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# MURRAY-DARLING BASIN COMMISSION

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## REVIEW OF THE OPERATION OF THE CAP : Economic & Social Impacts

2 March 2000

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*A s s o c i a t e s*

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## EXECUTIVE SUMMARY

1. A limit on growth in diversions from the Murray-Darling Basin (the Basin) river system was introduced by the Ministerial Council in June 1995 and confirmed as a permanent cap with effect from 1 July 1997. As part of this agreement, the Ministerial Council agreed to undertake a review of the operation of the Cap in the year 2000.
2. The objective of the overall review is to establish a sustainable resource management outcome which achieves the optimal outcomes and balance between the three objectives of economic activity, social aspirations and ecological outcomes. The objectives of this consultancy are to:
  - review the aggregate social and economic impacts of the operation of the Cap on diversions from the Murray-Darling Basin (M-DB) river system; and
  - identify and describe the benefits and costs on different groups of enterprises, valleys and irrigation systems and resulting equity issues.
3. The consultancy brief envisaged the report as a desk review, sourced from relevant work already performed or currently underway, in particular the major submissions to be received from partner governments, the Community Advisory Committee (CAC) and other stakeholders across the Basin.
4. The main paradigm which underpins standard project appraisals is benefit cost analysis (CBA).

In a standard economic analysis, the rights of subsequent generations are essentially ignored and discount rates are applied to establish the value of future costs and benefits to the current generation at the current day.

The standard benefit cost framework needs to be extended when dealing with major environmental issues in order to recognise impacts on the value of natural capital. An important extension is to incorporate the “sustainability principle” which recognises that the resource base and environment do not exist purely for financial benefit and that there is a responsibility to pass natural capital intact from one generation to another, ie to achieve intergenerational equity.

Use of the benefit cost paradigm does not imply that the impacts of the Cap can, or need be, described in terms of the net present value of dollar benefits and costs. The approach adopted in this review is to identify, describe and, where possible, indicate the order of magnitude of the benefits and costs associated with the announcement and implementation of the Cap.

5. To apply any benefit cost framework requires clear distinction between the Cap and No Cap scenarios and careful attention to avoid double counting and ignoring offsetting benefits or costs.

The paradigm applied in this Review observes these requirements.

## **ROLE OF THE CAP**

6. A core question addressed by the consultancy was whether the Cap had played a central role in triggering the introduction of additional control measures across the Basin or had merely been just another element in a continuing process of responding to increasing resource scarcity.
7. Prior to the announcement of the Cap, individual governments had begun to change their water management policies. However, these initiatives were developed and implemented in an uneven way, with considerable variation both between and within States and with little recognition of Basin-wide implications. The situation pre-Cap contrasts sharply with the coordinated suite of measures and controls which are now in place across most of the Basin.
8. The 1995 Audit of Water Use in the Basin was clearly a watershed in the development of a common and agreed understanding of the issues of resource sustainability between members governments.
9. The subsequent decision of the Ministerial Council to introduce a Cap signalled, publicly, the need for a Basin-wide commitment to limit future growth in diversions. Discussions with water managers in each state confirm that the formal announcement of the Cap galvanised thinking and effort to achieve better and sustainable outcomes.
10. Therefore, rather than seeing the Cap as just another step in a series of responses to increasing resource scarcity, the more appropriate perspective is that the Audit and the Cap were essential pre-requisites to the suite of controls currently in place or being implemented by the individual states. In simple terms, the effects have been to:
  - provide a Basin-wide framework to co-ordinate actions between states and catchments;
  - strengthen and reinforce existing reform initiatives;
  - provide a benchmark for future regulation of diversions; and
  - ensure compliance, monitoring and publicity in all 22 major systems in the Basin.

## **DEFINING THE NO-CAP SCENARIO**

11. In defining the No Cap scenario, a crucial question is what would have been the river flow and management objectives and, in turn, the impact of these on allowable diversions. The starting base for our assessment of Cap impacts is the No Cap scenario based on Full Development as specified in the 1995 Audit.

## **BENEFITS AND COSTS OF THE CAP**

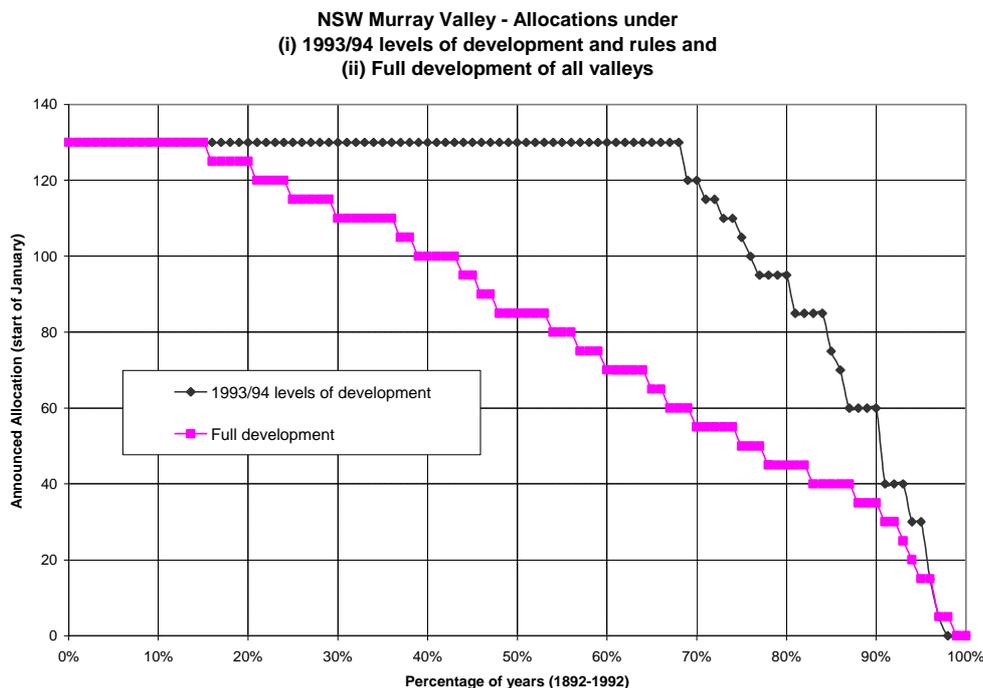
### **Impacts on the Agricultural Economy**

12. The prime benefit of the Cap is the guaranteeing of security on a valley-by-valley basis. In the absence of the Cap there would be substantial erosion of security of entitlements across the Basin, but particularly in the major southern systems. The magnitude of the erosion is not widely perceived (Chart ES.1). The guaranteeing of this security through the introduction of the Cap provides a better and more certain climate for investment and jobs growth. Long term investment in high value agriculture and value-adding processing is dependent on the underlying security of the base resource.
13. Part of the benefit of guaranteeing this long term security is potentially offset by the reduction in development opportunities, ie., costs associated with this guarantee of security are that development, particularly in less developed valleys, is – other things being equal – curtailed.

To date, there appears to be little firm evidence of aggregate reductions in development opportunities:

- in the northern systems, the Cap has not yet been fully implemented and development has continued apace;
- in the southern systems, allocations in recent seasons have been impacted by the resource availability rather than the Cap. The impact of lowered allocations due to resource scarcity/availability is most heavily felt by those whose enterprises are most reliant on high allocations, including the historic ability to utilise the unused allocations of other entitlement holders. The Cap, when it bites, will have a similar impact. However, while individual enterprises currently dependent on high allocations will be adversely affected, the industries and regions appear likely to continue to prosper;
- in other cases, development may have been displaced from one valley to another; and
- through water trade, new high-value developments can still take place, but at the expense of existing lower value activities.

CHART ES.1



14. Estimates provided in submissions of the costs of the Cap in terms of development that may be forgone in the future provide a partial picture only since these estimates are specific to particular locations and ignore the benefits of guaranteed security which are widespread and diverse.

Overall, the guarantee of security in the longer term is a major net benefit to the Basin irrigation community.

15. Under the No Cap scenario, the growth of diversions towards full development would also increase the sensitivity of irrigated agriculture to changes in climate and rainfall. The impact of drought sequences on cash flow, the ability to access debt finance and fund existing commitments would worsen progressively. A benefit of the Cap, therefore, is to maintain the viability of irrigated agriculture in the Basin. In turn, this will prevent irrigators from unnecessarily being forced off their land due to the collapse in the security of diversions.
16. A further benefit of the Cap is the stimulus to codifying and improving property rights and entitlements to water. By definition, when the demands on the fixed pool of resources can be substantially expanded, then each property right risks erosion. Placing a finite limit on diversions across the Basin, therefore, gives a stronger property right by providing known and guaranteed security. The Cap has also stimulated the streamlining of property rights to better facilitate trading in water.
17. Water trade substantially reduces the economic cost of compliance with the Cap and with environmental flow rules. The impetus provided by the Cap to facilitate trade is

fostering better trading rules, third party protection and easier movement of water to high value activities. Trade would occur independently of the Cap but the Cap stimulated reforms will accelerate that trade.

The economic benefit of water trade in NSW alone is estimated to exceed \$65 million annually with the benefit of trade across the Basin likely to exceed \$100 million annually. The Cap initiated reforms to water trading will enhance these benefits.

18. As the No Cap scenario progresses to Full Development, there will be increasing tensions between irrigator groups and between regions as security declines and water trading becomes more aggressive. Individual irrigators, industry associations, local government and others initiate legal actions against partner governments and the MDBC for failing to provide adequate stewardship of the water resource and riverine environment. Other legal actions seek to either remove or improve constraints on water trade. In other words, there is a disorderly scramble and lack of process.

The benefit of the Cap is that it allows the valleys and states in the Basin to avoid the water wars that have typified developments in California and Colorado. These disputes have run for more than 60 years and are noted for their polarity, community tension and disruption and waste of community resources.

19. Concern over possible future impacts of the Cap on the social fabric of particular irrigation communities appears misplaced when the impact of potential water wars on the social fabric of the Basin as a whole is contemplated.
20. Within Australia, the metropolitan electorate would become increasingly out of patience with the irrigation community and the unwillingness of Governments to halt the degradation. The perceived division between country and city Australians would increase.
21. In summary, from the perspective of the agricultural economy, the Cap has produced major immediate benefits with little commensurate cost. The better investment climate created by certainty over water security, improved property rights and improved trading arrangements are attributable to the announcement of the Cap and are not dependent on the timing of its actual implementation – provided that implementation is in fact proceeding.
22. In principle, the capping of diversions means that some potential developments may be curtailed and benefits forgone. In fact, with the southern systems largely constrained by resource scarcity since 1995, the Cap has not had a physical impact on constraining diversions. Similarly, in the northern systems the Cap has not yet been fully applied. This combination of circumstances means that the immediate benefit cost ratio, ie., for the first five years, is undoubtedly highly positive.

23. In the medium term, progression to Full Development would lead to the collapse of security in the southern valleys and a significant loss of security in the north. As a result, the annual benefits of the Cap increase over time. These benefits accrue to both existing and new enterprises.
24. By guaranteeing security of entitlement the Cap will help create and sustain viable communities thus promoting social outcomes such as employment, schools and community welfare and cohesion. The Cap also provides a mechanism whereby disputes and tensions over resource scarcity, between community groups within the Basin and divisions between country and city Australians, can be managed and resolved in an orderly way.

### **Equity Issues**

25. Within the agricultural economy, the Cap has differential impacts between valleys and between irrigators.
26. Under the No Cap case, constraints imposed by resource availability will impact on both existing activities and potential new developments. The sharp falls in security, and resulting volatility, are likely to necessitate the winding back and adjustment of existing industries including the Victorian dairy industry, the NSW rice industry and, to a lesser extent, existing cotton growers. With the Cap, the security of existing development in aggregate – though not individual businesses – is guaranteed and the constraints imposed by scarcity borne primarily by forgoing potential new developments, particularly in upper reaches and tributaries.

Under the No Cap scenario the costs of adjusting to security are likely to be both higher and tangible. In contrast to the possible costs of losing potential development, the costs of winding back and restructuring existing enterprises, industries and towns are very real.

27. The tributaries and upper reaches are disadvantaged through timing and history in that development occurred earlier in the south and the impending resource constraints mean that it is cheaper for the Basin as a whole to halt development at existing levels – this raises inevitable equity issues but the issues of who bears the pain of increasing scarcity and who shares the gains of access to the resource arise under both scenarios.
28. The guaranteeing of security at the valley level defines the security of entitlement for individual irrigators, but has differential impacts among irrigators since some enterprises have grown through extensive use of off-allocation and allocations above 100% of entitlements.
29. A major equity concern hinges on the activation of sleepers/dozers issue and the view that the Cap is causing “a massive wealth transfer”. The activation of sleeper dozer licences is essential for increased development and facilitates the shift of water to

higher value activities, particularly in years of allocation resource scarcity and low allocation.

Two mutually reinforcing effects have led to the rapid expansion of trade, ie.:

- increasing trade of unused entitlements causes lower announced allocations; and
- lower announced allocations causes more irrigators to seek additional water pushing up the price of water and encouraging greater release of unused entitlements into the water market.

Introduction of the Cap may have advanced the activation of sleeper dozer licences but this is unclear. Indeed, the opposite view is that:

*“While sleeper activation has had an impact, this level of impact would have been even worse in the absence of a Cap.”<sup>1</sup>*

The issue of the wealth transfer is heavily felt but whether “wealth is transferred” or rather wealth already held is simply realised depends critically upon the perception of the relative merits of prior rights or history of use approaches.

### **Non-Agricultural Benefits and Costs**

30. Confidence that the benefits associated with the Cap substantially outweigh the costs is increased when impacts outside the agricultural economy are considered.
31. First, there are direct economic benefits attributable to the natural capital stock. The rivers and lakes have direct economic benefits in terms of tourism, commercial and recreational fishing, duck shooting and real estate amenity. While no precise estimates appear to be available for the Murray-Darling Basin, indicative estimates from other catchments in eastern Australia confirm the hard financial benefit of a good environment and, therefore, the costs of losing it. For instance, the costs of the 1999 algal bloom on the Gippsland Lakes is estimated to be around \$5 million comprising around \$2 million for commercial fishing and \$3 million for tourism for the six week bloom.<sup>2</sup> Importantly, the adverse impacts appear to carry over from one year to another in terms of reduced tourism.

Nationwide, the recent Atech-CSIRO study puts *“the current total cost of algal blooms of \$180 million to \$240 million.....a conservative order of magnitude estimate.”*<sup>3</sup> For the rural sector itself the estimated costs of algal blooms is \$60 million per year.<sup>4</sup>

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<sup>1</sup> Australian Conservation Foundation, Submission (1999).

<sup>2</sup> *pers. comm.* Rob Molloy, Project Co-ordinator, CSIRO, 22 February 2000.

<sup>3</sup> Atech Group (1999), “Cost of Algal Blooms”, LWRRDC Occasional Paper 26/99, Executive Summary, p.x

<sup>4</sup> *ibid*, p.xi.

32. Second, the riverine environment has an intrinsic value to most Australians. This means that the high level of degradation of the river under the No Cap scenario is a cost, albeit intangible. In the absence of the Cap, continued development would lead to consequential reductions in river flows and accelerate the degradation of the riverine environment. With the Cap, degradation is slowed and this loss of capital value therefore reduced.

### **Conclusion on Net Benefits**

33. Taken together, our assessment indicates that the Cap has already delivered significant benefits to the Basin community and that the net benefit will increase over time.

This strong positive conclusion will not accord with the perception of every stakeholder in the Basin. This gap in perceptions needs to be understood to remove unwarranted criticism and allow attention to be focussed on improvements to the future operation of the Cap.

34. A first step is to ensure that people understand what would happen if the Cap were to be removed.

### **IMPACT OF THE REMOVAL OF THE CAP**

35. The removal of the Cap after five years of implementation would reverse many of the net benefits. Essentially, this is the No Cap scenario applying from the date of removal of the Cap. In summary, this comprises:

- in the absence of the formal announcement of the Cap on diversions, irrigation development would proceed – at least initially – in most valleys. As a result, resource sustainability would become a major issue;
- the increased development would lead to a steady erosion of security reducing the incentive for new entrants to begin irrigating but also undermining the security of existing entitlements and enterprises in all valleys.

Security in lower valleys and reaches would fall significantly due to development in these lower valleys as well as development in upstream reaches and tributaries. For instance, reflecting the obligations of NSW and Victoria to South Australia under the Murray-Darling Basin Agreement, new developments on the Darling and tributaries would also impact on the security of supply for the Murray systems;

- by definition, the movement to Full Development under the No Cap scenario must entail activation of unused rights, entitlements and licences. This occurs through continued development by existing entitlement holders and/or by the sale of unused entitlements in the market to new entrants seeking to gain entitlements;
- not all unused entitlements would be activated since some are kept as insurance to ensure greater reliability and others are held in anticipation of future development;

- sleeper and dozer licences would also be purchased by existing users as they seek to restore their previous levels of security;
- the degradation of the riverine environment and water quality would proceed at an accelerating pace. Algal blooms would become a recurring feature of major reaches as dilution flows are reduced. Salinity, particularly in the lower reaches, would continue to rise. In the mid and lower sections of the river, the rise in water salinity would lead to increased salt accumulation and loss of the remaining bio-diversity;
- socio-demographic trends would continue to be driven by the major forces impacting on irrigated agriculture, ie., commodity prices, seasonal allocations and access to export markets. However, the collapse in security in the southern systems would undermine the viability of existing industries and towns;
- with the substantial reduction in security, the income and viability of irrigated enterprises and communities across the Basin, but particularly in the southern valleys, becomes increasingly sensitive to seasonal and climatic variation;
- there would be increasing tensions between irrigator groups and between regions as security declines and water trading becomes more aggressive.

Individual irrigators, industry associations, local government and others initiate legal actions against the State Governments and the MDBC for failing to provide adequate stewardship of the water resource and riverine environment. The recent announcement from Premier Olsen provides an example of this risk:

*“If NSW just simply continue to ignore our calls for appropriate flows through the River Murray we will take retaliatory action.”<sup>5</sup>*

In the absence of the Cap these challenges become far more common and vociferous. Other legal actions seek to either remove or improve constraints on water trade. In other words, there is a disorderly scramble and lack of process;

- as resource availability and security deteriorate rapidly in the final stages of this full development scenario, incentives for water use efficiencies rise sharply, stimulating major investment late in the period. Major corporate farms will be better placed to fund those capital expenditures and benefit generally from the free for all situation;
- pressures and urgency also amount for changes in river and system management as discussions increase to Full Development levels. However, the ability of partner governments to respond is likely to be significantly constrained by counter injunctions;
- as end of valley flows continue to fall and the damage to the river environment becomes stark, the urban electorate loses patience with and sympathy for irrigators and Basin communities.

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<sup>5</sup> Premier Olsen (2000), as reported in The Sunday Mail, 20 February.

## IMPROVING THE OPERATION OF THE CAP

36. A number of measures to improve the operation of the Cap which will both increase the benefits and reduce the costs were identified during the consultancy.

### Closing the Perception Gap

37. The gap in perceptions and understanding regarding the Cap needs to be closed. Factors leading to a gap in perception of the impact of the Cap include:

- **the different starting points.** Many of the submissions do not compare the Cap with the No Cap scenario. Rather, they compare the Cap with the situation before resource constraints became apparent, ie., the early 1990s;
- **the different understandings on the role of sleepers and dozers.** The rapid growth of trading and the activation of sleepers and dozers is a consequence of increasing development and resource scarcity and not of the introduction of the Cap. Full Development cannot proceed unless sleepers and dozers are activated; and
- **difficulty in separating the impacts of resource scarcity and the Cap.** Although reduced allocations in the southern systems coincide with the announcement of the Cap, they have in fact been driven by resource scarcity and the resultant increase in trading.

38. These different starting points mean that some stakeholders ascribe far more to the Cap and associated reforms than is warranted. This leads to an overestimate and misperception of the adverse impacts of the Cap and fear and anger about the future. This destroys the trust required for meaningful dialogue on how to improve the operation of the Cap.

A further gap in perception arises from the **impact on security**. The underwriting of long term security in each of the valleys – the major direct benefit to irrigated agriculture – appears not to be well understood. This knowledge, summarised in the simulation models, may be familiar to water managers and industry leaders but has not been readily available to, or known by, irrigators and local communities.

39. Closing the gap requires a tailored communication strategy.

## Operational Improvements

40. Operational improvements to ensure that the administration of the Cap does not lead to a downward bias in diversions appear achievable. For instance, detailed analysis undertaken by Murray Irrigation identifies some scope to optimise NSW Murray resources through more timely and accurate reporting of tributary inflows and intervalley transfers.

Possible options for improved harmonisation of Murray-Darling Basin management include:

- improved interaction between the Murrumbidgee modelling (DLWC) and the Murray modelling (MDBC);
- centralised management – or at least better integration – of Murray-Darling Basin modelling may offer the best opportunity for improved management. (This may raise sovereignty and other issues);
- improved timeliness of streamflow reporting, particularly significant rainfall events and rainfall “rejections”;
- improved management of intervalley transfer accounting; and
- greater flexibility with on-route storage management – for example, Lake Victoria management will exacerbate the problems of harmonisation.<sup>6</sup>

## Socio-demographic Impacts

41. The concern that the Cap is causing generally widespread adverse socio-demographic impacts is not supported by the findings of this consultancy. Nonetheless, the concern will need to be further addressed with better information and understanding through the assembly and analysis of key data and targeted case studies. These are not mutually exclusive.
42. The current socio-demographic profile of the Basin extends only up to 1996 and therefore will not capture many of the more recent impacts of the Cap. Because the 2001 and 2006 Censuses will provide new socio-demographic data on the Basin, other benchmark data should sensibly be assembled. The snapshots of 2001 and 2006 should therefore incorporate:
- the socio-demographic profile from the ABS Census;
  - a better understanding of water use across the basin. This requires improved information on water use by crop type and application method;
  - a better understanding of the drivers and benefits of water trades, both permanent and temporary. This requires source and destination information to be collected at

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<sup>6</sup> Murrumbidgee Consultancy (1999), “Assessing the Impacts of the MDBC Cap on Murray Irrigation Limited”, Report prepared for Murray Irrigation Limited, pp. 20-21.

time of trade showing enterprise/activity of the seller and intended use by the buyer. Such information is essential in demonstrating the magnitudes of the benefits derived from trading and to better understand the adjustment processes operating within the Basin; and

- a better understanding of the attitudes, concerns and knowledge of water and resource management issues. This benchmark survey would facilitate development of a more comprehensive and targeted communication strategy.
43. Finally, some of the concerns expressed by irrigation communities which are alleged to be adverse effects of the Cap, in practice relate to the rules for activation of sleepers and dozers. Where Cap compliance is not jeopardised, consideration could be given to allowing irrigation communities to opt out of the “prior right” approach and to adopt a “history of use” approach to Cap implementation. Proposals for such opting out must satisfy the State and the Independent Audit Group and command a high level of support, say 75%, in plebiscites of affected winners and losers.

## SUMMARY

44. The Cap provided a clear signal to stakeholders, across the Basin, that there was increasing resource scarcity, that previous state by state arrangements had proved inadequate and that there was the political commitment to implement necessary additional controls.
45. The Cap has:
- provided a Basin-wide framework to coordinate actions between states and catchments;
  - strengthened and reinforced existing reform initiatives;
  - stimulated additional controls;
  - provided a benchmark for future regulation of diversions; and
  - ensured compliance, monitoring and publicity in all 22 major systems in the Basin.
46. The introduction of the Cap has generated significant economic and social benefits.

The prime benefit of the Cap is the guaranteeing of security on a valley-by-valley basis. This provides a better and more certain climate for investment and jobs growth. Long term investment in high value agriculture and value adding processing is dependent on the underlying security of the resource base. Under the No Cap scenario this is likely to be eroded in the short to medium term.

47. By guaranteeing security of entitlement, the Cap will help create and sustain viable communities. The benefits from this will flow through into social outcomes such as employment, schools and community welfare and cohesion.
48. The Cap also provides a mechanism whereby disputes and tensions over resource scarcity, between community groups within the Basin and divisions between country and city Australians, can be managed and resolved in an orderly way.
49. By slowing degradation of the riverine environment, the Cap reduces the loss of direct economic benefits attributable to this natural capital stock, ie., it helps preserve the direct economic benefits of tourism, commercial and recreational fishing, duck shooting and real estate amenity. It also reduces the costs of deteriorating water quality, blue green algal blooms and salinity.

Finally, the Cap helps preserve the riverine environment itself a special form of natural capital with high intrinsic value to most Australians.

**2 March 2000**

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# 1. INTRODUCTION

## 1.1. STUDY OBJECTIVES

A Cap on diversions from the Murray-Darling Basin (the Basin) river system was first introduced by the Ministerial Council in June 1995, in response to an Audit of water use across the Basin. This Cap was later confirmed as permanent with effect from 1 July 1997.

As part of this agreement, the Ministerial Council undertook to undertake a review of the operation of the Cap in the year 2000. This five year period, between the initial application of the temporary Cap and the year 2000, has allowed the Cap to begin to “bed-down” and trends in the long-run effect of the Cap are beginning to emerge.

The objective of the overall Review of the Operation of the Cap is to establish a sustainable resource management outcome which achieves the optimal outcomes and balance between the three objectives of:

- economic activity;
- social aspirations; and
- ecological outcomes.

The review will help identify whether the Cap could be operated in a way which more closely approximates to an optimal balance between these three objectives.

The five-year Review of the Operation of the Cap comprises four discrete assessments. These separate assessments relate to the:

- ecological sustainability of rivers;
- equity aspects of the application of a Cap;
- levels of implementation and compliance with the Cap; and
- economic and social consequences of the application of a Cap.

This consultancy is concerned with the last task, ie., to:

- establish a clear framework/paradigm for assessing the social and economic impacts;
- review the aggregate social and economic impacts of the operation of the Cap on diversions from the Murray-Darling Basin river system;
- identify and describe the benefits and costs on different groups of enterprises, valleys and irrigation systems and resulting equity issues; and
- assess the implications for the agricultural economy.

The consultancy brief envisaged the report as a desk review of relevant work completed or underway, primarily sourced from the major submissions to be received from partner governments, the Community Advisory Committee (CAC) and other stakeholders across the Basin.

However, the submissions from partner governments, received in early December 1999, were not as comprehensive and substantial as envisaged. The submission from the CAC was supported by a significant number of direct submissions to the MDBC from irrigators and community groups, including catchment management committees and water user associations. Of the 25 direct submissions to the review on economic and social impacts, 24 were from NSW organisations. Attachment A provides a listing of the submissions made to the review of economic and social impacts, both via the CAC and direct to the MDBC.

At an early stage we therefore sought further assistance and advice from the partner governments and other stakeholders in the assembly of a comprehensive reference list of relevant articles, reports, research and consulting studies. Attachment B provides a listing of the references referred to in this review.

## **1.2. CAP OBJECTIVES AND DEFINITION**

The objective of introducing the Cap on diversions was to:

- maintain and, where appropriate, improve existing flow regimes in the waterways of the Murray-Darling Basin to protect and enhance the riverine environment; and
- achieve sustainable consumptive use by developing and managing Basin water resources to meet ecological, commercial and social needs.

The MDBMC in its review of Cap implementation for 1998/99 summarised the Cap in the following words.

*“The introduction of the Cap was seen as an essential first step in establishing management systems to achieve healthy rivers and sustainable consumptive uses. In other words, the Council determined that a balance needed to be struck between the significant economic and social benefits that have been obtained from the development of the Basin's water resources on the one hand, and the environmental uses of water in the rivers on the other.”<sup>7</sup>*

The Cap has signalled approaching resource constraints by bringing forward the time at which they will impact and providing a formal framework for sharing the benefits and costs of that limited resource.

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<sup>7</sup> Murray-Darling Basin Ministerial Council (1996), “Setting the Cap, Report of the Independent Audit Group”, p.vi.

It is clear that the Cap was not intended to be an end in itself:

*“The Cap per se, is only a means to an end. It is not the end in itself. The IAG [Independent Audit Group] recognises that the overall objectives can be achieved only by identifying environmental water requirements and flow regimes and by establishing a supporting management and institutional framework, including trading of water.”<sup>8</sup>*

As the Commonwealth submission states:

*“When the Cap was introduced in 1995, it was intended to be a first step towards striking a balance between in-stream and consumptive use by limiting growth on diversions...Formal determination of water allocations, including water for the environment as a legitimate user of water, is the long-term mechanism by which the balance between consumptive and in-stream uses are to be achieved.”<sup>9</sup>*

The agreed mechanism is to limit diversions in each of the 22 valleys/systems to 1993/94 levels of development. The Ministerial Council agreed that the Cap be defined as:

*“The volume of water that would have been diverted under 1993/94 levels of development. In unregulated rivers this Cap may be expressed as an end-of-valley flow regime.”*

*Diversion at 1993/94 levels of development does not mean the volume of water that was used in 1993/94. Rather, the Cap in any year is the volume of water that would have been used with the infrastructure (pumps, dams, channels, areas developed for irrigation, management rules, etc.) that existed in 1993/94, assuming similar climatic and hydrologic conditions to those experienced in the year in question. Thus, the Cap provides scope for greater water use in certain years and lower use in other years.<sup>10</sup>*

This definition, therefore, does not define the Cap as a specified volumetric limit which will apply in every year. It allows for fluctuations in diversions to take account of variations in climatic conditions, provided that, in the longer term, the level of diversions does not increase.

*This has been the way the Cap has been applied, with small variations, in New South Wales, Victoria and South Australia (who between them*

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<sup>8</sup> *ibid*, p viii.

<sup>9</sup> Commonwealth (1999) Submission.

<sup>10</sup> Close, A.F., and McLeod, A.J. (2000) “The Cap as Public Policy in Natural Resource Sharing” Xth World Water Congress, Melbourne, 12-17 March, pp. 8.

*extract 95 % of the water diverted in the Basin). In Queensland and the Australian Capital Territory (total of 5% of Basin diversions), the final details of the Cap are yet to be determined.<sup>11</sup>*

Implementation of the Cap is a State responsibility with considerable variation occurring between the States. The method by which compliance is achieved is a matter for each state but all states have chosen to recognise prior rights rather than history of use and to ensure compliance primarily by reducing announced allocation levels.

*The Cap itself does not attempt to reduce Basin diversions, merely prevent them from increasing. New developments are possible under the Cap provided that the water for them is obtained by improving water use efficiency or by purchasing water from existing developments".<sup>12</sup>*

### **1.3. BASIS FOR COMPARISON**

There are two main steps to assess the effects of a policy change such as the announcement of a Cap on diversions

The first is simply descriptive, detailing the changes between the pre-Cap and post-Cap situation. A good descriptive analysis requires access to comprehensive and robust information to establish the facts and the main changes.<sup>13</sup> A good description, however, does not necessarily distinguish the role of the Cap from the many other factors affecting economic and social behaviour in the Basin. A further step is required.

The second step is to attempt to separate out the impact of the Cap from the wide range of other factors. This is the familiar approach used in benefit cost analyses.

Conceptual clarity is best achieved by first specifying, and then comparing, the With Cap and No Cap situations/scenarios. The With Cap situation is observable and can be described based on a comprehensive collation of available information. The No Cap scenario is more difficult. Desirably, it should be derived independently of the With Cap scenario.

Such a comparison can be undertaken from a summary, all encompassing perspective or through an item-by-item comparison of the With and No Cap scenarios. Extreme care must be taken in any such comparisons to avoid double counting and the failure

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<sup>11</sup> *ibid*, p. 4.

<sup>12</sup> *ibid*, p. 8.

<sup>13</sup> An early insight of this review is as to the paucity of the data which is available on most aspects of the economic and social impacts of the Cap and the need for the MDBC and partner governments to collect and analyse further information.

to acknowledge offsetting impacts. This is particularly relevant when evaluating the impact of the Cap since the benefit to one irrigator community will be offset to some degree by costs to another and, probably, to the environment.<sup>14</sup>

### The Benefit Cost Paradigm

The main paradigm which underpins standard project appraisals is that of the benefit cost analysis (CBA). This standard framework needs to be extended when dealing with major environmental issues in order to recognise and incorporate the principles which underpin the concept of ecological sustainable development, ie.:

- **the sustainability principle** which recognises that the resource base and environment does not exist purely for financial benefit and that there is a responsibility to pass the resource and environment base intact from one generation to another. The sustainability principle is therefore closely intertwined with the principle of intergenerational equity, ie. the next generations should have access to at least the same resource base as the previous generation.<sup>15</sup>

It follows that the need to sustain the resource base and environment is not an objective which must be justified in terms of net financial benefits, nor should the future of a major natural resource system be construed in terms of least cost outcomes. While the major rivers systems have been undeniably damaged, few Australians would wish the River to be operated as Murray Pipes Ltd. and Murray Drains Ltd;

- the principles of sustainability and intergenerational equity have important implications for the application of **discount rates** to derive discounted cash flows at present values. In a standard financial analysis, the rights of subsequent generations are essentially ignored and discount rates are applied to establish the value of future costs and benefits to the current generation at the current day;
- the intergenerational equity principle implies a distinction between natural capital and manmade capital. This cuts directly across the standard financial perspective and requires that zero or low discount rates be applied.<sup>16</sup> Intergenerational equity also recognises that natural resources and the environment are multifunctional and vast store houses of economic value. To treat some of these functions and services as if they had zero value is to seriously risk overuse and destruction of the natural capital asset. It is, therefore, vitally important that the environment is valued correctly and that these values are integrated into economic evaluations and policy decisions.

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<sup>14</sup> Several submissions to the Review identified the impact of the Cap to their local community, but few identified offsetting costs or benefits to other irrigator communities or to the riverine environment.

<sup>15</sup> Rawls J., (1972), "A Theory of Justice", Oxford University Press, Oxford.

<sup>16</sup> The discount rate applied to a particular development proposal should be lower or zero where natural capital is subject to irreversible or reversibility is uncertain; see Pearce and Turner (1990), The Economics of Natural Resources and the Environment, Harvester Wheat Sheaf.

A range of techniques have been developed over the last twenty years to provide an approach to placing a dollar value on environmental goods. These include contingent valuation and choice modelling, representing the distinction between revealed preference, stated preference etc.. In the water sector, there is also a growing appreciation of the real commercial value of non consumptive uses of water, such as tourism, fishing, duck-shooting etc. However, neither of these approaches ascribes any inherent value to the water itself; and

- inherent in the sustainability principle is the **precautionary principle** which states that where the total costs and benefits of a particular proposal or series of proposals are uncertain and there is risk of irreversible loss, then policy makers should err on the side of conservatism. The need for precaution is driven by information failure. Obviously, the sustainability principle would be violated if there were high and uncertain risks of catastrophic and irreversible loss.

These considerations require an extension of the standard benefit cost paradigm. They do not undermine it. The essential extension is to insert into the standard paradigm, the need to at least sustain, ie. hold constant or improve, the natural capital base.<sup>17</sup>

The benefit cost paradigm can be applied both to guide policy decisions and to evaluate their impacts. Many of the submissions to the review, made from community and catchment groups, argued strongly that until the socio-economics of the Cap and its implementation had been fully and publicly evaluated no change in policy should have occurred. The alternative of at least one partner government is that:

*“We’ve never tried to justify our reforms by benefit cost analyses or from social impacts. This is because we see the issues as a matter of rights - We don’t believe that rights should be altered just because the benefit cost ratio is positive or negative. But we do believe that rights are a tiered hierarchy as a result of security and maturity of development - and that we have a responsibility to ensure that when rights are changed that this occurs in an orderly and transparent way.”<sup>18</sup>*

Use of the benefit cost paradigm does not imply that the impacts of the Cap can, or need to be, described in terms of the net present value of dollar benefits and costs. (Indeed, as outlined above, this will be rarely achievable when dealing with issues of resource sustainability and the avoidance of catastrophic and irreversible losses.) Rather, the approach to be adopted here is to identify, describe and, where possible, indicate the order of magnitude of the benefits and costs associated with the announcement and implementation of the Cap.

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<sup>17</sup> Pearce D.W., Barbier E.B., Markandya A. (1988), “Sustainable Development and Cost Benefit Analysis”, International Institute for Environment and Development/UCL London Environmental Economics Centre.

<sup>18</sup> *pers. comm.*, Victorian Department of Natural Resources and Environment, February 2000.

#### **1.4. STRUCTURE OF REPORT**

Chapter 2 provides background information on economic activity, water use and the development of trading within the Basin. It also explores the range of factors which impact on farming enterprises and communities and recognises the difficulties in distinguishing those outcomes which can be attributed solely to the impact of the Cap. This sets the Cap in the context of the wider reform agenda implemented by partner Governments across the Basin to respond to increasing resource scarcity which is outlined in Chapter 3.

Chapter 4 specifies the No Cap scenario. A critical choice is whether the specification of the No Cap scenario should be based on a full development scenario which assumes the absence of environmental flows, or on a full development scenario in the presence of environmental flow requirements. In either case it is necessary to analyse the full development scenario as a process of development, rather than simply as an end point.

Assessment of the impacts brought about by the introduction of the Cap are identified in Chapter 5. We examine the impacts which the Cap has had on yield and security and, therefore, on the agricultural economy. The effects of changes in security on water-use-efficiency and water-trading are also addressed, together with the equity issues associated with the introduction of the Cap. The chapter also examines the social and environmental impacts of the Cap.

## **2. ECONOMIC ACTIVITY AND WATER USE IN THE BASIN**

The Murray-Darling Basin is defined geographically by its rivers and economically by irrigated agriculture. The changes to water management policies and water use associated with the Cap must, therefore, be seen in context.

Accordingly, this Chapter provides a descriptive overview of the Basin, its productive output and contribution to the Australian economy. The Chapter outlines the increasing development in water use which has taken place and the implications for water trading. Finally it identifies that farming across the Basin has been subject to powerful forces which have driven and continue to drive major changes in farming practice.

### **2.1. ECONOMIC & SOCIAL ACTIVITY**

The Basin is home to 1.9 million people with over half living in small country towns and a significant proportion on farms. The Basin contains Australia's major inland urban centres, the largest of which are Canberra-Queanbeyan, Toowoomba, Bendigo, Albury-Wodonga and Wagga Wagga. Another million people who live elsewhere are dependent on the waters of the Basin. The River Murray is a major source of water for around one and a quarter million people living outside of the Basin in South Australia. The significance of the Basin extends well beyond its catchment boundaries and some towns and many agricultural and industrial enterprises would not exist without the waters of the Basin.

### **2.2. AGRICULTURE AND OTHER INDUSTRIES OF THE BASIN**

The Basin contains 42 per cent of all Australian farms and produces wool, wheat, sheep, cotton, rice, vegetables, dairy produce, wine, fruit and oil seed. Half of Australia's crop land and sheep, and a quarter of the beef and dairy cattle are located in the Basin. The Basin also holds three-quarters of the nation's irrigated agriculture producing 90 per cent of Australia's irrigated crops. The Basin contributed to approximately 40 per cent (or \$22.8 billion) of the total exports of Australia's agricultural production in 1997/98.

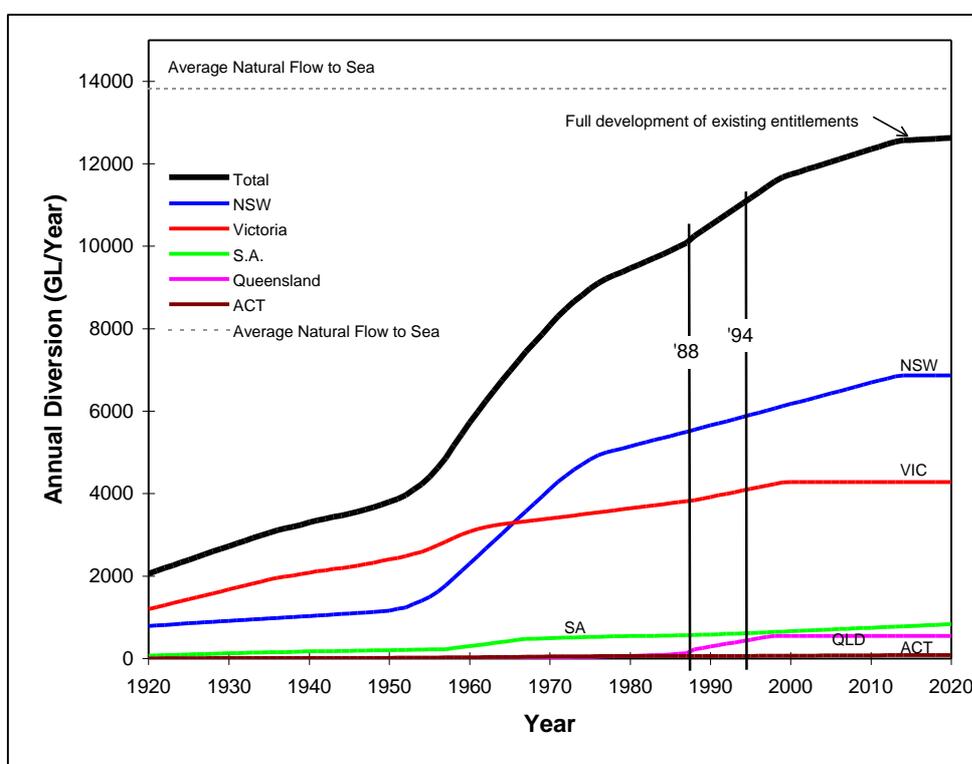
The Basin also has a significant manufacturing industry with ABS data indicating that there were some 3,280 manufacturing locations employing over 62,400 people, with a turnover producing 6.4 per cent of the Australian total in 1991/92. By far the biggest sector is food, beverages and tobacco, in which the Basin accounts for 17.2 per cent of the Australian total. The Basin also accounts for 16.8 per cent of the total Australian production of textiles. Other important industries in the Basin include tourism and recreation contributing \$3.5 billion pa and mining which is valued at over \$1.5 billion pa. Many of these industries both support and depend on communities in their region

and on local agricultural production. A reliable and good quality water resource is fundamental to the long-term survival and sustainability of many of these industries.

### 2.3. WATER USE IN THE BASIN

Total water use in the Basin and its component valleys is now well documented as a result of the Audit of Water Use which led to the introduction of the Cap on diversions and are recorded in the annual reports from the Independent Audit Group.<sup>19</sup> The original audit provided a clear picture of the extent to which water previously flowing to the river mouth was diverted overwhelmingly for the purposes of irrigated agriculture.

CHART 2.1 GROWTH IN DIVERSIONS ACROSS THE BASIN



Source: Murray-Darling Basin Ministerial Council (1995), "An Audit of Water Use in the Murray-Darling Basin", page 13.

<sup>19</sup> Murray-Darling Basin Ministerial Council (1995), "An Audit of Water Use in the Murray-Darling Basin".

Salient features of water use in the Basin include:

- the substantial addition to the value of agricultural production achieved by irrigated agriculture in comparison with the opportunities available to traditional dryland farming and the further scope to shift irrigated production into high value water uses with consequent benefits to the Basin's economy and communities;
- the different pattern of irrigated crop and enterprise types across valleys within each State. Within NSW, cotton is the dominant enterprise in all the northern valleys with rice playing a major role in the southern systems. The Lachlan retains a broader mix of crop type and obtains less benefit from irrigation (Chart 2.2);

**CHART 2.2 : VALUE OF IRRIGATED OUTPUT BY NSW CATCHMENT, 1997**

CATCHMENT	VALUE \$M	% OF AG OUTPUT	MAJOR CROPS & % OF IRRIGATED VALUE
Border (inc. Qld)	271.3	33	Cotton, 62%
Darling	74.4	37	Cotton, 79%
Gwydir	245.1	41	Cotton, 90%
Namoi	292.2	30	Cotton, 83%
Macquarie	263.1	22	Cotton, 42%
Lachlan	165.3	17	Grain, 29%, canola, 17%, fruit, 14%, livestock 16%
Murray	388.8	40	Rice 44%, grapes, 12%, fruit 11%
Murrumbidgee	475.7	42	Fruit 27%, rice 26%

Source: NSW Irrigators Council, from ABS Agricultural Census, March 1997.

- the different pattern of irrigated crop and enterprise types across the four States reflecting primarily the different policies of the State Governments towards development and security.

In South Australia, where horticultural crops predominate, entitlements are effectively 100% secure. In Victoria, irrigator entitlements are divided into water rights which are very secure and less secure 'sales water'. Complementary to the more conservative policies of the two southern States, NSW has promoted more opportunistic water use. Queensland's policies have developed to serve an expanding irrigated sector, where there is considerable reliance on water harvesting for irrigated cotton growing, largely outside the licensing controls of the current legislation. Recent proposals will create a more structured and comprehensive regime;

- reflecting these policies, NSW diversions accounted for some 57% of total diversions within the Basin during the Audit period (1989 to 1994). NSW allocation and development strategies have been to take advantage of the unused

water available in most years. The advantages of such a strategy are enhanced by the more conservative policies adopted, particularly by Victoria. This complementarity is evidenced both by different crop enterprise types and the much higher diversions recorded by NSW compared to that State's entitlement under the Murray-Darling Basin Agreement. Whereas NSW and Victoria are each entitled to 50% of water remaining in the Murray after the South Australian guarantee amount has been supplied, NSW took 53% of total diversions in the audit period compared with 47% for Victoria;

- the very rapid growth of diversions between 1988 and 1994 and the consequent effects on river flows, particularly in the lower reaches.

*“Water taken out of the rivers and streams of the Murray-Darling Basin has grown to over 10,000 GL a year, or 80% of the water that used to flow out of the mouth before irrigation began;”<sup>20</sup>*

- the continuing decline in river health including increasing salinity, growing frequency of algal blooms, the declining biodiversity in the riverine corridor and the decreasing frequency of beneficial flooding of the floodplain and ephemeral streams – all as a result of the increasing demand for water from the system.

*“This has reduced the bottom end of the Murray to a pond for most of the time. Stress on the riverine environment has showed up in rising salinity, more algal blooms, a reduction in native animal and plant life, and contraction of redgum forests and other wetland habitats.”<sup>21</sup>;*

- the rapidly approaching date of full development of the water resources available for consumptive uses, the resulting reduction in system reliability and the need to anticipate how the gains from existing water use and the pain of resource scarcity should be shared.

*“It is worth noting that most irrigators’ perceptions of their rights are based on their experience over the last two or three decades, when resources have generally not been constrained.*

*“Looking back over the types of weather patterns that have occurred over the last 100 years has been a salutary experience, and has reinforced the urgency of bringing the growth in water use to a halt.”;<sup>22</sup>*

- the dramatic growth in water trade since 1994/95, especially in the temporary, (ie., leasehold) market within the southern systems. This growth was stimulated by a combination of factors including increased resource scarcity, a reduction in

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<sup>20</sup> Murray Water Entitlement Committee (1997), “Sharing the Murray”, Proposal for defining people's entitlements to Victoria's water from the Murray, October.

<sup>21</sup> *ibid*

<sup>22</sup> *ibid*

announced allocations as a result of the recognition of the property rights of sleepers and dozers in the water market, and possibly the announcement of the Cap; and

- the ability to access the water market varies markedly across the Basin with much greater opportunities in the inter-linked southern systems than in northern systems or in unregulated rivers where trading rules and environmental flow regimes are less well established.

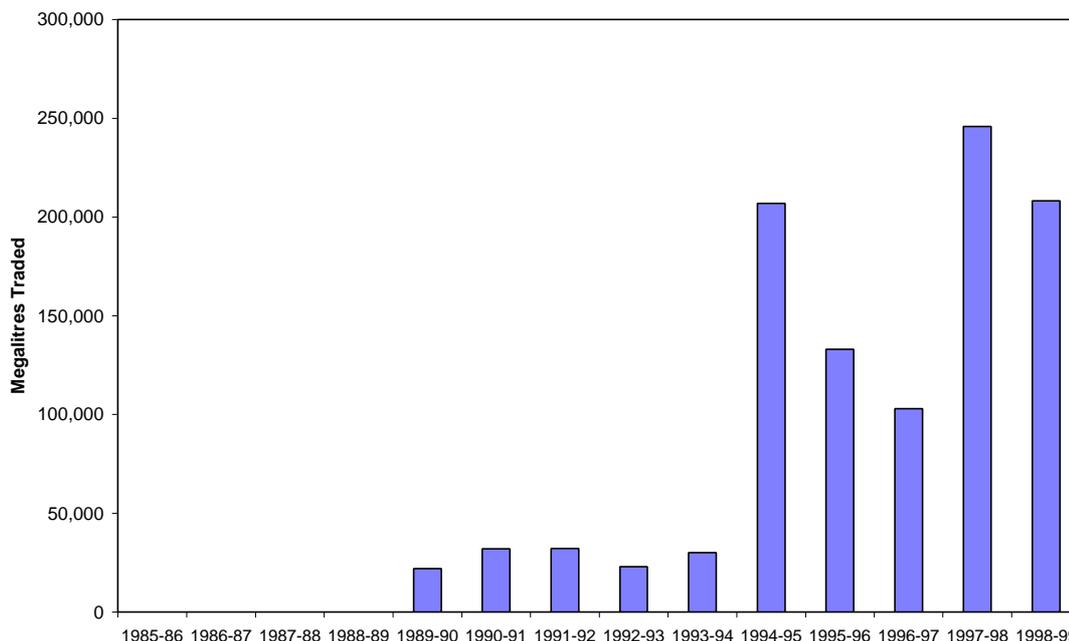
#### **2.4. DEVELOPMENT OF WATER TRADING**

The volume of water traded in the Basin has exploded since the 1994/95 season. For instance, the volume of water traded in the Goulburn-Murray system since 1994/95 onwards has been seven times greater than the volumes traded in the preceding five years (Chart 2.3).

The period since the Cap has also seen the development of interstate trade in water. This has been facilitated by the pilot interstate water trading project which was approved by the Ministerial Council in November 1997. During the 1998/99 financial year there were twenty trades totaling 3,546 ML – with trades almost universally downstream from NSW to SA. The volumes concerned are still very small in comparison to the volumes involved in intra-state trade.

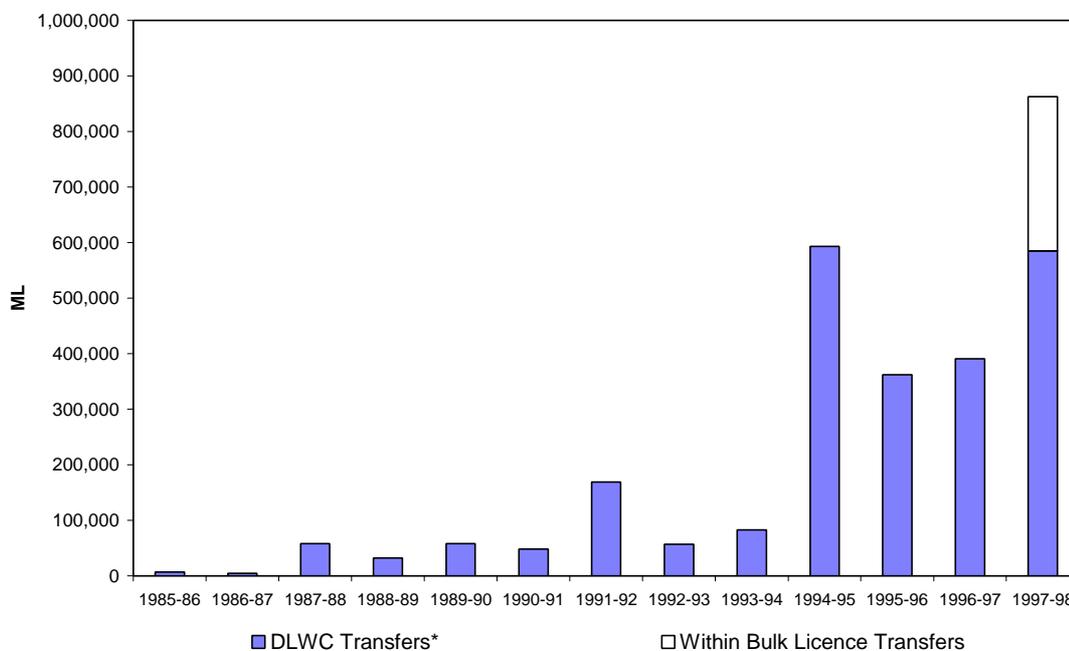
This section provides an initial description of the changes in water trading which have taken place over the Cap period. Section 5.4 then provides an in-depth analysis of the relationship between the Cap, increasing resource scarcity and water trade.

**CHART 2.3 : WATER TRADING : GOULBURN-MURRAY WATER TEMPORARY TRANSFERS**



Similar dramatic increases in the volume of water traded from 1994-95 onwards have also occurred in New South Wales<sup>23</sup> (Chart 2.4).

**CHART 2.4 : GROWTH IN WATER TRADING IN NSW, 1985-86 TO 1997-98**



<sup>23</sup> Marsden Jacob Associates (1999), "Water Trading Development and Monitoring", report prepared for the NSW Department of Land and Water Conservation, Chart 3.4, p. 3.7.

During the 1997-98 irrigation season, some 863,145 ML<sup>24</sup> of water was traded in NSW, comprising 832,149 ML of sales within the State, 16,282 ML of purchases from Victoria and South Australia and 14,714 ML of sales to those States. Total sales (intrastate trade and exports of water) represented 11% of the total water entitlement.

This trade occurred solely within the regulated river systems. The partial information available on the volume of water traded in previous years suggests that the volume of trade has increased over thirteenfold since the 1988/89 season, with most of this increase occurring since 1993/94. Indeed, the volume of water traded in NSW between licence holders rose 50% between 1996/97 and 1997/98, to reach 585,091 ML.

Across the Basin, the great bulk of water transferred is through temporary transfers. For instance, in NSW more than 95% of the 863 GL of water traded in the 1997-98 season occurred as temporary trade. In comparison, permanent trades in the same year were 39 GL.

The growth in temporary trade in NSW and Victoria, since 1994, has been driven by a series of factors:

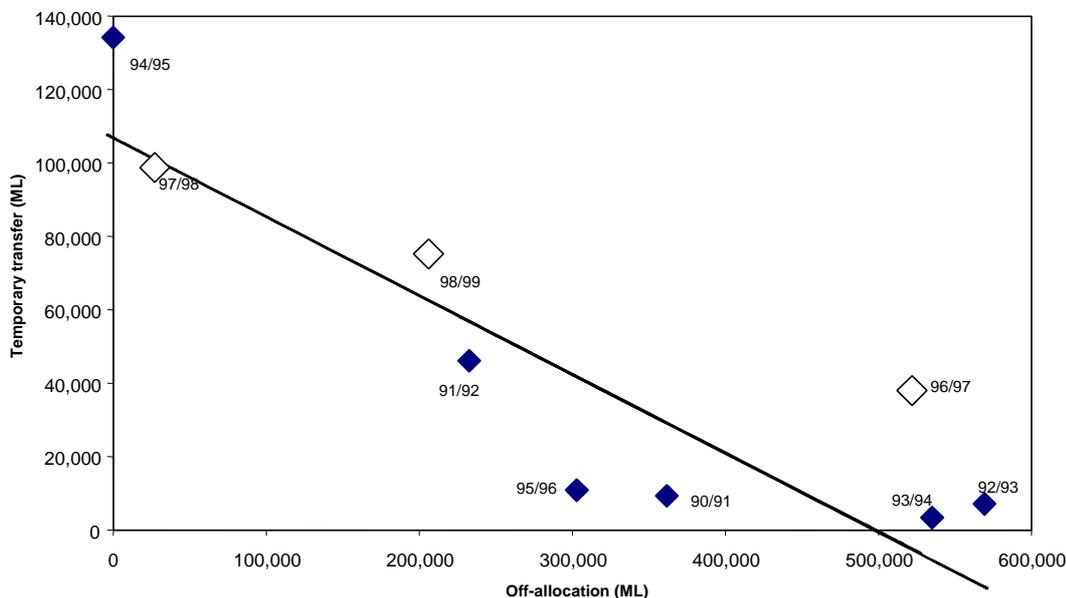
- the reduction in the level of announced allocations, and access to off-allocation water;
- resource scarcity at the end of an El Niño sequence;
- a reduction in the availability of unused water, through the activation of sleeper and dozer licences (stimulated by trading opportunities); and
- the announcement of the Cap on diversions.

The level of announced allocations and off-allocation flows appears to be the most powerful driver of temporary trade (Charts 2.5 and 2.6).

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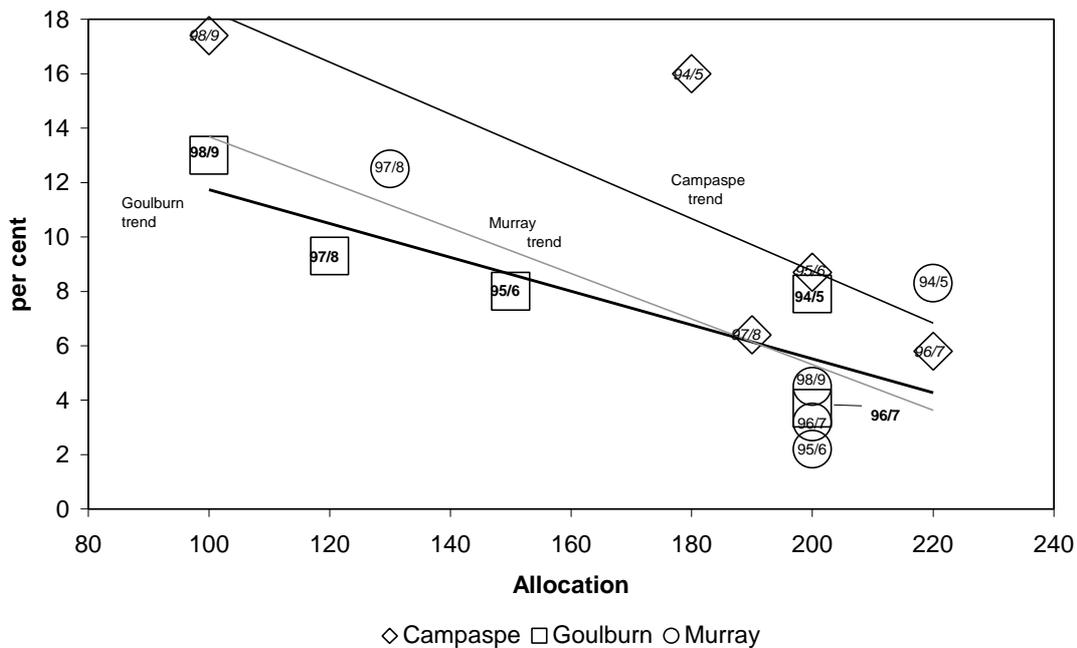
<sup>24</sup> Trading includes transfers between landholders in Murray Irrigation, Murrumbidgee Irrigation, Coleambally Irrigation, Western Murray Irrigation and Jemalong Irrigation; transfers between licence holders recorded by DLWC in NSW; and transfers between licence holders in NSW and organisations in Victoria and South Australia.

**CHART 2.5 : TRADING VOLUMES, OFF-ALLOCATION AND THE IMPACT OF THE CAP (MURRAY IRRIGATION)**



This shows that the volume of trade increases as the level of off-allocation decreases.

**CHART 2.6: VOLUME OF WATER TEMPORARILY TRADED AS A PROPORTION OF TOTAL WATER USE (NORTHERN VICTORIA)**



In northern Victoria, lower allocations has increased the pressure for greater temporary trade.

## 2.5. FACTORS IMPACTING ON AGRICULTURE

A major suite of factors has impacted on farming over the past decade across Australia. Key elements include:

- changes in international commodity prices. Australia is a price taker, rather than a price maker in many of its export markets for agricultural products. This exposes it to risk from movements in international commodity prices, eg:

*“higher production in most States is partly offsetting the effects of lower export prices for key farm commodities such as wheat, canola, sugar and cotton.”<sup>25</sup>*

- a long-term downward trend in farmers’ terms of trade (ie, the ratio of prices received to prices paid). In the mid 1950s this ratio was four times higher than it is today;<sup>26</sup>
- exchange and interest rates;
- weather and droughts through the patterns of El Niño and La Niña and larger scale changes over the past eighty years.<sup>27,28</sup> The period since the Cap has seen a sequence of particularly dry years;
- environmental pressures: salinity, waterlogging, erosion, nutrient pollution:

*“Preliminary results for farms growing rice in the southern Murray-Darling Basin show that spatial patterns in farm productivity are consistent with a number of degradation problems in the area...These results suggest that there is a clear relationship between farm productivity and resource condition.”<sup>29</sup>*

- introduction of environmental flow rules;
- COAG: pricing reform, water allocations and water trading;
- industry de-regulation;
- changes in consumption and demographic changes;
- pressures for productivity and efficiency improvements; and
- moves to corporatised and mechanised farming.

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<sup>25</sup> ABARE (1999), “Australian Commodities, Forecasts and Issues”, December Quarter

<sup>26</sup> Productivity Commission (1999), “Impact of Competition Policy Reforms on Rural and Regional Australia”, Report No 8, September, p. xxvii.

<sup>27</sup> Hennessy, K., et al (1999), “Australian rainfall changes, 1910-1995”, CSIRO, Australian Meteorology Magazine, vol. 48, 1-13.

<sup>28</sup> Suppiah, R. and Hennessy, K., (1998), “Trends in total rainfall, heavy rain events and number of dry days in Australia, 1910-1990”, Int. Journal of Climatology, vol. 10, pp. 1141-1164.

<sup>29</sup> ABARE (1999), “Farm financial performance” paper by Stephen Beare at Outlook 99, vol. 2, pp 16-17.

The impact of these forces has been confirmed in the recent Productivity Commission report on Rural and Regional Australia:

*“ Forces affecting the fortunes of country Australia include:*

- *a downward trend in the world prices for agricultural and mineral commodities, which has been reflected in a decline in producers’ terms of trade;*
- *technological advances, such as increased mechanisation of farming, agronomic developments, adoption of new mining techniques and improved telecommunications;*
- *changes in consumer tastes, such as the decline in the demand for wool and increased expenditure on tourism;*
- *changes in lifestyle, such as an increase in internal migration to coastal areas; and*
- *government policy changes, such as lowering trade barriers, deregulating the financial system and increased regulation to protect the environment.”*

*In response to these longer term forces, increases in agricultural productivity have resulted in fewer, but larger, farms.”*<sup>30</sup>

The Productivity Commission Report also identified that there have been some marked shifts in the location of populations outside the capital cities. In country Australia there has been a movement to ‘sponge cities’, ie., provincial centres which have grown largely at the expense of their surrounding districts. Good examples of these in the Basin, include Dubbo, Wagga Wagga, Albury-Wodonga and Mildura.<sup>31</sup>

Current socio-demographic information on rural Australia, including the Basin, paints a picture of people experiencing some social disadvantage and having to make individual, family and community adjustments which together add up to major structural change. Across Australia the overall picture is one of:

- continuing demands for increased productivity to respond to cost pressures from declining terms of trade;
- stable or declining rural populations; and
- increase in average age for active farmers.

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<sup>30</sup> Productivity Commission (1999), “Impact of Competition Policy Reforms on Rural and Regional Australia”, Report No 8, September.

<sup>31</sup> *ibid* p. 27.

The Basin has faced many of the same pressures. It is important, however, to recognise the areas where irrigated agriculture in the Basin differs:

- it faces different commodity price trends – with a greater potential for irrigators to move into higher value products such as horticulture or to exit farming through realising the value of their water entitlement;
- it faces clearer resource definition than other non-irrigated areas;
- it is subject to environmental degradation and adverse impacts which are more apparent and extreme than many dryland enterprises; and
- it has experienced differential rises in key input costs, such as government charges for water.

The following pointers from the Bureau of Rural Sciences' *Country matters: Social atlas of rural and regional Australia, 1999*, highlight some features of the changes and pressures which the Basin's population has faced over the past ten years.

- average age is increasing with an overall 10-20% increase in people 65 years or older in most Statistical Local Areas (SLAs) over the period 1991-96;
- median age of farm managers in the Basin is generally 43 years old or more and increased over the period 1991-96;
- population is decreasing overall (many SLAs in the Basin showed either a 0-5% or a 5-20% decrease in population over the period 1991-96) – the only major exception relates to indigenous people, whose population increased by up to 20% in some SLAs over the same period;
- there is net out-migration of youth (most SLAs showed losses in the proportion of the population aged 15-24 years over the period 1991-96) – the only gains tended to be in areas where there are tertiary education institutions;
- unemployment rates in 1996 are generally above those of metropolitan areas by up to 40% in some SLAs;
- employment in agricultural industries is generally declining (the percentage decline in employment in this sector was between 0 and 20% or greater in most SLAs between 1991 and 1996) – this is seen as being part of a long-term pattern of structural change in the Australian economy in which technological improvements are lessening the need for human labour;
- generally an increasing percentage of the population is employed in service industries and in manufacturing (percentage increase in employment in these sectors varied between 0% and 20% or greater in most SLAs between 1991 and 1996); and
- mean taxable incomes in the Basin are generally below those in metropolitan areas (by up to 20% in some SLAs).

These aggregate trends mask significant variations between regions, industries and individual farms, according to a whole range of environmental, financial and social factors. For example, in the rice, cotton and wheat growing industries, the age of the grower operator is showing a consistent downward trend, whereas in the wool industry the average age of farmers is rising and is now well above sixty.

This analysis applies more widely to the overall review of economic and social impacts where the assessment has identified widely differing outcomes for different groups, regions and types of enterprise.

It should be noted that the majority of the data in the Bureau's report extends only up to 1996 and therefore will not capture many of the more recent impacts of the Cap and related water reforms. The forthcoming census in 2001 will provide an invaluable opportunity for member States to source key data to enable a more comprehensive assessment of the Cap to be undertaken.

A recommendation from the review is that full opportunity should be taken of the 2001 census to develop a data base which will allow key issues from the overall review of the Operation of the Cap to be analysed further.

## 2.6. PRODUCTIVITY AND FARM ECONOMICS

As we have seen there are strong pressures across Australia to drive change in agriculture in the same way as the rest of the economy:

- pressure to reduce labour costs;
- the need to increase productivity;
- a trend to an increase in farm size;
- an increase in capitalisation; and
- shifts in crop type.

This has seen the traditional one family farm being transformed with an inexorable drive towards larger, more professionally managed enterprises with increased use of labour and contract services. This is particularly true of the irrigated sector.

The opportunities available for meeting these pressures in each sector differ and so do the strategies available for implementing structural change and adjustment. In many cases higher productivity has been the pre-requisite to continued business existence – not a route to increased profitability.

- **Dairy:** the main route to increased productivity has been an increase in the size of the production unit. This movement has been particularly noted with the aggregation of farms in northern Victoria although there is also some movement to the creation of greenfield dairy enterprises in southern NSW.

Productivity is driven by increasing the area of permanent pasture subject to irrigation. This change has been dependent on water trading. There is a limit to size of a farm which can be run by one family, normally estimated at a maximum of 200 cows. Beyond this size there is a move from the individual dairy farmer (plus son or brother) to employing 1 labour unit per 100 additional cows. Dairying has also provided the maximum opportunity for industries with added value.

Future levels of investment and output are uncertain with the phasing out of the Domestic Market Support Scheme for manufactured milk by the end of June 2000 and further de-regulation of farmgate pricing and supply of market milk. However, dairy farms within the Basin should retain a competitive advantage over dryland dairy farms given their relative financial position and the continued growth in the export market for dairy products.

- **Rice:** there has been significant growth in the total area under cultivation over the past twenty years. This has centred on the southern valleys of NSW and is most notable in the Murray, which overtook Murrumbidgee in output in 1990. Overall production in NSW has increased from an average of 600,000 tonnes pa in the early 1980s to the figure of 1.38 million tonnes recorded for 1989/99.<sup>32</sup> Future levels of rice production are forecast to decline from this high level in response to a fall in world prices.<sup>33</sup>

The main change in farming practice has been an increase in the size of the enterprise. This has required easy access to surplus water, initially from off-allocation supplies and more recently from the temporary trading market. This trade has not necessarily led to an increase in the gross margins from the water use – but has allowed an increase in total enterprise surplus.

- **Horticulture:** the term horticulture covers both permanent plantings such as citrus or vines on the one hand and annual cash crops such as vegetables on the other. Both have seen substantial growth in the period since the Cap and are the major success story of the irrigated sector. Permanent horticulture requires considerable certainty and security in its future water allocation. They have been the main purchasers in the permanent water market. Vegetable growers can be more opportunistic in their access to water markets.

The Australian wine industry, in particular, has grown dramatically over the past decade, with a 56% increase in the area under cultivation since 1996.<sup>34</sup> The industry is now predominantly export led and so will be increasingly exposed to world economic conditions. Once again a distinction has to be drawn between vineyards in the traditional irrigated areas around say Mildura and the Riverland,

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<sup>32</sup> Ricegrowers Association of Australia, Yanco Avenue (PO Box 561), Leeton, NSW 2705 .

<sup>33</sup> ABARE (1999), "Commodity Notes: Agriculture".

<sup>34</sup> ABARE (1999), "Australian Commodities", December Quarter, p. 635.

and new entrants in cooler climates in the southern highlands of NSW. The two sectors have experienced different impacts from the Cap with the new entrants often struggling to obtain water allocations in upper catchments due to tighter controls on new diversions and poorly defined trading rules for unregulated streams.

Horticulture has always employed more labour than other sectors as it is reliant on seasonal labour for picking etc. It is also more highly capital-intensive with average investment rates of between \$25-35,000 per hectare for vineyards or orchards. This sector has become an entry point both for corporate entities seeking to control the full value chain in the vertically integrated wine market, and also, at the other end of the spectrum, for small scale enterprises able to build up the scale of their output over time.

- **Cotton:** cotton production has nearly doubled in Australia over the last ten years, from 370 kt in 1990 to 716 kt in 1998/99.<sup>35</sup> The large majority is exported and so exposed to shifts in international commodity prices. The last five years has seen significant growth in production in southern Queensland and northern NSW valleys, including the upper Darling, and a gradual southwards expansion down into the Macquarie and, to a lesser extent the Lachlan, as new varieties become established.

Cotton now dominates all NSW valleys other than the Lachlan, Murrumbidgee and the Murray. This growth and movement has been dependent on the availability of water through trading. Cotton provides a far higher gross margin in these valleys (around \$300/ML) than the traditional mixed farming enterprises (\$70 to \$100/ML). However, water trades may involve a shift in the predominant flows from a winter/spring cycle to a summer flow.

The area of dryland cotton planted is forecast to drop over the coming seasons in response to lower prices and less favourable soil moisture. However, the area of irrigated cotton is forecast to remain largely unchanged as the returns relative to other crops remain attractive.<sup>36</sup> This demonstrates the relative robustness of the irrigated sector in the Basin over traditional dryland farming which is less resilient in markets exposed to commodity price effects.

Cotton is a family farm based enterprise, but it relies on large players supporting regional development and on personal entrepreneurs rather than government endorsement.

- **Mixed Farming:** the traditional mixed farm of livestock and cereals has found it less easy to find a route into higher productivity. This sector has therefore tended to fall behind – especially where faced by intractable environmental problems, and has given way to more specialised sectors identified above.

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<sup>35</sup> Cotton Australia, Level 2, 490 Crown St, Surrey Hills, NSW 2010.

<sup>36</sup> ABARE (1999), Australian Commodities, December Quarter, p. 624.

*“Success for Australian Farmers depends...on their ability to manage in a constantly changing business environment. Political, social and economic change impacts daily on the business environment and hence, individuals and communities. These changes, for the most part, are outside the control of any individual, business, or domestic government. To manage and succeed, individuals and businesses must be adaptable and adept at assessing and managing their risks.”<sup>37</sup>*

This review of irrigated agriculture in the Basin raises several important issues for the subsequent analysis of the Cap impacts:

- irrigated agriculture has demonstrated that it is a dynamic sector of the economy over the past ten years with evidence of major changes in crop type, farm size and practice, productivity and capitalisation, in response to external pressures;
- changes in water management and the Cap specifically are, therefore, clearly only one small subset of the wide range of factors which impact on farming;
- it will be difficult to disaggregate the impact of the Cap from other factors:  
*“...it is impossible to separate...the cumulative impacts that have flowed from the Cap, the introduction of the Environmental Flow Rules and the impact of the temporary transfer market.”<sup>38</sup>*
- the relative impact of the Cap is likely to be small in comparison with other factors, such as changes in commodity prices; however
- the Cap will be a focus of attention as it is a clearly identified factor which results from deliberate government action.

This Chapter has provided a snap-shot of key aspects of the Basin’s economy and social structure. It has emphasised the dynamic characteristics of farming within the Basin and has confirmed the increasingly active role of water trading as a response to resource scarcity. The overview therefore provides the context for an appreciation of the role and impact which the MDBC Cap has played since its announcement in 1995.

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<sup>37</sup> Commonwealth (1999) Submission.

<sup>38</sup> Murrumbidgee Irrigation Limited, MIA Council of Horticultural Associations and the Ricegrowers Association of Australia (1999) Joint Submission.

### **3. THE CAP : CONTEXT AND STATE RESPONSES**

To understand the impact of the Cap we must have a clear picture of precisely what the Cap does and does not involve. This chapter therefore provides an understanding of the context and objectives of the decision to introduce a Cap and the actions taken by partner governments to ensure compliance.

#### **3.1. ASSESSING THE ROLE OF THE CAP**

From one perspective, the Cap can be seen as just another element in an expanding suite of controls adopted by the States across the Basin, over a period of twenty-five years, reflecting a growing recognition of the increased scarcity of water as an essential resource.

An alternative perspective would cast the Cap as the essential precursor and stimulus for the decisions and controls which have been implemented since 1995.

It is clear that the formal MDBC Cap (which has a very specific timeline, definition and application) is in many ways just the focus of a broader commitment to “capping” which can be seen to have a longer history and wider application. While the political decision to Cap diversions was not formally made until 1996, the need to do so became evident several years before then (it was formalised by the Basin water audit). The bureaucratic processes were under way in many States to put a Cap in place well before the formal decision was made. Were that not the case, the political decision would not have been possible.

The following analysis adopts this wider definition of “capping”.

#### **3.2. PRE-CAP INITIATIVES**

This section provides a review of the controls and arrangements implemented by the different States prior to the introduction of the Cap. This allows an analysis of the extent to which the Cap can be seen merely as part of a continuum of developing arrangements or whether, in practice it triggered a far more rigorous suite of controls.

The specific policies and arrangements adopted by the different States pre-Cap were determined by a range of factors, including the history of development and the nature of the major irrigated sectors and crop types involved. Examples of these initiatives include:

- controls on overall diversions established in South Australia in 1968, due to the high security required for the permanent plantings;

- conversion of licences to a volume basis on the regulated rivers in NSW in the late 1970s and early 1980s, as part of the volumetric allocation schemes. This defined the entitlements of the individual irrigators and the relative availability of resources;
- cessation of dam building in the southern systems on completion of Dartmouth in the early 1980s. This reflected a recognition of the limitations of the remaining available flows and dam sites;
- actions in NSW, from the mid 1980s, to set water quality objectives for all waterways, which became part of the National Water Quality Management Strategy in the early 1990s;
- establishment of environmental flows for the Macquarie Marshes in 1986, as an early example of minimum environmental flow rules in regulated systems;
- introduction of the Water Act in Victoria in 1989. The objective of this Act was *“to promote the orderly, equitable and efficient use of water resources ...[and] to make sure that water resources are conserved and properly managed for sustainable use for the benefit of present and future Victorians.”*<sup>39</sup>
- the change, in 1989, from annual to continuous accounting for the allocation of diversions for Victoria and NSW from the Murray. Prior to this, NSW benefited each year from the conservative approach adopted by Victoria, as any water remaining in the dam at year end was shared equally between the two parties in the following year;
- decisions to cease awarding further entitlements in the regulated southern systems in the late 1980s in Victoria (when the last diversion licences were auctioned for the Loddon, Goulburn and Broken catchments) and in NSW from the early 1990s;
- confirmation of property rights in Victoria through Bulk Entitlements (BEs) under the Water Act. BEs for the Goulburn system, representing a third of Victoria’s water usage, were mostly issued in 1995, prior to the Cap. These BEs clearly delineated existing rights to water in terms of both volume and security;
- introduction of a moratorium on the issue of new licences within Queensland, in 1995; and
- introduction of the NSW water reform program in 1995 with the objective to better share the available water, enhance support to the rural sector and reshape how water management was delivered.

Overall there were a range of initiatives and controls in place across all States. However, these were uneven in their application both within States and across the Basin more widely. The decision to restrict the level of any further diversions was a

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<sup>39</sup> *Water Act 1989*, Victoria, Section 1.

major step-change in the degree of the control introduced, in the creation of a Basin-wide coordinated approach and in its focus on outcomes to be achieved rather than input controls.

This conclusion is reinforced through the following analysis of the controls implemented by each of the States, both pre and post Cap.

### **3.3. NEW SOUTH WALES RESPONSE TO CAP**

#### **Pre-Cap**

Prior to the formal announcement of the Cap, NSW established a suite of controls for water resource management covering both consumptive use and environmental objectives.

The flow rules for the Macquarie Marshes, which were first introduced in 1986, are an example of early implementation of environmental flow rules. Equally, access rules have been in place since the early 1980s, with diversion licences on most regulated systems converted to a volumetric basis in the late 1970s and early 1980s.

However, the application of these rules was uneven and despite their application it became evident that the growth in diversions was unsustainable and, in some valleys, probably already beyond the level of environmental sustainability.

#### **Response to Cap**

The NSW Government, therefore, strongly supported the introduction of the Cap, as evidenced by the major program of water reforms introduced in 1995 and reinforced in 1997 and 1999.<sup>40</sup>

The 1995 reforms started the comprehensive process of developing river flow and water quality objectives for the State's waters and provided water for the environment in the Macquarie and Gwydir River systems. Institutional reforms included setting up the Healthy Rivers Commission and the Water Advisory Council and separating out responsibility for operation, regulation and licence management.

The 1997 reforms extended these initiatives identifying stressed unregulated rivers and involving local management committees in developing management plans for environmental flow rules.

The Cap is applied on a valley-by-valley basis with compliance assessed through computer simulation models of river flows.

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<sup>40</sup> NSW Water Reform Agenda (1995), Outlined in "Securing our Water Future" DLWC and the 1999 White Paper "A proposal for updated and consolidated water management legislation for New South Wales".

NSW's response to the Cap involves two major aspects:

- Access Rules which are the primary tool to ensure compliance with the Cap; and
- Environmental Flow Rules, which seek to achieve optimal environmental outcomes within the available water.

These are explored further below.

### **Access Rules**

Access rules were substantially strengthened to ensure Cap compliance. The primary mechanisms employed were:

- reduced announced allocation levels or limits;
- controls on off-allocation diversions: eg. either as a volumetric limit or raising 'commence-to-pump' levels or reduced rate of extraction limits; and
- changes in ownership and use of water through carryover and continuous accounting of water.

The following specific steps were taken in regulated systems to ensure Cap compliance:<sup>41</sup>

- from 1995, announced allocations were reduced to reflect the recognition that unused sleeper and dozer entitlements, in any year, could no longer be automatically re-allocated to high volume users, as the owners of those entitlements could now trade the unused allocation;
- announced allocations in the Murray and Murrumbidgee valleys have been limited, since 1995, to 100%, down from their previous 130% and 120% limits respectively;
- in some valleys (such as the Macquarie) off-allocation access has been refused, since 1997, to any licence holder without a previous history of use of off-allocation;
- off-allocation volumetric limits have been halved in both the Murray and Murrumbidgee valleys since 1997;
- high security licence holders have had no access to off-allocation flows since 1997;
- equally allowance to borrow from next year's resources has been eliminated or reduced since 1997 (with no waiving of this policy when the dam spills);

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<sup>41</sup> *pers. comm.* Kim Alvarez, DLWC, February 2000.

- carryover has been introduced to reduce the ‘use-it’ or ‘lose-it’ behaviour engendered by annual allocations. This policy has been introduced progressively across NSW from 1995; and
- late season trades have not been approved in some instances in order to reduce incentives for growth in diversions based on irrigating larger areas.

A parallel work program was initiated in 1998 to quantify and control unregulated usage:

- conversion of licences from an area-based to volumetric limits;
- embargoes on new entitlements;
- limitations on trade, especially in sleepers; and,
- restrictions on the growth in farm dams, with the introduction of the farm dams policy which ensures that 90% of runoff continues to reach the rivers.

### **Environmental Flow Rules**

With a Cap on diversions in place, enforced by access rules, it was possible for the first time to set realistic environmental (water quality and river flow) objectives for waterways and to introduce environmental flow rules to manage river flows so as to optimise environmental benefits. Environmental flow regimes have been determined for each valley to achieve specific environmental outcomes.

Decisions on these objectives are taken by locally based management committees which are best able to balance the competing objectives of consumptive and environmental outcomes. Any reduction on consumptive use is limited to a maximum of a 10% reduction in diversions to irrigators from Cap levels. These controls have been guaranteed for a period of five years to give additional security.

### **Integration**

Although the two sets of controls (access rules and environmental flow regimes) have different immediate objectives, both are designed to contribute towards delivery of the environmental objectives which the Cap has enabled NSW to set for the first time. Their implementation has been integrated to ensure effective coordination.

In some valleys, where historical usage has been relatively low, the Cap may ensure the minimum required for environmental flows. For most rivers, however, it has been evident that access controls, based on achieving the Cap, will not be sufficient to meet the river-flow and water-quality objectives required. In these circumstances additional controls have been introduced, through the access rules, to further reduce diversions, eg:

- end-of-system flows have been increased; and

- storage reserves have been increased, limiting annual allocations to allow for future environmental contingencies.

Equally, if the outcome of a valley's long-term model indicates that the present access rules, in combination with environmental flows and the irrigator behaviour, do not maintain diversions within the Cap, then adjustments are made to the access rules. This is an iterative process with the magnitude of the adjustment chosen so that the long-term diversions resulting from the change falls back within the long-term valley cap.

These rules and controls are still in the early stages of implementation. Environmental objectives for river systems were only agreed by the NSW Cabinet in mid 1999 and the access and flow rules are still being refined by the local River Management Committees. In practice, the process is only just beginning to take effect, as serious resource constraints in the southern systems have limited diversions over the past five years while full implementation has taken longer to achieve in some of the northern valleys.

The latest IAG report suggests that these controls are not yet fully effective in controlling diversions within Cap limits, especially on the Barwon Darling.

### **Summary**

The Cap provided a clear signal to stakeholders across the Basin that there was increasing resource scarcity, that previous arrangements were insufficient and that there was the political commitment to implement necessary controls.

Moreover, the Cap set a benchmark against which future regulation of diversions could be measured and resulted in a tightening of access rules and other measures to ensure Cap compliance. In turn, the policy initiatives facilitated the introduction of environmental flow rules to manage river flows to produce environmental benefits. Benefits attributable to the Cap therefore include advanced timing and wider scope of such initiatives, if not the initiatives themselves. As for Victoria, the Cap has had strong publicity effects and promoted trade and hence resource use efficiency.

### 3.4. VICTORIA'S RESPONSE TO CAP

The MDBC Cap was a powerful agent for additional reforms in the water sector. The following are an indication of the actions undertaken by Victoria following its introduction:

#### Initial Actions

- within weeks there was a moratorium on diversions:
  - Victoria had not issued standard diversion licences in the northern systems since a final auction in February 1994. However it had still issued new winter-fill licences;
  - it now only issued new licences as a result of trade;
- new constraints were imposed on trade on unregulated systems:
  - trade was only allowed downstream & a 20% levy was imposed on all trades;
- no trade was allowed in sales water;
- 100% limit was imposed on sales allocations; and
- seasonal allocation policy was adjusted to ensure:
  - a higher reserve, and a higher utilisation factor.

#### Later Framework

Following extensive consultation summarised in the publication “Sharing the Murray”<sup>42</sup>, the Victorian Government in 1997 introduced a series of further reforms to make controls over diversions more effective. These included:

- constraint of trade in sales above 30%;
- limiting off-allocation to 20% of Water Right;
- tightening the allocation methodology for setting Urban Bulk Entitlements (BEs);
- introducing more rigorous criteria for setting BEs on the Murray than had been followed for the Goulburn/Broken catchment:
  - there was a greater community acceptance of the importance of recognising the needs of the environment eg as for the Barmah Millewa Forest,
  - entitlements for Urbans were far more restrictive,
  - the rules for over and under use were more stringent; and
- introducing bulk metering to FMIT to control and manage diversions.

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<sup>42</sup> Murray Water Entitlement Committee (2997), “Sharing the Murray – Proposal for defining people’s entitlements to Victoria’s water from the Murray”.

## **Summary**

The introduction of the Cap led to changes in Victorian rules on the issues of entitlements, seasonal allocations and water trading.

For instance, additional controls were included in the Murray BEs beyond those present in the Goulburn Broken BEs, which had been finalised prior to the Cap. Goulburn urban water users were allocated an entitlement based on the design capacity of their works (some 20% - 40% greater than past use) and at 99% reliability. In contrast, urban authorities on the Murray accepted an entitlement capped at past use, and at the same reliability as that of irrigators, ie 96% reliability.

The Cap has also had a powerful publicity or announcement effect. It was recognised as a high profile statement of future policy and practice. This stimulated change in perception across the range of water users and facilitated the introduction of more rigorous controls.

However, in practice, in the time period since 1996, the Cap has had little direct impact in Victoria because resource scarcity has acted as the primary constraint on development. The River Murray models do not yet have climate adjusted monitoring simulation. However, the frameworks and behaviour developed over this period will extend beyond the period of the drought.

The Cap can, therefore, be seen to have had benefits through:

- publicity value (acceptance of change and appreciation of the impact of your actions/ preferences on others);
- discipline value (better and clearer definition of agreements); and
- acceleration of outcomes.

### **3.5. SOUTH AUSTRALIA'S RESPONSE TO CAP**

Reflecting the predominant use of water for horticulture, SA has adopted a conservative and prudent approach to allocations and diversions. As it is located at the end of the Basin, SA is vulnerable to reductions in the volume and quality of its water resources as development occurs up-stream. Adelaide residents are particularly aware of their dependence on the Murray as their source of drinking water.

These concerns were critical in driving the commitment in the Murray-Darling Basin Agreement to guarantee SA minimum passing flows at the border of 1,850 GL.

## Pre-Cap

SA has had an effective limit on entitlements since 1968. This level has been reduced twice, since then, to ensure maintenance of a high level of security for irrigators.

The limit was set at the maximum level of entitlements, not at the level of use or diversion. On average, diversions have only represented 80% of those entitlements in any year. The level was set at the total volume which SA would take from the Murray, irrespective of rainfall, and with reference to the level of diversion which was environmentally sustainable during minimum drought flows (entitlements represent approximately 40% of minimum flows). During average to wet years a much higher volume is made available to the environment. Traditionally, SA has not made use of opportunistic, annual off-allocations.

Rehabilitation of irrigation areas also started at an earlier stage in SA than in other States and led to savings which were returned to the environment.

## Response to Cap

The SA Government was one of the key early proponents of the Cap. The paper from Minister Klunder to the Ministerial Council in June 1993 was a central stimulus for the Audit which led to the introduction of the Cap. This paper argued that “*there be no further regulation and diversion arrangements which would exacerbate deteriorating flow regimes*” throughout the Basin.<sup>43</sup>

SA, therefore, welcomed the introduction of the Cap as protecting its future resources and minimising risks from , for example, increased salinisation.

In negotiating the introduction of the Cap, SA argued that its future level of diversions should be set by reference to the limit of entitlements, not by reference to the actual level of diversions in 1993/94. This involved a potential increase in total diversions of 69 GL, over 1993/94 levels, if diversions increased to 90% of entitlement (approved by the Ministerial Council). SA also renounced any future access to above-entitlement flows as part of the negotiation over the Cap.

## Summary

Announcement of the Cap had little impact on existing water management procedures and practice, as SA had implemented an effective cap since 1968. Moreover, as the Cap was set at a level above 1994 levels of usage, it has not been an immediate constraint on diversions, having the potential to increase from an average of 80% pre-Cap to 90% post-Cap. Implementation of the Cap, however, has involved development and refinement of monitoring tools and climate adjusted models.

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<sup>43</sup> Klunder, J., (1993), “The changing demands for surface water in the Murray Darling Basin”, address to the MDBMC meeting in Melbourne, June.

### 3.6. QUEENSLAND RESPONSE TO CAP

Prior to the announcement of the Cap, Queensland had recognised the need for coordinated resource management controls:

*“The need for basin wide planning to support the management of water became evident in the Queensland section of the Murray-Darling Basin prior to the decision ...to introduce a Cap on water diversions ... Queensland had therefore effectively introduced its own cap in advance of the Murray-Darling decision in 1995.”<sup>44</sup>*

The major mechanism introduced by Queensland, pre-Cap, was a moratorium on the issue of new licences. However, this failed to place a restriction on future growth in diversions, as full activation of licence entitlement was allowed. Equally it had no effect on floodplain harvesting. The Cap, by distinction, focuses on the output to be achieved, ie no growth in total diversions.

Queensland’s approach to ensuring Cap compliance was based on:

*“Its Water Allocation Management Planning (WAMP) process to set end of river flow objectives based on limiting consumptive water use to sustainable levels.”<sup>45</sup>*

The IAG and Ministerial Council endorsed this approach in 1996, subject to independent audit of the results of the WAMP process. Queensland’s original compliance strategy was based on completion of the necessary WAMPs and Water Management Plans (WMPs) by 1997. In practice, progress has been slower than expected, due to the complexity of the catchment-wide models required, the hydrologic and scientific issues raised and the need to consult with community representatives and water-use stakeholders.

#### Major Actions

In late 1999, the Queensland Government adopted a streamlined WAMP process to reduce the time required to produce draft plans.

One of the intended outcomes of the WAMP process is to establish minimum performance measures for various types of water entitlements (Water Entitlement Security Objectives or WESOs) in each basin. WESOs will specify the minimum benchmarks of performance, either in terms of the monthly and/or annual reliabilities for regulated water allocations, or in terms of a range of simulated diversions (in days per year for various percentiles of years) for water harvesting entitlements.

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<sup>44</sup> Queensland (1999) Submission.

<sup>45</sup> Murray-Darling Basin Ministerial Council (1996), “Setting the Cap – Report of the Independent Audit Group”, p. vi.

Other initiatives include:

- confirmation of the moratorium on the issue of new licences, pending completion of the WAMPs, which will provide a framework for decisions on individual applications;
- abandonment of proposals to construct the Beardmore Dam Western Cell which would have provided additional water to the St George Irrigation Area. The reliability of allocations to farms in the area will be enhanced through the introduction of capacity sharing in the storage and an offer to buy back allocations;<sup>46</sup> and
- the joint Queensland and NSW report on the Border Rivers which establishes an outer envelope for flow management planning.<sup>47</sup> This makes two policy commitments:<sup>48</sup>
  - it establishes an end of flow regime for the rivers, at Mungindi, and commits to prevent any worsening of this flow, currently at 60% of natural mean annual flow;
  - it restricts any further increase in total diversions within regulated systems which feed into the main stem. In time this will reduce the average security of all licence holders as sleepers are progressively activated. Trading will provide a mechanism to minimise this impact. However, operational arrangements will take eighteen months to implement.

Coincident with these initiatives there has been:

- major growth in the harvesting of over-land flows and number and volume of off-stream storages. For instance, the IAG reports that harvesting in the upper Condamine is currently estimated at 120 GL compared to 44 GL in 1993/94.<sup>49</sup> This harvesting has the potential to impact on existing water allocations and on environmental values both within and outside the riverine environment;
- Growth in capacity of on-farm storages for both licensed water-harvesting and non-licensed overland flow diversions; and
- a negative trend in key flow statistics for the Border Rivers and other streams.<sup>50</sup>

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<sup>46</sup> Hon Rod Welford, MLA, letter to all holders of Nominal Allocation in the St George Irrigation Area and Project, 21 December 1999.

<sup>47</sup> DNR/DLWC (1999), "Border Rivers: Flow Management Planning – water use and flow performance."

<sup>48</sup> DNR (1999), "States Cooperate to protect Border Rivers", Press Release, 25 November.

<sup>49</sup> Murray-Darling Basin Ministerial Council (1999), "Review of Cap Implementation 1998/99 – Report of the Independent Audit Group", p. 25.

<sup>50</sup> DNR/DLWC (1999), "Border Rivers: Flow Management Planning – water use and flow performance."

The substantial expansion of diversions above 1993/94 levels does not constitute a breach of the Cap as Queensland's Cap is still to be determined following completion of the WAMPs. The increase in water-harvesting falls within the terms of the existing licences which specify the threshold flow, diversion rate and timing of diversions. In addition, the harvesting of overland flow is not currently subject to any of the State's allocation systems.

**New overarching legislation** will be in place, from later in 2000, in line with the recently published draft Water (Allocation and Management) Bill,<sup>51</sup> to provide a framework which should ensure adequate controls across the broad field of water allocation and management. The proposed new allocation system will provide a statutory basis for the WAMP process and provide controls for the harvesting of overland flows.

### Summary

The impact of the Cap, and related external audit and reporting mechanisms, has been to galvanise Government and landholder thinking on the need to advance and extend the WAMP and water management frameworks. On the other hand, it has also spurred some landholders to develop their water use to the maximum possible ahead of formal application of a Cap to diversions in Queensland catchments. As with other States, the Cap has had announcement benefits particularly in terms of providing a Basin-wide perspective on Queensland water management and development particularly the impact of Queensland developments on the security of entitlements on the Border Rivers and northern NSW and the impact on the security of Queensland entitlements.

### 3.7. ACT ACTIONS TO IMPLEMENT CAP

*“A formal Cap has yet to be determined for the ACT. It is expected that the ACT will shortly bring forward to the Council a proposal for a Cap covering the territory together with proposed management rules.”<sup>52</sup>*

Key issues to be addressed will include defining the entitlement for ACTEW and establishing rules for water trade with NSW.

<sup>51</sup> Queensland Water Reform Unit (1999), “Water (Allocation and Management) Bill”, Exposure Draft Bill and Explanatory Material.

<sup>52</sup> Murray-Darling Basin Ministerial Council (2000) “Review of the Operation of the Cap – Implementation and Compliance”, Report of the Independent Audit Group, p. 8.

### 3.8. SUMMARY

In summary, prior to the announcement of the decision to limit growth in diversions, individual governments had begun to change their water management policies. However, these initiatives were developed and implemented in an uneven way, with considerable variation both between and within States and with little recognition of Basin-wide implications. The initiatives compare powerfully with the coordinated suite of measures and controls now in place across most of the Basin.

The 1995 Audit of Water Use in the Basin was a watershed in terms of developing a common and agreed understanding of the issues of resource sustainability between member governments.

It identified and documented:

- the extremely rapid growth of diversions between the 1988 and 1994 seasons;
- the rapidly advancing limits to further growth;
- the dramatic decline in scarcity of access that would result under a No Cap/full development scenario in, say, the Victorian Murray;
- the continuing fall in end of river flows and the decline in the environmental health of the river system; and
- the need for co-ordinated basin-wide action.

The subsequent decision of the Ministerial Council signalled publicly the need for Basin-wide commitment to limit future growth in diversions.

Discussions with water managers in each State confirm that the formal announcement of the Cap galvanised thinking and effort to achieve better and sustainable outcomes.

Rather than seeing the Cap as just one step in a series of responses to increasing resource scarcity, the more appropriate perspective is that the Audit and the Cap were essential precursors of the suite of controls currently in place or being implemented by the individual States.

In simple terms the effects were :

- to strengthen and reinforce existing reform initiatives;
- to stimulate additional controls;
- to act as a benchmark for future regulation of diversions;
- to provide a Basin-wide framework and so coordinate actions between catchments and States; and
- to ensure compliance monitoring and publicity at the sub-state level.

## **4. NO CAP SCENARIO**

As noted, the impact of the Cap should be appropriately assessed by comparing the With Cap situation against the benchmark set by the No Cap scenario. This Chapter assesses the possible options for defining the No Cap scenario and sets out the preferred approach.

### **4.1. CHOICE OF NO CAP SCENARIO**

In terms of specifying the detail of the No Cap scenario, there are several choices. The most important of these concern the impact of the environmental flow regimes, particularly in NSW and the judgement made on whether these flow regimes would have been introduced in a timely manner in the absence of a Cap.

Our review of the State responses to the Cap and the preceding changes to water management indicates that while environmental flow regimes and water management plans were evident prior to the announcement of the Cap, that announcement stimulated and galvanised action in these areas. The result has been to initiate a much more comprehensive and integrated application of environmental flow and water management regimes.

The preferred No Cap scenario adopted for this review is “No Cap and the absence of environmental flows”. We note, however, that some environmental flows would have been established.

Within the preferred scenario of No Cap and the absence of environmental flows, there are several possible variants, but they do not alter the qualitative description of the No Cap scenario.

### **4.2. NO CAP IN THE ABSENCE OF ENVIRONMENTAL FLOWS**

The No Cap scenario would demonstrate the following characteristics:

- in the absence of the formal announcement of the Cap on diversions, irrigation development would proceed – at least initially – in most valleys. As a result, resource sustainability would become a major issue;
- the increased development would lead to a steady erosion of security reducing the incentive for new entrants to begin irrigating but also undermining the security of existing entitlements and enterprises in all valleys.

Security in lower valleys and reaches would fall significantly due to development in these lower valleys as well as development in upstream reaches and tributaries. For instance, reflecting the obligations of NSW and Victoria to South Australia under the Murray-Darling Basin Agreement, new developments on the Darling and tributaries would also impact on the security of supply for the Murray system;

- by definition, the movement to full development must entail activation of unused rights, entitlements and licences. This occurs through continued development by existing entitlement holders and/or by the sale of unused entitlements in the market to new entrants seeking to gain entitlements;
- not all unused entitlements would be activated since some are kept as insurance to ensure greater reliability and others are held in anticipation of future development;
- sleeper and dozer licences would also be purchased by existing users as they seek to restore their previous level of security;
- the **degradation of the riverine environment** and water quality would proceed at an accelerating pace. Algal blooms would become a recurring feature of major reaches as dilution flows are reduced. Salinity, particularly in the lower reaches, would continue to rise. In the mid and lower sections of the river, the rise in water salinity would lead to increased salt accumulation and loss of the remaining bio-diversity;
- socio-demographic trends would continue to be driven by the major forces impacting on irrigated agriculture, ie., commodity prices, seasonal allocations and access to export markets;
- there would be **increasing tensions** between irrigator groups and between regions as security declines and water trading becomes more aggressive.

Individual irrigators, industry associations, local government and others initiate legal actions against the State Governments and the MDBC for failing to provide adequate stewardship of the water resource and riverine environment. The recent announcement from Premier Olsen provides an example of this risk:

*“If NSW just simply continues to ignore our calls for appropriate flows through the River Murray we will take retaliatory action.”<sup>53</sup>*

In the absence of a cap these challenges would have been far more common and vociferous. Other legal actions seek to either remove or improve constraints on water trade. In other words, there is a disorderly scramble and lack of process;

- as resource availability and security deteriorate rapidly in the final stages of this full development scenario, incentives for water use efficiencies rise sharply, stimulating major investment late in the period. Major corporate farms will be better placed to fund those capital expenditures;
- changes in river and system operation would tend to occur progressively but predominately in the full development scenario as the pressures and urgency mount;

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<sup>53</sup> Premier Olsen (2000), as reported in The Sunday Mail, 20 February.

- as end of valley flows continue to fall and the damage to the river environment becomes stark, the urban electorate loses patience and sympathy with irrigators and basin communities; and
- with the substantial reduction in security, the income and viability of irrigated enterprises and communities across the Basin becomes increasingly sensitive to seasonal and climatic variation.

By way of comparison, the No Cap scenario involves some of the same features observed in the Cap situation:

- the activation of sleeper and dozer licences is an essential feature of increasing development;
- the availability of sleeper/dozer licences would be reduced as water becomes more valuable;
- holders of sleeper and dozer licences – like all holders of entitlement – would enjoy a progressive appreciation in value of their entitlements/licences;
- existing irrigators would be forced to buy additional water in order to preserve security;
- some water would normally be under-used in any year due to need to maintain security insurance;
- new entrants would need to buy entitlement in order to establish irrigation operations; and
- irrigators previously reliant on benefiting from off-allocation or sales water would be faced with rapidly diminishing availability of such sources of water.

The important distinction to draw is that in the With Cap scenario these changes and challenges are presented within a coordinated framework where competing and conflicting interests can be addressed and resolved. This contrasts with the disorder and scramble for decreasing resources which characterises the No-Cap scenario. As the Victorians put it:

*“If the Cap hadn’t been deliberately set, the physical limitations of the system would have imposed one on us anyway. This would have been a lot less orderly and more painful than the Cap we’re now grappling with.”<sup>54</sup>*

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<sup>54</sup> Murray Water Entitlement Committee (1997), “Sharing the Murray – Proposal for defining people’s entitlements to Victoria’s water from the Murray”, page 9.

### 4.3. VARIANTS OF NO CAP SCENARIO

The qualitative description of the No Cap scenario in the absence of environmental flows is consistent with several variants of this scenario including:

- the progression to “**Full Development**” as specified by the 1995 Audit Report;
- scenarios consistent with the concept of **optimal development** of the Basin or of individual valleys; and
- scenarios which recognise the close **inter-relationship** of development and allocations across the river systems of the Basin.

**Full Development:** The Audit Report’s interpretation of the Full Development scenario suggests substantial scope for expansion above the 1993-94 development levels (Chart 4.1) but at a cost of very substantial reductions in security. Whether development would proceed to the level of “Full Development” in the face of the dramatic decline in water security across the Basin, is an economic issue not addressed by the hydrological analysis of the 1995 Audit.

**CHART 4.1 : FULL DEVELOPMENT SCENARIO SPECIFIED BY 1995 AUDIT**

RIVER SYSTEM	1994 DEVELOPMENT DIVERSION	AUDIT SCENARIO	
		FULL DEVELOPMENT OF EXISTING ENTITLEMENTS	CHANGE FROM 1994
<b>NSW</b>			
Darling and tributaries u/s Menindee	1,445	1,976	531
Lower Darling	139	183	44
Murrumbidgee	2,300	2,670	370
Murray	1,977	2,039	62
<b>Total NSW</b>	<b>5,861</b>	<b>6,868</b>	<b>1,007</b>
<b>Victoria</b>			
Murray	1,725	1,910	185
Goulburn/Broken/Campaspe /Loddon	2,094	2,100	6
<b>Total Victoria</b>	<b>3,819</b>	<b>4,010</b>	<b>191</b>
<b>South Australia</b>			
Pumped Diversions	506	731	225
Reclaimed Swamps	104	104	–
<b>Total South Australia</b>	<b>610</b>	<b>835</b>	<b>225</b>
<b>Queensland</b>			
Border Rivers	135	156	21
Condamine/Balonne	291	400	109
<b>Total Queensland</b>	<b>426</b>	<b>556</b>	<b>130</b>
<b>ACT</b>	<b>65</b>	<b>75</b>	<b>10</b>
<b>Total for Basin</b>	<b>10,781</b>	<b>12,344</b>	<b>1,563</b>

Source: MDBC (1995), “An Audit of Water Use in the M-D Basin,”, Table 4, p.10.

**Optimal Development:** An alternative concept is, therefore, “optimal development”, defined in terms of optimising the financial outcomes at either the Basin or individual valley levels. This concept is now being embodied in the IQQM models which recognise the need for irrigators to pay the full costs of any additional infrastructure investments – whether on-river or on-farm – required to achieve increased levels of development.

From a Basin perspective, levels of “optimal development” (in the absence of a Cap and environmental flow rules) can only be established by reference to simulations of yet to be constructed IQQM and linear programming models which integrate the decision process across all major catchments/systems.

Levels of optimal development may be greater than Full Development as envisaged in the 1995 Audit, although in general they appear likely to be lower. They are likely to be lower because, while individual landholders may choose to ignore the impact of their development on the security of others, these impacts would be recognised in any decision process leading to the definition of optimal levels of development in a valley.

**Physically Possible Development:** The need to take a Basin-wide view on the definition of the No Cap scenario is further emphasised by recent hydrological advice from DLWC.<sup>55</sup> This indicates that it may not be physically possible for all valleys to develop full entitlement simultaneously. Integration of the Basin means that full development in upper tributaries will impact on yield in lower tributaries.

For instance, full development on northern tributary rivers in NSW is likely to result in reduced allocations within the Murray, viz.:

- full development in the unregulated streams above storages in the northern NSW rivers will reduce the ability of those storages (such as the Keepit Dam) to guarantee security to licence holders in the regulated systems;
- some further development in the regulated tributaries of the Barwon Darling such as the Namoi, would still be possible. However, such development would be predicated on harvesting flood-flows thus requiring construction of further farm storages. Clearly a point would be reached whereby the cost of additional storages would be greater than the returns achieved from the incremental flows able to be harvested. As a result, there is an economic limit to full development in an unconstrained system;
- full development in these tributary rivers would severely affect the normal flows in the Barwon Darling. This would limit further diversions and development in

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<sup>55</sup> *pers. comm.* DLWC, 17 February 2000.

this system to very large flood events. The physical and economic scope to capture such flows is likely to be severely limited; and

- if normal flows from the Darling are reduced significantly, then the southern systems sourced from Hume and Dartmouth will carry greater responsibility to meet the commitment to deliver minimum passing flows to South Australia. This, in turn, will result in a reduction in available allocations within the Murray.

### **Conclusion**

For the sake of clarity of exposition and consistency with the Audit Reports, we begin our assessment of Cap impacts, in Chapter 5, from the starting base of the No Cap based on Full Development as specified in the 1995 Audit.

## 5. ASSESSMENT OF CAP IMPACTS

### 5.1. IDENTIFICATION OF IMPACTS

Impacts from the announcement of a limit to diversions across the Murray-Darling Basin and the subsequent and on-going introduction of management regimes to achieve Cap compliance include:

- changes in yield and security which affect the viability of individual enterprises, employment opportunities and the social fabric of the broader agricultural economy;
- equity issues arising from differential impacts;
- the stimulus to water use efficiency and to trade water to high value uses;
- improvements in the institutional framework for property rights, third party impacts and trading arrangements; and
- as a catalyst for advancing and broadening environmental flow regimes, reducing adverse environmental impacts and slowing of long term degradation.

Each of these impacts is examined in turn in the sections below.

In examining these impacts, several distinctions need to be drawn. First, while many of the submissions focused on the impact of the Cap compared to the pre-Cap situation, the impact of the Cap is more accurately assessed against the yardstick of the No Cap scenario.

Second, because the limit to diversions applies on a valley by valley basis, these impacts vary accordingly. However, impacts on individual irrigators also vary – particularly between conservative and opportunistic water users – and need to be explicitly considered.

Third, in identifying and describing the impacts of the Cap, we need to distinguish between direct impacts – potentially observable in the 1995/96 to 1999/2000 seasons and longer run – and second round flow-on effects. The need to distinguish between the potential short-run and longer run effects has been accentuated by the succession of dry seasons since the announcement of the Cap. These have meant that in the southern systems resource scarcity, rather than the Cap, has been the dominant constraint. Similarly in Queensland, the Cap has not been a constraint since it has not been formally implemented pending completion of the WAMP processes, now projected for completion by end 2000. In NSW the Independent Audit Group Report for 1998/99 notes that the Cap has not been fully implemented in the Gwydir and Border Rivers as the models for monitoring compliance are not yet complete.

This chapter provides an assessment of the Cap impacts on the agricultural economy and the Basin community in general, drawing on the available information from the submissions to the Review from partner governments and from community groups, as well as data not previously assembled.

## **5.2. CHANGES IN YIELD, SECURITY AND THE AGRICULTURAL ECONOMY**

Limitation of the growth of diversions has several potentially major impacts on the security of allocations across the Basin. These impacts move in opposite directions.

*“The introduction of transfer schemes, particularly temporary transfer schemes, and the subsequent introduction of the extractive Cap:*

- has increased the reliability of a reduced minimum level of water availability, and at the same time*
- has accelerated the reduction in reliability of water supplies in excess of the minimum reliable quantity.”<sup>56</sup>*

These two impacts are observable in the short term, ie., now. In the longer term as the No Cap scenario progresses towards Full Development, the impact of the Cap in guaranteeing the reliability of supply becomes increasingly important.

The twin impacts of seasonal allocations below minimum reliable quantity are observable, for instance, in the NSW Murray Valley where allocations in a normal year will be around 87% of entitlement. Similarly, Victorian dairy farmers within the boundaries of Goulburn-Murray Water (G-MW) are adjusting to the reduced availability of sales water. The fact that the seasonal allocations have been reduced primarily because of the drought sequence and resource scarcity rather than the Cap does not prevent these twin impacts from being observed.

In the medium to long term as the No Cap scenario progresses to Full Development, high allocations will become a rare event in the major southern valleys with smaller, but significant, reductions in reliability in the northern valleys of NSW and in Queensland. Consistent with these differences in reliability impacts, the irrigators and community groups in the southern regulated systems are much more strongly supportive of the Cap than are counterpart groups in the northern regulated and unregulated systems.

*“Responses are clearly divided by location in the Basin. Regulated systems, particularly at the bottom of the River, are very positive about the Cap in providing security of supply, encouraging irrigation efficiencies and ongoing reform to high value crops. It is also recognised that the Cap*

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<sup>56</sup> Combined submission from Murrumbidgee Irrigation, MIA Council of Horticultural Associations and Ricegrowers Association of Australia.

*will have positive economic and social impacts by providing great security for irrigation allocations.*

*Conversely, there are regulated areas which consider there would be benefits if the Cap were removed and that the impact on development has been too severe. This is also the view of unregulated systems which consider the Cap to have had major negative impacts, and the introduction of environmental flows or payback under Schedule F would cause economic collapse.”<sup>57</sup>*

The magnitude of the ultimate reductions in reliability needs to be fully appreciated. The prime tool for assessing the security/reliability of water supplies are the “reliability/exceedence” curves which summarise the probability (or number of years in 100) of different levels of supply being available.<sup>58</sup>

These reliability curves are based on hydrological simulation models under specified assumptions relating to levels of development, climate patterns and stream flows. Consistent with the assessment framework specified to assess the impact of the Cap in Chapter 1, reliability/exceedence curves are required for several obvious scenarios. These are:

- a baseline curve for historic use as at, say, 1988;
- the reliability of supply at 1993/94 levels of development, ie., under the Cap scenario; and

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<sup>57</sup> Community Advisory Committee (1999), Submission, p.17.

<sup>58</sup> Reliability/exceedence curves are typically defined in regulated systems in terms of the reliability of different levels of allocations. In unregulated systems (and in regulated systems where there is substantial off or out-of-allocation harvesting), the reliability/exceedence curves need to be defined in terms of, say, the percentage of peak diversions.

In both cases the underlying concept is the same. Single summary measures, such as “mean annual diversions” can be derived from the information contained in the reliability/exceedence curves provided these are comprehensively defined.

The reliability/exceedence curves are preferred to single summary measures such as mean annual diversions because mean or median measures do not adequately describe the situation in drought sequences “*when the chips are down.*”

For instance, while “mean annual diversions” may increase as development proceeds, the level of possible diversions will become (much) more variable.

As a result, more development by some may mean lower utilisation of infrastructure and other assets by others.

Reliability/exceedence curves allow water users and managers to assess individually risk and reliability.

- the reliability of supply under the No Cap scenario, ie., Full Development in the absence of environmental flow rules.<sup>59</sup>

The prime focus must be on the change in reliability between the Cap, ie., 1993/94 levels of development and the No Cap scenario.

The available hydrological evidence indicates that unconstrained growth in diversions would lead to a fundamental change in yield/security relationships. In the major systems and other valleys, these changes are sufficiently large to undermine existing irrigation enterprises and communities.

Simply put, there is a limited amount of water. Users can either take a high annual volume, at a low level of reliability, or a low volume at high reliability. If annual diversions are allowed to rise, the reserves for the following year are eroded and the reliability drops. Although the precise situation and security impacts vary between valleys and type of entitlement, this qualitative conclusion applies uniformly.

Valley by valley examination of these impacts illustrates both the magnitude of the changes in yield and security and the potential consequences.

### **Valley by Valley**

In the **NSW Murray** as the No Cap scenario progresses to Full Development, the security of allocations progressively collapses (Chart 5.1). At the completion of the development process high allocations have become an infrequent event:

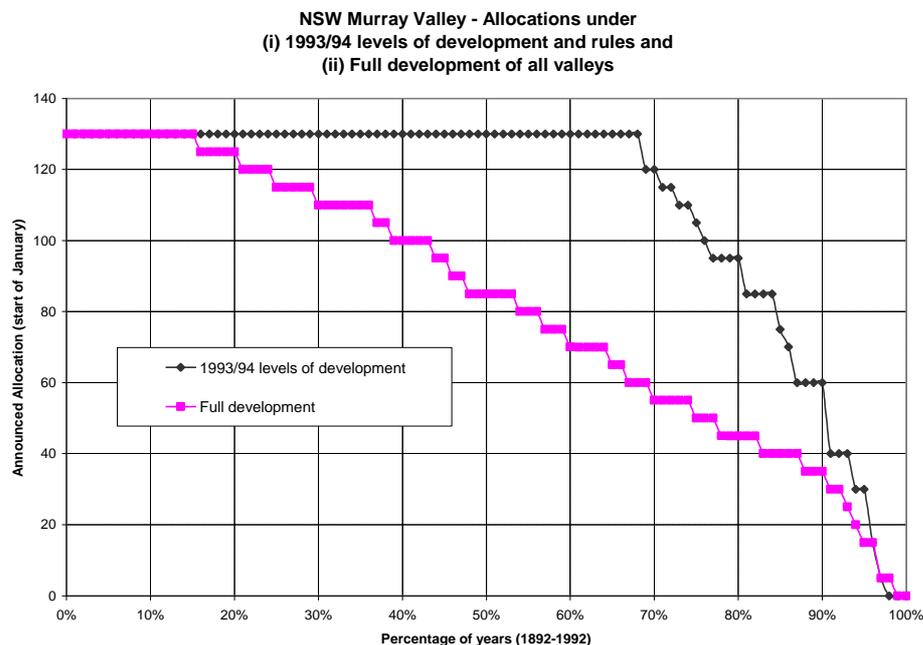
- whereas under 1993/94 levels of development, allocations of 100% or more could be achieved in almost 75% of years, under Full Development this is achieved in only 45% of years; and
- under the 1993/94 levels of development, allocations of 80% or more could be achieved in almost 85% of years, under Full Development this would be achieved in little more than 50% of years.

It should be noted that the above scenario is based on both the level of development and the allocation rules which were in place in 1993/94. It is also the outcome of MDBC modelling dating from 1995.

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<sup>59</sup> Full Development as specified in the 1995 Audit need have no direct counterpart under the more sophisticated IQQM models developed more recently.

CHART 5.1



In the **NSW Murray** the sharp reduction in level of security between the 1993/94 level of development and the Full Development scenario implies highly adverse impacts on general security irrigators and the wider agricultural economy. For instance:

- individual irrigators would face more volatile water supply, output and income requiring increased cashflow and funds in order to service existing debt levels;
- the rice industry would have difficulty in achieving a high and stable level of production leading to a lower proportion of the crop being marketed through long-term contracts; and
- attempts to offset the loss of security by building on-farm storages would involve not only high capital investment and pumping costs but localised high water tables and land salinisation.

In terms of timing, the greater part of the development phase is likely to occur in the early years with the rate of development slowing as Full Development is approached. This implies that the decline in security would be especially fast in the first five to ten years before slowing as the development phase runs its course.

In the **Victorian Murray** and **Goulburn systems** similar contrasts between security under the Cap and No Cap scenarios are observed (Charts 5.2 and 5.3). Again, as the No Cap scenario progresses to Full Development high allocations become a rare event:

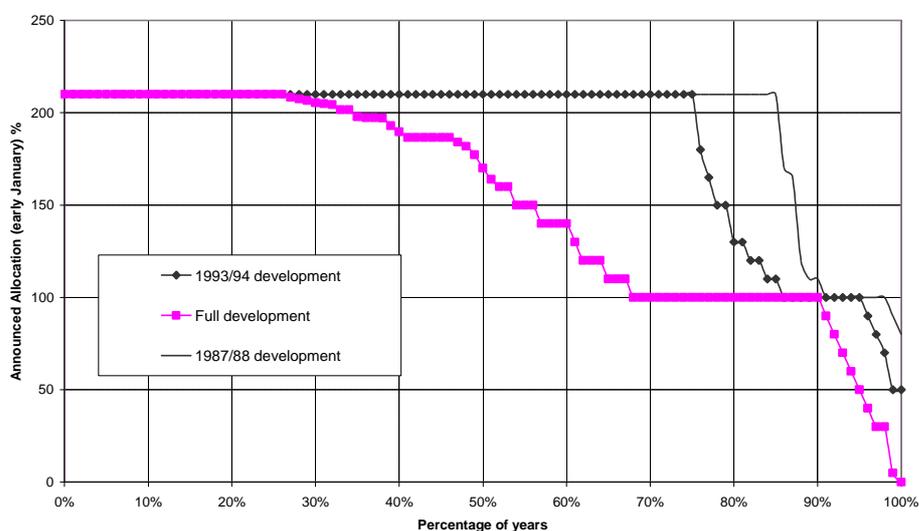
- in the Victorian Murray, whereas under the 1993/94 levels of development, an allocation of 220% would be received in 75% of years, under Full Development this falls to around 27% of years; and
- in the case of the Goulburn system, the comparable reduction is from 55% to 5% of years, respectively.

A feature of current water use within North East Victoria is the reliance of dairy farms on ‘sales water’ which is only available at times of relative resource abundance:

*“Dairy farms are more reliant on high sales allocations than mixed farms or horticulture (close to Water Right plus 100% sales in the record delivery year).”<sup>60</sup>*

**CHART 5.2**

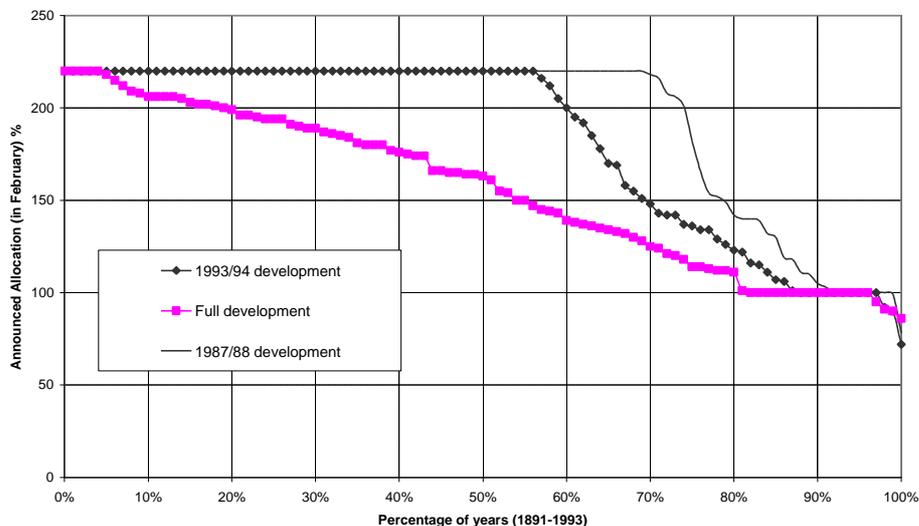
Victorian Murray Irrigation Districts - Allocations under  
(i) 1987/88 levels of development  
(ii) 1993/94 levels of development and  
(iii) Full development



<sup>60</sup> FARMANCO Pty Ltd (1998), “The Potential impacts on the Dairy Industry from Victoria’s commitment to meeting the MDBC Cap on Diversions”, January, p.5.

CHART 5.3

Goulburn Security - Allocations under  
(i) 1987/88 levels of development  
(ii) 1993/94 levels of development and  
(iii) Full development



These dairy farms have been impacted by changes in water management policy in recent years – particularly the decision to restrict sales allocations. Nonetheless, a comprehensive process of surveys, analyses and workshops confirms that while some individual farms would be adversely affected, the dairy industry as a whole would continue to prosper and expand under the Cap:

*“Dairy Processors should be confident that the Industry can maintain and continue to expand production under the MDB Cap.”*<sup>61</sup>

The sharp decline in security and the rarity of high allocation years under the Full Development scenario raises a different and more severe set of implications. At a minimum, the No Cap scenario implies for the northern Victorian dairy industry:

- increased purchase of grain and fodder;
- purchases of water entitlement; and/or
- a reduction in stock numbers.

<sup>61</sup> *ibid.* p. 7.

The underwriting of security in the Victorian Murray and Goulburn systems by the Cap is substantial and well recognised by Victorian irrigators and investors.

*“The MDBC Cap has generated significant economic and social benefit as it has complemented the water management regime in Victoria, which is based on both quantity and reliability. Together, these two factors have resulted in effective and sustainable management of this finite resource. This has encouraged long term investment and the investment is providing identifiable and sustainable economic and social benefits.”<sup>62</sup>*

*“In the Goulburn Valley alone, in the last five years in excess of \$800 million has been invested in irrigated agriculture. An estimated additional \$800 million has been invested in value added agribusiness industry. As detailed above, this investment would not have occurred without water resource management that assured reliability, adequate volumes and sustainability.”<sup>63</sup>*

On the **Murrumbidgee**, implementation of the Cap has had immediate impact in increasing the reliability of minimum reliable quantities and reducing the reliability of water supplies in excess of that minimum. As a result, irrigators previously heavily reliant on high allocations lose access and must recoup the security where possible. With the progression of the No Cap scenario towards Full Development, security is progressively eroded exacerbating the previous concerns of Murrumbidgee irrigators over security. For instance in 1991 the Department had proposed the release of an additional 300 GL of water for further development in the Murrumbidgee. For security and other reasons this offer was rejected by Murrumbidgee irrigators.<sup>64</sup>

In the **Macquarie**, there is evidence of progressive reduction in security of irrigators' allocations, over a twenty year period, as riparian licences are extended and environmental flow rules introduced:

*“In 1995 simulations studies by the Department showed that as a result of water transferability and because of the huge increase in construction of farm water storages, the reliability of water supply on the Macquarie had declined even further (from around 80% at the time our allocation was first granted) to 28%.”<sup>65</sup>*

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<sup>62</sup> Goulburn-North - East-Water for Agriculture – Ministerial Committee (1999), Submission, p.2.

<sup>63</sup> *ibid*, p.3.

<sup>64</sup> Cummings BA (1996), “Removing Barriers: Helping irrigators to become more Competitive”.

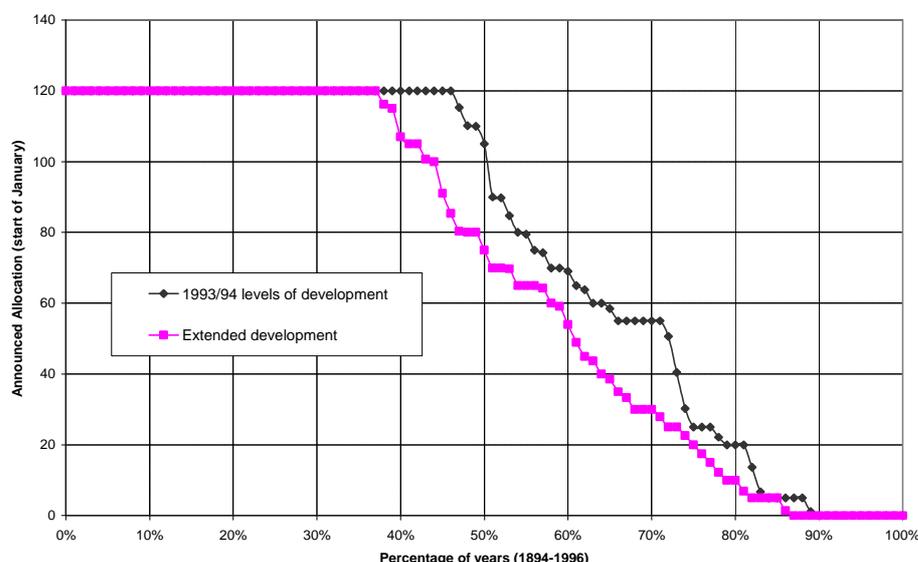
<sup>65</sup> Narromine Irrigation Board of Management (1999) Submission, p.2.

In the **Lachlan Valley**, the progressive divergence between the security levels guaranteed under the Cap and the progression toward Full Development appear less extreme (Chart 5.4). This partly reflects the lower percentage which the irrigated sector comprises within the agriculture of the catchment.

Nonetheless, any development beyond 1993-94 levels will lead to a reduction in security of supply for both new and existing entitlement holders.<sup>66</sup>

**CHART 5.4**

**Lachlan River Systems - Allocations under  
 (i) 1993/94 levels of development and  
 (ii) Extended development**



On the **Barwon-Darling** the Cap has not yet been formally applied and development is following the No Cap scenario. There is continued growth in irrigation infrastructure, with an increase of around 30% in the irrigated crop area since 1993/94,<sup>67</sup> accounting for increased diversions of an additional 77 GL of water in the past two seasons.<sup>68</sup> The Independent Audit Group, therefore, reports that NSW is in breach of its Cap obligations for the Barwon-Darling.

Under the No Cap scenario, as development proceeds on the Barwon-Darling and its tributaries, reliability on the river becomes increasingly under threat from growth in extractions and water-harvesting on the tributaries (Border Rivers, Namoi, Gwydir,

<sup>66</sup> “Extended development” is DLWC’s best estimate of further growth in each valley taking account of crop type, irrigation practices, and the declining investment on on-farm storages. However, this level of development should not be construed as an optimum level of development.

<sup>67</sup> Murray-Darling Basin Ministerial Council (1999), “Review of Cap Implementation 1998/99 – Report of the Independent Audit Group”, p. 20.

<sup>68</sup> *pers. comm.* (2000), A McLeod, MDBC, February.

Macquarie and Warego). These developments eliminate the smaller flood peaks making water-harvesting on the Barwon-Darling dependent on the major peaks. This undermines the economics of new on-farm storages and increases the duration of drought with resultant adverse impacts on the cash flow of the farms.

The income stability provided by irrigation is eroded and income volatility increases reducing the ability to service debt and so on.

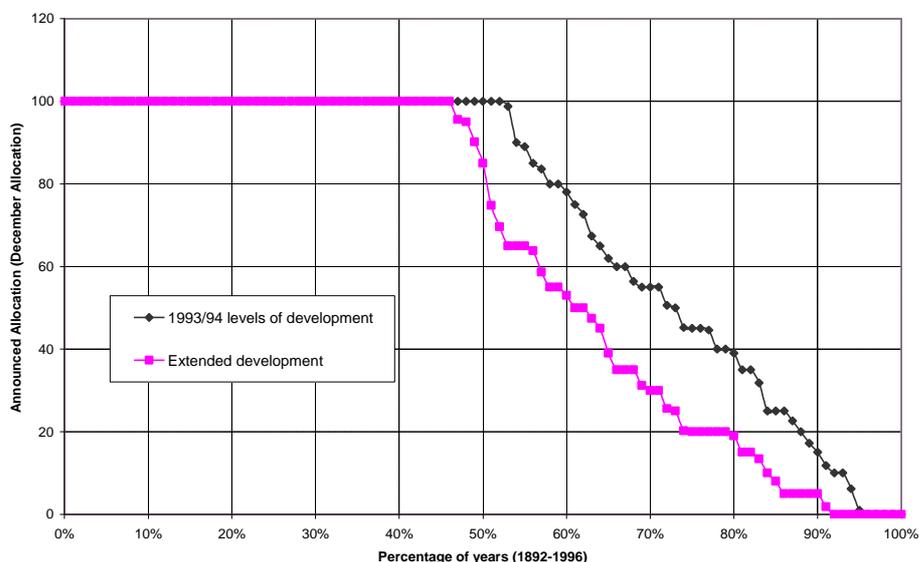
In the **Northern Valleys**, ie., the Namoi and other tributaries of the Barwon-Darling, the Cap has not yet been fully implemented, as valley based IQQM models are still being developed. For example:

*“As the Cap has never been implemented in the Gwydir Valley, there are no economic or social impacts, good or bad, ...”*<sup>69</sup>

As a result, development has continued to proceed at a rapid level. The levels of existing development in these cotton dominated valleys (Chart 5.5) suggests that the erosion of underlying security due to ongoing development may be greater than observed in the case of the Lachlan.

CHART 5.5

Namoi Valley Valley - Allocations under  
(i) 1993/94 levels of development and  
(ii) Extended development



The resulting loss of security in cotton intensive irrigation leads to pressure on marketing and contract selling arrangements. The importance of these marketing and contractual issues was recognised in submissions:

<sup>69</sup> Gwydir Valley irrigators Association (1999), Submission, p.2.

*“There has been no consideration of the impacts of loss of access and security of supply of water on the marketing strategies that are required for successful and profitable cropping in the region”<sup>70</sup>*

In the **Border Rivers**, the Cap has not been implemented pending agreement on end-of-river flows and completion of a joint Flow Management Plan (FMP) by the NSW and Queensland Governments. NSW is finalising its Cap separate to the FMP. However, as noted, the November 1999 Agreement by the NSW and Queensland Governments effectively caps the Border Rivers’ end-of-flow regime at Mungindi:

- further growth in diversions in regulated streams will not be allowed; and
- increases in water use in the Border Rivers Catchment that lead to further deterioration in the end of system flow regime will not be supported.

Since 1995, development has proceeded within the NSW and Queensland sectors of the Border Rivers. Part of this increase reflects growth in diversions from the Pindari Dam, which was endorsed by the Ministerial Council, and part a growth in on-farm storages. In the Queensland sections of the Rivers the capacity of on-farm dams increased from 210 to 230 GL from 1997/98 to 1998/99.<sup>71</sup> Equally, estimates of projected diversions in a No-Cap scenario indicate a 50% growth from 1993/94 levels of diversion.<sup>72</sup>

In the **Condamine-Balonne**, considerable growth in on-farm storages has taken place even since 1997, when environmental flow reports indicated that many parts of the lower Balonne were impacted.<sup>73</sup>

Projections on mean annual diversions without the WAMP or Cap again demonstrate major future growth, particularly in water harvesting and unregulated supplies. These have risen from 257 GL in 1993/94 to 500 GL in mid 1999 with further growth projected to reach 706 GL in due course.<sup>74</sup>

A conclusion on the impact of this growth, in the Border Rivers and Condamine-Balonne, on the reliability of supply to existing licence holders cannot be made until the FMP and WAMPs are complete.

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<sup>70</sup> Namoi Water Users Association (1999), Submission to CAC, p.2.

<sup>71</sup> Murray-Darling Basin Ministerial Council (1999) “Review of Cap Implementation 1998/99”, Report of the Independent Audit Group, p. 28.

<sup>72</sup> DNR Queensland (2000), Submission.

<sup>73</sup> Murray-Darling Basin Ministerial Council (1999) “Review of Cap Implementation 1998/99”, Report of the Independent Audit Group, p. 32.

<sup>74</sup> DNR Queensland (2000), Submission.

### 5.3. EQUITY ISSUES

While there is substantial agreement across Basin communities on the need of a Cap to halt the growth of diversions and to sustain river health and consumptive use, there is considerable disquiet over equity and implementation issues.

The key concerns in the community submissions, which were overwhelmingly from NSW, relate to the unequal distribution of the adverse impacts of the introduction of the Cap between different individuals and communities. The main areas of concern and disquiet relate to:

- the wealth transfer resulting from the activation of sleeper and dozer licences and from the preferential treatment accorded irrigators with high security entitlement vis-à-vis those with general security entitlement; and
- the perceived inequities in the implementation of the Cap between highly developed and less developed valleys, ie., the limitation of further development in valleys where 1994 levels of water diversions are seen to be low.

#### **Sleeper Activation and Wealth Transfer**

Among NSW communities there is broad concern over the “*massive transfer of wealth from active productive irrigators to sleepers and dozers.*”<sup>75</sup>

*“... in NSW some water users have been allowed to increase water use at the direct expense of water users with a demonstrated history of use and dependence, such as the 2000 shareholders of Murray Irrigation Limited .... As the Cap currently stands, water users that have historically used less than their entitlement are receiving significant benefits through greater demand and price for their tradeable surplus. Above average water users have experienced no benefit from the introduction of the Cap.”*<sup>76</sup>

The basis of this concern is well summarised by the following extract:

*“By its very nature the CAP limit is set by the history of use for the valley as a whole.*

*“Whilst the total volume of water available for extraction is based on history of use, individual rights to access water are still based on licensed entitlement, regardless of individual history of use. As water trading has become well established within the valley, irrigators who previously under utilised their entitlement are now fully activating their entitlements through the temporary and permanent transfer markets.*

<sup>75</sup> Hay Water Users Association (1999), Submission to CAC, p.3.

<sup>76</sup> Murray Irrigation Limited (1999), Submission.

*“As activation of sleeper and dozer licences continues at a pace, the general security allocation must be continually reduced in order to limit valley extraction to the Cap limit. This situation creates serious inequities between irrigators with a high history of use and those with low history of use. High history of use irrigators must now purchase water on the temporary transfer market, at between \$30 and \$60/ML in an attempt to secure water supplies to maintain their farm programs.*

*“It must be remembered that irrigators with a high history of use have invested massive amounts of capital in irrigation infrastructure, in order to achieve a return on that capital they must now purchase water from irrigators that have made little or no investment in irrigation infrastructure of production. There is a massive transfer of wealth from active productive irrigators to sleepers and dozers.”<sup>77</sup>*

In the case of the NSW Murray Valley, concerns over the resulting wealth transfer are exacerbated because:

- i) compliance with the Cap in the Murray Valley requires that allocations are generally not greater than 100% of entitlement in a normal year;
- ii) the Barmah-Millewa choke, which restricts water availability downstream, is seen to provide a clear demarcation between those irrigators who in general must buy additional water and those downstream who in general have water entitlement and allocation in excess of existing production requirements;
- iii) the magnitude of water that must be purchased (whether annually or permanently) is very substantial, especially for those irrigators who have pursued high levels of development relative to their level of entitlement.

*“Individual impacts resulting from Cap implementations vary across valleys and regions, however, reductions of up to 40% in the Murray and 30% in the Murrumbidgee are not uncommon”<sup>78</sup>*

As a result, there are clear and strongly held opinions within the NSW Murray Valley on the magnitude of the total water in excess of production requirements, the levels which are available for trade and which groups hold what water.

The estimated magnitudes of the annual “wealth transfers” are substantial. For instance, Murray Irrigation advises that \$50-\$60 million is paid annually by their shareholders to other irrigators holding unused allocations.<sup>79</sup> Around Hay, the net cost is estimated at almost \$10 million a year.<sup>80</sup>

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<sup>77</sup> *ibid.*

<sup>78</sup> Rice Growers’ Association (1999) Submission.

<sup>79</sup> Murray Irrigation Limited (1999), Submission.

<sup>80</sup> Hay Water Users Association (1999), Submission.

However, in analysing these allegations of ‘wealth transfers’, it is also relevant to note that:

- every dollar paid, to regain previous levels of water availability, is a dollar received by another irrigator in the same location or elsewhere in the Basin who holds sleeper/dozer licences;
- the purchaser gains the value of using the purchased water; and
- although water must now be purchased in the market place, the prior position depended on high users accessing water in excess of entitlement, at delivery cost only.

On the issue of whether wealth is “transferred” or rather wealth, already held, is simply “realised”, depends, critically, upon the perception of the relative merits of prior rights or history of use approaches.

Arguments/concerns that there are major wealth transfers from existing water users to holders of unused entitlements are strongly felt, but fail to recognise that the activation of sleeper and dozer licences is an inevitable result of increasing resource scarcity. Importantly, the activation of sleeper and dozer licences would have occurred, with at least equal impact, under the Full Development scenario in the absence of the Cap.

The formal announcement of the Cap has signalled approaching resource constraints and has accelerated the activation of sleeper and dozen licences. This activation could only have been prevented if the Cap had been implemented for individual irrigators or sub groups on the basis of “history of use” rather than “prior right”. This would not have been impossible, although very difficult to validate and implement. It would also have required ceding additional power to the MDBC to audit diversions at a farm level.

Our review of approaches to resource allocation indicates that a “prior right” has typically been preferred over “history of use” arguments, except in extreme cases where the community of rights holders and users agrees voluntarily to adopt history of use in order to reduce adjustment costs.

Where Cap compliance is not jeopardised, consideration could be given to allowing irrigation communities to opt out of the “prior right” approach and to adopt a “history of use” approach to Cap implementation. Proposals for such opting out must satisfy the State and the Independent Audit Group and command a high level of support, say 75%, in plebiscites of affected winners and losers.

## Trading by High Security Holders

Similar equity concerns arise from the treatment of high security entitlements under the Cap and the ability of persons holding these entitlements to trade.

*“This situation [of wealth transfer] is further exacerbated by the situation with high security water, which can now be traded on the temporary transfer market.*

*High security entitlements have not been impacted by any of the water reform processes, however calculation of the Cap only included approximately half of the high security entitlement for the valley. As more and more of this water is mobilised on the temporary transfer market, it bites deeper and deeper into general security allocation announcements.*

*Once again general security irrigators with a high history of use are transferring massive amounts of capital to high security irrigators, insulated from the water reform process and making free fall gains from water trading.”<sup>81</sup>*

The original objective of High Security licences was to provide horticultural growers, reliant on permanent plantings, with a water allocation which would not be restricted. This protected their investment which would, otherwise, be vulnerable to seasonal variations in allocation. However, it would clearly be inequitable if holders of those licences were able to claim that water, at the expense of general security licences, not for use on vulnerable permanent plantings (as intended) but only to sell it to those lower security licence holders whose own allocations had been reduced to provide the high security allocation in the first instance.

This concern is recognised in the NSW Government’s White Paper, which provides holders of High Security with a choice. They can either obtain 100% of their entitlement, but then have no right to trade, or they can claim their allocation at the level of General Security, along with the right to trade:

*“High security share allocations will be tradeable but only to the level of announced general security supply. There must be equity between high security and other entitlement holders in trading opportunities. High security entitlement holders will not be entitled to receive or purchase “off-allocation” water.”<sup>82</sup>*

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<sup>81</sup> Hay Water Users Association (1999), Submission, p.3.

<sup>82</sup> DLWC (1999), “A proposal for updated and consolidated water management legislation for New South Wales – A White Paper”, December, pp. 32-33.

## Levels of Development

The Cap limits diversions in each valley to the 1993-94 level of development. Valleys such as the Darling, Macquarie, Lachlan and Cudgegong had much lower levels of development than in the southern systems. For instance,

*“For historical reasons, including water trading restrictions, communities along the unregulated Barwon and Darling Rivers had not developed to the same extent that communities on regulated rivers had developed when the 1993-94 benchmark was set.”<sup>83</sup>*

As a result of the differences in development levels, it is inevitable that as an across-the-board initiative, the Cap has different impacts in terms of the potential level of development foregone in the individual valley or river reach.

The Cudgegong submission summarises the position as:

*“Although we can appreciate the reasoning behind the Cap, we believe the Cudgegong Valley Irrigators have been disadvantaged far greater than what was intended by the Cap.*

*At the time of imposition of the Cap the valley was on the verge of a substantial increase in the area of vineyards ... an enormous area of plantings which were planned for the valley were moved to Victoria and South Australia where ironically water was freely available ... the development which would have taken place has been permanently lost with the jobs which would have been created now being available in other states.”<sup>84</sup>*

Implicit behind these particular concerns is the belief that rather than adopting an approach to setting caps for each valley based on “history of use”, some alternative based on “potential” or “intended use” should have been employed – as occurred with the area below the newly completed Pindari Dam in the Border Rivers.

On the other hand, the southern valleys tend to take a different view:

*“Murray Irrigation Limited endorses the continued implementation of the MDBC Cap on a valley by valley basis. In the case of interstate rivers the MDBC Cap should continue to be implemented as water use, equivalent to the 1993/94 level of development in each state. ...*

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<sup>83</sup> Darling River Food & Fibre (1999) Submission, p.2.

<sup>84</sup> Macquarie/Cudgegong River Management Committee, Submission to CAC.

*Murray Irrigation Limited consider further questioning of this approach by other valleys or jurisdictions would be a retrograde action.*

*As a principle, all states and valleys should comply with the requirement to limit diversions to the 93/94 level of development.”<sup>85</sup>*

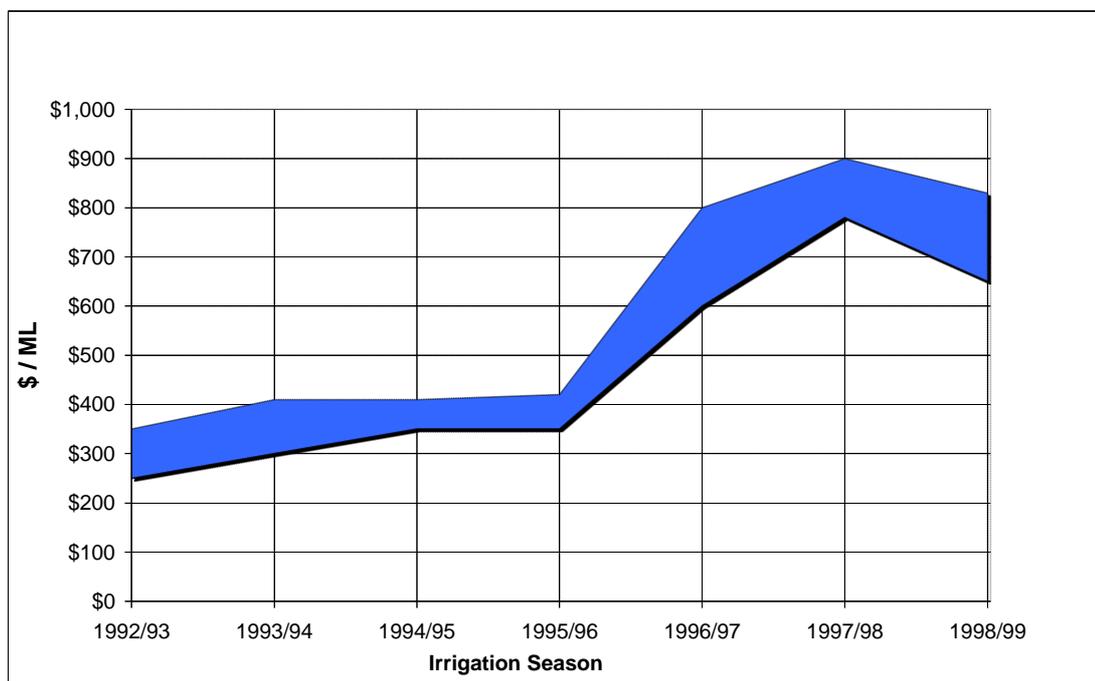
Ironically the concerns of the irrigators on the Cudgegong are not shared by their colleagues further down the catchment:

*“If the Cap were removed it would allow full development of all rivers in the Basin. As most of these rivers were originally over allocated the effects would be disastrous for both industry and the environment.”<sup>86</sup>*

#### 5.4. RESPONSE TO SCARCITY

The impact of increasing scarcity of water resources is to increase water use efficiency by both irrigators and system managers and to stimulate trade in water. Recognition of the scarcity of water is reflected in its price which had been relatively stable up to and including the 1995/6 season (Chart 5.6).

**CHART 5.6 : PRICES OF PERMANENT WATER – NORTHERN VICTORIA**



Source: MDBC/ Planright Australasia Pty Ltd, Victoria.

<sup>85</sup> Murray Irrigation Limited, Submission.

<sup>86</sup> Macquarie/Cudgegong River Management Committee , Submission to CAC.

#### 5.4.1. WATER USE EFFICIENCY

Water use efficiency is generally thought to be improving across the Basin as a result of a number of pressures, including:

- increasing scarcity of water brought about by a combination of factors such as the Cap and related changes in allocation and environmental flow policies;
- implementation of land and water management plan initiatives such as on-farm storages and recycling systems with a resultant reduction in drainage flows; and
- desire to reduce irrigation labour inputs. Examples of such initiatives include changes in irrigation systems away from furrow to automated micro or drip irrigation systems in horticulture and use of automated devices on border check systems.

Not only is it difficult to attribute with any degree of accuracy the relative importance of these different pressures on improvements in water efficiency, the submissions to this Review made little or no useful mention of the subject.

Nonetheless, logic suggests that increasing scarcity will act as a powerful incentive mechanism to achieve on-going improvements in water use efficiency.

*“The greatest economic benefit of the cap is to create more efficient use of water.”<sup>87</sup>*

One submission, however, did raise the issue that not only should the focus on water-use efficiency be directed at farm use but also at system efficiency.

*“A reduction in river system losses of only 2.3% would allow another 400 GL to reach the Barrages in South Australia. State Authorities must be obliged to improve their water management and water use efficiency in the same way that irrigators have responded to the continual on-farm and off-farm pressures to improve efficiency. The same improvement of 2.3%, if taken from irrigators rather than the State’s delivery system, would mean a cost to the nation of around \$160 million per annum in lost production.”<sup>88</sup>*

#### 5.4.2. STIMULUS TO WATER TRADE

Increasing scarcity and falling reliability provides existing irrigators with a strong motivation to purchase additional water to maintain water security. Demand for water from new developments must also be satisfied by activating previously unused

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<sup>87</sup> Murray Darling Association Submission.

<sup>88</sup> Twynam Submission.

entitlements or by purchasing water that is currently used in lower returning enterprises.

Supplementing the increasing scarcity of water in the long run has been the reduction in allocations due to the sequence of dry years since the introduction of the Cap.

In addition, water managers have recognised that with approaching scarcity they would no longer be able to announce allocations at levels which pre-suppose that a high proportion of irrigators would not use their full entitlement.

Two mutually reinforcing effects which lead to a rapid expansion of trade in water are:

- increasing trade of unused entitlements causes lower announced allocations; and
- lower announced allocations causes more irrigators to seek additional water pushing up the price of water and encouraging greater release of unused entitlements into the water market.

#### **5.4.3. REALISED BENEFITS**

##### **Water Trading Lowers Costs**

The rapid growth of regional, intervalley and interstate trade has dramatically lowered the cost of compliance with the Cap and adjustment to other changes in water management policies. Equivalent restrictions on diversions and levels of restriction to environmental flows and protection can now be achieved at substantially lower cost to private water users as a result of access to water markets.

For instance, in the relatively less secure Murray Valley, trade is estimated to reduce the impact of increased environmental flows by between a third and a half depending upon the flow scenario.<sup>89</sup>

A worked case-study, on the Macquarie, is provided below to indicate the practical benefits which water trading can provide when an irrigated area faces the challenge to reduce the total level of its water diversions (Chart 5.7).

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<sup>89</sup> Marsden Jacob Associates (1999) "Water Trading Development and Monitoring", report prepared for the NSW Department of Land and Water Conservation, p. 55.

**CHART 5.7 : WATER TRADE MINIMISES THE COSTS OF THE CAP AND ENVIRONMENTAL FLOWS**

The impact of water trading in reducing the cost of the Cap or environmental flow regimes on individual farmers is readily demonstrated. Consider the imaginary case of two irrigators in the Macquarie, each with an entitlement of 1,000 ML, growing cotton and wheat respectively. Cotton generates a gross margin of \$350/ML whilst wheat only creates \$65/ML. The total annual gross value of their combined output therefore equals \$415,000.

Without Trade (Scenario A) each farmer must reduce diversions by 20% in order to restore environmental flows. The two irrigators now each have an entitlement of 800 ML. In the absence of trading opportunities, this reduces their combined annual gross value by 20% (i.e., down by \$83,000) to \$332,000.

With Trade (Scenario B) the reduction of 20% in diversions can be achieved at dramatically lower cost. In this case Irrigator A, who grows cotton, buys 200 ML, on the temporary market, from Irrigator B, who grows wheat. This augments Irrigator A's allocation to 1,000 ML and reduces Irrigator B's allocation to 600 ML. The reduction of combined annual gross value, under this scenario, is merely \$26,000 or 6.3%.

The impact of trade is therefore to reduce the potential loss of income due to the introduction of a Cap or higher environmental flows to the combined irrigation enterprises.

	<b>Entitlement</b>	<b>Gross Margin</b>	<b>Gross Value</b>
<b>CURRENT POSITION</b>			
Irrigator A Cotton	1000 ML	\$350/ML	\$350,000
Irrigator B Wheat	1000 ML	\$65/ML	\$65,000
<b>Total Gross Value</b>			<b>\$415,000</b>
<b>SCENARIO A: 20% REDUCTION IN ENTITLEMENT: NO TRADE</b>			
Irrigator A: Cotton	800 ML	\$350/ML	\$280,000
Irrigator B: Wheat	800 ML	\$65/ML	\$52,000
<b>Total Gross Value</b>			<b>\$332,000</b>
<b>Loss in Gross Value (\$415,000 - \$332,000) =</b>			<b>\$83,000</b>
<b>SCENARIO B: 20% REDUCTION + TRADING ALLOWED</b>			
Irrigator A: Cotton	800 ML	\$350/ML	\$280,000
+ 200 ML bought from Irrigator B @ \$90/ML	200 ML	\$260/ML = \$350 - \$90	\$52,000
<b>Total Gross Value: Irrigator A</b>			<b>\$332,000</b>
Irrigator B Wheat	600 ML	\$65/ML	\$39,000
+ 200 ML sold @ \$90/ML	200 ML	\$90/ML	\$18,000
<b>Total Gross Value: Irrigator B</b>			<b>\$57,000</b>
<b>Total Gross Value: Irrigators A + B (\$332,000 + \$57,000) =</b>			<b>\$389,000</b>
<b>Loss in Gross Value (\$415,000 - \$389,000) =</b>			<b>\$26,000</b>
<b>BENEFIT FROM ALLOWING TRADE (\$83,000 - \$26,000) =</b>			<b>\$57,000</b>

### Gains From Water Trade In the Basin

There is strong evidence that trade in water is allowing irrigation activities within the Murray Darling Basin to move to higher value enterprises. The directions are well documented in SA and Victoria through extensive surveys and interviews with the buyers and sellers in studies of all permanent trades in the period 1994 to 1996.<sup>90</sup>

Permanent trade in SA in the 1994-96 period transferred water from low margin activities, generally in the lower reaches of the Murray, to high value activities upstream. Almost half the water sold had previously been used in lucerne and grain production with 81% of water purchased being applied to the higher value horticultural enterprises such as vines and vegetables (Chart 5.8).

Marsden Jacob Associates (1999) calculated that the productivity of water permanently transferred in SA between 1994-96 increased between six to ten times as a result of the trade, depending on assumed gross margins. The average gross margin of the water prior to trade was \$80-100/ML but post trade increased to between \$480 and \$900 plus/ML.<sup>91</sup>

**CHART 5.8 : SOURCE & DESTINATION OF PERMANENT TRADES IN SA 1987-93**

SOUTH AUSTRALIA	% OF SELLERS	% OF BUYERS
Vines	6.4	26.9
Citrus	0.9	8.7
Stone Fruit	4.4	0.5
Other Horticulture	1.7	38.1
Vegetables	13.6	16.4
Dairy Pastures	12.3	0.4
Lucerne & Grain	49.3	6.9
Other Purposes	11.4	2.1
<b>Total</b>	<b>100</b>	<b>100</b>

Source: Marsden Jacob Associates (1999) derived from Bjornlund & McKay (1997) "Do Water Trade Policies Achieve Environmental and Socio-Economic Goals?" *Water*, p.5.

<sup>90</sup> Bjornlund, H., and McKay, Dr. J (1997) "Do Water Trade Policies Achieve Environmental and Socio-Economic Goals?" See also "Can Water Trading Achieve Environmental Goals?" (1995) *Water*, 22 (5) 31-3 34 and "Transferable Water Entitlements: Early Lessons from South Australia", (1996) *Water* 23 (5) 39-43 and "Factors Affecting Water Prices in a Rural Water Market : A South Australian Experience", (1998) *Water Resources Research*, 34 (6), 1563-1570.

<sup>91</sup> Marsden Jacob Associates (1999), "Water Trading Development and Monitoring", report prepared for NSW Department of Land & Water Conservation.

Similarly, permanent transfers in Victoria between 1994 and 1996 (Chart 5.9) are estimated to have increased the productivity of that water by around four times.<sup>92</sup>

**CHART 5.9 : SOURCE & DESTINATION OF PERMANENT TRADES IN VICTORIA 1992-94**

VICTORIA	% OF SELLERS	% OF BUYERS
Dairy	6.8	79.3
Cattle	37.9	9.8
Sheep	39.9	1.6
Horticulture	2.8	5.8
Other Crops	6.7	3.5
No Crop	5.9	–
<b>Total</b>	<b>100</b>	<b>100</b>

Source: Marsden Jacob Associates (1999) derived from Bjornlund & McKay (1997) “Do Water Trade Policies Achieve Environmental and Socio-Economic Goals?”, p.4.

The available information strongly suggests that the same process is occurring in NSW and that the benefits to that State from the existing trade are substantial. An order of magnitude estimate for the annual benefits to NSW is around \$65 million a year. These magnitudes were described as indicative and likely minimums.<sup>93</sup>

A rather crude indication of the magnitude of the benefits of water trade – both permanent and temporary, in Goulburn-Murray Water, can be obtained by simply pro-rata-ing the estimates for NSW. As noted, the first round benefits of both permanent and temporary trade were estimated at around \$65 million for NSW and that temporary trade accounted for around half of these benefits. On a simple pro rata basis, this suggests that the benefits to Victoria from trade involving G-MW irrigators might be around \$20 million per year.

### **Wider Benefits of Water Trade**

As noted, water trading offers practical opportunities to realise substantial benefits for the Basin economy and individual water users. These benefits arise from a wide variety of sources including by:

- providing a financial incentive for investments in efficiency savings in water use;
- allowing new water users to invest in higher value activities – whether mines or higher value horticulture – and to acquire water without jeopardising each

<sup>92</sup> *ibid.*

<sup>93</sup> *ibid.*, pp. 3.16 – 3.24.

State's responsibilities for adherence to sustainable environmental flow regimes and associated caps on consumptive use;

- allowing rice, cotton and other profitable annual crops to use the surplus water allocations which are available in most years from permanent plantings;
- allowing greater flexibility in land use, particularly by transferring water from less to more sustainable land use practices, eg. transferring the water use away from sandy soil areas, where rising watertables are a problem;
- gaining fuller advantage of the physical interconnections in the river and delivery systems (such as the inter-linking of the Murray, Murrumbidgee, Lower Darling and Goulburn-Murray systems through shared headworks in the Snowy and Lake Hume and the interstate obligations to South Australia under the River Murray Agreement). The potential benefits of trade in these interconnected systems extend to more efficient production and use of both water and electricity;
- allowing businesses to adjust their water supply security to the long-term reliability of the water source. Current security levels will decline as inactive licences are used. The market allows businesses to obtain additional water to maintain required security levels;
- allowing more efficient consumptive use of water without further depletion of minimum flow regimes for fish breeding, river health and other environmental needs;
- allowing landholders seeking to retire, restructure or exit to realise their assets at full value through efficient and, desirably, equitable markets. While the "drying" of heavily-watered and irrigated properties may reduce income flows within some regions, the sale of water is usually a major cash injection into the local community;
- by reducing the economic cost of achieving Cap compliance and/or environmental flows. The increased ability to trade interstate will further reduce the economic impact and adjustment required to accommodate increased environmental flows in NSW valleys and elsewhere; and
- creating economic benefits to the States in the Basin through driving water to higher value uses. Detailed surveys have been completed for Victoria and South Australia on the nature and pattern of permanent trades, and information is emerging on temporary trades. These allow broad order of magnitude estimates of the aggregate benefits to the States in the Basin for water trade to be derived.

Simply put, trade allows the Basin's water resources to be used more productively within a sustainable framework. However, for these benefits to be realised, partner governments need to provide players in this market with clearly defined property rights, within well structured and robust markets and explicit and flexible trading rules.

## 5.5. INSTITUTIONAL CHANGE

The Cap has helped accelerate controls over water diversions. However, those controls have been only one element of a wider framework of institutional change which has been implemented over the past five years, much of which can be attributed to the Cap.

These changes include:

- property right definitions;
- planning and licensing procedures;
- water allocation procedures;
- water trading rules and markets; and
- community involvement in decision making.

### **Property Right Definitions And Allocation**

One of the major initiatives has been the development of clearer property rights to water. This also implements the requirements of NCP/COAG in the Strategic Framework for the Water Industry. This is a developing position with uneven application by States and across regions:

- in Victoria bulk entitlements (BEs) have been defined and implemented in all catchments in the Basin. This has clarified and confirmed the rights not only of Authorities but also of high security licences;
- the terms and rigour of those BEs has been directly influenced by the Cap;
- Retail Entitlement Reform (RER) is also progressing which will convert ill-defined Sales allocations into medium reliability property rights;
- in NSW the volumetric basis of regulated entitlements is now more clearly defined. Although more still needs to be done to provide clarity to irrigators in western and northern valleys as to probable future yields;
- in all States there has been a recognition of the superior position of prior right over history of use:
  - as in the allocation of sales water as part of the Victorian retail entitlement reform; and
  - in the recognition of the rights of sleepers and dozers in NSW over those of historical high-users;
- in all States there is increasing separation of property rights over water from its traditional linkage to land. This will facilitate water trading; and

- there is universal conversion of licences from an area definition to a volumetric measure. This process has furthest to go on unregulated streams where there are complex issues to resolve in codifying diversion rights.

### **Water Trading Rules and Markets**

One of the most substantial developments since 1994 has been the growth in water trading and markets. The key elements are:

- substantial growth in trade, particularly in the temporary market in the southern systems. This reflects a reduction in announced allocations and the need of users with a high history-of-use to restore their previous level of diversion;
- all States are removing barriers to the more effective development of that trade through the drafting of trading rules and conversion rates particularly for inter-valley trade;
- as a result of this growth in trade there has been a development in the institutional arrangements to facilitate that trade. There are now a number of different and inter-linked markets across the Basin run by SRIDC, the Northern Victorian Water Exchange and the MIA. These employ a range of different market mechanisms to ensure transparency, disclosure, speed of dispatch and efficiency;
- parallel to these markets within each State, there has also been a pilot interstate project to encourage and control trade between States. This was formally commenced in January 1998 and the first trade took place in September. During 1998/99 financial year there were twenty trades totaling 3,546 ML – with trades almost universally downstream and the large majority from NSW to SA. This has increased river-flows; and
- these market developments are also stimulating the development of more sophisticated market instruments to allow for longer term leases.

### **Community Involvement**

One of the most notable changes across the Basin has been the increased involvement of local communities in decision making about resource use and allocation:

- in Queensland the water allocation and management planning (WAMP) process involves community and stakeholder consultation to identify issues associated with the allocation and management of water resources within the study area. As part of the process, community and stakeholder input is sought when determining the acceptable balance between competing water uses and for specifying water entitlement in terms of tenure, access and transferability;
- in NSW, Water Management Committees have been appointed in all major regulated unregulated and groundwater districts to provide a structure to identify and resolve competing objectives and to advise on allocation and management

issues. The Committees have also been tasked with considering socio-economic factors in those deliberations; and

- in Victoria, existing consultative arrangements for the allocation of resources from the Murray were formalised through the creation of the Murray Water Entitlement Committee involving more than 30 members representing water users, irrigation industry groups, water authorities, environmental groups and government departments. The major outcome of that Committee was the publication of the booklet “Sharing the Murray” which provided a forum for the resolution of allocation issues.

Looking further ahead, both NSW and Queensland have major proposals at a final stage to further codify and implement these institutional changes.

### **New South Wales**

NSW has recently published a White Paper setting out proposals for a new legislative framework for water management across the State:

*“The Act will promote the best use of water and support ecosystems, public health, town water, industry, agriculture and recreation.”<sup>94</sup>*

The White Paper provides updated and consolidated legislation to replace the current Water Act which dates from 1912. The proposals extend the key elements of the water reform process in NSW, which has seen major policy announcements and initiatives since the 1980s, with major programs introduced in 1995 and 1997. The Water Sharing Access & Use policy document, published in 1998, raised many of the central issues about the principles and practice of water allocation.

The White Paper covers the full suite of institutional issues:

- legal standing for entitlements for the environment: introduction of mechanisms for defining and managing extractable limits for water;
- clarification of water rights: clearer specification of different categories of entitlement and segmented licensing to reflect the different components of that entitlement;
- integrated planning: a revised approvals system will be simpler, more transparent and less costly – complementing the integrated development approvals system in planning. A revised appeals procedure to the Land and Environment Court will be provided;

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<sup>94</sup> DLWC (1999), “A proposal for updated and consolidated water management legislation for New South Wales – A White Paper”, December.

- water management planning and the community: involvement of local water management committees in advising on water management plans and clarity on the processes which DLWC will follow in implementing those plans;
- enhanced water trading: clarity on trading rules and process; and
- enforcement: new and additional explicit powers to monitor and ensure compliance across the range of licence functions.

## **Queensland**

Queensland has recently published an Exposure Draft Bill on water allocation and management.<sup>95</sup> This updates water resource management arrangements across the State and provides a generic system for future water allocation and management. The arrangements will ensure Basin-wide planning and provide mechanisms to control harvesting of overland flows.

The Bill will provide a statutory base for water resource planning and coordinate all current tools such as WAMPs and WMPs within a coherent scheme. It will make formal provision for environmental flow requirements, define resources available for future consumptive development and formalise trading rules.

A revised licensing system will establish transferable water allocations through a two stage process involving WAMPs and Resource Operations Plans. Those licences will be recorded in a Water Entitlements Register which will facilitate financing through recording of encumbrances.

## **5.6. SOCIAL IMPACTS**

### **Broader Social Pressures**

As noted in Chapter 2, farming communities have had to respond to a wide spectrum of external factors and risks over the five years of the Cap, since 1995/96. These include:

- shifts in international commodity prices and declining producer terms of trade;
- demographic shifts in population from rural communities to major regional centres;
- a reduction in the number and increase in the size of farms;
- wider pressures for increases in productivity; and
- wide ranging water reforms.

Any possible social impacts of the Cap need to be assessed within this broader setting.

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<sup>95</sup> DNR (1999), "Water (Allocation and Management) Bill – Exposure draft Bill and Explanatory Material", November.

## **Risks of Social Outcomes**

Several of the submissions referred to probable social outcomes of any down-turn in economic activity, eg. the Country Women's Association has expressed concerns on potential impacts on the family – in particular women and children – community health and community infrastructure and service, such as:

*“...the stress and strain on human relationships from stress related illnesses to suicide...schools are staffed by (reference to the) number of students. The fewer the number of students, the fewer the number of teachers and the fewer the subjects can be offered, so our children will be deprived of the best education....a downturn in the farm economy...could lead to further alcohol abuse, drug abuse and worse still a rise in the crime rate.”<sup>96</sup>*

A report for Darling River Food and Fibre provides a review of the economic and social impacts which might arise from future changes to the diversion and flow rules on the Darling River for the irrigation industry and township of Bourke.<sup>97</sup> This is one of the few available reports which undertakes a structured and comprehensive review of possible social impacts of the Cap.

Concerns identified included the possible downsizing and closure of operations of local businesses and a loss of trained/skilled workforce. In turn, this could reduce revenues for the Shire council, threaten the viability of health services and reduce funding for local schools. A final outcome would be a smaller township, with less community infrastructure and services whilst being more reliant on social welfare.

## **Social Benefits from the Cap**

It is clearly difficult to ascribe particular social outcomes to the suite of water reforms or to attribute specific impacts to the Cap within that broader suite.

*“The tempo of reform underway within the Basin is such that for practical purposes it is not possible to definitively distinguish between the impacts of the Cap, the Water Reform process of the NSW Government and the general on-going structural change within rural areas.”<sup>98</sup>*

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<sup>96</sup> Coleambally-Argoon branch of the Country Women's Association Submission.

<sup>97</sup> Hassall & Associates (1999), “The Socio-Economic Impacts Of Reduced Water Availability On The Irrigation Industry And Town Of Bourke, NSW”, April.

<sup>98</sup> Moira Private Irrigation Board (1999), Submission.

However, the review has identified a series of major positive benefits to the social fabric which can be linked to the introduction of the Cap:

- the economic benefits identified earlier will create positive flow-on effects within the social environment; and
- the Cap has created a structured framework for future resource allocation. This has prevented the disorderly scramble for resources and the social tensions which would have arisen from a No Cap scenario.

The positive economic benefits created by the Cap centre on guaranteeing the security of water entitlements on a valley-by-valley basis. Long-term investment in high value agriculture is dependent on the underlying security of the resource base. In the absence of the Cap there would be substantial erosion of this security. The Cap provides that security and also has stimulated the development of clearer property rights and water markets.

From this perspective, estimates provided in submissions on the costs of the Cap, in terms of development that may be forgone, provide only a partial picture since these estimates are specific to particular locations and ignore the benefits of guaranteed security which are widespread and diverse.

These benefits of additional certainty and security will generate positive social outcomes by ensuring a sustainable local economy. That will provide the basis for the improved education, housing and health which are the reasonable concerns and objectives of all communities.

These social benefits also arise from a reduction in the social tensions which would have been the inevitable consequence of the No Cap scenario. In the absence of the Cap on growth in diversions there would have been a relentless reduction in the security of water entitlements. This would have created increasing tensions between irrigator groups and regions as competition for increasingly scarce resources became more extreme. This would have led to a disorderly scramble and conflict which would have torn at the social fabric.

The recent announcement from Premier Olsen provides an example of this risk:

*“If NSW just simply continues to ignore our calls for appropriate flows through the River Murray we will take retaliatory action.”<sup>99</sup>*

In the absence of the Cap these challenges would have been far more common, vociferous and extreme. The risk of water wars as seen in the USA<sup>100</sup> and other countries is not an overstated scenario.

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<sup>99</sup> Premier Olsen (2000), as reported in The Sunday Mail, 20 February.

Concern over possible future impacts of the Cap on the social fabric of particular irrigation communities appears misplaced when the impact of potential water wars on the social fabric of the Basin as a whole is contemplated.

It also seems probable that smaller family farms would have lost out, in that competitive scramble, to the larger corporate entities who would have had greater access to the financial backing required to acquire those scarce resources.

Through water trading, the Cap has also created social benefits, by allowing innovative and entrepreneurial farmers to move into higher value enterprises and by providing a mechanism to allow farmers in poorer economic and environmental settings to realise the value of their assets and exit the industry.

The Cap has also helped prevent further division between country and city Australia. Continued growth in diversions would have seen inexorable degradation of the environment of the Basin. Without the Cap, the metropolitan electorate would have become increasingly out of patience with the irrigation community and Governments' failure to halt this continued degradation:

*“river health is used as a measure by which irrigators will be judged by the wider community.”<sup>101</sup>*

In summary, by guaranteeing security of entitlement the Cap will help create economically sustainable communities. The benefits from this will flow through into social outcomes such as employment, schools and community welfare. The Cap also provides a mechanism whereby disputes and tensions over resource scarcity, between community groups within the Basin and divisions between country and city Australians, can be managed and resolved in an orderly way.

#### **5.6.1. STATE GOVERNMENT APPROACHES**

The various States have adopted different approaches in dealing with social impacts, associated with major policy change such as the Cap. In general terms, Victoria and South Australia have relied on social consultative processes whilst NSW favours technical assessment criteria and guidelines.

Under the former approach, the State establishes a social process to create local ownership of the process and decisions by key stakeholders whilst at the same time ensuring that those decisions are based on robust and professionally valid data and

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<sup>100</sup> These disputes have run for more than 60 years and are noted for their polarity, community tension and disruption and waste of community resources.

<sup>101</sup> Murrumbidgee Consultancy (1999), “Assessing the Impacts of the MDBC Cap on Murray Irrigation Limited”, Report prepared for Murray Irrigation Limited, p.4.

analysis. The mix of the two elements adopted in any individual case will reflect the history of water management in the particular valley and State concerned.

In contrast, NSW has recently adopted a more structured approach involving the established guidelines drawn-up for the NSW water management committees.<sup>102</sup> These provide guidance to water management committees, given the responsibility of developing water management plans, on how to assess the socio-economic implications of their decisions. The objective of the approach is to promote community involvement and progressive feedback.

The guidelines are detailed and comprehensive and involve a ten step process founded on the collation and review of data on a range of indices. Even the initial step, of creating a “community water profile”, requires a substantial process including:

“ *brief description of the socio-economic characteristics of the catchment and how they have changed over time. This may include:*

- *brief history of region*
- *population within each catchment*
- *age structure and education level*
- *employment and income levels*
- *major industries and sources of employment*

*profile of water use in the catchment. This could include:*

- *information on water resources*
- *types of water use in the catchment*
- *perspectives on water use by major water use groups*
- *information on water users and the social and economic contributions to locality and region.*”<sup>103</sup>

There is some concern that the very comprehensive approach recommended may prove problematic for the lay committees to deliver in practice, eg:

“*Valley groups in NSW have been charged with the job of assessing the socio-economic effects of the Cap and other policy initiatives themselves.*

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<sup>102</sup> IACSEA (1998), “Socio-economic Assessment Guidelines for River, Groundwater and Water Management Committees”, produced for DLWC by the Independent Advisory Committee on Socio-economic Analysis.

<sup>103</sup> *ibid.* p. 4.

*The guidelines for these assessments are far too onerous for voluntary committees with limited resources.”<sup>104</sup>*

Queensland also has set out a formal methodology which it proposes for assessing social impacts as part of the second stage implementation of its wider Water Allocation and Management Planning process. This proposed approach, which follows an equivalent methodology to that recommended in NSW, requires three main stages:

“ *Scoping:*

- *stakeholder issues, aspirations and expectations*

*Profiling:*

- *Town resource Cluster identification*
- *Social profiles and Indicators*
- *GIS modelling and Integration*

*Prediction:*

- *data modelling*
- *scenario development*
- *use of focus groups for impact prediction and mitigation strategy development”<sup>105</sup>*

Again there is a question to the complexity of the exercise which is sustainable through a lay process and the degree to which the assessment will require input from a more technical group and leadership from within the political arena.

These formalised approaches contrast to that of Victoria which has had a history of successfully involving the full scope of interested parties in the area of water management. Recent decisions on allocating resources from the River Murray were taken by the Murray Water Entitlement Committee which comprised water users and irrigation industry groups, urban water authorities, environment and catchment management groups and Government.

This group worked over an eighteen month period to assess and review a variety of options and scenarios for the future allocation of water from the River Murray. Technical data on the various options and their implications was developed and submitted to the Committee as the debate developed. The outcome was a publication

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<sup>104</sup> Twynam Pastoral Company Submission, p. 9.

<sup>105</sup> Queensland Government Submission. pp. 8-12.

which won the support and confidence of all parties involved in the area.<sup>106</sup> It is interesting to note that the Committee took a fairly high-level approach to assessing the social and economic impacts of different options, with less detail on specific scenarios than might have been generated by application of the NSW or Queensland methodologies.

Victoria has the advantage of a history of such interaction and cooperation between the relevant stakeholders. It also has a relatively limited set of rivers and catchments to deal with and a predominantly well-developed irrigation sector. In this regard it is fairly similar to the situation in South Australia which has also managed to create inclusive debate on resource allocation.

NSW faces different circumstances, without the same history of mutual cooperation between parties and a more complex set of catchments, at different levels of development. That creates a more conflicting set of incentives for the different players. This is reflected in some of the submissions, as in the comments from irrigators on the Namoi:

*“The process that the NSW government has embarked upon in setting and managing the Cap in the Namoi and other valleys has not in any way been satisfactorily reviewed with regard to socio economic impacts of the changes involved.*

*“The “Expert Panel” and the Ministers own “Socio Economic Task Force” were unable to come up with a consensus position of processes that would satisfy the requirements of COAG, and so now the government has determined that politically correct laymen will do the studies that should be done by people that have expertise in this very imprecise field.”<sup>107</sup>*

However the River Namoi itself has been the location of successful negotiation within a community over the re-distribution of over-allocated groundwater supplies. This has required general community agreement on the process for sharing the pain.

The examples identified above confirm the relative importance of creating effective social processes over the comprehensiveness of the technical assessment involved.

## **5.7. ENVIRONMENTAL IMPACTS**

A further benefit from imposing the Cap is environmental. This benefit may arise from either an improvement in environmental values in the riverine environment and

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<sup>106</sup> Murray Water Entitlement Committee (1997), “Sharing the Murray – Proposal for defining people’s entitlements to Victoria’s water from the Murray”.

<sup>107</sup> Namoi Valley Water Users’ Association Submission, p. 2.

ecology of the Basin and its numerous valleys, or from a slowing of longer term degradation of these values.

A comparison of the With Cap case against that of the No Cap case needs to take into account the non-private or public benefits and costs that arise from each case. In turn these relate to the different environmental outcomes that result.

As for the private benefits and costs, none of the submissions provided detailed information on the environmental outcomes under either of the two cases. However, we set out below some broad observations:

### **River Health : Intrinsic Values**

This category includes both intrinsic valuation of ecosystems, and the “existence values” placed by the public on the continued survival of species.

The values for these approaches can be obtained from standard revealed and stated preference techniques, such as contingent valuation and choice modeling.<sup>108</sup> Choice modelling is a well-developed technique from marketing and areas such as transport. It has also been used in Australia more recently to measure eg. the willingness of customers to pay for environmental benefits related to water supply<sup>109</sup>, and was trialed in a case-study involving the allocation of water between agriculture and wetlands in the Macquarie and Gwydir Rivers in NSW.<sup>110, 111, 112</sup>

These approaches are also being investigated by the National Land and Water Resources Audit and the NSW Independent Advisory Committee on Socio-Economic Analysis. CSIRO is currently developing a program to assess the *Nature and Value of Australian Ecosystems Services*.

The riverine environment has an intrinsic value to most Australians. This means that the high level of degradation of the river under the No Cap scenario is a cost, albeit intangible. With the Cap, degradation is slowed and this loss of capital value therefore reduced.

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<sup>108</sup> Pearce, D. and Turner, K., (1990) “Economics of Natural Resources and the Environment”, Harvester Wheatsheaf.

<sup>109</sup> Centre for International Economics (1999), “A study to assess environmental values associated with water supply options”, prepared for ACTEW, May.

<sup>110</sup> Bennett, J., (1999), “Estimating the Values of Environmental Impacts of Agriculture”, presented to Country Matters Conference, Bureau of Rural Sciences, Canberra, 20-21 May.

<sup>111</sup> Whitten S. and Bennett, J., “Private and Social Values of Wetlands Research”, School of Economics and Management, University of New South Wales.

<sup>112</sup> Morrison, M.D., Bennett, J.W., and Blamey R.K. (1998), “Valuing improved wetland quality using choice modelling”, Research Report No 6, Choice Modelling Research Reports, University of NSW.

### **River Health: Direct Benefits**

River health generates direct benefits with an attributable commercial value in terms of agriculture, tourism, commercial and recreational fishing and river state amenity.

In terms of agricultural impacts:

*“Irrigators are aware that their own-farm viability and profitability is affected by declining water quality and that this is directly affected by river health.”<sup>113</sup>*

Blue-green algal blooms are conservatively estimated to cost rural industries across Australia some \$60 million per year. The recent estimates suggest that more than half of this cost is likely to be incurred in the Murray-Darling Basin.<sup>114</sup>

In addition increasing salinity adversely affects citrus growing and a wide range of other irrigated enterprises. Better river health reduces these costs and provides benefits in pest control, pollination of crops and re-cycling of nutrients.<sup>115</sup>

Maintenance of high quality rivers, lakes and wetlands creates major commercial benefits from other active uses. These include:

- duck shooters, who spend \$40 million on equipment in Victoria each year;<sup>116</sup>
- recreational and commercial fisheries,<sup>117</sup> and
- tourism, recreation and real estate amenity.

While no precise estimates of these economic values appear to be available for the Basin, indicative estimates from other catchments in eastern Australia confirm the hard financial benefit of a good environment and, therefore, the costs of losing it, eg. it was estimated that restoring 28% flows in the Snowy might result in an additional 136,000 visitor days to the area (associated with rafting, canoeing and fishing) generating benefits between \$51 and \$84 million, capitalised over thirty years. In addition there would be regional economic impacts from that tourist activity which would lead to higher employment and wider activity of at least the same order.<sup>118</sup>

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<sup>113</sup> SRIDC Submission.

<sup>114</sup> Atech Group (1999), “Cost of Algal Blooms”, LWRRDC Occasional Paper 26/99, Executive Summary, p.xi.

<sup>115</sup> Commonwealth (1999) Submission.

<sup>116</sup> Department of Natural Resources and Environment, Victoria (1995), “1995 Hunter Mail Survey”, p. 13.

<sup>117</sup> Australian Conservation Foundation, Submission.

<sup>118</sup> Gillespie Economics (1998), “Economic benefits of Environmental Flows for the Snowy River”, presented to the Snowy Water Inquiry.

In terms of the costs of losing a good environment, blue-green algal blooms provide prominent examples:

- the cost of the 1999 algal bloom on the Gippsland Lakes is estimated to be around \$5 million comprising around \$2 million for commercial fishing and \$3 million for tourism for the six week bloom.<sup>119</sup> Importantly, the adverse impacts appear to carry over from one year to another in terms of reduced tourism; and
- nationwide, the recent Atech-CSIRO study puts “*the current total cost of algal blooms of \$180 million to \$240 million.....a conservative order of magnitude estimate.*”<sup>120</sup> As noted, for the rural sector itself the estimated costs of algal blooms is \$60 million per year.

### **Salinity and Drinking Water**

A particular issue in valuing the quality of the River Murray in South Australia is that it provides the major source of drinking water for Adelaide. The recent MDBC report on salinity confirms the success which has been achieved in reducing the trends in increasing salinity at Morgan. This should defer the date at which it becomes necessary to treat Adelaide’s drinking water for salinity by around fifty years. That will have significant economic benefits.

It must be assumed that any continued increased diversions, which might have been associated with a No Cap Scenario, would have reduced the levels of dilution available in the Murray in South Australia thereby increasing the salinity.

By stimulating water use efficiency the Cap will assist in reducing the rapid growth of salinity in the Basin.

### **Concluding Comment**

The step-by-step assessment of the impacts of the Cap compared with the No Cap scenario reported in this chapter provide the basis for assessing the overall benefits and costs of the announcement and implementation of the Cap. This is reported in the following chapter.

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<sup>119</sup> *pers. comm.* Rob Molloy, Project Co-ordinator, CSIRO, 22 February 2000.

<sup>120</sup> Atech Group (1999) The Cost of Algal Blooms, LWRRDC Occasional Paper 26/99, Executive Summary, p.x

## 6. SUMMARY AND OVERVIEW

### 6.1. PERSPECTIVES ON THE CAP

As noted, the decision to implement the Cap was made with the objective:

- “ 1) to maintain and, where appropriate, improve existing flow regimes in the waterways of the Murray-Darling Basin to protect and enhance the riverine environment; and
- 2) to achieve sustainable consumptive use by developing and managing Basin water resources to meet ecological, commercial and social needs”

#### Process

The introduction of the Cap followed a deliberative and transparent process leading to final agreement by the partner governments. Importantly, the Cap was introduced following an audit of water use in the basin and extensive discussion between representative governments following a broad consideration of relevant issues relating to the economic, social and environmental impacts.

Following the introduction of the Cap, some States have facilitated the broader consideration of how the gains from use of water resources and the pain resulting from the increasing scarcity of the water resource should be shared.<sup>121</sup>

In summary, the 1995 decision to introduce a Cap on diversions, ahead of reaching absolute full development of existing entitlements, reflected a judgement that the resulting environmental, social and economic benefits of a Cap outweighed, in aggregate, the corresponding costs.

Partner governments uniformly endorse the need for the Cap and to make it work effectively. Similarly, with the important exception of northern NSW, submissions to this Review from community groups provided strong and uniform support for the concept and introduction of the Cap.

*“Sustainability in an ecological sense is inseparably linked to the economic sustainability of those industries and communities which the river system supports.”<sup>122</sup>*

*“...recognises the need for the implementation of a tool such as a cap on diversions ... the Cap will in some instances provide the necessary*

<sup>121</sup> Murray Water Entitlement Committee, (1997), Sharing the Murray, Proposal for defining peoples' entitlements to Victoria's water from the Murray, October.

<sup>122</sup> Murray Valley Diverters, Submission.

*security of resources to enable our region a sustainable and long term future.*<sup>123</sup>

*“The greatest economic benefit of the cap is to create more efficient use of water”*<sup>124</sup>

*“In principle supports the implementation of a MDBC Cap on diversions as a means of protecting the security of irrigators in the Murray Valley and to ensure the continued health of our rivers systems.”*<sup>125</sup>

*“The Cap’s value comes from the restraints it imposes upon unbridled use of our finite supply of water in the interests of one sector of our community, the irrigators, at the expense of the rest.”*<sup>126</sup>

As the specification of the No Cap scenario has clearly demonstrated, the activation of sleeper and dozer licences is an essential feature of continuing development and encroaching resource scarcity. It is in no way a unique feature of the Cap. Nonetheless, the formal signal of encroaching resource scarcity provided by the Cap may have brought forward sleeper/dozer activation and trading.

Despite these concerns, there is on balance a *prima facie* case for concluding that the Cap has produced public and private benefits to the Basin community and Australia more generally.

### **Cap Effectiveness**

A central question for the review is whether the Cap has played a central role in triggering the introduction of additional control measures across the Basin or has merely been just another in a continuing process of responding to increasing resource scarcity.

Prior to the announcement of the Cap individual governments had begun to change their water management policies. However, these initiatives were developed and implemented in an uneven way, with considerable variation both between and within States and with little recognition of Basin-wide implications. These compare strongly with the coordinated suite of measures and controls which are now in place across most of the Basin.

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<sup>123</sup> Murray Valley Voice, Submission.

<sup>124</sup> Murray Darling Association, Submission.

<sup>125</sup> SRIDC, Submission.

<sup>126</sup> Tumut River Landowners, Submission

The 1995 Audit of Water Use in the Basin was a watershed in terms of developing a common and agreed understanding of the issues of resource sustainability between members governments. It identified and documented:

- the extremely rapid growth of diversions between the 1988 and 1994 seasons;
- the rapidly advancing limits to further growth;
- the dramatic decline in scarcity of access that would result under a No Cap/full development scenario in, say, the Victorian Murray;
- the continuing fall in end of river flows and the decline in the environmental health of the river system; and
- the need for coordinated basin-wide action.

The subsequent decision of the Ministerial Council to introduce the Cap, signalled publicly the need for a Basin wide commitment to limit future growth in diversions. Discussions with water managers in each state confirm that the formal announcement of the Cap galvanised thinking and effort to achieve better and sustainable outcomes.

Therefore, rather than seeing the Cap as just another step in a series of responses to increasing resource scarcity, the more appropriate perspective is that the Audit and the Cap were essential pre-cursors of the suite of controls currently in place or being implemented by the individual states.

Their effects have been:

- to strengthen and reinforce existing reform initiatives;
- to stimulate additional controls;
- to act as a benchmark for future regulation of diversions;
- to provide a Basin wide framework and so coordinate actions between catchments and States; and
- to ensure compliance monitoring and publicity at the sub-state level.

## **6.2. THE BENEFITS AND COSTS OF THE CAP**

The impacts of the Cap must be evaluated against the clearly specified No Cap scenario. Based on the analysis presented in Chapter 5, the component benefits and costs of introducing the Cap are summarised in terms of:

- the agricultural economy and social fabric;
- tourism, fishing and the non-agricultural economy generally; and
- the natural resource base including the riverine environment.

## Impacts on the Agricultural Economy

The prime benefit of the Cap is the guaranteeing of security on a valley-by-valley basis. In the absence of the Cap there would be substantial erosion of security of entitlements across the Basin, but particularly in the major southern systems. The guaranteeing of this security through the introduction of the Cap provides a better and more certain climate for investment and jobs growth. Long term investment in high value agriculture and value-adding processing is dependent on the underlying security of the base resource. Under the No Cap scenario this is likely to be eroded in the short to medium term.

Part of guaranteeing this long term security is potentially offset by the reduction in development opportunities, ie., costs associated with this guarantee of security are that development, particularly in less developed valleys, is – other things being equal – curtailed.

To date, there appears to be little firm evidence of reductions in development opportunities:

- in the northern systems the Cap has not yet been fully implemented and development has continued apace;
- in the southern systems allocation in recent seasons have been impacted by the resource availability rather than the Cap.

Lowered allocations due to resource availability have greatest impact via those whose enterprises are most reliant on high allocations including the historic ability to utilise the unused allocations of other entitlement holders.

The Cap, when it bites, will have a similar impact. However, while individual high allocation enterprises will be adversely affected, the industries and regions appear likely to continue to prosper.

*“Dairy processors should be confident that the industry can maintain and continue to expand production under the MDBC Cap.”<sup>127</sup>*

- in other cases, development may have been displaced from one valley to another; and
- through water trade, new high-value developments can still take place, merely at the expense of existing lower value activities.

Estimates provided in submissions of the costs of the Cap in terms of development that may be forgone provide a partial picture only since these estimates are specific to particular locations and ignore the benefits of guaranteed security, which are

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<sup>127</sup> FARMANCO Pty Ltd (1998), “The Potential Economic Impacts on the Dairy Industry From Victoria’s Commitment to Meeting the Murray-Darling Basin Cap”, January.

widespread and diverse. Overall, the guarantee of security in the longer term is a major net benefit to the Basin irrigation community;

Second, under a No Cap scenario, the growth of diversions towards full development would increase the sensitivity of irrigated agriculture to changes in climate and rainfall. The impact of drought sequences on cash flow, the ability to access debt finance and fund existing commitments would progressively worsen. A benefit of the Cap, therefore, is to maintain the viability of irrigated agriculture in the Basin and to prevent irrigators from unnecessarily being forced off the land due to the collapse of security and their finances in the absence of the Cap.

A third benefit of the Cap is the stimulus to codifying and improving property rights and entitlements to water. By definition, when the demands on the fixed pool of resources can be substantially expanded, then each property right risks erosion. Placing a finite limit on diversions across the Basin, therefore, gives a stronger property right by providing known and guaranteed security. The Cap has also stimulated the streamlining of property rights to better facilitate trading in water.

Fourth, water trade substantially reduces the economic cost of compliance with the Cap and with environmental flow rules. The impetus provided by the Cap to facilitate trade is fostering better trading rules, third party protection and easier movement of water to high value activities. Trade would occur independently of the Cap but the Cap stimulated reforms are contributing to the early acceleration of that trade and will increase the associated benefits from trade.

The economic benefit of water trade in NSW is estimated to exceed \$65 million with the benefit of trade across the Basin likely to exceed \$100 million annually. The Cap initiated reforms to water trading will enhance these benefits.

Fifth, as the No Cap scenario progresses to Full Development there will be increasing tensions between irrigator groups and between regions as security declines and water trading becomes more aggressive. Individual irrigators, industry associations, local government and others initiate legal actions against the State Governments and the MDBC for failing to provide adequate stewardship of the water resource and riverine environment. Other legal actions seek to either remove or improve constraints on water trade. In other words, there is a disorderly scramble and lack of process.

The benefit of the Cap is that it allows the valleys and states in the Basin to avoid the water wars that have typified developments in California and Colorado. These disputes have run for more than 60 years and are noted for their polarity, community tension and disruption and waste of community resources.

Concern over possible future impacts of the Cap on the social fabric of particular irrigation communities appears misplaced when the impact of potential water wars on the social fabric of the Basin as a whole is contemplated.

Sixth, in the absence of the Cap, continued development would lead to consequential reductions in river flows and accelerate the degradation of the riverine environment.

*“Careful consideration of the impacts of river flows is required, since river health is used as a measure by which irrigators will be judged by the wider community.”<sup>128</sup>*

Within Australia, the metropolitan electorate would become increasingly out of patience with the irrigation community and the unwillingness of Governments to halt the degradation. The perceived division between country and city Australians would increase.

In summary, from the perspective of the agricultural economy, the Cap has produced major immediate benefits with little commensurate cost. The better investment climate created by certainty over water security, improved property rights and improved trading arrangements are attributable to the announcement of the Cap and are not dependent on the timing of its actual implementation – provided that implementation is in fact proceeding.

In principle, the capping of diversions means that some potential developments may be curtailed and benefits forgone. In fact, with the southern systems largely constrained by resource scarcity since 1995, the Cap has not had a physical impact on constraining diversions. Similarly, in the northern systems the Cap has not yet been fully applied. This combination of circumstances means that the immediate benefit cost ratio, ie., for the first five years, is undoubtedly highly positive.

In the medium term, progression to Full Development would lead to the collapse of security in the southern valleys and a significant loss of security in the north. As a result, the annual benefits of the Cap increase over time. These benefits occur to both existing and new enterprises.

### **Equity Issues**

With the agricultural economy, the Cap induces some important differences in impact between valleys and between irrigators:

- under the No Cap case, constraints imposed by security will impact on both existing activities and potential new developments. The sharp falls in security –

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<sup>128</sup> Murrumbidgee Consultancy (1999) Assessing the Impacts of the MDBC Cap on Murray Irrigation Limited – A Modified Version of the August 1999 Report, Report prepared for Murray Irrigation Limited, p.4.

and resulting volatility – are likely to necessitate the winding back and adjustment of existing industries including the Victorian dairy industry, the NSW rice industry and, to a lesser extent, existing cotton growers. With the Cap, the security of existing development in aggregate – though not individual businesses – is guaranteed and the constraints imposed by scarcity borne primarily by forgoing potential new developments, particularly in upper reaches and tributaries.

Under the No Cap scenario the adjustment costs are likely to be both higher and tangible. In contrast to the possible costs of losing potential development, the costs of winding back and restructuring existing enterprises and industries are very real.

The tributaries and upper reaches are disadvantaged through timing and history in that development occurred earlier in the south and the impending resource constraints mean that it is cheaper for the Basin as a whole to halt development at existing levels – this raises inevitable equity issues but such issues arise under both scenarios; and

- the guaranteeing of security at the valley level defines the security of entitlement for individual irrigators, but has differential impacts among irrigators since some enterprises have grown through extensive use of off-allocation and allocations above 100% of entitlements.

A major equity issue hinges on the activation of sleepers/dozers issue and the view that the Cap is causing “a massive wealth transfer”. The activation of sleeper dozer licences is essential for increased development and facilitates the shift of water to higher value activities particularly in years of low allocation due to resource scarcity.

Two mutually reinforcing effects have led to the rapid expansion of trade, ie.:

- increasing trade of unused entitlements causes lower announced allocations; and
- lower announced allocations causes more irrigators to seek additional water pushing up the price of water and encouraging greater release of unused entitlements into the water market.

Introduction of the Cap may have advanced the activation of sleeper dozer licences but this is unclear. Indeed, the opposite view is that:

*“While sleeper activation has had an impact, this level of impact would have been even worse in the absence of a Cap.”<sup>129</sup>*

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<sup>129</sup> Australian Conservation Foundation, Submission (1999).

The issue of the wealth transfer is heavily felt but whether “wealth is transferred” or rather wealth already held is simply realised depends critically upon the perception of the relative merits of prior rights or history of use approaches.

### **Social Impacts and Benefits**

As noted above, the Cap has created positive social impacts. By guaranteeing security of entitlement the Cap will help create economically sustainable communities. The benefits from this will flow through into social outcomes such as employment, schools and community welfare.

The Cap also provides a mechanism whereby disputes and tensions over resource scarcity, between community groups within the Basin and divisions between country and city Australians, can be largely avoided.

### **Non-Agricultural Benefits and Costs**

Confidence that the benefits associated with the Cap substantially outweigh the costs is increased when impacts outside the agricultural economy are considered.

First, there are direct economic benefits attributable to the natural capital stock. The rivers and lakes have direct economic benefits in terms of tourism, commercial and recreational fishing, duck shooting and real estate amenity. While no precise estimates appear to be available for the Murray-Darling Basin, indicative estimates from other catchments in eastern Australia confirm the hard financial benefit of a good environment and, therefore, the costs of losing it. For instance, the costs of the 1999 algal bloom on the Gippsland Lakes is estimated to be around \$5 million comprising around \$2 million for commercial fishing and \$3 million for tourism for the six week bloom.<sup>130</sup> Importantly, the adverse impacts appear to carry over from one year to another in terms of reduced tourism.

Nationwide, the recent Atech-CSIRO study puts “*the current total cost of algal blooms of \$180 million to \$240 million.....a conservative order of magnitude estimate.*”<sup>131</sup> For the rural sector itself the estimated costs of algal blooms is \$60 million per year.<sup>132</sup>

Second, the riverine environment has an intrinsic value to most Australians. This means that the high level of degradation of the river under the No Cap scenario is a cost, albeit intangible. With the Cap, degradation is slowed and this loss of capital value therefore reduced.

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<sup>130</sup> *pers. comm.* Rob Molloy, Project Co-ordinator, CSIRO, 22 February 2000.

<sup>131</sup> Atech Group (1999) “Cost of Algal Blooms”, LWRRDC Occasional Paper 26/99, Executive Summary, p.x

<sup>132</sup> *ibid*, p.xi.

## Conclusion on Net Benefits

Taken together, our assessment indicates that the Cap has already delivered significant benefits to the Basin community and that the net benefit will increase over time.

This strong positive conclusion will not accord with the perception of every stakeholder in the Basin. This gap in perceptions needs to be understood to remove unwarranted criticism and allow attention to be focussed on improvements to the future operation of the Cap.

A first step is to ensure that people understand what would happen if the Cap were to be removed (see Section 6.3 below).

### 6.3. IMPROVING THE OPERATION OF THE CAP

Our review has identified a number of measures to improve the operation of the Cap which will both increase the benefits and reduce the costs. We consider each of these in turn.

First, the gap in perceptions and understanding regarding the Cap needs to be closed. Factors leading to a gap in perception of the impact of the Cap include:

- **the different starting points.** Many of the submissions do not compare the Cap with the No Cap scenario. Rather, they compare the Cap with the situation before resource constraints became apparent, ie., the early 1990s;
- **the different understandings on the role of sleepers and dozers.** The rapid growth of trading and the activation of sleepers and dozers is a consequence of increasing development and resource scarcity and not of the introduction of the Cap. Full Development cannot proceed unless sleepers and dozers are activated; and
- **difficulty in separating the impacts of resource scarcity and the Cap.** Although reduced allocations in the southern systems coincide with the announcement of the Cap, they have in fact been driven by resource scarcity and resultant increase in trading.

These different starting points mean that some stakeholders ascribe far more to the Cap and associated reforms than is warranted. This leads to an overestimate and misperception of the adverse impacts of the Cap and fear and anger about the future.

*There is a lack of discussion with affected parties, whether or not they happen to be water users or residents of country towns whose lifestyle is*

*being affected not only by changes which have occurred but also because of the fears being generated as a result of proposed changes.*<sup>133</sup>

This destroys the trust required for meaningful dialogue on how to improve the operation of the Cap.

A further gap in perception arises from the **impact on security**. The underwriting of long term security in each of the valleys – the major direct benefit to irrigated agriculture – appears not to be well understood. This knowledge, summarised in the simulation models, may be familiar to water managers and industry leaders but has not been readily available to, or known by, irrigators and local communities.

Closing the gap requires a tailored communication strategy.

Second, operational improvements to ensure that the administration of the Cap does not lead to a downward bias in diversions appears achievable. For instance, detailed analysis undertaken by Murray Irrigation identifies some scope to optimise NSW Murray resources through more timely and accurate reporting of tributary inflows and intervalley transfers.

Possible options for improved harmonisation of Murray-Darling Basin management include:

- improved interaction between the Murrumbidgee modelling (DLWC) and the Murray modelling (MDBC);
- centralised management – or at least better integration – of Murray-Darling Basin modelling may offer the best opportunity for improved management. (This may raise sovereignty and other issues);
- improved timeliness of streamflow reporting, particularly significant rainfall events and rainfall “rejections”;
- improved management of intervalley transfer accounting; and
- greater flexibility with on-route storage management – for example, Lake Victoria management will exacerbate the problems of harmonisation.<sup>134</sup>

Third, the concern that the Cap is causing generally widespread adverse socio-demographic impacts is not supported by this first review. Nonetheless, the concern will need to be further addressed with better information and understanding through the assembly and analysis of key data and targeted case studies. These are not mutually exclusive.

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<sup>133</sup> Western Catchment Management Committee (1999), Submission.

<sup>134</sup> Murrumbidgee Consultancy (1999), “Assessing the Impacts of the MDBC Cap on Murray Irrigation Limited”, Report prepared for Murray Irrigation Limited, pp.20-21.

The 1996 socio-demographic profile of the Basin is now dated and does not provide insights into more recent effects of the Cap. Because the 2001 and 2006 Censuses will provide new socio-demographic data on the Basin, other benchmark data should sensibly be assembled. The snapshots of 2001 and 2006 should therefore incorporate:

- the socio-demographic profile from the ABS Census;
- a better understanding of water use across the basin. This requires improved information on water use by crop type and application method;
- a better understanding of the drivers and benefits of water trades, both permanent and temporary. This requires source and destination information to be collected at time of trade showing enterprise activity of the seller and intended use by the buyer. Such information is essential in demonstrating the magnitudes of the benefits derived from trading and to better understand the adjustment processes operating within the Basin; and
- a better understanding of the attitudes, concerns and knowledge of water and resource management issues. This benchmark survey would facilitate development of a more comprehensive and targeted communication strategy.

Finally, some of the concerns expressed by irrigation communities which are alleged to be adverse effects of the Cap, in practice relate to the rules for activation of sleepers and dozers.

Where Cap compliance is not jeopardised, consideration could be given to allowing irrigation communities to opt out of the “prior right” approach and to adopt a “history of use” approach to Cap implementation. Proposals for such opting out must satisfy the State and the Independent Audit Group and command a high level of support, say 75%, in plebiscites of affected winners and losers.

#### **6.4. PROJECT BRIEF QUESTIONS**

Given the nature of the exercise the review has addressed issues at a generic level, as in the discussion above. The Contract Brief included an explicit set of questions where the Cap Project Board sought particular insights.

This Section demonstrates how that analysis has provided answers to the specific questions in the original project brief.

The Contract Brief for this Review posed an explicit set of questions. Recognising the overlap of these questions, our responses to these questions are summarised below:

i) **How suitable is the benefit cost paradigm for assessing the Cap?**

The standard benefit cost framework needs to be extended when dealing with major environmental issues to recognise impacts on the value of natural capital. This extension does not undermine the standard framework.

To apply any benefit cost framework requires clear distinction between the Cap and No Cap scenarios and careful attention to avoid double counting and ignoring offsetting benefits or costs.

The paradigm applied in this Review observes these requirements. We conclude that the paradigm is appropriate and has been followed (Section 1.3).

ii) **What is the aggregate value of the Cap to the economic and social welfare of the Basin?**

Taking all components and impacts together, our assessment indicates that the Cap has already delivered significant benefits to the Basin community and that the net benefit will increase over time.

To date, the Cap has had little “cost”, because it not yet been fully implemented in Queensland and the northern valleys of NSW and the southern valleys have been resource constrained.

This strong positive conclusion will not accord with the perception of every stakeholder in the Basin. There is clear concern and misunderstanding over what the Cap means and this has created apprehension and anger amongst irrigators in some valleys, especially in NSW.

This gap in perceptions needs to be understood to remove unwarranted criticism and allow attention to be focussed on improvements to the future operation of the Cap.

iii) **What has been the impact on the agricultural economy?**

The prime benefit of the Cap is the guaranteeing of security on a valley-by-valley basis. In the absence of the Cap there would be substantial erosion of security of entitlements across the basin, but particularly in the major southern systems. The guaranteeing of this security through the introduction of the Cap provides a better and more certain climate for investment and jobs growth. Long term investment in high value agriculture and value-adding processing is dependent on the underlying security of the base resource. Under the No Cap scenario this is likely to be eroded in the short to medium term.

This increased security and its consequences will also generate significant social benefits. Other economic and social benefits include:

- by comparison with the No Cap scenario, a benefit is the maintenance of the viability of irrigated agriculture in the Basin and to prevent irrigators from unnecessarily being forced off the land due to the collapse of security and their finances in the absence of the Cap; and
- water trade substantially reduces the economic cost of compliance with the Cap and with environmental flow rules. The impetus provided by the Cap to facilitate trade is fostering better trading rules, third party protection and easier movement of water to high value activities. Trade would occur independently of the Cap but the Cap stimulated reforms are contributing to the early acceleration of that trade and will increase the associated benefits from trade;
- reduced tension between irrigator groups and between the irrigation community and the city.

iv) **Have we seen other major positive or negative economic and social impacts of the Cap?**

In addition to the impacts on the agricultural economy noted above, the Cap has major positive impacts on independent activities such as tourism, recreational and commercial fishing and real estate amenity and water quality for urban consumption.

Moreover, the Cap has stimulated institutional reform which will lead to better appreciation of property rights to water, more effective rules for water markets including interstate trade and strengthened and more comprehensive river management and environmental flow regimes. These will also be reflected in positive social outcomes.

v) **To what extent have there been public and/or private gains or losses throughout the Basin under the Cap?**

In terms of private gains and losses, the Cap provides major gains in terms of underwriting resource security on a valley-by-valley basis. The benefits of this underwriting are greatest for the highly developed valleys and for irrigators whose use is relative to their entitlement has been conservative.

Conversely, there is a loss of development potential in less developed valleys and adverse impacts from the adjustment required by irrigators whose use has been high relative to their formal entitlement.

Despite these differential impacts, the Cap provides net benefits to the Basin compared with the No Cap scenario.

vi) **What have been the benefits of water markets in the context of the Cap?**

As noted, benefits attributable to the Cap include:

- a stimulus to codifying and improving property rights and entitlements to water. By definition, when the demands on the fixed pool of resources can be substantially expanded, then each property right risks erosion. Placing a finite limit on diversions across the Basin, therefore, gives a stronger property right by providing known and guaranteed security. The Cap has also stimulated the streamlining of property rights to better facilitate trading in water;
- a reduction in the economic cost of compliance with the Cap and with environmental flow rules. The impetus provided by the Cap to facilitate trade is fostering better trading rules, third party protection and easier movement of water to high value activities. Trade would occur independently of the Cap but the Cap stimulated reforms are contributing to the early acceleration of that trade and will increase the associated benefits from trade.

vii) **What would be the impact if the Cap were to be removed (especially through the erosion of security of supply to existing users)?**

Essentially, this is the No Cap scenario applying from the date of removal of the Cap. In summary, this comprises:

- in the absence of the formal announcement of the Cap on diversions, irrigation development would proceed – at least initially – in most valleys. As a result, resource sustainability would become a major issue;
- the increased development would lead to a steady erosion of security reducing the incentive for new entrants to begin irrigating but also undermining the security of existing entitlements and enterprises in all valleys.
- security in lower valleys and reaches would fall significantly due to development in these lower valleys as well as development in upstream reaches and tributaries. For instance, reflecting the obligations of NSW and Victoria to South Australia under the Murray-Darling Basin Agreement, new developments on the Darling and tributaries would also impact on the security of supply for the Murray systems;
- by definition, the movement to full development must entail activation of unused rights, entitlements and licences. This occurs through continued development by existing entitlement holders and/or by the sale of unused entitlements in the market to new entrants seeking to gain entitlements;

- not all unused entitlements would be activated since some are kept as insurance to ensure greater reliability and others are held in anticipation of future development;
- sleeper and dozer licences would also be purchased by existing users as they seek to restore their previous level of security;
- the degradation of the riverine environment and water quality would proceed at an accelerating pace. Algal blooms would become a recurring feature of major reaches as dilution flows are reduced. Salinity, particularly in the lower reaches, would continue to rise. In the mid and lower sections of the river, the rise in water salinity would lead to increased salt accumulation and loss of the remaining bio-diversity;
- socio-demographic trends would continue to be driven by the major forces impacting on irrigated agriculture, ie., commodity prices, seasonal allocations and access to export markets;
- there would be increasing tensions between irrigator groups and between regions as security declines and water trading becomes more aggressive.
- individual irrigators, industry associations, local government and others initiate legal actions against the State Governments and the MDBC for failing to provide adequate stewardship of the water resource and riverine environment. The recent announcement from Premier Olsen provides an example of this risk:

*“If NSW just simply continue to ignore our calls for appropriate flows through the River Murray we will take retaliatory action.”<sup>135</sup>*

In the absence of a cap these challenges would have been far more common and vociferous. Other legal actions seek to either remove or improve constraints on water trade. In other words, there is a disorderly scramble and lack of process;

- as resource availability and security deteriorate rapidly in the final stages of this full development scenario, incentives for water use efficiencies rise sharply, stimulating major investment late in the period. Major corporate farms will be better placed to fund those capital expenditures;
- changes in river and system operation would tend to occur progressively but predominately in the full development scenario as the pressures and urgency mount;
- as end of valley flows continue to fall and the damage to the river environment becomes stark, the urban electorate loses patience and sympathy with irrigators and basin communities; and

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<sup>135</sup> Premier Olsen (2000), as reported in The Sunday Mail, 20 February.

- with the substantial reduction in security, the income and viability of irrigated enterprises and communities across the Basin becomes increasingly sensitive to seasonal and climatic variation.

## SUMMARY

The Cap provided a clear signal to stakeholders, across the Basin, that there was increasing resource scarcity, that previous arrangements had proved inadequate and that there was the political commitment to implement necessary additional controls.

The Cap has:

- strengthened and reinforced existing reform initiatives;
- stimulated additional controls;
- provided a benchmark for future regulation of diversions;
- provided a Basin-wide framework to coordinate actions between catchments and States; and
- ensured compliance, monitoring and publicity at the sub-state level.

The introduction of the Cap has generated significant economic and social benefits. The prime benefit is the guaranteeing of security on a valley-by-valley basis. This provides a better and more certain climate for investment and jobs growth. Long term investment in high value agriculture and value adding processing is dependent on the underlying security of the resource base. Under the No Cap scenario this is likely to be eroded in the short to medium term.

By guaranteeing security of entitlement, the Cap will help create economically sustainable communities. The benefits from this will flow through into social outcomes such as employment, schools and community welfare and cohesion. The Cap also provides a mechanism whereby disputes and tensions over resource scarcity, between community groups within the Basin and divisions between country and city Australians, can be managed and resolved in an orderly way.

Finally, the Cap creates significant environmental benefits. These are realised both as direct benefits attributable to the natural capital stock – such as from increased tourism, recreation and real estate amenity – and in slowing further degradation of the riverine environment which has intrinsic value to most Australians.

## **ATTACHMENT A**

### **Review of the Operation of the Cap : Economic and Social Impacts**

#### **a) Submissions made to the Community Advisory Committee**

##### **New South Wales**

Western Catchment Management Committee  
Central West Catchment  
Lower Murray Darling Catchment  
Murrumbidgee Irrigation  
Ricegrowers Association  
Batlow Unregulated Streams  
Tumut River Landowner  
MIA Council of Horticultural Associations  
Yanco Creek and Tributaries  
North West Catchment Management Committee  
Macquarie/Cudgegong River Management Committee

##### **Victoria**

Joint CAC members  
North East Catchment  
Mallee Catchment

##### **South Australia**

Riverland  
Lower Murray Catchment

##### **Queensland**

Maranoa-Balonne Catchment

Murray Darling Association  
Cotton Australia

#### **b) Other Community Submissions Provided Directly to the Review**

Berrigan Shire  
Bourke Chamber of Commerce  
Bourke Cotton Growers Association  
Bourke Shire Council  
Brewarrina Shire Council  
Coleambally Community Action

(incl. Dr Robert Byrne, Country Women's Assoc., Barry Hogan and St Peter's Primary School)  
Darling River Food & Fibre  
Goulburn – North East – Water for Agriculture – Ministerial Committee  
Gwydir Valley Irrigators Association  
Hay Water Users Association  
Hume Shire Council  
Lachlan Valley Water  
MIA Council of Horticultural Associations  
Moirra Private Irrigation District  
Murray Irrigation Limited  
Murray Valley Voice  
Murray Valley Water Diverters Advisory Association  
Murrumbidgee Irrigation  
Namoi Valley Water Users' Association  
Narromine Irrigation Board of Management  
Ricegrowers Association  
Southern Riverina Irrigation Districts Council  
Tumbarumba Shire Council  
Twynam Pastoral Company  
West Corrgan Private Irrigation District

**c) State Submissions**

The review of economic and social impacts received formal submissions from each of the member States and from the Commonwealth Government. The review team would also like to place on record their appreciation of the contribution made by members of staff within the respective Departments of those member states, who generated original unpublished data for key aspects of the consultancy and provided invaluable comments and insights.

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