of Infrastructure, Planning and Natural Resources by June 2004 which will:
 - o incorporate the Healthy Rivers Commission Bega River Inquiry's recommendations for environmental flows for all unregulated rivers in the Bega River Catchment;
 - o adopt the existing Bemboka River Flow Plan with a Cease to Pump level of 2ML at Kanooma;
 - o establish balanced water trading rules that support river health and socio-economic sustainability of the Bega community;
 - o establish a fair mechanism to manage the risks from over-allocation of water licences; and
 - o endeavour to adaptively improve environmental outcomes using agreed strategies which are designed to cause 'no further pain' to existing water users during the life of the Plan subject to achievement of the *Bega River Health Package* targets.
2. Agree to refinements to the Dairy and Irrigation Industry Programs as developed by the Bega Valley Water Users Association in June 2004, recognising that improved environmental flows secured under the *Bega River Catchment Water Sharing Plan* alone are not sufficient to restore river health. Refined commitments and targets for the dairy industry program component of this agreement are set out in table 1 below:

Table 1: Dairy and Irrigation Industry Program Targets for the Bega River Health Agreement

DAIRY INDUSTRY PROGRAM

Program

Targets

Wetland Program

Targets linked to the Bega River Catchment Water Sharing Plans

- Within 5 years of the introduction of a Bega Catchment Water Sharing Plan 50% of wetlands (as recognised in the Bega River Action Plan) on dairy farms in the Bega River catchment will be fenced and managed for conservation & limited production, according to recommended practice.
- Within 10 years of the introduction of a Bega Catchment Water Sharing Plan all wetlands (as recognised in the Bega River Action Plan) on dairy farms in the Bega River catchment will be fenced and managed for conservation & limited production, according to recommended practice.
- Within 10 years of the introduction of a Bega Catchment Water Sharing Plan the critical hydraulic function of five key degraded wetlands (as recognised in the Bega River Action Plan) will be restored.

Aspirational Targets, not linked to the Water Sharing Plan

- Within 10 years of the introduction of a Bega Catchment Water Sharing Plan a total of 100 recognised wetlands will be fenced, rehabilitated and managed for conservation and limited production.
- Within 10 years of the introduction of a Bega Catchment Water Sharing Plan a wetland visitor centre and tourist trail will be established on the Bega River floodplain.

River Corridor Program

Targets linked to the Bega River Catchment Water Sharing Plans

- Within 5 years of the introduction of a Bega Catchment Water Sharing Plan 30% of all dairy farm river frontages in the Bega River catchment will be fenced and managed for conservation and limited production, according to recommended practice.
- Within 10 years of the introduction of a Bega Catchment Water Sharing Plan 40% of dairy farm river frontages in the Bega River catchment will be fenced and managed for conservation and limited production, according to recommended practice.
- Within 10 years of the introduction of a Bega Catchment Water Sharing Plan 30 high priority erosion and sediment sources on dairy farms (eroding river banks, erosion gullies, nick points etc. identified in the Bega River Action Plan) to be stabilised.

Aspirational Targets, not linked to the Water Sharing Plan

- Within 5 years of the introduction of a Bega Catchment Water Sharing Plan 20% of all river frontages on properties with river access licences in the Bega River catchment will be fenced and managed for conservation and limited production, according to recommended practice.
- Within 10 years of the introduction of a Bega Catchment Water Sharing Plan 40% of all river frontages on properties with river access licences in the Bega River catchment will be fenced and managed for conservation and limited production, according to recommended practice.

Nutrient Management Program

Targets linked to the Bega River Catchment Water Sharing Plan:

- Within 5 years of the introduction of a Bega Catchment Water Sharing Plan 50% of dairy laneways in the Bega River catchment will be upgraded to current recommended practice standard for nutrient runoff.
- Within 10 years of the introduction of a Bega Catchment Water Sharing Plan all dairy laneways in the Bega River catchment will be upgraded to current recommended practice standard for nutrient run-off.
- Within 5 years of the introduction of a Bega Catchment Water Sharing Plan 20 of the dairy herd river crossings assessed as high priority for nutrient reduction, will be upgraded and managed according to current recommended practice.
- Within 10 years of the introduction of a Bega Catchment Water Sharing Plan 40 of the dairy herd river crossings assessed as high to medium priority for nutrient reduction, will be upgraded and managed according to current recommended practice.
- Within 5 years of the introduction of the Bega Catchment Water Sharing Plan 50% of all dairy effluent and reuse systems in the Bega River catchment will meet current recommended practice guidelines.
- Within 10 years of the introduction of the Bega Catchment Water Sharing Plan all dairy effluent and reuse systems in the Bega River catchment will meet current recommended practice guidelines.

Aspirational Targets, not linked to the Water Sharing Plan

- Within 3 years of the introduction of a Bega Catchment Water Sharing Plan the average number of swimming days lost per year in the Lower Bogo River will be reduced by $\geq 50\%$.

Water Efficiency	<p>Targets linked to the Bega River Catchment Water Sharing Plan:</p> <ul style="list-style-type: none"> ○ Within 3 years of the introduction of a Bega Catchment Water Sharing Plan all irrigators in the Bemboka and Tantawangalo sub-catchments will have a recognised Irrigation and Drainage Management Plan (IDMP) or equivalent Farm Water Plan; and will have implemented water efficiency measures leading to a minimum 10% improvement in water application efficiency. ○ Within 5 years of the introduction of a Bega Catchment Water Sharing Plan all irrigators in the Bega River Catchment will have a recognised Irrigation and Drainage Management Plan (IDMP) or equivalent Farm Water Plan; and will have implemented water efficiency measures leading to a minimum 10% improvement in water application efficiency. ○ Within ten years of the introduction of a Bega Catchment Water Sharing Plan all irrigators in the Bega River Catchment will have implemented water efficiency measures leading to a minimum 20% improvement in water application efficiency. <p>Aspirational Targets, not linked to the Water Sharing Plan</p> <ul style="list-style-type: none"> ○ Within 5 years of the introduction of a Bega Catchment Water Sharing Plan all south coast irrigators will have completed "Waterwise Introduction to Irrigation Management" training and 50% will have completed IDMPs or equivalent Farm Water Plans and 50% to have implemented water efficiency measures leading to a minimum 10% improvement in water application efficiency.
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Specific Commitments within this Agreement

Strategies for implementation of this Agreement

Specific Links between this Agreement and the draft Bega River Catchment Water Sharing Plan

Specific Links between this Agreement and the NSW Government's Healthy Rivers Commission Statement of Intent for the Bega River Catchment

Specific Links between this Agreement and the Southern Rivers Catchment Action Plan and its Regional Investment Strategy

Preparation of a Memorandum of Understanding regarding Implementation of this Agreement

Signatures

iii Estimates of High Flow Water Resources Available in Bega Catchment Streams.

Mick Harewood, September 2005.

The Bega Valley Water Management Committee has been considering the provision of an incentive to irrigators to reduce the stress on streams at low flows. This would take the form of a volumetric premium for retiring A Class water shares in return for a higher volume of high-flow water. In November, 2004, I examined my earlier estimates of the volumes that might be available for capture and storage in the "flood flow" class.

My original estimates of the total volume of water flowing in each decile class of daily flows were made by averaging the flow at the top and the bottom of the decile class and multiplying by 36.5 (being 10% of 365 days) to get the area under the flow-duration curve. This is fine for the lower-flow classes but within the highest decile of daily flows, the curve is still quite inverse (concave) rather than linear. Therefore, I have considerably over-estimated the volume available in the "flood" class in my paper of August 2003 on farm dams policy.

To correct this error, I have refined the estimate of volume flowing in the flood-flow decile of daily flows by adding the five estimates of volume in each of the highest 2% ile flow classes. That is, I have averaged the flow in each two-percentile class and multiplied by 7.3 (being 2% of 365 days) to get that area under the flow duration curve, and summed these figures. The original data used for these calculations are from the flow duration table for Moran's Crossing in the back of the 1999 flow plan.

Flow class (percentiles)	0-2%	2-4%	4-6%	6-8%	8-10%	Total (0-10%)
Mean annual flow ML in this class	20431	15841	7293	5344	4249	53158

With this revised estimate of total flows in the "flood flow" decile of daily flows, the resource estimates in all the decile classes is as follows:

Flow class	0-10%	10-20%	20-30%	30-40%	40-50%	50-60%	60-70%	70-80%	80-90%	90-100%
Mean Annual Flow ML	53166	15111	9198	6862	5256	3978	2993	2227	1570	609

Percent of total "water resource"	52.6	15.0	9.1	6.8	5.2	3.9	3.0	2.2	1.6	0.6
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It is apparent that I have previously underestimated the low flow resource by about a factor of 10 and overestimated the flood flow resource by about a factor of 2. This doesn't change the general message (that we have been arguing over a very small percentage of the possible total resource and largely ignoring the largest bit) except by degree.

If these data are expressed in the familiar flow classes as per Advice to Water Management Committees Number 6, the same message comes through.

Flow class	Very Low	A	B	C	"Fresh"	"Flood"
Percentile of daily flows	>95	95-80	80-50	50-30	30-10	>10
Percent of Total annual volume	0.15	1.9	9.1	12	24.1	52.6

Readers will be aware that estimates of flow at high flows are inevitable subject to errors- they are based on scant data. Stream velocity can rarely be checked so the rating curve for each gauging site is only an approximation at high flows. However, for the purpose of water resource allocation, the general figures are accurate enough and the general conclusions are essentially unchanged.

That is:

- we are taking a high proportion of low flows
- capturing and storing a small proportion of high flows could make a big difference both to environmental flows and security of access for users.

With regard to the issue of the premium ratio that might be offered in order to encourage a shift from A class extraction to high flow storage, the ratio could be based on the total volume of flow available in the respective classes. Therefore, trading out of A class in the Bemboka into B or C classes could be at a volumetric premium of 5:1 and into "D" or higher could be at around 25:1. However, we still need to resolve the issue of how unallocated volume is estimated. If we are stuck with statewide policy of estimating peak daily demand based on crop requirements for the hottest day in summer, there will be an unnecessary impediment to progress with this strategy.

It must be understood that peak daily demand as estimated by the crop requirements for the hottest day in summer is not appropriate for most of the time when flows are in B and C classes. As a precautionary initial policy approach, estimated peak daily demand could be reduced by an agreed factor for times when flow is in B or C flow classes.

For the purpose of understanding how the volumetric premium strategy might apply to other streams, some comparisons are set out below.

Note that:

- two streams, the Bemboka and Brogo, are highly influenced by the effect of on-stream storages. These capture a proportion of high flows and increase the low flows to some extent. However, the low flows are still affected by irrigation extraction above the gauging stations.
- The Tantawangalo flows are affected by the Bega Valley Shire Council extraction via a 4 ML/day pipe from the weir in between the two gauges.

Percent of Total Annual Volume flowing in each class of daily flows for various Bega Catchment Streams.

Flow class		Very Low	A	B	C	“Fresh”	“Flood”
Percentile of daily flows	Comments	>95	95-80	80-50	50-30	30-10	>10
Bemboka at Moran’s Crossing	3000 ML hydro power dam	0.15	1.9	9.1	12	24.1	52.6
Rutherford Creek	Unregulated, no extraction	0.076	0.70	3.09	3.82	8.07	84.2
Tantawangalo Mountain	Unregulated, no extraction	0.086	0.76	3.35	4.08	3.42	88.3
Tantawangalo at Candelo Dam site	Below town water take-off	0.04	0.64	4.00	6.04	13.23	76.0
Double Creek near Brogo	Unregulated	0.01	0.43	2.54	7.54	24.6	64.7
Brogo at Angledale	8000 ML irrigation dam	0.2	1.7	0.78	12.4	40.6	44.2

From this table, the effect of storages on capturing a proportion of high flows and redistributing this water as sustained low flow (although somewhat diminished by extraction) is evident.

^{iv} By way of background, the Bega/Bemboka river system is subject to an embargo on the issue of new water extraction licences. The total annual licensed volume of extraction is about 19% of average annual flows, although the average annual extraction is typically about 4% of average annual flows. The discrepancy is due to the fact that the water simply is not there when irrigators want it.