

BULK WATER PRICES

An Interim Report



**INDEPENDENT PRICING AND REGULATORY TRIBUNAL
OF NEW SOUTH WALES**

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October 1996

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**INDEPENDENT PRICING AND REGULATORY TRIBUNAL
OF NEW SOUTH WALES**

**REPORT TO THE PREMIER ON PRICING PRINCIPLES FOR BULK WATER SERVICES
UNDER SECTION 12 (1)(b) OF THE INDEPENDENT PRICING AND REGULATORY
TRIBUNAL ACT, 1992**

- Matter No.:** SPDR/95/01
- Agency:** The Water Administration Ministerial Corporation (administered by the Department of Land and Water Conservation).
- Services:** Any services provided by the Water Administration Ministerial Corporation, to the extent that the service involves:
- a) the making available of water; or
 - b) the making available of the Corporation's water supply facilities; or
 - c) the supplying of water, whether by means of the Corporation's water supply facilities or otherwise

Declaration of government monopoly services under Section 4 of the Act:

Order dated 4 October 1995 - page 7115, Gazette No. 122

Foreword

In New South Wales, 90 per cent of the population is concentrated on the coast, but, coastal cities, towns, industry and agriculture consume only about 20 per cent of total water used. The other 80 per cent is used by the rural sector, chiefly for irrigation.

The Tribunal has completed inquiries into the state's principal urban water service providers: Sydney Water Corporation, Hunter Water Corporation, Gosford Council and Wyong Council. The Tribunal has also completed a review of pricing principles for water services provided by local water authorities throughout the state.

The review of charges for bulk water services is the final major step in the Tribunal's investigation of the water industry in New South Wales.

This interim report is concerned with the bulk water services provided by the Water Administration Ministerial Corporation, (the Ministerial Corporation) which is administered by the Department of Land and Water Conservation (DLWC). The DLWC controls use of the state's water through its ownership of major dams and related infrastructure, and its licensing of water extraction from rivers, streams and groundwater sources. The DLWC exercises monopoly power over the management, licensing and supply of bulk water services to rural and regional water authorities, towns, industry and irrigators.

The DLWC and other government agencies also influence the *quality* of water available. The DLWC incurs the costs of managing water resources and the dams, weirs and other infrastructure used to deliver water. The Environment Protection Authority (EPA) licenses discharge of water and wastewater into rivers and streams.

The state's water supply, especially bulk water in rural areas, is limited by many factors: variable river flows, low rainfall in many locations, the highly seasonal nature of precipitation, and generally high rates of evaporation. Much money and effort has been spent on attempting to better regulate the limited available supplies of surface and ground water in New South Wales. In the past century, as the water demands of society have grown, 200 major water storage facilities have been constructed.

There has been active debate over how to allocate the limited supply of bulk water among competing users, including the environment, and how to price and charge for that water. This debate has focused on the nature of licensed entitlements to use water, the structure of charges and the consequences of water use for the environment.

The Tribunal's inquiry is concerned primarily with the pricing of the resource management, supply and licensing of bulk water by the DLWC. There is necessarily some discussion of the related "non price" issues, as well, such as entitlements to use water, allocations and the administrative structure of the DLWC and other relevant organisations.

In fact, price has played a minimal role to date in the allocation of scarce bulk water resources. In the past, the state's water authorities allocated water to agricultural use in large volumes and at prices that generally did not cover the operating and maintenance costs of water services, let alone the high capital costs of the infrastructure. Prices are likely to continue to play a secondary role as an allocative instrument. Administrative decisions such as the Murray-Darling Basin Commission's cap on water extractions and the NSW

government's water quality and river flow objectives are likely to continue to be the major instruments affecting the allocation of bulk water resources.

Nevertheless, charges for bulk water services must recover the efficient costs incurred by the DLWC in delivering bulk water and administering the associated resource management and licensing activities. This interim report and the maximum prices that will be set by the Tribunal in June 1997 are concerned with setting the appropriate levels of water charges to meet this objective.

This report sets out the Tribunal's findings about a number of major factors that relate to charging for bulk water and related resource management and licensing services by the DLWC. The Tribunal finds there is:

- A clear need for better and more detailed information from the DLWC with respect to its activities and the costs associated with delivering its bulk water related services, because appropriate charges cannot be set until such information is forthcoming.
- A need to maintain the financial viability of the DLWC's bulk water services in the interests of all water users and other beneficiaries in the state.
- Apparent scope for improvements in efficiency, and reductions in the costs of service delivery by the DLWC.
- A case for better, catchment based charging, reflecting different catchment based activities and costs. In some catchments it is likely that charges will need to increase more over time than in other catchments.
- A case for changing the existing structure of charges to better reflect actual water delivery, resource management and licensing services by the DLWC.
- A need for greater expenditure on environmental improvements, and more effort and research to identify "polluters" of the environment and "beneficiaries" of environmental improvements.
- A strong case for better coordination and better accounting of the delivery and funding of services by the various agencies involved in water and land management in the state.

In conducting this inquiry, the Tribunal has benefited enormously from the input of a large number of interested parties. Those who made written submissions are listed in appendix 2 and those who appeared at public hearings are listed in appendix 4.

The Tribunal will hold public hearings on this interim report at regional centres in March and April of 1997. A maximum price determination will follow in June 1997, setting bulk water charges to apply from 1 July 1997. Much work remains to be done by the Tribunal, the DLWC and various interested parties to finalise this inquiry and set future charges for bulk water services.

Thomas G Parry
Chairman
October 1996

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Introduction

The Tribunal has spent the past nine months researching, reading submissions and holding public hearings to gather information for this interim report on charges for bulk water services.

The report is the first step towards reforming the pricing of bulk water services in NSW. The task is far from complete. The Independent Pricing and Regulatory Tribunal (the Tribunal), the Department of Land and Water Conservation (DLWC), water user groups, community groups and the NSW government all have important work to do over the next seven months and in subsequent years to reform the pricing of bulk water services.

The chart on page iii shows the water resource management, bulk water supply and licensing services provided by the DLWC. The Tribunal sets maximum prices for each of these three bulk water services. Also shown on page iii are the seven other work program areas administered by the DLWC. The Tribunal's inquiry relates only to the DLWC's administration of water resources.

This interim report details the Tribunal's findings on a great many issues relevant to bulk water charges in NSW. It also defines the pricing principles the Tribunal intends to use in setting bulk water prices. The limited financial information available is used to calculate indicative future bulk water charges. Further comments and submissions are now sought from interested parties and the general public. The interim report does not have all the answers, rather it is intended as the beginning of a path towards serious reform of bulk water prices in NSW.

The most important forthcoming dates for the Tribunal's inquiry into charges for bulk water services are:

October 1996	Publication of this interim report seeking submissions by 14 February 1997.
17 January 1997	DLWC's proposed water charges to apply from 1 July 1997 circulated for comment.
14 February 1997	Last date for submissions on Tribunal's interim report and DLWC's proposed prices.
March & April 1997	Public hearings at regional centres.
June 1997	Determination setting maximum prices to apply from 1 July 1997.

Price setting by the Tribunal

The Tribunal's task is to review the pricing policies and set maximum prices for those government-owned monopoly enterprises referred to it by the Premier. This is an on-going task. Once an enterprise has been referred to the Tribunal, maximum prices are set and reset for it indefinitely. In relation to the investigation of bulk water services, the Tribunal's task is to:

- examine how the DLWC sets charges, including the resource management, supply and licensing of bulk water use
- review current charges for bulk water services

- specify reforms needed, taking into account a list of matters that are contained in section 15 of the Tribunal's Act
- identify what needs to be done by the Tribunal, the DLWC, water users groups, community groups and government to achieve these pricing reforms
- create a structure for setting maximum prices in the future.

This interim report contains the Tribunal's views on current bulk water charges and the need for significant reforms. It identifies much of the reform work that needs to be done and presents the Tribunal's views on how to achieve these. It also presents for comment some preliminary views on the best means of regulating bulk water prices in the future.

Purpose of this interim report

The Tribunal's intention in releasing this interim report is to provide interested parties and the general public with enough information to allow them to comment on the issues relevant to bulk water prices. In particular, the Tribunal seeks feedback on these questions:

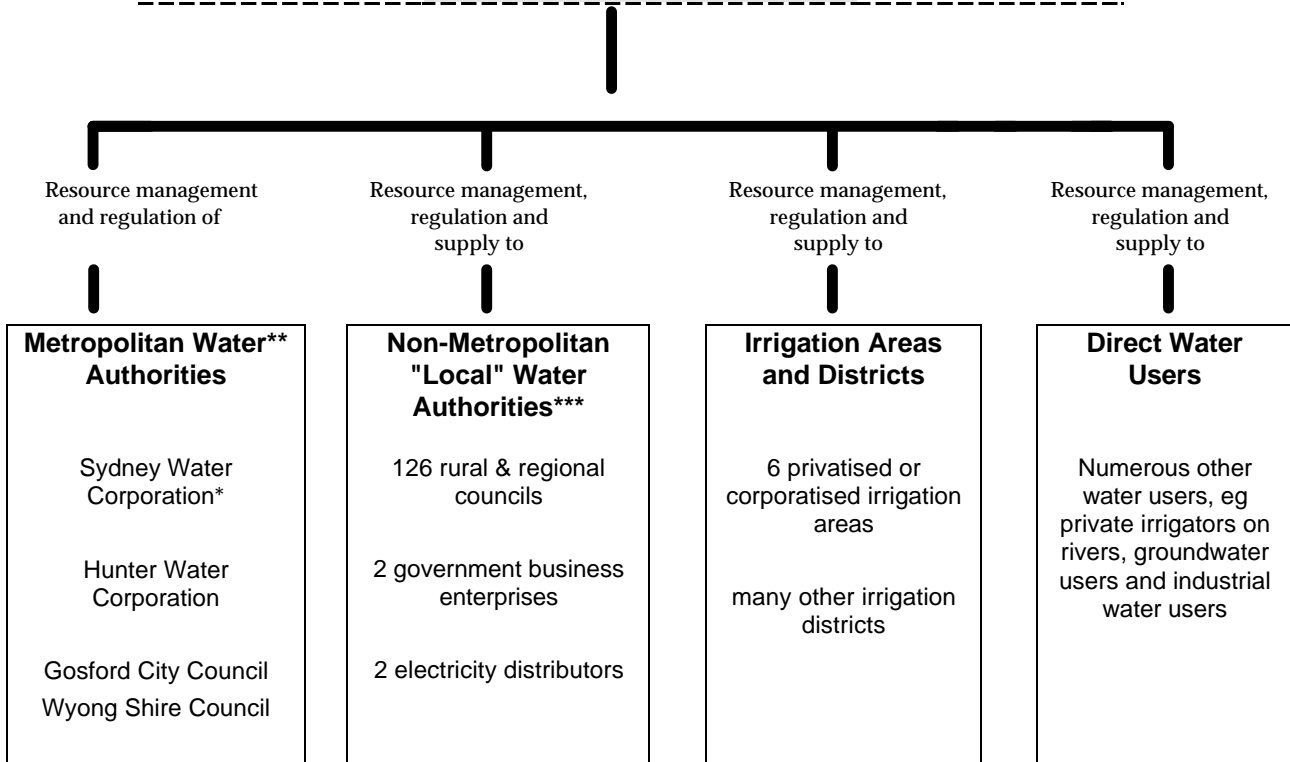
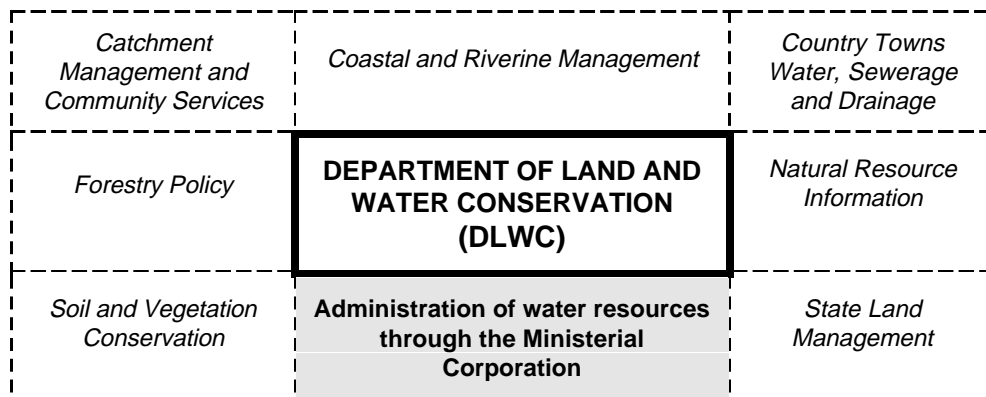
- Has the Tribunal correctly assessed problems associated with existing bulk water pricing?
- Are the Tribunal's suggested reforms appropriate and complete?
- What other reforms would improve the pricing of bulk water services?
- How can the suggested reforms best be achieved?
- How should bulk water prices be regulated in the future?

The pricing principles and reform agenda that are set out in this interim report are a blueprint for the setting of maximum bulk water prices in the future. To be successful, the Tribunal's recommendations must be the shared responsibility of the Tribunal, the DLWC, water user groups, community groups and governments.

PROVISION OF BULK WATER SERVICES BY THE WATER ADMINISTRATION MINISTERIAL CORPORATION

The Water Administration Ministerial Corporation (the Ministerial Corporation) provides three bulk water services:

1. **Resource management** *to ensure sustainable use and quality of water.*
2. **Supply** *to water authorities, irrigation areas and districts, and direct water users through river systems and manmade channels.*
3. **Regulation** *to ensure users comply with standards and licence conditions.*



* Sydney Water Corporation performs catchment management within its own river catchments and shares responsibility for resource management in the Hawkesbury-Nepean and Shoalhaven river systems.

** Metropolitan Water Authorities own their own dams and have the statutory right on behalf of the Ministerial Corporation to provide their own bulk water supply.

*** Some Non-Metropolitan "Local" Water Authorities own their own dams and hence have the statutory right on behalf of the Ministerial Corporation to provide their own bulk water supply.

1 OVERVIEW

This interim report presents the Tribunal's findings on the costs and charges for bulk water services in NSW. This report seeks submissions from interested parties on these findings. Bulk water services are provided by the Water Administration Ministerial Corporation, (the Ministerial Corporation) which is administered by the Department of Land and Water Conservation (DLWC).

A chronology of the Tribunal's pricing regulation of the NSW water industry and an explanation of key concepts and acronyms used in this interim report are provided at the back of the report. These sections are printed on blue paper for ease of reference.

Summaries of recommendations are provided at the end of each chapter and a summary of all recommendations is contained in chapter 11.

Chapter 2 Water reform policy context

Water users are affected by the *quantity, quality and security of supply* of water. They are also affected by the price of water. Prices can be adjusted to reflect other factors, but price is not always the principal determining factor in water use.

Chapter 2 views the Tribunal's inquiry in the context of other developments occurring in water resource policy which affect the quantity, quality and security of supply of water.

The main conclusions of chapter 2 are:

- ⇒ Initiatives are being taken at national and state level to better manage the nation's water resources. Many of these have pricing implications that could impact significantly on the price of bulk water. Others will have non-price impacts, the consequences of which could outweigh any increases in prices.
- ⇒ The Tribunal's responsibility is to determine bulk water prices in New South Wales. It acknowledges that there are many important non-price aspects to consider and welcomes the opportunity to contribute to discussion in cases where the issues are related to or impact on pricing.
- ⇒ Non-price mechanisms are likely to be the most effective way of achieving environment improvements. The key non-price mechanisms are likely to be:
 - the MDBC's cap on extractions of water from the Murray-Darling Basin
 - providing specific water entitlements for the environment
 - implementing water quality and river flow objectives which will restore river health and key features of natural flow regimes
 - regenerating native ecosystems in the riverine environment, especially in riparian areas.

Chapter 3 The purpose of bulk water pricing reform

The pricing principles that should be followed in setting charges for bulk water services are:

Pricing Principles
<ol style="list-style-type: none">1. Water charges should be based on the most efficient way of providing water services.2. The DLWC's administration of water resources through the Ministerial Corporation should achieve financial stability and deliver a sustainable level of water services.3. Pricing policy should encourage the best overall outcome for the community from the use of water and the other resources used to store, manager and deliver that water.4. The cost of water services should be paid by those who are responsible for causing, or benefit from, those services. Those who cause more services to be required, or benefit more, should pay more.5. Pricing policy should promote ecologically sustainable use of water and of the resources used to store, manage and deliver that water.

The chapter develops 17 recommendations which the Tribunal believes the DLWC should implement to achieve these pricing principles. Subsequent chapters add further recommendations.

Chapter 4 Functions and costs of the Ministerial Corporation

Apart from managing the state's water resources, the DLWC performs many other activities. The chart on page iii of the Introduction to this report shows the DLWC's areas of responsibility.

Chapter 4 defines the specific functions of the Ministerial Corporation (performed by the DLWC) for which the Tribunal is required to set prices. The chapter explains that the function (and hence costs) relevant to the Tribunal's inquiry are those incurred by the DLWC when:

- as *resource manager*, it *administers* licensed entitlements to water in regulated rivers, unregulated rivers and groundwater sources, and uses standards set by the government to *formulate plans* for use of the resource
- as *operator*, it *controls* the infrastructure and natural river systems to achieve these standards and to ensure resource sharing
- as *regulator*, it *enforces* licence conditions and sharing arrangements on regulated rivers, unregulated rivers and groundwater sources.

The arguments in favour of separating the functions of resource manager, operator and regulator are:

- ⇒ avoiding conflicts of interest between each function
- ⇒ delivering each function by a more specialised agency
- ⇒ assigning to each function the costs it incurs
- ⇒ implementing strategies to determine and achieve efficient costs for each function tailored to suit each particular function
- ⇒ improving the overall transparency and accountability of each function.

The DLWC has argued against having separate organisations perform each function. The Tribunal recommends that at a minimum the DLWC should differentiate the costs of performing the functions of the Ministerial Corporation as resource manager, operator and regulator.

The DLWC's current estimates of the costs of carrying out each function are explained and rejected as a basis for setting bulk water charges. The chapter argues that water charges should:

- be **region specific** rather than an averaging of costs across all regions
- be based on forward looking **economic** costs of the DLWC, not the backward looking **accounting** costs of the former Department of Water Resources
- be based on the **efficient** costs of each activity
- incorporate the **pricing principles** identified in chapter 3.

The DLWC is asked to develop much more detailed and rigorous information on the economic cost of its activities, on how efficiently these activities are carried out, and the extent to which each activity contributes towards achieving each of the Ministerial Corporation's functions.

Chapter 5 The economic costs of making water available

This chapter explains why bulk water charges should be based on the economic costs of making water available on regulated rivers, unregulated rivers and groundwater sources.

An important distinction is made between accounting costs and economic costs:

- economic costs include external costs, accounting costs do not
- the economic costs of using water infrastructure assets differ from the conventional accounting charges for use of those assets.

The full economic costs of bulk water services provided by the DLWC on regulated rivers, unregulated rivers and groundwater sources are as set out below.

Economic costs of bulk water services provided by the DLWC

- recurrent costs of administration, operations and any maintenance, on regulated rivers, unregulated rivers and groundwater sources
- recurrent costs of resource management on regulated rivers, unregulated rivers and groundwater sources
- recurrent costs of dealing with the external environmental impacts of water use
- a capital cost calculated using the annuities approach to fund refurbishment and replacement costs for infrastructure assets on regulated rivers. This should not include a rate of return on existing infrastructure assets
- a depreciation charge for those fixed assets that have finite lives
- a real rate of return on new investments and augmentations to existing infrastructure on regulated rivers
- licensing and other regulation related costs

Chapter 6 Sharing efficient costs between beneficiaries

The Tribunal will set a work program for the DLWC to develop a regionalised information base for systematic cost sharing over the next 12 months.

The Tribunal is conscious that the DLWC does not have the information to carry out these cost sharing exercises. In the interim, the Tribunal will use such information as is available to share costs by applying the DLWC's allocation of its costs between statewide and regionalised costs and within regions, as follows:

- Statewide costs will be allocated 30% to water users and 70% to government as the representative of all other beneficiaries.
- Regional costs other than resource management costs will be allocated 70% to water users and 30% to government.
- Regional resource management costs will be allocated 50% to water users and 50% to government.

The Tribunal does not have sufficient information to judge the reasonableness of the cost sharing ratios outlined. The Tribunal does not consider these ratios to be settled, and they will be revised as more information becomes available. The Tribunal hopes to receive further submissions on these points.

In considering how best to share the DLWC's costs between water users and other beneficiaries, the Tribunal supports the use of a cost of service (COS) model as the primary

mechanism to share costs. Only efficient costs should be incorporated into the COS model. It is intended that output from the COS model will form the basis of regional cost reporting.

In cases of resource management and environmental costs where appropriate cost sharing is more difficult to determine, the Tribunal supports the use of the model developed by the Murray-Darling Basin Commission's consultants. In particular, the Tribunal favours the following features of the MDBC approach:

- *Equality of input* from all stakeholders into all phases of the process. It is most important that the entire community develop involvement with, and ownership of, all aspects of the process.
- Consideration of '*polluter pays*' before '*beneficiary pays*', indicating that those responsible for activities which cause measurable impacts on the resource should be required to pay for the remediation of those impacts. Beneficiaries should then be required to fund remediation of the remaining impacts.
- Inclusion of *feed-back mechanisms* which specify outcomes and require completion to the satisfaction of those paying the cost.

Chapter 7 Regional differences and the structure of charges

The arguments for a greater regional focus for services delivery and cost recovery are presented in this chapter.

The opportunities of a regional focus include:

- enhancing the *benchmarking* of operations and maintenance costs across valleys/regions to determine efficient costs
- improving *accountability* for the way water services are delivered at a valley or regional level
- encouraging *contracting out and privatising* elements of operations, regulation and management where appropriate
- developing *activity-based costing* to explain how costs are incurred within each region and why they differ between regions
- defining *head office* costs more sharply
- allowing *flexibility* in regional pricing structures, including the mix of fixed and use-related charges to accommodate regional differences
- highlighting the different *regional economic impacts* of altered water charges or water trading possibilities
- encouraging *local communities* to become involved in planning and implementing resource management in partnership with the DLWC
- encouraging *voluntary efforts by water users* to internalise externalities within regions, with the resource management arm of the DLWC acting as a facilitator.

The chapter then identifies the main factors contributing to regional cost differences and explains how they should be reflected in water charges. These factors are:

- system complexity
- variation in the importance of 'allocation' water in total consumption
- natural resource constraints and environmental maintenance requirements
- physical asset capacity and age
- ease of regulatory enforcement
- variations in the cost of supplying high security needs in different systems.

Existing water charges are examined and consolidated in Table 7.2 which shows the effective price per megalitre paid for water by irrigators and towns on regulated rivers in the Barwon, Central West, Murrumbidgee and Murray regions.

The DLWC's water resource management charge is examined and criticised as a badly structured charge:

- it averages all costs across the state, creating cross subsidies between water users
- it does not attribute costs to regions or particular groups
- it is not offset where the costs of a resource management activity by water users have resource management benefits outside their own area or catchment
- it is calculated to recover some infrastructure maintenance costs which should be recovered by a much more region-specific water delivery charge
- the cost base for the charge is not transparent and the justification for and efficiency of each activity cannot be scrutinised.

The water resource management charge should be restructured and costs should be recovered through charges based as far as possible on region-specific costs.

The DLWC should make the following charges for bulk water services:

Bulk water charges

1. A bulk water charge made up of:
 - (a) A **water supply component** to recover an appropriate share of the efficient costs of the operation, maintenance, administration and capital costs of bulk water services. This includes costs generated while dealing with any environmental impacts and any threat to sustainable supply presented by current water consumers.
 - (b) A **resource management component** to recover an appropriate share of the efficient costs of managing and resolving competing claims to water resources.
2. A separate **licensing charge** to fully recover regulation related costs which are all attributable to extractive users.
3. **Environmental levies** on water users and other beneficiaries where appropriate to recover a share of the costs of providing diffuse public benefits.

The Tribunal supports a two part charge for bulk water supply with the usage component reflecting that part of costs which varies with water usage.

Chapter 8 Environmental costs

The level and pattern of current and past water use has produced some serious environmental consequences. The extent of environmental degradation is not well understood and requires a much deeper understanding of the resource. Similarly, the costs associated with rectifying environmental damage are not well understood. In fact, it is doubtful that all environmental costs can be known with certainty, since some aspects of environmental degradation become apparent only over a long time scale.

Given these uncertainties, it is the Tribunal's view that the first step to dealing with this issue is to improve our knowledge of the resource. Greater knowledge will help identify many of the more serious environmental problems which, in turn, will inform the development of management options and techniques to address these problems.

The Tribunal notes that non-price measures and management options are likely to provide a more appropriate response to many environmental issues than the use of price mechanisms alone. Important among these non-price measures are the NSW government's water quality and river flow objectives.

Chapter 9 Impacts of reform on irrigated agriculture

The information available to the Tribunal on the impact of increases in water charges indicates that the aggregate effect of increased water charges is likely to be small when compared to the aggregate effect of reductions in water allocations.

This chapter argues that the DLWC should develop representative farm models to determine the impact of increased charges at a disaggregated level. The essential features of such a model are explained.

Chapter 10 Scenario analysis

Scenarios are developed to indicate the likely paths of future water charges in the Barwon and Murrumbidgee regions.

These scenarios are presented to help those making submissions to this interim report understand:

- how the Tribunal's interim cost sharing pricing principles operate
- the factors likely to determine water charges in the future
- the importance of achieving efficiency improvements within the DLWC.

The results of the scenarios indicate that water charges are likely to increase by more in the Barwon region than in the Murrumbidgee, but any increase can be minimised if the DLWC improves the efficiency of its delivery of water services.

The Tribunal has asked the DLWC to generate similar scenarios in its January 1997 price proposal for:

- water users on regulated rivers in regions other than the Barwon and Murrumbidgee
- water users on unregulated rivers in all regions
- groundwater users in all regions
- urban water authorities in all regions.

Chapter 11 Summary of recommendations

A summary of all recommendations is provided in chapter 11.

2 WATER REFORM POLICY CONTEXT

Australia is widely described as the driest continent. While that description does not apply uniformly across Australia, the use and misuse of water have severe implications for the Australian environment and economy. Australian governments have required specific actions by each of the states and territories to ensure the appropriate use of water resources.

Water users are affected by the *quantity, quality and security of supply* of water. They are also affected by the *price* of water. Prices can be adjusted to reflect the other factors, but price is not always the principal determining factor in water use. For example, if the cost of water is a small component of the total cost of an enterprise, the available quantity of water, and the timing of that availability may be more important for financial viability than mere cost. Initiatives have been taken to control water quantity and quality. However, the Tribunal's inquiry is primarily concerned with the *prices* charged for bulk water.

Waterways are also used as drainage systems. If waterways are polluted by discharges, downstream users may be affected and the true costs of water use may differ from the prices charged for it.

While the Tribunal is concerned with pricing matters, other government agencies are concerned with non-price controls on water use. For example, the Environment Protection Authority (EPA) is concerned with maintaining the level and rate of river flows necessary to sustain the ecology of river systems, and controlling the volume and content of discharges of pollutants into waterways. These matters are discussed in more detail in later chapters.

This chapter places the current inquiry in context with other developments occurring in water resource policy.

This chapter discusses:

- 2.1 Council of Australian Governments (COAG) Water Resource Policy**
- 2.2 National Strategy for Ecologically Sustainable Development**
- 2.3 National Competition Policy Package**
- 2.4 Murray Darling Basin Commission and other interstate issues**
- 2.5 Whole of catchment planning**
- 2.6 Conclusion**

2.1 Council of Australian Governments (COAG) Water Resource Policy

All the Australian governments endorsed a Water Resource Policy at the February 1994 meeting of the Council of Australian Governments (COAG). The policy contains a range of principles relating to environment protection, pricing, water trading, institutional arrangements, community liaison and education. The policy positions adopted by COAG have important implications for this inquiry.

2.1.1 Relevance of COAG policy for this inquiry

A number of submissions to the Tribunal query how the COAG policy initiatives relate to the Tribunal's inquiry. Produced with considerable expertise and resources, the COAG water resources policy marks a significant step towards addressing fundamental problems in the management of Australia's water resources. Importantly, it represents a joint initiative of all Australian governments to address problems with water resources. Satisfactory progress on water resources policy is a prerequisite for payments to the states and territories from the Commonwealth under the National Competition Policy package.

The Tribunal's task is limited to reviewing the pricing policies of the DLWC and setting maximum prices for the sale of bulk water services. This is a much narrower task than COAG's water policy reform agenda. Furthermore, in making its determinations, the Tribunal is required to consider a wide range of matters listed in section 15 of its Act. Although the Tribunal must take COAG's conclusions into account, it is required by its legislation to exercise its own judgement in making recommendations and determinations based on the evidence presented.

The COAG Water Resource Policy provides an important context for the Tribunal's recommendations.

2.1.2 Bulk water pricing

The principles endorsed by COAG relating directly to bulk water pricing for rural water supplies¹ are to:

- adopt pricing regimes based on the principles of consumption-based pricing, full cost recovery and removal of cross subsidies. Where cross subsidies continue to exist, they should be made transparent
- disclose the costs whenever service deliverers are required to provide water services to classes of customers at less than full cost
- pay the service deliverer the difference between full cost and actual charges as a community service obligation
- agree that charges and costs for rural water users be reviewed progressively so that they comply with the principle of full cost recovery with any subsidies made transparent and achieve positive real rates of return on the written-down replacement costs of assets in rural water supply by 2000, wherever practicable
- agree that charges and costs for urban water users be reviewed progressively so that they comply with the principle of full cost recovery with any subsidies made transparent and achieve positive real rates of return on the written-down replacement costs of assets in urban water supply by 1998
- undertake future investments in new schemes or extensions to existing schemes only where appraisal indicates they are economically viable and ecologically sustainable
- ensure pricing and assets valuation arrangements are consistent between states where trading in water could occur across state borders

¹ Council of Australian Governments, *Communiqué from the meeting held on 25 February 1994*, Hobart.

- set aside funds for future asset refurbishment and/or upgrading of government-supplied water infrastructure
- require the Murray-Darling Basin Ministerial Council to put in place arrangements which ensure water charges provide for the future maintenance, refurbishment and/or upgrading of headworks and other structures under the Commission's control.

The implementation of these principles requires clarification of the following issues:

- | |
|--|
| <ul style="list-style-type: none"> • What are the full costs of bulk water supply and how should those costs be assigned to water users? |
| <ul style="list-style-type: none"> • How can cross subsidies be identified and are there community benefits from their continuance? |
| <ul style="list-style-type: none"> • How close are current charges to full cost recovery and what are the implications for water users, and water use, of a move to full cost recovery? |
| <ul style="list-style-type: none"> • What is the appropriate structure for bulk water prices and should separate fixed and usage components be included? |
| <ul style="list-style-type: none"> • If the existing infrastructure was not in place, would it be built today? |
| <ul style="list-style-type: none"> • Will charges based on the costs of existing infrastructure provide appropriate economic signals for future water use? |
| <ul style="list-style-type: none"> • What is the condition of existing infrastructure, should it be maintained and what would it cost to maintain it? |
| <ul style="list-style-type: none"> • What inconsistencies exist in the states' approaches to water pricing and what are the implications of such inconsistencies? |

The Tribunal has attempted to provide answers to these questions in the chapters which follow. However, in many cases its answers are incomplete due to the paucity of information available. Much better cost information is required to set water charges in the future.

2.1.3 Water Resource Policy Principles

COAG adopted principles relating to institutional structures, entitlements to use water, water trading, environment protection requirements and community education. In summary, they are to:

- implement comprehensive systems and water allocations to use water entitlements by:
 - ⇒ separating entitlements to use water from land title
 - ⇒ clearly specifying entitlements in terms of ownership, volume, reliability, transferability and quality
 - ⇒ formally determining water allocations to the environment
 - ⇒ instituting trading arrangements in water allocations and entitlements by 1998
 - ⇒ making substantial progress by 1998 towards providing a better balance in water resource use where river systems have been over allocated.

- separate the roles of water resource management and standard setting, water supply and regulatory enforcement
- adopt an integrated catchment management approach involving consultation with local government and the wider community in respect of each catchment
- give constituents a greater degree of responsibility for the management of irrigation areas, for example, by devolving operational responsibility to local bodies
- develop education programs in relation to the use of water and the benefits of reform.

Although the above matters are outside of the control of the Tribunal, they raise significant issues for this inquiry. These include:

- What is being priced, an entitlement to use water or the actual water used?
- Should the charges for bulk water bear any relationship to the traded price of entitlements to use water?
- Should the price of bulk water be adjusted to reflect volume, reliability and quality?
- Are the costs of the roles of resource manager, operator and regulator able to be identified and, if so, how should these costs be shared?

2.2 National Strategy for Ecologically Sustainable Development

COAG has also endorsed the National Strategy for Ecologically Sustainable Development (ESD).² An objective of this strategy is to develop functional water resource management mechanisms. Governments undertook to:

- "examine and determine within their own jurisdiction, the most effective mix of water resource management mechanisms, including appropriate pricing policies, regulatory measures, long-term monitoring strategies, adequate research support, and a better utilisation of the existing infrastructure
- consider economic, environmental, and social factors when upgrading or providing new infrastructure
- continue working within their own jurisdictions to review the operation of their water management sector
- continue to develop methodologies by which environmental externalities can be reflected in water pricing
- encourage more rapid adoption of water pricing structures, including where appropriate, complete pay-for-use tariff policies which more accurately reflect the price of delivery
- focus on improving water markets and mechanisms for introducing more comprehensive systems of transferable water entitlements"

When setting pricing policy objectives, a key question which arises is the appropriate role for pricing mechanisms in achieving the broader aims of ecologically sustainable development. The range of non-price mechanisms available to assist in the attainment of ecologically sustainable development includes :

- restricting water abstractions from, and discharges to water bodies
- providing specific water entitlements for the environment
- restoring river flows to regimes that mimic key features of natural flows
- regenerating native ecosystems in the riverine environment, especially riparian areas.

² Commonwealth of Australia, *National Strategy for Ecologically Sustainable Development*, Australian Government Publishing, 1992.

The appropriate role for pricing policy is to complement these non-price mechanisms and develop better ways of including in water charges the external costs imposed on the environment by water use. This is consistent with pricing policy's role of ensuring the efficient allocation of resources. To achieve these aims, the Tribunal must decide:

- What are the external costs imposed on the environment by water use?
- How should these be included in water prices?

Placing a monetary value on environmental costs, when the environmental impact of water use has not been fully assessed, poses significant problems for the Tribunal in this inquiry.³

2.3 National Competition Policy Package

The national competition policy package was accepted at the 1995 Council of Australian Governments meeting. The package comprises three intergovernmental agreements:

1. The Conduct Code Agreement which establishes a protocol for amending the cooperative framework by which the Trade Practices Act has been extended to all states and territories.
2. The Competition Principles Agreement which establishes a range of obligations which all governments must pursue to promote competition.
3. The Agreement to Implement the National Competition Policy and Related Reforms which establishes a series of payments from the Commonwealth to all states conditional upon successful implementation of the national competition policy package.

The Competition Principles Agreement sets out independent price oversight and competitive neutrality principles which should be applied to government trading enterprises (GTEs). The DLWC is not a government trading enterprise and is not covered by these obligations. Conceivably, the operational aspects of the DLWC's activities, such as dam operations and licensing, could be regarded as those of a GTE if they were separated from the balance of its activities.

The Competition Principles Agreement also specifies requirements (in section 4) for structural reform of public monopolies:

- "1) Each party is free to determine its own agenda for the reform of public monopolies.
- 2) Before a party introduces competition to a sector traditionally supplied by a public monopoly, it will remove from the public monopoly any responsibilities for industry regulation. The party will relocate industry regulation functions so as to prevent the former monopolist enjoying a regulatory advantage over its (existing and potential) rivals.
- 3) Before a party introduces competition to a market traditionally supplied by a public monopoly, and before a party privatises a public monopoly, it will undertake a review into:
 - a) the appropriate commercial objectives for the public monopoly

³ Environmental impacts and costs associated with urban water use, such as those considered by the Tribunal in its determination of Sydney Water's prices are more "point source - like" than those in rural areas. The difference in complexity derives, in large part, from the diffuse nature of rural water use impacts. This is discussed in more detail throughout chapter 3 and 8.

- b) the merits of separating any natural monopoly elements from potentially competitive elements of the public monopoly
- c) the merits of separating potentially competitive elements of the public monopoly
- d) the most effective means of separating regulatory functions from commercial functions of the public monopoly
- e) the most effective means of implementing the competitive neutrality principles set out in [the Competition Principles Agreement]
- f) the merits of any community service obligations undertaken by the public monopoly and the best means of funding any delivering and mandated community service obligations
- g) the price and service regulations to be applied in the industry
- h) the appropriate financial relationships between the owner of the public monopoly and the public monopoly including the rate of return targets, dividends and capital structure."

The Tribunal's review of the DLWC's pricing principles is part of the NSW government's agenda for reform of public monopolies.

The issues posed for this inquiry arising from the National Competition Policy include:

- What are the separate regulatory and commercial functions of the Ministerial Corporation?
- Can competition effectively be introduced for any aspects of the Ministerial Corporation's activities and what will this imply for costs?
- Is it possible to identify existing community service obligations and should the costs of these be included in charges for bulk water?

2.4 Murray-Darling Basin Commission and other interstate issues

Several interstate policy initiatives are relevant to the management of water resources in NSW. The Murray-Darling Basin Commission (MDBC) to the south, and the Dumaresq-Barwon Border Rivers Commission in the north of the state, are charged with responsibility for taking a "whole of system" perspective on water resource management issues involving more than one state.

The issues paper for this inquiry discussed the MDBC's interim cap on water extractions from the Murray-Darling Basin. The cap is discussed in chapter 8 of this report.

Possible future corporatisation of the MDBC's water supply business and the Snowy Mountains Hydro-Electric Scheme may affect the supply of water and the costs associated with that supply in the Murray region.

Policy initiatives generated by interstate bodies have cost consequences for the DLWC and water users which it serves.

The appropriate role for pricing policy in this context is to make transparent:

1. all costs associated with such interstate initiatives
2. the extent to which the total of these costs are passed through to water users
3. the mechanism by which these costs are shared between water users.

2.5 Whole of catchment planning

The issues paper for this inquiry discusses institutional arrangements for the NSW government's water reform package. Stage one of these arrangements involves the EPA working with the DLWC, other government agencies and Catchment Management Committees to develop water quality and river flow objectives for all NSW catchments. This stage, which entails the development of interim objectives for all catchments, is well advanced. A discussion paper on interim objectives is due to be released for public comment in early 1997. Stage two of the process involves the DLWC preparing catchment plans to achieve these objectives. A public inquiry process will determine final quality and flow objectives for some key catchments. The Healthy Rivers Commissioner has released a draft report on the Williams River and intends to release the final report before the end of the year.

These institutional arrangements will provide opportunities for public input into the development of policies regarding the future use of the state's rivers.

As noted earlier, catchment planning will have some implications for pricing. Catchment planning is costly in itself, and the outcome of that planning may impose costs on the DLWC. The DLWC should recover an appropriate proportion of these costs from users.

More importantly, catchment planning could lead to the development and implementation of non-price measures to achieve environmental objectives (including specification of entitlements to water).

To the extent that these measures are successful in reducing the adverse environmental consequences of water use, the environmental cost component in the charges set by the DLWC will be reduced.

The implications of catchment planning for the inquiry are:

- what additional costs will be incurred?
- who should pay these costs?
- will catchment planning reduce the costs of the DLWC, and if so, by how much?

2.6 Conclusion

Initiatives are being taken at national and state level to better manage the nation's water resources. Many of these have pricing implications that could impact significantly on the price of bulk water. Others will have non-price impacts, the consequences of which could outweigh any increases in prices.

The Tribunal's responsibility is to determine bulk water prices in New South Wales. It acknowledges that there are many important non-price aspects to consider and welcomes the opportunity to contribute to discussion in cases where the issues are related to or impact on pricing.

Non-price mechanisms are likely to be the most effective way of achieving environment improvements. The key non-price mechanisms are likely to be:

- the MDBC's cap on extractions of water from the Murray-Darling Basin
- providing specific water entitlements for the environment
- implementing water quality and river flow objectives which will restore river health and key features of natural flow regimes
- regenerating native ecosystems in the riverine environment, especially in riparian areas.

3 THE PURPOSE OF BULK WATER PRICING REFORM

The Independent Pricing and Regulatory Tribunal (IPART) is charged with the task of reviewing and determining the prices of bulk water supply, resource management and licensing services provided by the Water Administration Ministerial Corporation (the Ministerial Corporation). The Ministerial Corporation is a legal entity charged with the responsibility for managing the State's water resources. The Ministerial Corporation is administered along with seven other work programs undertaken by the Department of Land and Water Conservation (DLWC). These other work programs and meaning of "bulk water services" are shown in the chart on page iii of the Introduction of this report.

In the absence of a competitive market, the Tribunal's role is to independently assess and report on pricing policies and set maximum prices for government monopoly services. The Tribunal is required to set prices to achieve the best possible balance between competing claims within the community.

This chapter discusses the pricing principles that should be advanced in setting prices for public utilities and develops some recommendations for the DLWC to follow to advance those objectives. Subsequent chapters develop more recommendations:

This chapter discusses:

- 3.1. Operational efficiency, transparency and accountability**
- 3.2. Financial stability and corporate objectives**
- 3.3. Resource allocation and efficient use of water**
- 3.4. Equity considerations and user pays**
- 3.5. Ecologically sustainable development**
- 3.6. Implementation issues**
- 3.7. Summary of pricing principles and recommendations**

3.1 Operational efficiency, transparency and accountability

In highly competitive industries, producers attempt to gain customers and maximise returns by producing goods and/or services at minimum cost. This discipline on costs encourages producers to make the most from the resources available.

In the absence of competitive pressures, pricing policy for government monopoly services should mimic, as far as possible, this discipline on costs. Monopoly businesses tend to incur unnecessary costs and pass these on to customers. Many submissions to the Tribunal argue that some expenditure by the DLWC has been wasteful. Examples include over-engineering⁴ and inappropriate ways of providing services.⁵ Pricing policy should discourage the DLWC from incurring unnecessary costs. A central task of this review is to develop mechanisms to impose such discipline.

⁴ Murray Irrigation Limited, hearing transcript volume 7, March 14, 1996, pp 230-244.

⁵ Hunter Catchment Management Trust, hearing transcript volume 10, March 29, 1996, pp 429-430.

Pricing Principle 1

Water charges should be based on the most efficient way of providing water services.

A precondition for operational efficiency is adequate information on bulk water services undertaken, the means used to deliver those services, and their cost. This information should be available both to the DLWC, the Tribunal, water users and other beneficiaries of water use (“transparency”). Many submissions to this review have argued that it is difficult to obtain information on the costs that are recovered by particular charges⁶. The Tribunal has also had some difficulty in determining which costs are recovered by which water charges.

Recommendation 3.1

The DLWC should improve the transparency of its operations by:

- 1) detailing the bulk water services it provides***
- 2) specifying the means by which those services are delivered and the costs incurred***
- 3) publishing detailed information on which costs are to be recovered for the services.***

To encourage operational efficiency, the DLWC should be accountable for the way in which it operates. As detailed in the issues paper⁷, the DLWC is simultaneously a regulator, manager and operator of NSW’s bulk water supply system. The importance of each of these roles is discussed more fully in chapter 4. The DLWC’s activities benefit a range of groups from the general community, which wishes to see sustainable and efficient use of water resources, through to individual water users who wish to receive their water allocations as reliably and cheaply as possible.

The choice of means to achieve transparency should depend on the nature of the interests that are affected by a particular service. There should be scope for water users and other beneficiaries to influence the type of service provided and the efficiency with which services are delivered. Where services are delivered at a local level, wherever possible water users and other beneficiaries should be given the ability to negotiate directly with the DLWC.

Recommendation 3.2

Where those receiving the benefit of bulk water service have sufficiently similar interests, they should be able to negotiate the level of services they receive from the DLWC and the best way of delivering those services.

Currently, many services provided by the DLWC are provided to heterogeneous groups whose interests conflict in some way. The management of water resources, for example, involves balancing many competing claims on those resources. A key question for this review is to identify who benefits from each of the DLWC’s activities which provides joint benefits.

Before customers can be effective in holding the DLWC accountable for the efficiency of its service delivery, competing claims on resources must be resolved in consultation with those affected by the activity. For example, the allocation of water in a river between the

⁶ See for example, the submission by the NSW Irrigators’ Council.

⁷ Government Pricing Tribunal of New South Wales, *Pricing of Bulk Water Services in NSW: An issues paper*, Discussion paper No. 13, December 1995, p5.

environment and extractive users needs to be determined through a catchment planning process with very wide ranging consultation. Once a catchment plan is in place, the objectives of the DLWC's activity, that is, the type of water service to be delivered, is set. Each group of beneficiaries should then be given a "voice" to ensure that the agreed outcome is achieved at minimum cost.

Perhaps the only common ground among many competing interests is the desire that bulk water services be delivered as efficiently as possible. To the extent that more can be done with less, each competing claim may benefit.

Recommendation 3.3

That competing claims on water resources be resolved so that water users and other beneficiaries can effectively hold the DLWC accountable for the efficiency with which it delivers bulk water services.

The Tribunal has experience with a number of instruments which can be used to promote operational efficiency within public utilities. These include:

1. Benchmarking against other public and private businesses.
2. Monitoring performance indicators and setting performance targets.
3. Using incentive regulation such as CPI-X pricing formulae in which prices are reduced in real terms over time, forcing the utility to improve its operational efficiency if it is to achieve its financial targets.

Recommendation 3.4

Benchmarking, performance monitoring and incentive regulation should be used to improve the overall efficiency of the DLWC's operations.

3.2 Financial stability and corporate objectives

To ensure that the DLWC continues to provide a sustainable level of services, it must achieve financial stability and corporate objectives. Pricing policy should ensure that the revenues raised from water services contribute the correct proportion of the DLWC's revenue requirements.

Pricing Principle 2

The DLWC's administration of water resources through the Ministerial Corporation should achieve financial stability and deliver a sustainable level of water services.

Where a water authority operates as a government trading enterprise it is imperative that it be as commercially focused and as financially self-sufficient as possible. However, the DLWC is not a government trading enterprise because it is not concerned purely with commercial service delivery. Neither is it concerned purely with policy objectives.

In some limited cases it will be possible to differentiate core government activities of the DLWC which essentially benefit the community as a whole from purely commercially focused activities, which essentially benefit particular private beneficiaries. Where this can be done, taxpayers should fund the former, and the private beneficiaries should fund the latter.

Recommendation 3.5

Where activities can be identified as providing no private benefit, these should be regarded as core government activities and funded by taxpayers. Where activities can be identified as providing no public benefit, they should be funded by particular water users.

However, in a great many cases the DLWC provides services which have both public and private benefits. The problem the Tribunal faces is to determine an appropriate sharing of these joint costs between the government through taxpayers and private water users which accurately reflects the range of joint benefits.

At present the DLWC splits some costs associated with “running the [regulated] rivers” between extractive water users and government using a 70:30 ratio, with 70% being paid by water users. Water users pay 100% of licensing and metering costs. The DLWC has proposed recovering a wider range of costs from water users using a range of ratios discussed in chapter 6 of this report.

The Tribunal agrees in principle that joint costs should be shared between those responsible for and benefiting from those costs, using a range of ratios. However, the setting of ratios involves a degree of judgement since the causes of and benefits from the DLWC's activities are often difficult to evaluate. Chapter 6 presents for public comment the cost-sharing ratios proposed by the Tribunal.

As far as possible, ratios should be based on factual information and be set in an open and transparent way, allowing full consultation and negotiation with all beneficiaries.

Recommendation 3.6

Where costs are incurred by the DLWC in providing both private and public benefits, costs should be shared between beneficiaries according to negotiated ratios. The justification for all cost sharing ratios should be determined in an open and transparent process.

3.3 Resource allocation and efficient use of water

Pricing policies should encourage water use that generates the best overall outcome for the community from use of that water. They should also try to get the best overall result from the other resources (such as land, infrastructure, plant and equipment and labour) that are used to store, manage and deliver the water. The goal of efficiency in this context refers to allocative efficiency in the DLWC's use of water and other resources.

Pricing Principle 3

Pricing policy should encourage the best overall outcome for the community from the use of water and the other resources used to store, manage and deliver that water.

3.3.1 Price signals

Prices are important signals to consumers and suppliers of water. Prices influence consumers' decisions about how much water they will consume. Prices also influence producers' decisions about how much they will spend to deliver water and how much they will invest in water infrastructure.

Prices may give incorrect signals, particularly if competitive pressures are absent. If water is underpriced, over-consumption is encouraged, which may in turn cause infrastructure to be created prematurely to meet that demand, increasing environmental costs from the use of water. If water is overpriced, water users' incomes are reduced and the price of their products may increase. The continued viability of some industries and communities in NSW may be threatened in such a situation.

Recommendation 3.7

In the absence of competitive pressures, pricing principles must be developed to ensure that water charges encourage allocative efficiency in the use of the community's water resources and the other resources used to store, manage and deliver that water.

3.3.2 Charging to recover the cost of supplying water

The Tribunal noted in its 1993 Inquiry into Water and Related Services⁸,

"If society's resources are to be used in the most efficient way, prices should show each customer the costs of consuming water, discharging waste or moving to a particular location. Such costs should include environmental as well as financial imposts. Cost-reflective pricing can help ensure scarce water resources are not wasted and can promote more efficient investment in water infrastructure."

The phrase, "the costs of consuming water" is not as straightforward as it might seem. It is important to distinguish between the market price of water and the price which is charged by the DLWC for making water available.

The market price is determined by the supply and demand for water. There is an active market for water in several parts of NSW and high prices are sometimes paid for additional, reallocated water.⁹ Once decisions have been made about the broad allocation of water to competing claims, the availability of high returns from the re-selling of water is likely to be a powerful incentive for water to be used in an efficient way.

The main focus of the present inquiry is the administered price that is charged by the DLWC for making water available, ie the amount that needs to be charged to recover the infrastructure and other costs that the DLWC incurs in harvesting, storing and delivering water and managing extractions from unregulated rivers and groundwater in a sustainable way. These costs will include environmental costs where charging is the most effective way of achieving environmental objectives. In many cases non-price measures will be more effective in achieving environmental objectives. This is discussed in more detail in chapter 8.

Recommendation 3.8

Bulk water charges should be based on an appropriate share of the total costs that the DLWC incurs in regulating, managing and supplying water.

⁸ Government Pricing Tribunal of New South Wales, *Inquiry into Water and Related Services*, October 1993, p38.

⁹ Estimates given at the Tribunal's hearings ranged from \$35 to \$650 per megalitre for temporary and permanent transfers. Presentation by the MIA Council of Horticultural Associations at the Tribunal's Leeton hearing, hearing transcript volume 5, March 7, 1996, p 135. See also the Australian Conservation Foundation's submission and presentation at the Sydney hearing, hearing transcript volume 7, March 14, 1996, p 218.

Ultimately, prices will be set by looking at the costs incurred by the DLWC and allowing these to be recovered where they are efficient and essential. Where this would cause large changes from existing prices, suitable phasing in periods or explicit Community Service Obligation payments may be required.

The bulk water charge for making water available should be contrasted with the market price for water entitlement which is set by the supply and demand for water. Before the DLWC could use supply and demand to set water prices, all water entitlements would have to be auctioned to the highest bidder. This may not be a suitable pricing policy because of the extent to which existing low prices for bulk water have been capitalised into higher land values. Some potential water “users”, such as the environment, may be unable to bid successfully in such a hypothetical auction because they represent diffuse public benefits.

Nevertheless, it is possible to encourage trading in water entitlements to ensure that the supply and demand for water establish the marginal price of water entitlements and encourage water to be used in ways that generate the greatest benefits to the community as a whole. Chapter 8 looks at some of the environmental and other obstacles to increased trading in water entitlements.

Recommendation 3.9

Charges for bulk water services should reflect the full economic and identified environmental costs of making water available. The value of water entitlements should continue to be determined by the market.

3.3.3 Efficient pricing and a practical role for pricing in water reform

Economic theory holds that the most economically efficient allocation of a particular resource is found when the charge for making it available is set at the cost of supplying the last unit of the resource. This is the “marginal” cost of supply. For example, the total charge for a supply of 100 megalitres would be 100 times the cost of supplying the last megalitre of that supply.

Infrastructure costs pose particular problems when following this pricing rule. In the bulk water supply industry, as in many public utilities, the majority of costs incurred in making water available are for providing infrastructure. Typically, infrastructure is constructed in large blocks. Weirs and dams are built to last for long or indefinite periods. Many other infrastructure elements are built to service projected growth in an area. Wherever there is capacity to expand supply within the existing system, the infrastructure can supply extra water at little additional costs. The marginal cost is limited to any additional operating, maintenance and administrative costs. Economists term this the “short-run” marginal cost because it is the marginal cost of making additional water available when infrastructure capacity is fixed.

In the future, infrastructure may be close to capacity. This may mean, for example, that a new dam is required to meet a town’s growing needs. Alternatively, parts of the existing capacity may have reached the end of their useful life. For example, a weir may need to be replaced because it is in danger of collapsing. In the longer term, the cost of supplying an extra unit of water must include an allowance for renewing or extending the infrastructure where necessary. The marginal cost of making water available when the supply system approaches its limits is very much higher because it includes *infrastructure costs* as well as

the standard operating, maintenance and administrative costs. This is termed the "long-run" marginal cost.

Under strict marginal cost pricing, water charges are set very low (being at short-run marginal cost) and remain very low until the capacity of the infrastructure is reached. The price then rises to pay for augmentation, (set at long-run marginal cost) before falling again to a very low level (returning to short-run marginal cost) once the strain on capacity has passed.

The application of this regime would achieve the most efficient allocation of resources at any one time. However, water prices would fluctuate substantially over time. To avoid this, price could be related to an average of marginal costs through time.

Because marginal cost is frequently very low in infrastructure industries, a price set at marginal cost will not always produce sufficient revenue to cover the per unit costs of water services, that is, the total costs averaged over the total water supplied.

There is an extensive literature on the development of ways to recover fixed costs without raising the price of the last unit of a resource above the short-run marginal cost of making that unit available. The Tribunal favours a two part charge which includes an access charge to recover the fixed costs and a usage cost to recover the marginal cost. The access charge is the same, regardless of the amount of water consumed.

Unless access charges are so large that they deter customers from connecting to the system, they are unlikely to detract significantly from allocative efficiency. However, the way these charges are recovered could have important consequences for equity.

While a two part charge is beneficial, there is a degree of uncertainty as to which costs should be included in which component of the charge. This problem of balancing the two parts should be approached in a pragmatic way. In particular, the benefits of achieving an economically pure solution to the charging structure must be balanced against the transitional difficulties in arriving at this structure. Further, the definition of costs should not be restricted to those associated with infrastructure, but should include so-called externalities which are more difficult to calculate.

Recommendation 3.10

Charges should be based on a two part tariff composed of an access charge based on fixed costs and a usage charge based on variable costs. Where the quantum of these costs is uncertain, a pragmatic balance should be struck between them.

3.3.4 Scrutinising efficient costs: transparency and accountability

The most effective way of ensuring that prices are cost reflective is to create a process by which DLWC, water users and other beneficiaries have the opportunity to debate the following questions on the basis of good information:

1. Which water services are provided?
2. Who benefits from these water services?
3. Are these water services delivered in the most efficient way?

4. Has the cost of providing these services been passed through correctly to those who received a benefit from the service, or whose activities have created the need for the service?
5. Should additional services be provided?

Later chapters discuss how the Tribunal proposes to achieve transparency and accountability.

3.3.5 Trading in water entitlements to achieve allocative efficiency

The market price for water is more relevant where newly created water entitlements are sold (say, with a new dam being built) or where there is secondary trading of existing entitlements by existing water entitlement holders. Water entitlements are traded on either an annual or a permanent basis.

Trading provides a strong incentive for efficient use of water because entitlement holders can obtain a financial return by transferring unused water. However, before any attempt is made to better define entitlements to water and to expand trade there is a need to address the difficult issues of: over allocation of water rights, the possible need for future adjustments to those rights, the environmental sustainability of water use, and a range of spill-over effects. These are discussed in chapter 8.

Recommendation 3.11

Trading in water entitlements, subject to appropriate trading rules and environmental constraints, should encourage water to be used in the most efficient ways.

3.4 Equity considerations and user pays

Equity in a pricing system can have various applications. For example, pricing may be used to help achieve a particular outcome that is thought to be equitable, such as redistribution of income or ease of access to a particular service. The Tribunal places considerable weight on achieving equity in a pricing system through a user pays approach for services which provide clear benefits to particular users. A user pays approach states that consumers should pay the cost of the services they consume. Any other approach involves someone other than the consumer paying or "subsidising" at least some of the cost of the services.

3.4.1 Polluter pays and beneficiary pays

Several submissions to this review argue for a particular interpretation of a user pays approach to water pricing. The NSW Irrigators' Council argue that user pays should be implemented as a "beneficiary pays" principle:

"The NSW Irrigators' Council supports the principle that all water should be paid for by all beneficiaries in proportion to their benefit"¹⁰.

This argument is consistent with the 'benefit principle' of public finance, ie the costs of public services should be placed on those who benefit from them, and those who benefit more should pay more.

¹⁰ NSW Irrigators' Council, submission, January 1996, p 17.

The Australian Conservation Foundation and some other participants argue for an alternative interpretation of 'user pays' ie the 'polluter pays' or 'impactor pays' principle. This suggests that all costs, including the full environmental impacts of water use, should be included in the price that extractive users are required to pay.

The polluter pays approach is not necessarily inconsistent with the benefit principle, but it draws attention to a wider range of costs. The main practical problem in applying the polluter pays principle is the complex nature of the link between water use and environmental impacts, and our incomplete understanding of that link. It is often difficult to charge for costs imposed on the environment because it is hard to assess those costs in aggregate, and it is often even harder to attribute them to water consumption by particular customers.

It is equally difficult to apply the benefit principle, as it requires an evaluation of the environmental benefits of water allocated to in-stream use.

The benefit principle and the polluter pays principle are both valid interpretations of the user pays approach. However, special care will be needed in applying them in situations where they appear to suggest different results.

Chapter 6 sets out how the Tribunal proposes to recover the DLWC's costs from "polluters" and "beneficiaries".

Pricing Principle 4

The cost of water services should be paid by those who are responsible for causing, or benefit from, those services. Those who cause more services to be required, or benefit more, should pay more.

The preceding discussion has been concerned with the equity of the user pays approach in isolation from other considerations. The replacement of tax finance for a particular service with user payments will also have equity consequences. The introduction of user charges will provide additional revenue for the DLWC, potentially allowing a shift in the burden of costs from taxpayers in general, to those using particular water services.

As the recent history of the resource management charge illustrates, what happens to money raised by a charge is important. The equity consequences are quite different, depending on whether the money raised is used to provide services from which those who pay the new charges obtain benefits, or forms part of the general revenue of the state.

The main requirement for efficient resource allocation is that the usage component of price should equal the marginal cost of making water available. Provided the water supply infrastructure system operates below full capacity, the decision whether water users or taxpayers should fund the remaining fixed costs is a decision about equity. This is explained in more detail in chapter 7.

3.5 Ecologically sustainable development

Pricing should also aim to achieve environmental benefits. Ideally, the level and type of development should be sustainable in terms of its impact on, and integration with, the

environment. This, in a broad sense, is usually termed ecologically sustainable development (ESD).

Pricing Principle 5

Pricing policy should promote ecologically sustainable use of water and of the resources used to store, manage and deliver that water.

3.5.1 Measures to achieve ESD

The Tribunal's governing Act requires the Tribunal to have regard to the need to maintain ecologically sustainable development within the meaning of section 6 of the *Protection of the Environment Administration Act 1991*. Section 6 explains ESD as,

"Ecologically Sustainable Development requires the effective integration of economic and environmental considerations in decision-making processes. Ecologically sustainable development can be achieved through the implementation of the following principles and programs:

- a) The precautionary principle - namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.
- b) Inter-generational equity - namely that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.
- c) Conservation of biological diversity and ecological integrity.
- d) Improved valuation and pricing of environmental resources."¹¹

Progress towards ESD will require the careful coordination of price and non-price measures. Pricing policy is just one of the four measures identified in the Act as meaningful steps towards ESD. This means pricing policy alone is unlikely to be effective in achieving ESD.

In an ideal situation, water charges would include all costs, including the environmental costs, of resource use. Customers' decision-making could then be made with an appreciation of the economic and environmental considerations of their consumption of water. However, this implies that environmental costs can be readily measured in financial terms, so that environmental considerations could be translated into economic considerations. Not only is this translation process difficult, but we have only limited understanding of those ecological processes that have already occurred to a significant extent, let alone those processes that have commenced but have not yet become apparent. Thus, in a great many instances non-price measures will be required.

For example, if ESD considerations required that the total water extraction from a river be reduced by a given amount, it would be difficult for pricing alone to achieve the exact reduction required. Similarly, if ESD required the hydrology of a river to be restored to reflect some key aspects of an historical flow pattern, as well as an overall reduction in extractions, a price measure, such as a levy on the use of water, is an imprecise mechanism to achieve this outcome.

¹¹ *Protection of the Environment Administration Act 1991*, section 6 (2).

In these instances a market mechanism will probably fail to balance competing claims on resources because it does not properly measure environmental costs. In other words market mechanisms alone almost certainly will not manage environmental concerns. There is a crucial role for an independent resource manager to balance competing claims.

If it were possible for the resource manager to specify the sustainable amount that could be drawn from a river system and the timing of that extraction, water users could be given more secure entitlements to the remaining part of river flow. The price at which entitlements in that remaining flow were then traded would fully reflect the scarcity of available water. Further price measures would be unnecessary and, indeed, undesirable because they would reduce agricultural production unnecessarily. The EPA and DLWC are coordinating the development of such an approach for NSW rivers.

The integration of price and non-price measures has also been proposed in the form of tradable permit arrangements to control the release of certain pollutants, such as salt, into the environment.¹² Under these arrangements, the number of permits is determined according to a mix of environmental and economic objectives. To encourage environmental objectives to be met at least economic cost, the number of permits generally reduces through time. Producers who can reduce pollution at little cost have an incentive to do so because they are able to sell excess credits to producers who are not so well placed. If the tradable credit program is well designed, it should provide sufficient financial incentive to reduce pollution.

Recommendation 3.12

The most effective means of dealing with environmental degradation of water resources is likely to rely significantly on non-price measures. Pricing policies to promote ESD are likely to require the careful coordination of a number of price and non-price measures.

In the absence of ready solutions to environmental problems or incentives to reduce pollution and other environmental impacts, the DLWC must act as resource manager.

The DLWC has undertaken a number of activities (such as resource assessment and planning) which are related to ESD. It is reasonable that water users be asked to pay the costs of these activities to the extent that the activities provide a direct benefit to water users, or if there is a close link between the use of water and the need for the activities. In other cases it may be better to fund resource management from the general revenue of the State or from a levy on all residents within a catchment. At all times, allocation of costs should be transparent and accountable.

3.5.2 Public goods and diffuse impacts

Some services provided by the DLWC are “public goods”. One of the defining characteristics of a public good is that its benefits are diffuse. If it is provided to one member of a group, it must be provided to all - no member of the group can be excluded from enjoying these benefits. Two examples of such services are protecting residents living in flood prone areas by regulating a river via a dam, and managing the state’s resources to achieve a sustainable level of use in the interests of future generations. Charges relating directly to received benefits are often not practicable for public goods, so levies of one kind or another are required to average costs across all those who are receiving benefits.

¹² The system of tradable permits for salt discharge in the Hunter Valley is a notable example of such an approach.

Some external costs of water use are diffuse in that they cannot be directly attributed to specific water use. They arise because of water use by a range of water users and from land use by the community generally. Again, levies are the best way of charging for these diffuse impacts. For example, run off and drainage from some agricultural land into rivers degrades water quality and causes other damage to the riverine environment. These external costs impact on a diffuse range of water users and the community generally. The precise sources and impacts of such problems are often difficult to isolate and quantify.

To the extent that environmental degradation from water use can be determined, attempts can be made to translate the damage back up the river system and to isolate each contribution to the problem. However, such an exercise reaches a point where an average contribution to the problem must be attributed to all users in the area. To recover these costs a mixture of specific charges where impacts can be isolated, and area-wide average charges where they cannot, is needed. Whether the area-wide average charge should be paid by extractive users only or by all landholders within the relevant catchment, requires careful consideration of the particular environmental problems and their associated costs.

Examples of voluntary levies on water users to address water quality problems were drawn to the attention of the Tribunal during the inquiry. However, compulsory levies will often be required.

Load based licensing of specific point sources of discharge to waterways is an example of the polluter pays approach. A licence fee is charged on the basis of the volume of pollutants entering waterways. Where this approach can be applied, it provides a financial incentive to reduce the discharge of pollutants into waterways. The EPA is currently developing a load based licensing scheme for NSW.

Recommendation 3.13

Where a cost is incurred due to water use by an identifiable beneficiary and the cost can be estimated, the cost should be recovered from that beneficiary directly.

Recommendation 3.14

Where costs imposed by a group of beneficiaries cannot be disaggregated, costs incurred should be recovered by area-wide average charges imposed as area levies.

3.5.3 Water quality and reliability

Some submissions to the inquiry have suggested that the charge for water should be commensurate with the quality of the water received and the reliability of that supply.

Water quality problems can arise where the activities of upstream users affect the water quality that is enjoyed by downstream users. Upstream users need to be given adequate incentives to improve the quality of water that leaves their area through protection of waterways and improved land use practices. The licensing of land and water management plans and, perhaps ultimately, the development of load based licensing are examples of approaches that could be followed.

Reliability of supply is a complex function of the geography, hydrology, meteorology and water allocations of an area. The question which arises is whether price should make some allowance for differences in quality and reliability. Customers in competitive markets are generally willing to pay more for better quality service.

However, to avoid cross subsidies prices charged by regulated monopolies should not discriminate other than on grounds of cost. If this principle is followed, there may be little or no difference between the price charged by the DLWC for high security and lower security water. The Tribunal seeks further comment on how this issue can be resolved.

3.6 Implementation issues

The pricing principles and recommendations presented in this report may require significant changes to current pricing and management regimes for bulk water. The Tribunal's views on three important implementation issues should be clarified at this point.

3.6.1 Regional differences in costs of supply

Cost reflective pricing requires that charges vary to reflect regional differences in the cost of bulk water services. The issue which arises is how far to disaggregate charging. At one extreme, the whole state could be regarded as one region with a uniform charge. At the other extreme, attempts could be made to determine charges specific to each individual user.

Most delivery service and metering charges are valley based. This level of aggregation seems an appropriate starting point. Any aggregation of charges implies some deviation from full cost reflectivity and creates some cross subsidies between users. However, this is unavoidable in any realistic pricing arrangement. In principle, costs that are incurred on behalf of a specific region should be paid for by that region alone.

Where the DLWC delivers services at a regional level, the costs associated with those services should be relatively easy to attribute to that region. Where the DLWC incurs costs at head office level on behalf of a number of regions, an allocation of these costs should be made to regions. Alternatively, an average charge to recover head office costs could be imposed on all users. Some head office costs (perhaps most) will not be attributable to any one region. An element of judgement is required here.

Recommendation 3.15

Regional differences in the costs of bulk water services should be reflected in the water charges to each particular region.

3.6.2 Assessment of impacts and transitional measures

A cost reflective charging regime may be very different from the one which exists at present.

The Tribunal is required to assess the impacts on stakeholders of a move to a new pricing structure. Once a clear picture of the impacts of any charges emerges transitional steps can be taken where necessary to smooth the change to the new pricing structure.

Recommendation 3.16

An assessment should be made of the impact of any changes to current pricing policies and appropriate transitional measures should be established to manage those impacts.

3.6.3 Institutional and regulatory obstacles to pricing reform

The combination of managerial, operational and regulatory functions within the DLWC (discussed in chapter 4) makes it difficult to design pricing policies. A clearer separation of those functions would greatly assist the Tribunal in delineating those services providing benefits to individual users and providing public benefits to the wider community.

There are several reasons however, why the DLWC benefits from fulfilling the functions of manager, operator and regulator. The DLWC argues that it is easier to perform each of these functions if a single organisation also controls the other two functions. Many activities serve more than one function and transaction costs are eliminated which would otherwise be required in negotiating the provision of services.

A balance may need to be struck between achieving the lowest cost of providing all three function and promoting clarity, transparency and accountability for each of the identifiable functions. The arguments for and against separating some aspects of these functions are taken up in chapter 4.

Recommendation 3.17

Institutional and regulatory obstacles to the establishment of efficient prices for water itself and for making water available should be identified and removed where it is economic to do so.

3.7 Summary of pricing principles and recommendations

Pricing Principles

- 1. Water charges should be based on the most efficient way of providing water services.**
- 2. The DLWC's administration of water resources through the Ministerial Corporation should achieve financial stability and deliver a sustainable level of water services.**
- 3. Pricing policy should encourage the best overall outcome for the community from the use of water and the other resources used to store, manager and deliver that water.**
- 4. The cost of water services should be paid by those who are responsible for causing, or benefit from, those services. Those who cause more services to be required, or benefit more, should pay more.**
- 5. Pricing policy should promote ecologically sustainable use of water and of the resources used to store, manage and deliver that water.**

To achieve these pricing principles the DLWC should implement the following recommendations, as explained in this chapter:

Recommendation 3.1

The DLWC should improve the transparency of its operations by:

1. detailing the bulk water services it provides
2. specifying the means by which those services are delivered and the costs incurred
3. publishing detailed information on which costs are to be recovered for those services.

Recommendation 3.2

Where those receiving the benefits of bulk water service have sufficiently similar interests, they should be able to negotiate the level of service they receive from the DLWC and the best way of delivering those services.

Recommendation 3.3

That competing claims on water resources be resolved so that water users and other beneficiaries can effectively hold the DLWC accountable for the efficiency with which it delivers bulk water services.

Recommendation 3.4

Benchmarking, performance monitoring and incentive regulation should be used to improve the overall efficiency of operations of the DLWC.

Recommendation 3.5

Where activities can be identified as providing no private benefit, these should be regarded as core government activities and funded by taxpayers. Where activities can be identified as providing no public benefit, they should be funded by particular water users.

Recommendation 3.6

Where costs are incurred by the DLWC in providing both private and public benefits, costs should be shared between beneficiaries according to agreed ratios. The justification for all cost sharing ratios should be determined in an open and transparent process.

Recommendation 3.7

In the absence of competitive pressures, pricing principles must be developed to ensure that water charges encourage allocative efficiency in the use of the community's water resources and the other resources used to store, manage and deliver that water.

Recommendation 3.8

Bulk water charges should be based on an appropriate share of the total costs that the DLWC incurs in regulating, managing and supplying water.

Recommendation 3.9

Charges for bulk water services should reflect the full economic and environmental costs of making water available. The value of water entitlements should continue to be determined by the market.

Recommendation 3.10

Charges should be based on a two part tariff with an access charge and a usage charge based on fixed and variable costs respectively. Where the quantum of these costs is uncertain, a pragmatic balance should be struck between them.

Recommendation 3.11

Trading in water entitlements, subject to appropriate trading rules and environmental constraints, should encourage water to be used in the most efficient way.

Recommendation 3.12

The most effective means of dealing with environmental degradation of water resources is likely to rely significantly on non-price measures. Pricing policies to promote ESD are likely to require the careful coordination of a number of price and non-price measures.

Recommendation 3.13

Where a cost is incurred due to water use by an identifiable beneficiary and an estimate can be made of this cost, the cost should be recovered from that beneficiary directly.

Recommendation 3.14

Where costs imposed by a group of beneficiaries cannot be disaggregated, costs incurred should be recovered by area-wide average charges imposed as area levies.

Recommendation 3.15

Regional differences in the costs of bulk water services should be reflected in the water charges to each particular region.

Recommendation 3.16

An assessment should be made of the impact of any changes to current pricing policies and appropriate transitional measures should be established to manage those impacts.

Recommendation 3.17

Institutional and regulatory obstacles to the establishment of efficient prices for water itself and for making water available should be identified and removed where it is economic to do so.

4 FUNCTIONS AND COSTS OF THE MINISTERIAL CORPORATION

In order to set maximum prices for bulk water services, each function of the Ministerial Corporation must be clearly defined, together with the costs the Department of Land and Water Conservation (DLWC) incurs in undertaking those functions.

The Ministerial Corporation is not a separate reporting entity and its financial affairs are reported as part of the broader activities performed by the DLWC. The Tribunal's task has been complicated by the paucity of information available from the DLWC regarding past costs incurred in fulfilling the role of the Ministerial Corporation and likely future costs.

The Tribunal's task is further complicated by the fact that the Ministerial Corporation's functions encompass the conflicting roles of operator, resource manager, and regulator. In addition, some of its activities can be related directly to water abstractors while other activities benefit both water abstractors and broader community interests.

This chapter looks at what the DLWC does to carry out the Ministerial Corporation's functions and how much this costs. The task of attributing costs to different functions and then to stakeholders is reviewed. An examination of costs would not be complete without consideration of the wider environmental and community impacts of the DLWC's operations. The costing of these externalities presents particular difficulties. Finally, the distinction between the financial viability of the business operations of the DLWC and the recovery of full economic costs (including externalities) of bulk water supply is discussed.

This chapter discusses:

- 4.1 Separating the Ministerial Corporation
- 4.2 Functions of the Ministerial Corporation
- 4.3 Costs of the Ministerial Corporation
- 4.4 Conclusion
- 4.5 Summary of recommendations

The recommendations developed in this chapter relate primarily to pricing principles 1 and 4.

Pricing Principle 1

Water charges should be based on the most efficient way of providing water services.

Pricing Principle 4

The cost of water services should be paid by those who are responsible for causing, or benefit from, those services. Those who cause more services to be required, or benefit more, should pay more.

4.1 Separating the Ministerial Corporation

The first task in measuring costs is to determine what part of the DLWC's overall operations constitute the functions of the Ministerial Corporation.

This report has used the term the 'Ministerial Corporation' to mean the services provided by the DLWC for which the Tribunal sets prices. Those services are the management, supply and regulation of bulk water resources.

The DLWC was formed in March 1995 by the amalgamation of the Department of Conservation and Land Management, the Department of Water Resources and the Water Services Policy Division of the former NSW Public Works Department. The DLWC has had a financial reporting structure in place from 1 July 1996 which specifies the following work program areas. Those relevant to the Ministerial Corporation are italicised:

- A. Natural resources information
- B. Integrated and strategic natural resources policy***
- C. Forestry policy
- D. Country towns water, sewerage and drainage
- E. Water resource management***
- F. Major water infrastructure***
- G. Catchment and community services
- H. Coastal and riverine management
- I. Soil and vegetation services
- J. Land information centre
- K. State lands services

The functions of the Ministerial Corporation are limited to all of programs E and F plus some water policy work which will be completed in program B.

The Tribunal's task is therefore to set maximum prices for bulk water services provided by some work program areas of the DLWC. To set maximum prices for bulk water services, the DLWC must provide the Tribunal with an accounting of the DLWC's activities and costs limited to those related to the functions of performing the Ministerial Corporation.

Recommendation 4.1

Only those costs incurred by the DLWC in performing the functions of the Ministerial Corporation should be considered when setting bulk water prices.

The DLWC's new work program structure has placed the greater part of the Ministerial Corporation's functions in programs E and F. All DLWC staff now report their time and other expenses in a format which will allow the costs of performing the Ministerial Corporation's functions to be isolated within DLWC's total costs.

This will greatly assist the Tribunal to set maximum prices for 1997/98 and beyond. Isolating costs in this way will greatly assist water users too, as it will improve the transparency of the DLWC's activities.

Recommendation 4.2

The DLWC should set specific timeframes and work schedules in its efforts to separately identify costs incurred to perform the functions of the Ministerial Corporation, being the management, supply and regulation of bulk water. Separate identification of these costs is a precondition for pricing reform.

4.2 Functions of the Ministerial Corporation

Markets work best when property rights are well defined, easily and cheaply enforced, and when conditions favour the competitive provision of services. These conditions do not characterise many aspects of bulk water services. Furthermore, 'intervention into the hydrological cycle (has grown) to a point where significant conflict between different uses of the water resource is apparent.'¹³

To satisfy competing claims on scarce water resources, a balance must be struck between the benefits of abstracting¹⁴ water and those of the in stream use of that water. This situation is further complicated in the abstraction of groundwater. Groundwater resources have been built up over many centuries and little is known about the status of the resource, its current rate of depletion and the consequences of that depletion.

To achieve a balance between competing stakeholders, the DLWC:

- *administers* licensed entitlements to water in regulated rivers, unregulated rivers and groundwater sources, and uses standards set by the government to formulate plans for use of the resource (*as resource manager*)
- *controls* infrastructure and natural river systems to achieve these standards and to ensure resource sharing (*as operator*)
- *enforces* licence conditions and sharing arrangements on regulated rivers, unregulated rivers and groundwater sources (*as regulator*).

The Tribunal has received a number of submissions from water user groups which advocate physically separating the Ministerial Corporation's functions and having some operator functions on regulated rivers performed by an independent valley management authority.¹⁵

In principle, the separation of these functions would improve the delivery of each function and contribute to the achievement of efficient costs because:

- conflicts of interest between each function could be avoided
- each function could be delivered by a more specialised agency
- costs incurred could be assigned more easily and accurately to each function

¹³ ACIL Economics, *Management and Strategic Review of the Role and Activities of the NSW Water Resource Manager*, prepared for the NSW Premier's Department, August 1995, pp ii-iii.

¹⁴ Abstraction is the process of taking water out of a waterbody, typically a river or aquifer.

¹⁵ Such as Coleambally Irrigation submission, p 3, and hearing transcript volume 5, March 7, 1996, p 126. Murrumbidgee River Management Board submission p 11, and hearing transcript volume 5, March 7, 1996, p 150.

- strategies to determine and achieve efficient costs for each function could be tailored to suit each particular function
- the overall transparency and accountability of each function would be improved.

Despite these 'in principle' arguments for separation of function, the DLWC has defended the integration of these functions within a single agency.

During the Tribunal's public hearings, the DLWC's representatives argued that it was not practical for the DLWC to be charged with managing the state's resources without also being the operator of its major water storage infrastructure such as dams and weirs.¹⁶

The DLWC argue that there is so much uncertainty and interdependence in basin-wide natural resource management that the operation of storages must be very flexible. If a separate organisation operated the storages, it argues, this flexibility in addressing multiple goals would be lost. At the very least, it would be too hard to write contracts between the resource manager and storage operator because competition for access to water resources is so intense in New South Wales.¹⁷

This difficulty may reflect the absence of clear management objectives for the DLWC. However, the most compelling argument against separating the functions remains the increased transaction costs created by having separate agencies work together to undertake what is done currently within the DLWC.

If all three functions are carried out within the DLWC, the Tribunal believes that, as a minimum, a notional separation of each function, say between groups within the DLWC, is necessary to clarify transparency and accountability. Then:

- conflicts of interest between functions could be resolved in a more transparent way
- the fair sharing of costs between beneficiaries and government can vary between functions
- ways of holding the DLWC accountable for its activities will vary between functions.

Given these three justifications, the next section discusses how the Tribunal recommends that the DLWC should distinguish, and hence allocate costs, between each function. Some activities are conducted most efficiently serving two or more functions. These are discussed below under the heading, 'joint costs'.

4.2.1 Function of resource manager

The function of a resource manager is to balance competing claims on the resource and help the community make informed choices regarding the best overall outcomes from available resources.

¹⁶ Brian Haisman, Director of Water Resource Management, DLWC, hearing transcript volume 6, March 13, 1996, pp 195-214.

¹⁷ Des Cleary, Manager, Strategic Reform Policy, DLWC, hearing transcript volume 5, March 7, 1996, p 109 and volume 6, March 13, 1996, p 213.

In an effective competitive market with clearly defined property rights, this task would be done by the market and the prices of each resource used will provide the correct signal to achieve the best overall outcomes from available resources.

However, as discussed in chapter 3, some bulk water services have diffuse cost impacts (so-called 'external costs' such as those associated with environmental degradation and water quality deterioration), while other bulk water services have diffuse benefits (so called 'public goods' such as the safety of floodplain residents, and enhanced riverine and wetland environments resulting from sustainable use of the state's resources). In both cases, separate ownership of the resources used or benefits received is not easily defined. Markets will not signal the scale of external costs or who should pay for them. Markets will also fail to signal the scale of public benefits, willingness to pay for them and who receives them.

There is, then, a role for a natural resource manager to recognise these external costs and public benefits in allocating the resources under its control. In practice, this involves consulting all those who have competing claims to a resource and making an independent judgement on the best overall outcome from available resources, with resource sharing arrangements reflecting these judgements.

Competing claims on a resource come from those who benefit directly from the resource, such as private water users and urban and country town water authorities. However, they also include those who benefit indirectly from the sustainable use of the resource, such as future generations and the general community. Benefits can take the form of not paying for an external cost. A water user whose activity impacts on other water users or the environment (ie who imposes external costs) and who is not charged, receives the benefit of not paying for those impacts.

All those who derive some benefit from water, whether direct or indirect, have an interest in the efficient resolution of conflict over the allocation of resources and the sustainable use of the resource.

Ideally, the cost of management functions should be paid for by all those who benefit in proportion to the benefit they derive. In practice, this will include all direct beneficiaries, but also government as the representative of indirect beneficiaries. A considerable degree of judgement is required to assess who benefits from bulk water services because external costs and public benefits are widespread.

Under present institutional arrangements, the DLWC's resource management decisions are accountable to the community through Ministerial supervision. Resource management decisions are also made within a number of other agencies including the Environment Protection Authority and the Murray-Darling Basin Commission. Interim river flow and water quality objectives for the state's rivers involve resource management decisions jointly determined by a number of agencies in a process coordinated by the EPA.

NSW currently has no separate agency responsible for setting water resource management goals and for administering plans to achieve them through a process that includes structured community consultation. Traditionally, all NSW government agencies that make some resource management decisions also perform some operation or regulatory functions and hence have some degree of conflict of interest.

The Healthy Rivers Commission represents a first important step towards such an independent resource manager. Its role is to balance competing claims on water resources in certain key river catchments and decide on management options to achieve that balance. It has no role in delivering those options (as operator) or enforcing them (as regulator).

However, the Commission is not independent from the regulators. It operates within the Environment Protection Authority, which sets and enforces some standards for water. It does not have the funding or authority to balance competing claims to all NSW water resources.

Resource Manager

- The costs of the DLWC's resource management function are the costs of those activities required to balance competing claims on the resource and to decide on plans for achieving the best overall outcomes from the resource and standards for its use.
- Resource management costs should be recovered from all beneficiaries in proportion to the benefit they obtain from that activity. In the absence of a market, this will be a negotiated outcome. In cases where benefits are diffuse, it will involve recovery from government.
- The type of resource management activity undertaken by the DLWC, and the reasonableness of resource management outcomes should be accountable to the community as a whole. All agencies in NSW that exist to facilitate this accountability combine the function of resource manager with some operator or regulator functions, creating conflicts of interest.

4.2.2 Function of operator

The Ministerial Corporation's operator function is to implement resource management decisions and deliver water services to water users and diffuse beneficiaries. The DLWC provides bulk water to extractive customers on rivers regulated by major dams and weirs. By operating and maintaining these structures together with stream banks and channels, the operator is delivering the wider services associated with sharing releases from dams and running the rivers - services to recreational and environmental beneficiaries.

The operator should not be concerned with balancing competing demands. Trade offs between competing claims should have been determined already by the resource manager, or some mechanism to resolve competing claims should have been created. The operator should be concerned only with achieving predetermined resource allocation decisions in the most efficient way.

The costs of operator functions should be shared between those who receive the benefit of those functions in proportion to the benefit they draw. Beneficiaries of operator functions may be direct, such as water users, or indirect, such as floodplain residents. The specific beneficiaries of each operator activity vary, depending upon the type of service being delivered.

While a degree of judgement is involved in sharing costs between beneficiaries, in many cases there is scope for evaluating benefits and confirming or adjusting existing cost sharing ratios.

Resource sharing decisions are not the province of the operator. Accountability for services should be to water users, who in turn should be able to put pressure on operators to deliver predetermined shares in the most efficient way. This may best be done at a regional level, as discussed in chapter 7.

Resource Operator

- The costs of the DLWC's operator function are the costs of those activities required to operate and maintain infrastructure and river systems to achieve predetermined resource sharing and standards.
- Operator costs should be recovered from all beneficiaries in proportion to the benefit they obtain from receiving a particular bulk water service.
- The type of activity undertaken by the DLWC to perform operator functions and the efficiency of that activity should be accountable to those who receive a benefit and pay the cost of that activity.

4.2.3 Function of regulator

The Ministerial Corporation's regulator function is to enforce delivery of predetermined resource sharing, eg ensuring that water abstractors restrict their water use to a particular release share, and to check that standards for the use of the resource are observed, eg possession of a current licence.

As for resource management and operations, the costs of DLWC's regulator functions should be paid by those who receive the benefit of that regulation in proportion to the benefit they receive. Most of the DLWC's current regulatory activity involves licensing water users and enforcing those licences. Licence holders are the direct beneficiaries of this activity because, to the extent that it succeeds, it prevents those without a licence from accessing water.

The DLWC can be made directly accountable to water users for the method of regulation and the costs of this activity because there should be no dispute over the desired outcomes. If an outcome can be enforced in a more efficient way, customers should have the information and ability to challenge the enforcement method.

Resource Regulator

- The costs of the DLWC's regulatory function are the costs of those activities required to enforce agreed standards for resource utilisation and water sharing arrangements.
- Regulatory costs should be recovered from all beneficiaries in proportion to the benefit they obtain from the enforcement of a particular standard or outcome.
- The efficient cost of licensing should be recovered from extractive water users.
- The efficiency of the activities carried out by the DLWC to enforce water resource sharing should be accountable to those who receive a benefit and pay the costs of that regulation.

4.2.4 Sharing of joint costs between functions

Although the functions of manager, operator and regulator can be examined separately, in some cases the same activity may contribute to more than one of these functions.

As an example, river gauging stations monitor how much water is flowing in the rivers at any one time and how this water moves through the river system. This information is needed to:

- **manage** the system - the manager must know what water is available to manage before it can balance claims on that water
- **operate** the dams and weirs to deliver the correct amounts of water, ensuring that enough water reaches downstream water users
- **regulate** the system by combining stream gauging with the monitoring of quantities of water extracted from the river.

The most cost-effective way of carrying out a particular activity may be to combine it with an activity which contributes to another function. As an example, the DLWC has argued that planning the allocation of basin-wide water resources between valleys is best done 'on the job' while centrally regulating release shares from dams.

The issue then becomes one of who performs the task and how to share the cost of that task between functions and ultimately, between beneficiaries. In the above cases the task could be performed by the operator with costs assigned, in part, to the manager and regulator.

These so-called joint or common costs mean there is an unavoidable degree of arbitrariness in sharing costs between functions and thus, in how much should be recovered from the beneficiaries of the separate functions. At present the sharing of joint costs between functions is a policy decision within the DLWC.

How joint costs are shared between functions is very important for transparency and accountability. Where different cost sharing rules are applied to each function, the sharing of joint costs could affect the final water charge significantly.

Recommendation 4.3

The cost of activities which contribute to more than one function should be shared between functions proportionate to the contribution that the activity makes to each function. While some arbitrariness in the sharing of joint costs is unavoidable, the decisions made should be open and transparent.

4.3 Costs of the Ministerial Corporation

Because of changes in its organisation, the DLWC has had difficulty in providing the Tribunal with cost information. The primary information presented to the Tribunal as the basis for pricing, was an amended version of the 1994/95 budget of the former Department of Water Resources (DWR). This is the DLWC’s best estimate of the costs of bulk water services. However, it does not give any indication of the trend of costs, where the DLWC is in its investment cycle, or what may be the main areas of growth for costs in the future.

The DLWC gave the Tribunal three different allocations¹⁸ of these budget numbers among functions during the Tribunal's public hearings. Information from the first submission is presented here to show the DLWC’s view of how its costs are divided between manager, operator and regulator functions.

Table 4.1 is a simplified version of information presented in the DLWC’s main submission. The DLWC has subdivided its costs beyond the three main functions of management, regulation and operation and has suggested different cost-sharing ratios for each sub-function. These cost sharing ratios are discussed in chapter 6.

Table 4.1 DLWC's allocation of costs between functions

Function	Cost incurred \$ millions	% of total
Resource management	36.60	28.35
Regulatory issuing/monitoring licences	7.75	6.00
Product delivery	11.33	8.78
Maintaining infrastructure & refurbishment	22.10	17.12
Providing infrastructure	51.30	39.75
SUB-TOTAL: BUDGET OF THE MINISTERIAL CORPORATION	129.08	100.00
'National Resource Management Strategy'	0.80	
Grants and Subsidies	23.70	
Contributions to water entities	10.10	
One-off government reforms not allocated	7.29	
TOTAL - BUDGET OF THE DWR	170.97	

Source: An amended version of Table A4 of the DLWC's 7 January 1996 submission, page A19.

¹⁸ The first allocation was contained in its main submission dated 7 January 1996. The second was contained in its second submission dated 13 March 1996, presented at the Sydney hearing to identify those costs which were regionally based and its Critical Action Program. The third was contained in its third submission dated 29 March 1996, presented at the Tamworth hearing to explain the interim water resource management charge.

The subtotal of \$129.08 million is the DLWC's estimate of the costs of the Ministerial Corporation's functions in 1994/95 based on actual costs for the first six months of the financial year and budgeted costs for the second six months. Also included in Table 4.1 below the 'Sub-Total' line are details of the DWR's budgeted allocation for grants and subsidies and the National Resource Management Strategy in 1994/95 amounting to \$24.5 million.

Of this budget allocation, actual grants and subsidies paid in the 1994/95 totalled 27.3 million.¹⁹ There were paid to:

Darling River Weirs	\$75,000
NRMS Integrated Catchment Management	\$5,330,000
National Landcare Program	\$5,600,000
Irrigation Areas & Districts	\$16,338,000

The Tribunal has had the opportunity of reviewing the DWR's program structure and program costing documents which are the source of these numbers. In the Tribunal's view these costs do not give an accurate picture of the costs of activities relating to the outcomes of each function.

The most significant deficiencies are :

1. "maintaining infrastructure" and "providing new infrastructure" are not apportioned between functions.
2. \$29 million of budgeted **recurrent** expenditure was included in "providing new infrastructure" when it appears to be more suitably included in recurrent funding and shared between the operator and manager functions.
3. A component of costs allocated to resource management relates to operations, and not resource management. A sizeable portion of resource management costs would appear to be costs incurred in maintaining river systems, some of which would be external costs caused by delivery of bulk water. These are environmental costs of 'operating' river systems for the benefit of extractive water users.

Infrastructure maintenance/renewal expenditures serve the joint functions of operator and manager. As such, they are a category which is possibly best treated separately. However, at present a significant proportion of the expenditure wrongly categorised by the DLWC as 'providing new infrastructure' involves resource management work, such as the 'streamwatch' program, blue green algae education, 'rivercare', 'state of the rivers' reports, surface water and groundwater allocation plans, land and water management plans and wetlands management plans.

The DLWC's 1994/95 operating statement for its 'Water Resources' activities states that its capital works budget includes various projects which are ultimately not capitalised, with expenditure being disclosed in the operating statement. Of the \$51.3 million budget for *Providing Infrastructure*, only \$14.2 million was actually capitalised.

The Tribunal feels that a significant proportion of the DLWC's 'Resource management' activities could be better described as 'operator' functions because they involve programs

¹⁹ DLWC's unpublished 1994/95 Operating Statement for the Water Resources Business, Note 6(c).

designed to 'operate' river systems and catchments to achieve an agreed set of resource sharing outcomes. This confusion is a significant barrier to accountability as 'management' activity is less accountable to any specific direct beneficiary.

Management activity to agree upon a desired resource outcome (such as a catchment plan) must be completed before any particular beneficiary can be given a say in the most efficient way to achieve that outcome. However, there may be a range of options for achieving those resource management outcomes, and the choice of which to implement should be made transparent and accountable.

Recommendation 4.4

The DLWC should, as far as possible, record its expenditures in categories which give a clear indication of outlays on the functions of operator, manager and regulator. It should ensure that the 'infrastructure outlays' category contains only the costs related to capital items.

The Tribunal has reassessed the DWR's 1994/95 expenditure figures. Table 4.2 gives a clearer picture of how the DWR numbers should have been allocated. The non capitalised items are primarily those of a resource management and product delivery nature.

Table 4.2 1994/95 budget reallocated by the Tribunal

Function	Cost incurred \$ millions
Resource management	36.60
(Non capitalised "Providing Infrastructure")	18.66
Regulatory issuing/monitoring licences	7.75
Product delivery	11.33
(Non capitalised "Providing Infrastructure")	10.44
Maintaining infrastructure & refurbishment	22.10
Providing infrastructure - capitalised	11.74
Sub Total	118.62
'Coomealla Pipeline - Coomealla Irrigation District	7.34
Restoration of Town Levees	3.12
TOTAL COSTS OF THE CORPORATION	129.08

4.4 Conclusion

The Tribunal does not possess the detailed knowledge of specific work programs necessary to accurately reclassify the DWR's budget costs. Table 4.2 is the Tribunal's "best guess" of how the DWR's budget costs should be split between functions. The Tribunal does not regard the DWR's budget costs as an adequate basis for attributing costs to beneficiaries.

The Tribunal does not propose to base water charges on simple cost sharing of the DWR's budget numbers because water charges should:

- be **region specific** rather than an averaging of costs across all regions
- be based on forward looking **economic** costs of the DLWC, not the backward looking **accounting** costs of the former Department of Water Resources
- be based on the **efficient** costs of each activity
- incorporate the **pricing principles** identified in chapter 3.

Throughout the balance of this report where cost sharing issues are the focus, the Tribunal uses relevant cost elements of the budget sub-total of \$118.62 to generate *indicative* future water charges.

While this is sufficient for the purposes of this interim report, future price reform will depend on the DLWC developing much more detailed and rigorous information on the economic cost of its activities, on how efficiently those activities are carried out, and the extent to which each activity contributes towards achieving each function. Such expanded information will form the basis of actual price caps set by the Tribunal in future.

The next chapter of this report explains the Tribunal's views on the **economic** costs of bulk water services in NSW and how efficiently these activities carried out. Chapter 6 explains the share of these costs that should be recovered from water users and chapter 7 explains the importance of a regional focus for bulk water service delivery and charges.

The range of price and non-price measures to deal with environmental degradation are discussed in chapter 8.

4.5 Summary of recommendations

Recommendation 4.1

Only those costs incurred by the DLWC in performing the functions of the Ministerial Corporation should be considered when setting bulk water prices.

Recommendation 4.2

The DLWC should set specific timeframes and work schedules in its efforts to separately identify costs incurred to perform the functions of the Ministerial Corporation, being the management, supply and regulation of bulk water. Separate identification of these costs is a precondition for pricing reform.

Recommendation 4.3

The cost of activities which contribute to more than one function should be shared between functions proportionate to the contribution that the activity makes to each function. While some arbitrariness in the sharing of joint costs is unavoidable, the decisions made should be open and transparent.

Recommendation 4.4

The DLWC should, as far as possible, record its expenditures in categories which give a clear indication of outlays on the functions of operator, manager and regulator. It should ensure that the 'infrastructure outlays' category contains only the costs related to capital items.

5 THE ECONOMIC COSTS OF MAKING WATER AVAILABLE

The Tribunal has stressed that bulk water charges should be based on the economic costs of making water available. In this chapter the Tribunal explains how to measure the economic costs of making bulk water available in NSW.

This chapter discusses:

- 5.1 Defining the economic costs of making water available
- 5.2 External costs: environmental impacts
- 5.3 Capital costs: existing assets
- 5.4 A rate of return on existing assets
- 5.5 Capital costs: new investments
- 5.6 Operations and maintenance costs
- 5.7 Administration costs
- 5.8 Licence administration
- 5.9 Minimum business viability
- 5.10 Efficient costs
- 5.11 Conclusion
- 5.12 Summary of recommendations

The recommendations developed in this chapter relate primarily to pricing principles 1 and 3.

Pricing Principle 1

Water charges should be based on the most efficient way of providing water services.

Pricing Principle 3

Pricing policy should encourage the best overall outcome for the community from the use of water and the other resources used to store, manage and deliver that water.

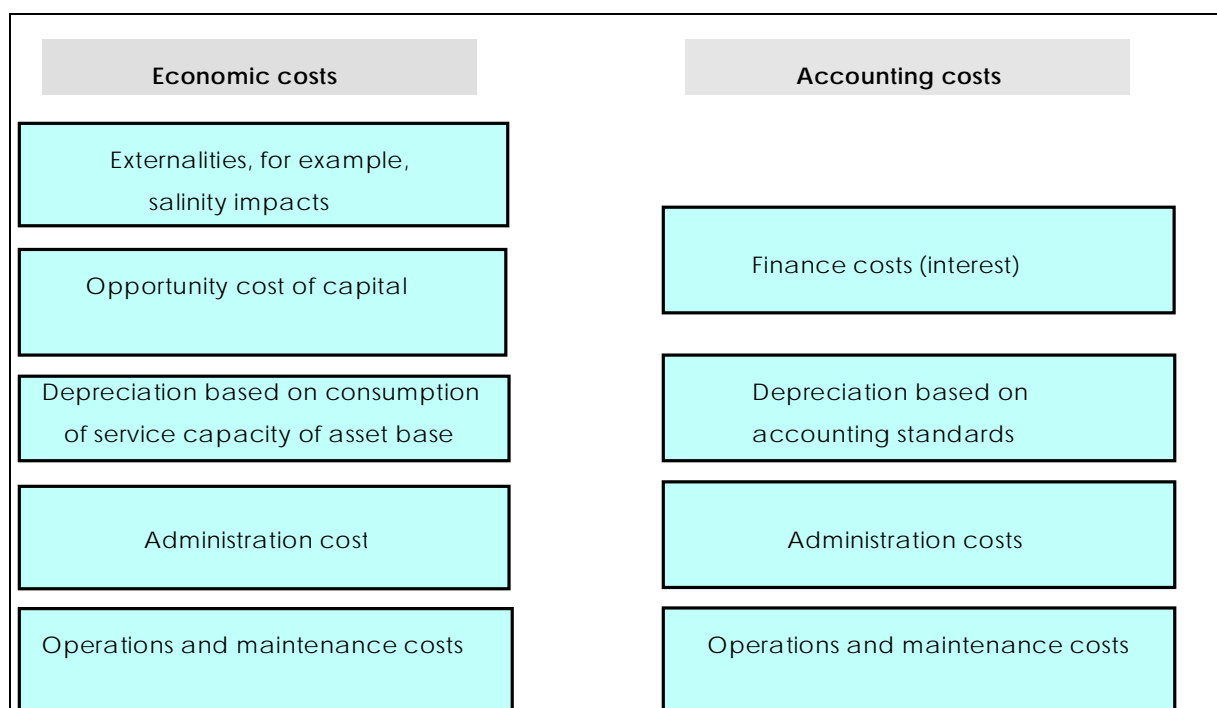
5.1 Defining the economic costs of supplying water

So far, the discussion of the costs incurred by the DLWC in discharging the Ministerial Corporation's functions has related to those costs that would be recorded in the account books of the DLWC's. The discussion has disregarded the broader environmental impact of the DLWC activities and the question of how to charge for the infrastructure assets used by the DLWC to supply water services.

The COAG Expert Group²⁰ has recommended a series of cost categories to help compare the **accounting (reported) costs** recorded by water supply authorities with the **economic costs** of supplying water that should be recovered in water charges. The Expert Group recognises that economic costs, rather than accounting costs, should be used as a basis for water charges to give appropriate signals for infrastructure investment and water consumption. The Group recommends that the full economic costs of providing water services attributable to specific, identifiable beneficiaries or impactors be recovered through charges imposed on them.

The COAG Expert Group recommends that the economic costs of supplying water be determined by reference to the categories in the left column of Figure 5.1. The column to the right lists the comparable accounting cost categories.

Figure 5.1 Economic and accounting costs



Data source: Amended version of Figure A8, DLWC's main submission, p 14.

Economic costs differ from accounting costs in two important respects:

- economic costs include external costs, accounting costs do not
- the economic costs of using water infrastructure assets differ from the conventional accounting charges for the use of those assets.

The cost information presented in the DLWC's submissions measures the accounting cost of bulk water services. As a result:

1. Significant costs may need to be incurred by the DLWC to rectify past environmental degradation and contain or avoid damage from current bulk water services. The DWR's

²⁰ Council of Australian Governments 1995, *Report of the Expert Group on Asset Valuation Methods and Cost-Recovery Definitions for the Australian Water Industry*.

reported costs do not include estimates of the scale and cost of activity needed in the future.

2. Depreciation for accounting purposes is usually calculated as the notional reduction of an asset's value over a prescribed period.²¹ According to the COAG Expert Group depreciation should be based on the actual deterioration of the service capacity of the asset over time. It is a dollar measure of the extent to which the asset loses its capacity to perform the same role.²² In the Expert Group's view economic depreciation represents 'the costs of consumption of the service potential of assets'²³. If the service capacity of large infrastructure assets lasts almost indefinitely, COAG's theoretical measures of depreciation may be significantly less in dollar value than conventional accounting measures.
3. The DLWC's costs do not include a measure of the opportunity cost of capital. The opportunity cost of capital for a specific asset is a measure of the value of that asset in its best alternative use. Where it is possible to reinvest the capital tied up in those assets in some other use, this would be the market rate of return. Not all the DLWC's assets have an opportunity cost, as is discussed below.

5.2 External costs: environmental impacts

External costs are costs imposed (eg on other water users, riparian landholders, the environment) that are not recovered in existing charges. Typically, as these costs are not charged for, consumption of the relevant resource is higher than it otherwise would be. Failure to include these costs means that consumption and investment decisions are made without considering the full economic costs of using resources.

The Land and Water Management Plans that are being developed by the DLWC in conjunction with irrigators, the EPA, local government and local communities, are increasingly being viewed as a key process for reducing external costs on the environment. Licences for Murray Irrigation, Jernalong and Coleambally are written on the basis of these plans.

Environment related expenditure is likely to be a significant growth area for the DLWC as competition for access to resources intensifies. Chapter 8 discusses the range of initiatives that will affect the scale of expenditure required by the DLWC in coming years to deal with external environmental costs.

To the extent that these costs can be identified and attributed to groups of water users or other beneficiaries, they can be included in water charges. The issue is how these costs should be shared between the state, residents in a catchment and water abstractors. This is discussed in chapter 6.

²¹ While depreciation for accounting purposes is, in practice, calculated by one of a number of mathematical methods, Australian Accounting Standard 4, note 16 is similar in intent to economic depreciation, stating that, 'Depreciation rates shall be reviewed annually, and, if necessary, adjusted so that they reflect the most recent assessments of the useful lives of the respective assets, having regard to such factors as asset usage and the rate of technical and commercial obsolescence, and also the most recent assessment of the net amounts expected to be recovered on their disposal.'

²² Council of Australian Governments, Report of the Expert Group on Asset Valuation Methods and Cost-Recovery Definitions for the Australian Water Industry, 1995, Paragraph 4.20, p 22.

²³ Ibid, paragraph 5.18, p 32.

5.3 Capital costs: existing assets

To refine the COAG Expert Group's framework for application to charges for bulk water services on regulated rivers, it is necessary to explore appropriate capital charges in detail. This section looks at how the DLWC should charge for the cost of existing assets.

Dams and weirs are the major publicly owned rural water infrastructure assets. They have long and indeterminate lives. Capital charges commonly take the form of depreciation to recover the capital value of the infrastructure over time and a rate of return to compensate for the investment of those funds and any risk that the capital might not be recovered.

5.3.1 Depreciation

Properly maintained, dams or weirs can last for many years. Some components of dams have such long productive lives, they can be thought of as lasting almost indefinitely. This longevity makes it difficult to justify a depreciation charge and to differentiate between depreciation, maintenance and replacement of assets.

The service capacity of even the most robust asset deteriorates over time if it is not maintained and refurbished. Because regular maintenance can extend the productive life of some asset indefinitely it becomes difficult to see what a depreciation charge should recover. If maintenance is being undertaken and paid for as required and there is no deterioration in the asset's service potential, a depreciation charge serves no economic purpose. It is not required because there is no deterioration in the service capacity of the asset.

For those assets with a definable lifetime, the issue is whether depreciation should be calculated on historic cost (ie the original purchase price) or the cost of a modern equivalent asset. COAG prefers current replacement cost. On this basis, depreciation is related to the value, in today's dollars, of the service derived from the asset.

If the asset is surplus to requirements or represents outdated technology, an adjustment is required to recover only the cost of what would be replaced if the DLWC were deprived of it (ie deprival value).

The issues are then:

- whether the expected asset life can be determined realistically
- whether the asset *is likely to* be replaced at some distant date
- whether it is appropriate to recover an 'updated' version of the original asset's cost from present users through annual charges.

5.3.2 Sunk costs

Irrigator groups have expressed a view to the Tribunal that existing infrastructure assets are sunk costs.²⁴

The capital value of infrastructure is regarded as 'sunk' if it cannot be moved to an alternative investment. The irrigators claim that all existing dams and weirs, except those parts of the structure with a known life of five years or less, should be treated as sunk costs.

²⁴ For example, the submission of the NSW Irrigators' Council.

In support of this view they emphasise:

- the non-commercial reasons behind the decision to build many dams
- uncertainty over the productive lives of these structures
- uncertainty over whether they will ultimately be replaced and, if so, for which purpose
- the problem of determining who benefits from the services and by how much.

The argument for a sunk cost view of past investments in headworks is related to the opportunity cost approach to efficient pricing. According to the Bureau of Industry Economics :

'Costs that are relevant for efficient pricing, including infrastructure pricing — are 'opportunity costs' or 'shadow prices' — that is, the returns that could be earned by using inputs in their next best use. If they have no value, then the past costs are 'sunk' and are of no relevance to the future pricing decision'.²⁵

An advocate of this view, states:

'The economically logical standpoint is that the costs of existing capital are sunk. What irrigation schemes cost to create is of historical interest; it may yield insights into the follies of the past, but nothing else'.²⁶

Under the sunk cost approach prices would not be set to recover either the historical cost or replacement cost through depreciation charges.

Recommendation 5.1

The Tribunal accepts that proper maintenance of some infrastructure assets will extend their useful lives indefinitely. No depreciation charge should be levied against them.

5.3.3 Charging for maintenance, refurbishment and replacement on 'sunk' assets

At least some components of all assets will deteriorate over time if not maintained. Where judgements are made that it is worth maintaining service flows from assets, water charges must meet the costs of maintaining and refurbishing those assets that have an indefinite life, and maintaining and replacing those assets that have a long but finite life.

This capital component of water charges should make provision for anticipated maintenance, refurbishment and replacement expenditure. Lumpy expenditure will occur if assets are accounted as costs are incurred. It is preferable that the charge recover a relatively constant amount while providing sufficient revenue. It is the Tribunal's view that the capital charge component of water charges should be based on an approach which amalgamates charging for 'maintenance', 'replacement', 'renewal' and 'augmentation'.

Irrigator groups have suggested that the appropriate way to charge for maintaining and refurbishing assets is to charge for all assets or components of assets with a life of less than five years when expenses are incurred. Assets with a life of greater than five years, should be debt-financed.²⁷ This would mean the full economic cost of long-lived assets would be

²⁵ Bureau of Industry Economics, *Issues in Infrastructure Pricing*, Research Report 69, August 1995 p 8.

²⁶ A S Watson, *Conceptual Issues in the Pricing of Water for Irrigation*, Dairy Research and Development Corporation, 1995, p 36.

²⁷ See, for example, the submissions of the NSW Irrigators' Council, Murray Irrigation Limited, Murrumbidgee Irrigation.

recovered via their inclusion in finance costs as an annual component of charges. The sharing of these finance costs would be negotiated between beneficiaries.

The Tribunal does not favour the debt-financing approach. It means the cost of restoring the loss of service capacity caused by the current generation of beneficiaries is imposed on future generations. Ideally, capital charges for an asset should be met by those who derive a benefit from the service capacity of that asset.

Recommendation 5.2

Where decisions are made that it is worth maintaining service flows from an infrastructure asset, provision should be made in current charges to maintain the asset's service capacity.

5.3.4 Infrastructure annuity approach

The Expert Group report referred to approaches used in other Australian states and internationally to calculate water charges relating to assets. The report saw considerable merit in the infrastructure annuity approach adopted by the Victorian Rural Water Corporation. Under this approach, assets are classified into four groups of infrastructure which:

1. has a market-based valuation
2. requires replacement or refurbishment
3. does not require replacement or refurbishment
4. is currently surplus to requirements.

The annuity approach relates only to those assets in category 2 ie requiring replacement or refurbishment. Where an asset has a market value, it is not a sunk cost and should be subject to depreciation (category 1). Where an asset will not be replaced (category 3) or is surplus to requirements (category 4), it is not relevant to infrastructure charging.

Under the annuity approach, normal maintenance is charged as an annual operating expense. An assessment is made of the future refurbishment or replacement costs of category 2 assets over a set time horizon. In Victoria this is 25 to 30 years. An annuity is then calculated that will raise sufficient revenue over the time horizon for all the expenditures to be recovered. All expenses and revenues are expressed in the same (current) year dollars by applying a net present value calculation and a suitable discount rate.

This approach generates a *depreciation charge* for assets that have a market-based value and an *annuity capital charge* for long-lived assets that require replacement or refurbishment.

The Tribunal recognises that this approach is marred by a core problem. A judgement is still required as to which assets will be replaced. Where assets continue to provide both public and private services, this decision will always be subject to an element of political judgement regarding the net benefits provided by assets. Net benefits from each major infrastructure assets would be assessed on a regional basis.

Clearly, the annuity approach requires a comprehensive asset register and a detailed asset management plan for every asset over the relevant time horizon. The DLWC has recently developed a maintenance program for its dams and weirs over the next ten years. The program does not include any planned refurbishment or replacement expenditures during this time.

The Tribunal has used this asset maintenance program in chapter 10 of this report to estimate a maintenance component of charges in the Barwon and Murrumbidgee regions.

The Tribunal sees considerable merit in moving towards sustainable use of the DLWC's water infrastructure, paid for by an infrastructure annuity approach with the costs of the annuity shared by beneficiaries. However, the DLWC's asset maintenance program needs to be expanded to include anticipated replacement and refurbishment expenditure before it provides an accurate view of future capital components of water charges.

Many submissions to the inquiry support the Victorian Annuity approach, but are concerned that the revenues raised by the annuity might not be adequately quarantined for capital works. Victorian regional water authorities are legally separate entities. This ensures protection of these funds. The Tribunal seeks submissions on possible institutional reforms to quarantine and protect such funds within the DLWC.

Recommendation 5.3

The Tribunal recommends that the DLWC extend its asset management plan to include refurbishing and replacing its assets over a longer time horizon. This information should form the basis for an infrastructure annuity approach to charging beneficiaries for the costs of maintaining the service potential of existing assets.

5.4 A rate of return on existing assets

Before committing financial capital to a project, commercial investors assess whether returns (adjusted for risk) can be had from that project which are comparable to those available elsewhere. In doing so, they are assessing the opportunity cost of their capital. Where capital is already committed, but can be withdrawn and placed elsewhere, a decision regarding whether or not to withdraw is based on rates of return being received. The rate of return currently earned on capital invested in particular enterprises is a guide to future investors. In fact, the relevance of rates of return is primarily their role in guiding choice.

If an attempt is made to build a rate of return on **existing** assets into water charges, it is important to consider both the efficiency and equity implications of doing this.

In deciding whether water charges should include provision for a return on **existing** assets, the Tribunal has had to consider the following questions:

1. Is there an opportunity cost associated with the major rural water infrastructure assets, dams and weirs, once they have been constructed?
2. Should rural water authorities such as the DLWC use their monopoly power to extract a positive rate of return on existing assets from water customers irrespective of the original reason for construction of the assets or the strength of demand for the assets' services?

These questions arise because the reasons for providing rural water infrastructure have varied over time and between regions.

Much irrigation infrastructure in Australia was created in the late 19th century and the first half of the 20th century. At the time, governments were heavily involved in promoting irrigation. Much irrigation infrastructure was constructed by governments with the explicit

purpose of pioneering the development of agriculture.²⁸ Other objectives such as control of floods, were also important. In more recent times, the consensus among Australian governments is that taxpayers should no longer fund the fixed costs of the system to the extent they did in the past.²⁹

The question remains, should the "modern" approach of expecting a commercial return be applied to past investments?

It has been suggested that entitlements to the use and control of water were issued on the understanding that tax payers would fund capital works. The anticipated benefits from entitlements were well in excess of the amount that it was expected would be charged for making water available. This 'under recovery' of costs made entitlements more valuable and increased the amount that people were willing to pay for them when they were subsequently traded.

Entitlements were attached to land. Hence, the anticipated value of holding entitlements was capitalised into higher land values. The beneficiaries of this windfall capital gain were the landholders at the time the licences were issued. While it may seem equitable to claw back such a windfall gain through increased water charges, there are a number of arguments against this.

Over time, many of the original landholders may have sold their properties, thus realising the capital value of the windfall gain. Subsequent purchasers of such land have, in effect, paid for the full value of the water entitlement, including the anticipated profit. To increase the charge for water is to reduce the capital value of the entitlement the new owner has purchased, at least in part.

Even where owners have not sold their properties, they will, in all likelihood, have invested in developing their farm to make use of the attached water entitlements. Using increased water charges to recover the cost of past capital expenditure or to provide a return to government on these assets will reduce the value of private infrastructure invested on the assumption of a particular level of cost recovery and water charges.

The fact that past private investments have taken place on the basis of expectations of indefinitely subsidised prices is not, in the Tribunal's view, a good reason for maintaining the status quo. The Tribunal does, however, accept that other reasons advanced for not seeking a return on old infrastructure are persuasive.

In some areas, the capacity for delivering more water for consumptive use is constrained by the natural capacity of stream channels. The capacity of the infrastructure assets to store and release water may exceed the capacity of natural streams to deliver that water.

Any addition to water charges which raises the price to users is sending a signal to reduce consumption. In systems where it can be demonstrated that reduced consumption will directly reduce environmental damage or reduce the costs of remedying that damage, there may be a case for raising charges to signal that reduced consumption is warranted, even though the existing *physical* assets are not being used to capacity.

²⁸ See P J Hallows and D G Thompson, *The History of Irrigation in Australia*, ANCID, 1995.

²⁹ Report of the Working Group on Water Resource Policy to the Council of Australian Governments, 1994, p 10.

However, such external cost reasons should be treated on their merits and not be confused with arguments to raise water charges to earn a rate of return on existing physical assets which have excess capacity and which have no alternative use.

In the past, dams and weirs have been designed and constructed to provide a given capacity. In some cases that has exceeded any foreseeable demand. Once the financial capital has been sunk in assets of this kind, the assets have no alternative use and no opportunity cost. If charges are raised above the full opportunity cost of services to obtain a return on sunk capital where there is already excess capacity in the infrastructure assets, such a step will further reduce utilisation and cut economic benefits along with it. In these cases, there are strong economic arguments against a rate of return on sunk assets.

Recommendation 5.4

Where existing assets have no opportunity cost, no rate of return element is warranted in water charges.

5.5 Capital costs: new investments

It is important to draw a distinction between past and future infrastructure expenditure. New capital expenditure does have an opportunity cost and should be subject to a rate of return.

Investment of public funds in new water assets should occur only when such investment yields adequate returns to the community, given the capital constraints that exist when the decision is made. This decision will typically involve calculating both a narrow (internal) rate of return on the funds employed and a broader economic rate of return.

The broader economic rate of return should quantify all the costs and benefits generated by the project, including those outside the 'business component' which encompasses only the costs and revenues related to the sale of water services. Increasingly, governments are taking the view that the internal rate of return recoverable through water sales should be comparable to rates obtainable by investing funds elsewhere, as a precondition for investment. Such a return should be built into capital charges.

The same arguments developed in favour of the infrastructure annuity approach preclude the inclusion of a depreciation charge for new assets with an indefinite productive life. The need remains for a charge to cover asset maintenance and refurbishment.

Augmentation of existing assets should be included in the infrastructure annuity approach, and a rate of return should be recovered as a relevant economic cost of these funds.

The source of finance for new investments should be linked to decisions on the optimum mix of debt and equity capital funding of the DLWC. Charges should reflect decisions on that optimum capital structure. Refurbishment and eventual replacement of these assets should also be covered in the infrastructure annuity.

When assets are refurbished, the refurbishment may present an opportunity to add to their service capacity rather than to simply maintain it. Where service capacity is increased, some proportion of the 'refurbishment' should be treated as new investment and a rate of return should be anticipated and incorporated in water charges.

Recommendation 5.5

Major new infrastructure and augmentation of existing infrastructure should be constructed only if beneficiaries are willing to pay the full economic costs, including environmental costs. These costs should include a rate of return on equity invested.

Negotiated increases in water prices may be an acceptable means of sharing the costs of financing new investment. The NSW Irrigators' Council has provided examples of negotiated approaches in the state's north, where Pindari Dam has been enlarged, and in Victoria, where Torrumbarry Weir is being replaced. The appropriate test to apply before proceeding with such projects is an estimation of the economic rate of return including quantification of net benefits other than those recovered through charges.

While the Tribunal supports a continuation of negotiations to determine the sharing of costs of new investment, the object of any negotiation should be to quantify the benefit that each beneficiary will receive from the investment. To the extent that all beneficiaries may not be represented at the negotiations, or may not have access to the relevant information, negotiation may result in an incorrect allocation of costs. The Tribunal's views on how cost sharing are discussed in chapter 6.

5.6 Operations and maintenance costs

Operations and maintenance costs are relatively straightforward by comparison to capital charges. These are current year expenses incurred by the DLWC. The Expert Group's operations and maintenance category equates directly to the DLWC's operations and maintenance expenditures.

Most irrigation groups, including the NSW Irrigators' Council, accept the inclusion of annual amounts sufficient to meet their 'fair share' of the efficient costs of operations and maintenance costs.³⁰

Recommendation 5.5

The efficient costs of operations and maintenance activity should be included in the economic costs of providing bulk water services to water users and other beneficiaries.

However, operating costs are wider than simply operating the major water storages on regulated rivers. Operating costs include the range of activities designed to maintain and "manage" natural river systems to achieve predetermined resource management plans. The beneficiaries and cost sharing between those beneficiaries vary depending upon the activity. This is discussed more fully in chapter 6.

5.7 Administration costs

At present, the DLWC does not differentiate various administration costs. Instead, administration costs are spread across other cost categories. While this may represent a realistic end result for cost recovery purposes, it does not allow separate performance monitoring and benchmarking of administration costs. Administrative costs are incurred within each function of resource management, operations and regulation.

³⁰ Submission by NSW Irrigators' Council pp 22-26. Mr Alan Wray, Coleambally Irrigation Area, hearing transcript volume 5, March 7, 1996, p 128. Mr Brett Tucker, MIA Council of Horticultural Industries, hearing transcript volume 5, March 7, 1996, pp 139 and 146. But see the contrary view of Mr Mike Hedditch, the Ricegrowers Association of Australia, hearing transcript volume 5, March 7, 1996, p 166.

The DWR programme structure includes administration costs called 'Achieving Top Performance'. The total for this category for 1994/95 was \$22 million, of which the individual 'product line' for 'Administration' was \$18 million. In the DLWC's submission, the total amount of \$22 million has been 'spread' across the resource management areas of 'planning', 'evaluation' and 'granting licences' after allocating \$1 million each to infrastructure maintenance and another area under one-off government reforms not allocated for pricing.

A more targeted allocation of administrative costs should be possible. For the administration activity to be benchmarked, it must be capable of specific measurement and should be identified separately within each cost category where possible.

Recommendation 5.6

The DLWC should separately identify administrative costs of performing each function of the Ministerial Corporation on regulated rivers, unregulated rivers and groundwater sources. Efficient level of these administrative costs should be included in the economic cost of providing bulk water services.

5.8 Licence administration

The Administrative costs of issuing licences should be recovered from licence holders. However, these regulatory activities may best be thought of as a distinct category for charging purposes.

Some groups are concerned about the effectiveness of the DLWC's licensing and regulatory activities. The Hawkesbury Nepean Catchment Management Trust has suggested that licence administration costs might be reduced by issuing perpetual licences for some classes of user. Riparian users who are capable of having an impact on riverine environments are not licensed at present. These users and constructors of on-farm drainage storages need to be brought within the regulatory framework. This is especially true for the highly developed Hawkesbury-Nepean catchment.

The adequacy of groundwater licensing has also attracted criticism. Murray Irrigation Limited³¹ points out that:

- water quality and pump test results are not considered in setting licence conditions, even though the DLWC requires them to be provided when applying for a licence
- farmers are not required to demonstrate sustainable use of groundwater when applying for a licence
- groundwater licence records are poorly kept by the DLWC.

The Dungowan Creek and Valley Water Users Association³² believes that the DLWC has neglected its licence responsibilities. Tamworth City operates Dungowan Dam under licence from the DLWC. The Association believes Tamworth Council operates the dam to the disadvantage of other river users.

These examples illustrate the problems faced by an authority with regulatory responsibility for water extractions across the state. The extent of the problem is only now being revealed,

³¹ Submission by Murray Irrigation Limited, p 26.

³² Submission by the Dungowan Creek and Valley Water Users Association, p 5.

particularly with respect to unregulated rivers and aquifers where formal volumetric entitlements do not exist. Although licences are required, unlicensed extraction is known to be widespread.

Regulatory costs are likely to increase and with them the total 'administration' costs of the DLWC. In particular, increased spending on monitoring and enforcement will be needed to achieve the river flow and water quality objectives that are currently being developed by the NSW government. Increased renewal fees will encourage some users to surrender their licences but may encourage illicit water extraction. Even with the enhanced satellite imaging and other techniques that are currently employed in catchments like the Hawkesbury-Nepean, regulatory costs are likely to rise. This makes it even more important for the DLWC to reduce the administrative costs associated with licence renewal.

5.9 Minimum business viability

The COAG Expert Group³³, recommends water charges should meet a "minimum business viability" test where water users are not able to pay for depreciation or a rate of return on assets. According to this test, water authorities should achieve financial independence by recovering all cash costs (operation and maintenance, administration and interest) and providing for future asset replacement and refurbishment. This chapter has already outlined the Tribunal's view that depreciation and a rate of return are not appropriate for **existing** infrastructure assets with **indefinite** productive lives.

COAG's minimum business viability test does not, however, address environmental sustainability because charging for external environmental costs is not included. This may arguably be appropriate for urban water authorities where the water distribution network is largely made of pipes, but it is not appropriate for the DLWC.

The Expert Group's minimum cost recovery would omit the considerable costs likely to be incurred by the DLWC in managing releases of water from dams in a manner that minimises environmental damage to the 'distribution network' — the receiving river system. These costs can be thought of as **environmental maintenance** costs and are a valid component of the DLWC's total operating and maintenance costs.

Such costs should be viewed as part of the minimum funding required for the DLWC to attain financial and environmental sustainability.

However, not all costs required for business viability should be recovered in water charges. As with the other types of costs discussed so far, the costs incurred by the DLWC to maintain the health of river systems are only partly created by delivering bulk water to current water users. Some of these costs are for activities to rectify past environmental degradation or to manage the effect of other land and water uses. The difficulty is knowing which elements of environmental maintenance activities are directly attributable to satisfying supplying bulk water services to current water users.

³³ Council of Australian Governments 1995, Report of the Expert Group on Asset Valuation Methods and Cost-Recovery Definitions for the Australian Water Industry.

5.10 Efficient costs

The Tribunal has stressed that only the efficient costs of bulk water services should be recovered from water users and other beneficiaries. Strong criticisms were made during the Tribunal's public hearings of the operational efficiency of DLWC's activities.³⁴

Murray River Irrigation Limited (MIL) was critical of the DLWC's effort to achieve operational efficiency. They claimed they had achieved a 30% cut in operations costs since privatisation of their irrigation area, arguing that the DLWC's effort in cutting its costs were, by comparison, quite unsatisfactory.³⁵

MIL also cited an example regarding the canal system on the Mulwala³⁶, where the DLWC suggested a replacement at the cost of \$19m. However, after an independent safety assessment, the system was repaired at a cost of some hundreds of thousands of dollars.

Another example was given by the Hunter Valley Water Users' Association in their presentation³⁷.

The Hunter river in particular is extremely sandy. We pump a lot of sand and the water meters would last about 3 months. We argued and we fought, and finally, after about 5 years, we got them to agree to connect our pumps to the electricity meters so we could work it out from there. It then took another 4 or 5 years to convince them that they did not need to have 3 or 4 men running up and down the river reading those meters because the Council was reading them anyway.

The Tribunal has not been able to assess the validity of these claims and has asked the DLWC to respond to these specific claims.

The Tribunal has also asked the DLWC to detail what process it has made to ensure its activities are completed in the most efficient way.

In calculating indicative water charges in chapter 10 the Tribunal has assumed significant efficiency gains can be made in how DLWC conducts its activities.

³⁴ Ricegrowers' Association of Australia, hearing transcript volume 5, March 7, 1996, p163.
NSW Farmers' Association, hearing transcript volume 7, March 14, 1996, p205.
Macquarie Cotton Growers' Association, hearing transcript volume 3, March 1, 1996, p52.
NSW Irrigators' Council, hearing transcript volume 7, March 14, 1996, p247, p249 & p251.
Gwydir Valley Irrigators' Association, hearing transcript volume 10, March 29, 1996, p399.
NSW Farmers Mudgee Branch, hearing transcript volume 3, March 1, 1996, p32.
Colly Farms Cotton Group, hearing transcript volume 10, March 29, 1996, p416.
Macquarie River Advisory Committee, hearing transcript volume 3, March 1, 1996, p68.
Coordinating Committee of the Namoi Valley Water Users' Association, hearing transcript, volume number 10, March 29, 1996, p433.

³⁵ Hearing transcript volume 7, March 14, 1996, p232.

³⁶ Hearing transcript volume 7, March 14, 1996, p238.

³⁷ Hearing transcript volume 10, March 29, 1996, p424.

5.11 Conclusion

Bulk water charges should be based on the economic costs to provide the appropriate economic signals for water use and investment. To the extent that reported (accounting) costs differ from full economic costs, they are not relevant in calculating bulk water charges.

Economic costs of bulk water services provided by the DLWC

- recurrent costs of administration, operations and any maintenance, on regulated rivers, unregulated rivers and groundwater sources
- recurrent costs of resource management on regulated rivers, unregulated rivers and groundwater sources
- recurrent costs of dealing with the external environmental impacts of water use
- a capital cost calculated using the annuities approach to fund refurbishment and replacement costs for infrastructure assets on regulated rivers. This should not include a rate of return on existing infrastructure assets
- a depreciation charge for those fixed assets that have finite lives
- a real rate of return on new investments and augmentations to existing infrastructure on regulated rivers
- licensing and other regulation related costs

Water charges should recover an appropriate share of the economic costs of the most efficient way of delivering bulk water services. Judgement, combined with appropriate consultation, will be required to apportion costs between water users, government and the wider population. The next chapter explains how to determine the share of economic costs that should be recovered in bulk water charges.

5.12 Summary of recommendations

Recommendation 5.1

The Tribunal accepts that proper maintenance of some infrastructure assets will extend their useful lives indefinitely. No depreciation charge should be levied against them.

Recommendation 5.2

Where decisions are made that it is worth maintaining service flows from an infrastructure asset, provision should be made in **current** charges to maintain the asset's service capacity.

Recommendation 5.3

The Tribunal recommends that the DLWC extend its asset management plan to include refurbishing and replacing its assets over a longer time horizon. This information should form the basis for an infrastructure annuity approach to charging beneficiaries for the costs of maintaining the service potential of existing assets.

Recommendation 5.4

Where existing assets have no opportunity cost, no rate of return element is warranted in water charges.

Recommendation 5.5

The efficient costs of operations and maintenance activity should be included in the economic costs of providing bulk water services to water users and other beneficiaries.

Recommendation 5.6

The DLWC should separately identify administrative costs of performing each function of the Ministerial Corporation on regulated rivers, unregulated rivers and groundwater sources. Efficient level of these administrative costs should be included in the economic cost of providing bulk water services.

6 SHARING EFFICIENT COSTS BETWEEN BENEFICIARIES

The object of cost sharing is to ensure, as far as possible, that beneficiaries pay the full economic costs of the water services from which they receive a benefit, in proportion to that benefit. Submissions to the Tribunal diverge radically in their views of how costs should be shared between beneficiaries.

Deciding on cost sharing is one of the most important tasks of this report.

Some components of the DLWC's costs can be directly attributed to individual water users. Others are identified as activities of government. A third group of costs relate to activities that yield identifiable private and public benefits and require an apportionment of costs between private users and the taxpayer.

This chapter examines the cost categories and cost sharing arrangements proposed by the DLWC. The chapter then outlines alternative approaches and indicates the cost sharing ratios the Tribunal considers more appropriate for the future.

This chapter discusses:

- 6.1 Principles of cost sharing**
- 6.2 Core government functions of the DLWC**
- 6.3 Cost sharing proposed by irrigator groups**
- 6.4 The DLWC's proposed cost sharing ratios**
- 6.5 Disaggregation of costs between regions and functions**
- 6.6 Cost sharing proposal by the MIA Council of Horticultural Associations**
- 6.7 Interim cost sharing**
- 6.8 Creating a cost of service model**
- 6.9 Sharing of resource management and environmental costs**
- 6.10 Conclusion**
- 6.11 Summary of recommendations**

The recommendations developed in this chapter relate primarily to pricing principle 4.

Pricing Principle 4

The cost of water services should be paid by those who are responsible for causing, or benefit from, those services. Those who cause more services to be required, or benefit more, should pay more.

6.1 Principles of cost sharing

The issue of cost sharing between beneficiaries requires the DLWC to form a view on who benefits from its services and to what extent. At an aggregated level the DLWC provides both private and public benefits, so its costs can be notionally attributed to either public and

private sources, or both. While cost-benefit analysis and other economic techniques can help in this assessment, the task will often be complicated and will always require difficult value judgements. The way forward on cost sharing between public and private beneficiaries is to make informed and transparent judgements on aggregate cost sharing, and to adjust these as more complete information becomes available.

At a disaggregated level, cost sharing requires the DLWC to attribute costs to individual beneficiaries or groups of beneficiaries. This is most important for private beneficiaries to ensure that water charges are costs reflective and do not contain cross subsidies. However, even for public benefits, there may be some scope to attribute some costs to particular groups of beneficiaries such as landholders within a catchment or residents of a particular river valley, rather than all taxpayers.

The DLWC is able to attribute some of its costs to regions. This accounting will be used to indicate the level of cost recovery from each region necessary to recover the full costs of making water available to regions.

Wherever an activity provides joint benefits, some principle must be established for sharing the costs of that activity between the beneficiaries.

6.2 Core government functions of the DLWC

Some of the DLWC's activities can be identified as core government activities providing only public benefits. This core set of responsibilities is performed on behalf of government and should be funded entirely from taxation revenue. These costs should be accounted for separately and quarantined from any cost sharing arrangement.

Core government functions carried out at the national level include input to national standard setting and guidelines and interaction with national and interstate resource managers such as the Murray-Darling Basin Commission.

At statewide and regional levels, core government activity includes:

- working on policy development
- participating in inter-departmental initiatives, such as the water reform process which will establish water quality and river flow objectives
- interacting with other government agencies, such as the Healthy Rivers Commission
- establishing criteria for the allocation of funds for natural resource management
- establishing criteria for funding community based programs through State Catchment Management Coordinating Committee.

The DLWC carries out feasibility studies for new water supplies and new supply options. These activities are designed to increase the state's natural resource bases and should form part of the core responsibility of government.

The clear separation of costs which contribute solely to either public or private benefits is an essential first step in any cost sharing exercise. The figures presented by the DLWC to the

Tribunal do not enable these activities to be identified within the overall expenditure of the DLWC.

6.3 Cost sharing proposed by irrigator groups

Irrigator groups³⁸ propose that they be charged only for those costs which would be *avoided* in the *absence* of irrigation. That is, costs which the DLWC incurs only because of irrigation. This "avoidable cost" option is one way in which costs might be shared.

Under this approach, extractive users on regulated rivers would pay very little of the maintenance and refurbishment costs of major dams. Despite the fact that dams were built, at least in part, to benefit irrigators, this approach argues that the community cannot allow these structures to fall into disrepair because of the risk of flood from a dam collapse. Any maintenance expenditure required for reasons of dams safety should be funded by floodplain residents or government. This reasoning would not extend to most weirs, since many weirs would not be required in the absence of irrigation and would pose less threat if they fell into disrepair.

Ironically, the "avoidable cost" test can be posed in reverse. In the absence of risk to life from dam collapse, irrigators could not afford to let dams fall into disrepair. So, the avoidable cost approach does not produce a simple solution to the sharing of costs.

Extractive users would be required to pay a higher proportion of management costs if the avoidable cost approach was followed. Water authorities argue that a large proportion of what they term "resource management" costs is created by the presence of extractive users. Despite the fact that some public benefits arise from the sustainable management of water resources, if no productive use had been made of water resources, no resource management would be necessary. Any resource management and "maintenance" expenditure on river systems would thus be funded by water users only.

The avoidable cost approach is inadequate because it ignores the shared public and private benefits of the activity. Irrigation does exist, and there is a risk to life and property from dam collapse. The state's land and water resources have been developed and river systems and catchments need to be managed and maintained. The benefits from these activities are shared. So too should the costs be shared. The avoidable costs approach perhaps establishes the minimum that any beneficiary should pay, but it does not show how all joint costs should be shared.

In its submission to the Tribunal, the NSW Irrigators' Council refers to a submission by an irrigator group to the Canadian government³⁹ in which 86% of the benefits were assessed as accruing to the region, province and country and 14% of the benefits to the irrigation industry in Alberta. The Tribunal notes there are significant social, economic and climatic differences between Alberta and NSW which reduce the usefulness of this study. The Tribunal has written to the Canadian government to determine its response to the irrigators' study.

³⁸ NSW Irrigators' Council submission.

³⁹ Alberta Irrigation Projects Association, Irrigation Impact Study, 1993.

6.4 The DLWC's proposed cost sharing ratios

Prior to the introduction of the \$1.35 per megalitre interim resource management charge, water users on regulated rivers paid 70% of the costs of "running the rivers". This limited cost base varied between regions, but in general terms referred to the cost of operations, maintenance and administration below the dam wall.

This cost sharing arrangement had its origin in a 1989 government pricing policy. The DLWC has not provided any economic analysis of how the 70:30 ratio was set. The Tribunal understands the cost sharing was negotiated and agreed between government and water users. During the inquiry, irrigator groups stressed to the Tribunal that this agreement to pay 70% referred only to the very limited cost base included in river operations accounts.⁴⁰

The DLWC has proposed a series of ratios to share costs between government and water users within each function. The ratios have not been applied by the DLWC in calculating actual water charges. They were generated by the DLWC for the assessment of an interim water resource management charge by government, and later reproduced for the Tribunal's consideration in this review.

Table 6.1 Cost apportionment ratios proposed by DLWC

	Surface Water				Ground water		River/catchment	
	Regulated rivers		Unregulated rivers		Govt	Users	Govt	Users
	Govt	Users	Govt	Users				
Resource management - planning	70%	30%	70%	30%	70%	30%	70%	30%
Resource management — resource evaluation	50%	50%	50%	50%	50%	50%	50%	50%
Issuing/monitoring licences and permits	0%	100%	0%	100%	0%	100%	0%	100%
Product delivery	30%	70%	n/a	n/a	n/a	n/a	n/a	n/a
Maintaining infrastructure & refurbishment	30%	70%	n/a	n/a	n/a	n/a	n/a	n/a
Providing infrastructure	*	*	*	*	*	*	*	*

* The cost apportionment of new infrastructure will be negotiated as the need arises.

n/a indicates that no costs are attributed to that water source for that particular function.

Source: reproduced from Table A3 of the DLWC's 7 January 1996 submission p A19.

The DLWC has not publicly released what it considers to be appropriate charges, but has gone part way by presenting the above view on cost sharing relativities⁴¹.

⁴⁰ NSW Irrigators' Council submission, p17.

⁴¹ DLWC submission dated 13 March 1996, p 1, paragraph 3.

The Tribunal does not proposed to calculate water charges using the ratios in Table 6.1 because:

- The proposed ratios would average all cost sharing across the state, ignoring important regional differences in the balance between public and private benefits. Costs should be disaggregated.
- The allocation of the DLWC's costs between the proposed cost categories does not accurately reflect the split of its costs attributable to the functions of manager, operator and regulator. The DLWC must significantly refine its allocation of costs between function.
- Existing cost arrangements were agreed in relation to operations, maintenance and administration costs, while the major cost drivers for the rest of the DLWC's activities are more likely to be associated with resource management and resource maintenance.

Sections 6.7, 6.8 and 6.9 set out the Tribunal's views on appropriate cost sharing ratios.

6.5 Disaggregation of costs between regions and functions

In seeking to attribute costs accurately, each disaggregation of the DLWC's activity, whether by function, region or public versus private benefits, will further refine the apportionment and make the resultant charges more cost reflective. However, there are limits to how accurately costs can be disaggregated given that:

- Many services are delivered jointly. There is no clear way to divide the cost of the joint delivery activities between the separate services provided.
- There are limits on how accurately external costs and public benefits can be measured.
- In some cases the costs of providing disaggregated information beyond a certain point may exceed the benefits of more cost reflective water charges.

Any cost sharing arrangement will thus have some arbitrary elements. The crucial issue is the establishment of an acceptable degree of arbitrariness in a cost sharing arrangement. The DLWC's water resource management charge is an example of a charge which the Tribunal believes was too arbitrary. The charge was levied across the state without sufficient analysis of which costs were being recovered through the charge and whether these were commensurate with benefits received. The Tribunal agrees that the cost which the charge will recover represents, in aggregate terms, a minimum to be recovered. However, this current charge is badly structured and should be revised significantly in this report.

A resource management charge is a legitimate method of recovery of expenditure incurred by the resource manager. However, the cost base for that charge should be limited to those costs required to perform that specific function. The proportion recovered from water users should be limited to the private benefits generated by this activity. In its current form, the water resource management charge is too arbitrary an allocation of costs. Appendix 3 presents the DLWC's calculations in setting the water resource management charge for regulated rivers, unregulated rivers, groundwater and urban authorities.

The Tribunal feels that a workable sharing of the DLWC's costs involves a comprehensive and accurate division of economic costs between water sources, regions and functions. At present, the DLWC does not have totally reliable disaggregations of its costs by these three variables. To a point, such an exercise is complicated by the presence of genuine centralised, "head office" costs which cannot be split. However, the Tribunal feels that the DLWC should make a more systematic attempt at disaggregation of its cost. For present purposes the following disaggregations are the best available.

Following requests from the Tribunal, the DLWC has provided costs split for each of its eight regions: Barwon, Hunter, Lachlan, Macquarie, Murray, Murrumbidgee, North Coast and South Coast. The DLWC has also subdivided costs between functions at an aggregate level, within each water source and within each region. The aggregate split between functions is shown in Table 4.3 in chapter 4. As indicated, the DLWC's costs are not accurately split between the functions of manager, operator and regulator, although some parallels can be drawn with the functional categories presented by the DLWC.

The accuracy of cost disaggregation within the DLWC's second submission on cost allocation is again problematic. Administration costs for each region are not generated from regional accounts. Rather, a share of total overhead costs has been spread across all regions in proportion to the other regionalised costs. Table 6.2 presents the Tribunal's best estimate of the DLWC's disaggregated costs. Further refinement of this data will be necessary for price setting purposes.

Table 6.2 1994/95 Budget shares by region and water source (\$ m)

Water source	Regulated Rivers	Unregulated Rivers	Groundwater	Catchment management	Overhead costs	Total
Barwon	7.41	0.43	0.83	0.15	1.64	10.46
Hunter	4.00	0.34	0.27	1.70	0.74	7.05
Lachlan	4.25	0.20	0.08	0.20	0.91	5.64
Macquarie	4.51	0.37	0.44	0.27	1.07	6.66
Murray	4.79	0.48	0.42	0.93	3.49	10.10
Murrumbidgee	7.01	0.35	0.15	0.11	0.31	7.93
South Coast	0.91	0.41	0.18	0.25	0.30	2.05
Statewide	44.91	3.82	3.22	2.11	12.72	66.78
Total	78.50	6.75	5.77	6.04	21.56	118.62

The overall split between regional and state costs is surprising since it indicates that about \$67m of a total of \$118.62m, that is, 57% of the total, represents statewide costs.

The DLWC's selection of regions introduces some difficulties since some regions contain more than one river catchment (the Barwon for example, contains three major river catchments). This means costs are averaged across those catchments, making charges less cost-reflective on a regional basis.

6.6 Cost sharing proposal by the MIA Council of Horticultural Associations

During the Tribunal's hearings the MIA Council of Horticultural Associations⁴² proposed a cost sharing procedure in which each activity would be broken down to its most

⁴² Hearing transcript volume 5, March 7, 1996, p 132.

disaggregated form. Negotiations would then proceed regarding the necessity, responsibility and means of achieving efficient and effective completion for each activity.

This detailed approach, while costly, has merit and the Tribunal has developed the concept in a cost of service model which shares the costs of the DLWC's main functions, as outlined in section 6.8 below. This approach is useful where the overall sharing of benefits between public and private beneficiaries can be readily agreed. This approach will be used to share most of the DLWC's product delivery and resource maintenance costs of supplying bulk water.

However, the MIA Council of Horticultural Associations approach is based on an assumption that all beneficiaries of the DLWC's activities can represent themselves in negotiations over each individual activity in each region and arrive at an agreed negotiated outcome which reflects the benefits received by each beneficiary. In the case of resource management many beneficiaries cannot represent themselves effectively in negotiations. Diffused beneficiaries within the catchment, the community generally, and especially future generations, could not fully participate in these negotiations.

Consequently, a different approach may be required to generate an objective basis for sharing the costs of resource management activity. This is outlined in section 6.9 and will apply where there is difficulty in reaching agreement on the sharing of public and private benefits.

6.7 Interim cost sharing

The Tribunal will set a work program for the DLWC to develop a regionalised information base for systematic cost sharing over the next 12 months. This will take the form of:

1. A cost of service model to apply to that part of the DLWC's expenditure for which the shares of public and private benefits can be negotiated by water users and the DLWC (discussed in section 6.8).
2. A consultative process for sharing the costs of resource management expenditure and environment costs among the beneficiaries where the shares of public and private benefits may be more difficult to determine (discussed in section 6.9).

The Tribunal is conscious that the DLWC does not have the information to carry out these cost sharing exercises. In the interim, the Tribunal will use such information as is available to share costs by applying the DLWC's allocation of its costs between statewide and regionalised costs and within regions, as follows:

- Statewide costs will be allocated 30% to water users and 70% to government as the representative of all other beneficiaries
- Regional costs other than resource management costs will be allocated 70% to water users and 30% to government.
- Regional resource management costs will be allocated 50% to water users and 50% to government.

The Tribunal does not have sufficient information to judge the reasonableness of the cost sharing ratios outlined. The Tribunal does not consider these ratios to be settled, and they will be revised as more information becomes available. The Tribunal hopes to receive more submissions on these points.

In Chapter 10 scenarios are developed which apply the above ratios and generate indicative water charges necessary to reach full cost recovery by the year 2000.

6.8 Creating a cost of service model

The major principle of the cost of service (COS) approach is that customers be assigned the cost of providing the service they receive. They should not be assigned costs associated with serving other individual customers, but they should be assigned a fair share of the joint costs of serving all customers.

A COS study is performed in three stages: functionalisation, classification, and distribution. In the first step the organisation's assets and operating costs are reviewed to determine the function and activities associated with each asset. The organisation's costs are then analysed to determine the basis on which they tend to increase or decrease, ie to identify cost drivers. Finally, the costs are distributed to customer classes based on the proportion of services used by each customer class. As far as possible, costs are assigned directly to those customer classes who benefit from the sole use of particular assets. To the extent that information is available, a COS study allows the organisation to determine how costs are incurred on a geographical basis.

The output of a COS study is a summary of the costs required to service each class of customer within each region. When compared to the respective revenues, the COS study will highlight the extent to which certain customers are paying less than, or more than, their assigned costs. This information can then be used to determine any changes in water charges.

The first step to evaluating the DLWC's cost of service is to determine a comprehensive list of tasks performed by the DLWC on a regional and head office basis. The assets involved in performing those tasks should also be identified along with their rate of attrition, if any.

The next step is to determine cost drivers corresponding to each task. These are the factors which, when increased or decreased, result in a direct change in the cost of performing a given task or the carrying out of a function.

Those who benefit from the performance of a specific function by the DLWC or those whose actions are responsible for impacts that result in costs incurred should also be identified. Wherever possible, these benefits or impacts will need to be quantified.

Based on this information, the final step is to determine which beneficiaries of, or impactors on, the DLWC's activities should be allocated which costs and in what proportion.

Table 6.3 provides an indication of the type of information that is required in order to carry out the cost of service study.

Table 6.3 Identification of beneficiaries and impactors for DLWC's activities

DLWC Activity	Cost Drivers	Beneficiaries(B) & Impactors(I)
Dam maintenance	Age of dams No of 'operations'	Water users(B), valley residents(B), visitors & recreators(B)
Dam operation and other in-stream flow regulation	Rainfall, No of 'operations', flow variability, weather patterns.	Water users(B), valley residents and state community (environmental flows)(B), visitors & recreators(B).
Weir Maintenance	Age of weirs rainfall/flood frequency,	Water users(B),
Water quality management	Assessment, extent and nature of degradation and pollution, specialist labour and equipment	Water users(B)(I), visitors & recreators(B)(I), valley residents and state community (B)(I).
Maintenance of supply & drainage systems	Age of supply system, cost of materials	Water users(B)
Hydrological data collection	Computing and analysis costs, data collection costs and frequency	Water users(B), visitors & recreators(B), state community(B)
Flood data collection	Flood frequency, scientific assessment costs.	Valley residents(B)
Hydrological investigation & research	Specialist labour and equipment	Water users(B), state community (B)
Groundwater management	No of bores, resource assessment, extent and nature of degradation and pollution, specialist labour and equipment.	Bore pumpers(B)(I), state community(B)
Licence approvals and renewals	No of applications	Licensees(B)(I)
Licence surveillance	No of extractors, frequency of surveillance, complexity of water supply network, automation of surveillance.	Licensees(B)
Metering and billing	No of water users /meters, meter reading/ billing frequency, cost of meters	Water users(B), meter owners(B)
Wetlands management	Severity of impacts, complexity of ecosystem	Water users(I), valley residents and state community(B)(I)
Riverbank protection	Extent of riverbank instability, flood frequency	Water users(I) ,state community(B)
Murray Darling Basin Commission contribution	Extent of proposed works	Water users(B)(I), valley residents and state community(B)(I)
New infrastructure construction	Nature of individual projects	Water users(B), valley residents(B), visitors & recreators(B)

Recommendation 6.1

The DLWC should develop a cost of service model to apply to the majority of its expenditure for which the shares of public and private benefits can be negotiated by water users and the DLWC.

6.9 Sharing of resource management and environmental costs

The DLWC's management role involves physical as well as environmental assets, and the reconciliation of conflicting demands on both natural resources and physical assets. The DLWC argues that its resource management costs are required in large part because of the activities of extractive users. The costs of managing the impact of extractive users include those for stabilising and restoring the riparian zone (river banks have been destabilised by

high flows to extractive users), minimising the discharge of pollutants into water systems, monitoring water quality and recharging aquifers.

These so-called “external” costs are very difficult to attribute to users with any precision. Problems such as water quality deterioration, bank slumping and damage to native fish populations may have as much to do with the clearing of vegetation, past agricultural practices, and European carp proliferation as with water extraction.

There are several obstacles to achieving a practical and or polluter pays approach to allocating cost shares. One obstacle is the difficulty of isolating the damage done by extractive users from other threats to waterways. Another obstacle is the problem of clearly identifying expenditure on environmental management, both the quantum and where it is spent. This identification and clarification is important if those water users who are committing to damage control expenditures of their own, through the development and implementation of detailed land and water management plans, are to be reassured that they are not ‘paying twice’.

The DLWC’s classification of resource management activities into ‘planning’ and ‘resource evaluation and assessment’ does not in itself provide much information about the cost of water resource management versus the cost of dealing with the external costs of water use. This makes it difficult for the Tribunal to form a view about whether environmental costs are, or should be, recovered in the management component of water charges, and if so, from whom.

Recommendation 6.2

The DLWC should further refine its reporting of the costs of resource management. In particular, further efforts should be made to identify DLWC costs for managing and correcting environmental damage created by extractive users in individual valleys.

A recent discussion paper prepared by AACM International Pty Ltd for the Murray-Darling Basin Commission⁴³ provides a useful survey of the available literature and principles of cost sharing. The report identifies polluter pays principles and beneficiary pays principles as the two key principles available to allocate costs where there is extensive market failure.

Polluter pays principles dictate that those whose activities contribute to water resource degradation should pay for efforts to manage and alleviate those problems in proportion to their impact. From a practical point of view, this may be implemented only where the pollution in question is from an identifiable point source such as effluent from an irrigation area, a sewerage treatment works or a dairy farm. Where the source of the pollution is diffuse it may not be possible or practical to spend the time and money determining who is “responsible” for that pollution. Land clearing is generally recognised as a significant element in many aspects of land and water degradation, but attributing this damage to anything more specific than general catchments is often not feasible.

In such situations the ‘beneficiary pays’ principle may be easier to implement and provide a more robust solution. The beneficiary pays principle requires beneficiaries to contribute in proportion to the benefit they draw. The Tribunal agrees with this approach in theory. A polluter pays approach should be used wherever practical. However, where the source of pollution is diffuse and direct attribution to any group is not feasible, a beneficiary pays approach should be used.

⁴³ Cost sharing for on-ground works, discussion paper, June 1995, and final report, September 1996.

It should be recognised that a polluter pays approach will recover proportionately more from those who contribute relatively more to resource degradation such as those located in headwaters areas, while a beneficiary pays approach will recover proportionately more from those who are subject to diffuse source impacts such as those who live in downstream regions. The balance between the two will always be a pragmatic choice governed by the most effective way of achieving resource improvements.

The MDBC report has identified eight essential features of a cost sharing framework for resource management and environmental activity as listed below:

**Cost sharing framework for resource management
and environmental activities**

1. Form a representative group of those stakeholders who are affected by the resource use and degradation and who may eventually share the costs of any remedial activity. This group will be asked to participate in planning, implementing, and evaluating proposed activity.
2. Identify and value the cost and benefits associated with the use and management of natural resources. This will require a detailed understanding of integrated natural resource management processes.
3. Link the causes of problems with the responsibility for sharing the costs wherever possible. This is essential to implement a polluter pays principle wherever possible.
4. Identify beneficiaries of activities where causes cannot be clearly linked to water users or other groups or individuals. This is essential to implement a beneficiary pays principle to apportion the remaining costs.
5. Develop an action plan based on the appropriate mix of principles and solutions.
6. Consider the role of government and the private sector in order to facilitate a negotiation process based on a clear understanding of the constitutional, legislative and moral responsibilities of the parties.
7. Develop implementation schedules so that each party will meet its obligations and responsibilities for cost sharing, maintenance, implementation and monitoring.
8. Evaluate outcomes to ensure that activities are carried out in the most efficient way and those carrying out activities are held accountable to those paying the cost.

The Tribunal sees considerable merit in the MDBC approach to cost sharing resource management and environmental activities. The Tribunal has asked the DLWC to develop a framework for implementing such an approach.

Recommendation 6.3

The DLWC should develop a framework for implementing the cost sharing process recommended by the MDBC to share the costs of those of its resource management and environment activities where the shares of public and private benefits may be more difficult to determine.

6.10 Conclusion

This chapter has considered how to share to DLWC's cost between water users and other beneficiaries.

The Tribunal supports the use of the Cost of Service (COS) Model as the primary mechanism to share costs. Only efficient costs should be incorporated into the COS model. It is intended that output from the COS model will form the basis of regional cost reporting.

In cases of resource management and environmental costs where appropriate cost sharing is more difficult to determine, the Tribunal supports use of the model developed by the MDBC consultants. In particular, the Tribunal favours the following features of the MDBC approach:

- *Equality of input* from all stakeholders into all phases of the process. It is most important that the entire community develop involvement with, and ownership of, all aspects of the process.
- Consideration of '*polluter pays*' before '*beneficiary pays*', indicating that those responsible for activities which cause measurable impacts on the resource should be required to pay for the remediation of those impacts. Beneficiaries should then be required to fund remediation of the remaining impacts.
- Inclusion of *feed-back mechanisms* which specify outcomes and require completion to the satisfaction of those paying the cost.

6.11 Summary of recommendations

Recommendation 6.1

The DLWC should develop a cost of service model to apply to the majority of its expenditure for which the shares of public and private benefits can be negotiated by water users and the DLWC.

Recommendation 6.2

The DLWC should further refine its reporting of the costs of resource management. In particular, further efforts should be made to identify DLWC costs for managing and correcting environmental damage created by extractive users in individual valleys.

Recommendation 6.3

The DLWC should develop a framework for implementing the cost sharing process recommended by the MDBC to share the costs of those of its resource management and environment activities where the shares of public and private benefits may be more difficult to determine.

7 REGIONAL DIFFERENCES AND THE STRUCTURE OF CHARGES

So far, this report has identified economic costs that should be recovered and proposed a way to identify who should pay costs. Two further important issues must be resolved to determine actual water charges. They are:

- how the regional differences in providing bulk water services in different parts of the state should be reflected in different regional charges
- what is the appropriate means of structuring the charge between fixed and usage charges given the high fixed component of costs.

This chapter discusses:

- 7.1 The advantages of a greater regional focus
- 7.2 Regional cost differences
- 7.3 Regional variations in current water charges
- 7.4 Regional costs in the Barwon and Murrumbidgee regions
- 7.5 The structure of charges
- 7.6 Conclusions
- 7.7 Summary of recommendations

The recommendations developed in this chapter relate primarily to pricing principle 4.

Pricing Principle 4

The cost of water services should be paid by those who are responsible for causing, or benefit from, those services. Those who cause more services to be required, or benefit more, should pay more.

7.1 The advantages of a greater regional focus

The ACIL Management Strategy Review of the former DWR concludes that ‘a department structured strongly along basin/catchment lines, rather than reflecting a land/water split, should help significantly in managing concerns (about the land and water resource base)’.⁴⁴

A move to a greater regional focus for the activities would greatly improve opportunities for better and more efficient delivery of its functions.

⁴⁴ ACIL Economics 1995, *Management and Strategic Review of the Role and Activities of the NSW Water Resource Manager*, prepared for the NSW Premier’s Department, August 1995.

These opportunities include:

- enhancing the *benchmarking* of operations and maintenance costs across valleys/regions to determine efficient costs
- improving *accountability* for the way water services are delivered at a valley or regional level
- encouraging *contracting out and privatising* elements of operations, regulation and management where appropriate
- developing *activity-based costing* to explain how costs are incurred within each region and why they differ between regions
- defining *head office* costs more sharply
- allowing *flexibility* in regional pricing structures, including the mix of fixed and use-related charges to accommodate regional differences
- highlighting the different *regional economic impacts* of altered water charges or water trading possibilities
- encouraging *local communities* to become involved in planning and implementing resource management in partnership with the DLWC
- encouraging *voluntary efforts by water users* to internalise externalities within regions, with the resource management arm of the DLWC acting as a facilitator.

The Tribunal is aware of two promising examples of regional focus by the DLWC. These are the draft operational accountability statements being trialed in the Lachlan Valley, and the Land and Water Management Plans (LWMPs) that have been put in place in the Murray region. These LWMPs are discussed in chapter 8.

7.1.1 Storage operations agreements and regional accountability

A recent move towards improved regional accountability has been the efforts by the DLWC to establish operational agreements for the management of all its dams. A prototype agreement has been developed for the Lachlan Valley. It may provide a useful template for other regions.

The Lachlan Valley agreement sets out the accountabilities of the operator of the DLWC's dam in the valley. The operator agrees to comply with the purposes and objectives set down for the dam and to operate within constraints and operational parameters formulated by the DLWC including responsibility for:

- maintaining safety and flood operations and issuing warnings
- algal managing and issuing warnings
- complying with an operations plan which provides for releases to water users and an environmental flows plan.

At present, the operator is accountable only to the DLWC's regional director. There would be important opportunities for regional input into the operations plans if accountability was to a valley or catchment based board representative of all beneficiaries. This approach

would also provide valuable feedback to water users and other beneficiaries about the informational and planning requirements for successful operation of dams.

The Tribunal has been made aware of dissatisfaction with the present level of detail and transparency of river operations accounts in particular,⁴⁵ on the part of irrigators.

The present state of the river operations accounts may reflect the relatively weak role of the river management advisory boards. A strengthened role for these boards could:

- make dam operators subject to more effective scrutiny by management boards (with well defined resource management constraints imposed on operators by the DLWC)
- restructure the river operations accounts to accommodate and reflect the costs of implementing operation plans for dams.

7.2 Regional cost differences

Existing cost sharing between extractive users and the wider community of NSW has relied on applying the same cost sharing ratios to the entire state.

However, it is clear that costs differ in identifiable ways between regions due to factors such as:

- system complexity
- variation in the importance of 'allocation' water in total consumption
- natural resource constraints and environmental maintenance requirements
- physical asset capacity and age
- ease of regulatory enforcement
- variations in the cost of supplying high security needs in different systems.

7.2.1 Differing importance of 'allocation' and 'off-allocation' water

Regions rely to varying extents on 'off-allocation' water. While metered water users at present pay for all the water they extract from regulated streams, water users vary in the amount of 'storage and delivery services' they receive. Two water users with identical water entitlements in different regions may use the same total amount of water, but generate different water service costs depending upon how much "allocation" versus "off-allocation" water each receives.

Greater reliance on off-allocation water in the state's north has arisen partly through climatic difference. Irrigators there have access to a less reliable supply and an expected allocation that is a fraction of licensed entitlement. Construction of on-farm storages has been an important means of compensating for this. The costs of these capital items are borne by the irrigators.

⁴⁵ Murrumbidgee River Management Board, hearing transcript volume 5, March 7, 1996.

The relative importance of off-allocation water in the rivers in the state's north is shown in figures 8.1a and 8.1b in chapter 8.

Where water users rely to a far lesser extent on water that is stored and managed for their benefit by the DLWC, the costs incurred by the DLWC per megalitre of water consumed might be expected to be accordingly less. However, figures provided by the DLWC suggest that this is not the case. Table 7.1 points to operations costs (narrowly defined to exclude maintenance) which are similar in the Barwon region (containing the three northern rivers of the Border, Gwydir and Namoi), to the Murrumbidgee, where a much higher proportion of water consumed on average is 'allocation' water.

Thus while irrigators and other extractive users obtain much larger volumes of water from the systems in the Murrumbidgee, and most of this is provided as allocation water, the costs of 'running the rivers' in the Barwon region are little different from the Murrumbidgee. Reasons for these cost differences must therefore lie elsewhere.

Table 7.1 Regional based costs (\$m)

Activity	Barwon	Murrumbidgee
Resource management planning	0.25	0.51
Resource management evaluation	0.46	0.14
Product delivery	2.93	3.11
Infrastructure maintenance	1.94	0.80
Total	5.58	4.56

7.2.2 System complexity and regional operating costs

The Barwon and Murrumbidgee regions are very different from the operator point of view. The Murrumbidgee system is served by just two major dams located high up in the system, with effluent streams that also join well upstream to form the Murrumbidgee River. The Barwon region includes four major rivers and five dams as part of a complex river system that is effluent to the Darling River. The costs of operations per megalitre of entitlement are much higher there.

There are other ways in which complexity of operations even within a single valley can have an impact on costs.

For irrigation schemes previously owned by the government, channels had often been constructed at capacities less than the maximum supply requirements of individual farms. This necessitated roster systems which shared the available channel capacity.

This supply need/delivery capacity imbalance has also emerged in many river systems. It creates problems which vary from valley to valley in the delivery and sharing of allocation water among different irrigators, the sharing of off-allocation water between users and the river, and in the handling of supply constraints on allocation water created by the capacity of dams and river channels.

The existence of different crop varieties with different water needs, and irrigators' pumping capacities that are not necessarily matched to water entitlements or allocations, creates further scheduling and operating complexities, again with regional variations in the resulting costs of operations and channel maintenance.

The Tribunal recognises that previous allocation decisions have issued entitlements to water users in some regions in a way that some have termed 'over allocation'. This has contributed to complexity and to costs. The extent of this is difficult to assess and isolate from demand driven factors. The fact remains that where irrigators and other extractive users have requirements that generate costs, and these differ by region, so should the charges that face them.

Recommendation 7.1

Where costs of operating and maintaining systems, including river channels differ because of complexities in sharing access to the resource, these cost differences should be reflected in regional charges.

7.2.3 Maintenance costs and regional assets' age

Another regional cost driver is the size and age of regional infrastructure. A large collection of ageing assets required to deliver existing service levels will incur high maintenance costs. Evidence of this effect might be expected when comparing the Murrumbidgee region, where dams and weirs and other assets are much older, to the Barwon region where operations date largely from the 1960s. Table 7.1 shows actual maintenance expenditures in the Murrumbidgee and Barwon regions for one year.

The Tribunal notes that these maintenance expenditures do not include expenditure for maintaining the health of river systems used to deliver bulk water, as discussed in chapter 5. They refer only to maintenance of physical capital.

These figures are the only ones available from submissions. This demonstrates the difficulties the Tribunal has in making regional comparisons. Because they are a one year 'snapshot' of maintenance, rather than an average or part of an asset maintenance plan, these figures show 'opportunistic' maintenance spending facilitated by drought in the state's north. Along with the greater number of assets to be serviced there, the drought camouflages the effect that asset age might have on regional outlays. The figures reinforce the need identified by the Tribunal for asset management plans for the regions.

The DLWC has recently provided the Tribunal with a draft asset maintenance plan for each region. This is used in chapter 10 to estimate future maintenance charges for physical assets.

7.3 Regional variations in current water charges

Some differences in regional costs are already reflected in existing delivery service and metering charges which recover 70% of costs included in the regional river operations accounts.

7.3.1 Delivery service and metering charges

The actual per megalitre charges borne by individual users in any region vary according to:

- the structure of charges including the minimum average charge that depends on entitlement rather than use
- the proportion of an entitlement made available as an allocation in any year
- the proportion of allocation used.

Appendix 3 set out the DLWC's existing water charges in each region. Table 7.2 shows the effective price paid to the DLWC per megalitre of general security and high security water delivered in each region. This includes the water resource management charge and other levies and charges paid to the DLWC.

Table 7.2 shows, for example, that a water user in the Murrumbidgee receiving 100% of a 100 ML normal security entitlement pays \$2.83 per ML of bulk water delivered. Meanwhile, a water user in the Barwon region receiving 50% of a 100 ML entitlement allocation will pay \$8.70 per ML delivered, or \$18.10 per ML if contributing to the enlargement of Pindari Dam. Charges for the other regions typically lie between these extremes. Figure 7.2 compares effective water charges per megalitre across each region assuming water users receive a total water usage typical of the last six years. The typical water usages are shown in brackets as a proportion of entitlements.

The water charges in Figure 7.2 and Table 7.2 do not include any costs of delivering water to the farm gate. This would include charges paid for water delivery within irrigation areas and districts, and other water users pumping and reticulation costs. These costs are not considered here because they are not costs expended by the DLWC. They should be included when assessing the complete cost of using water and the impact of this on water users.

Delivery service and metering charges are subject to scrutiny by water user groups. Each year, a river operations account is produced for each region and water user groups scrutinise the justification for and efficiency of these costs. However, the Murrumbidgee River Management Board has argued it has not been successful in scrutinising these costs and an increasing proportion of these costs are becoming non-negotiable.⁴⁶ Other water user groups have echoed these similar concerns.⁴⁷

⁴⁶ Hearing transcript volume 5, March 7, 1996, p148 and p151.

⁴⁷ NSW Farmers' Association, hearing transcript volume 7, March 14, 1996, p205.

Macquarie Cotton Growers' Association, hearing transcript volume 3, March 1, 1996, p52.

The Gwydir Valley Irrigators' Association, hearing transcript volume 10, March 29, 1996, p399.

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7.3.2 . The water resource management charge

In September 1995 the DLWC introduced a water resource management charge payable for the year to June 1996. The charge is based on water entitlement and is averaged across all regions. The DLWC estimates that the charge will recover approximately \$10m from water users on regulated rivers and a further \$3m from water users on unregulated rivers and groundwater sources.

Full details of the charge and how it was calculated are reproduced in Appendix 3 to this report.

The DLWC argues that most of its resource management costs are 'statewide' and should be recovered from all users in the state on a 'per megalitre of entitlement' basis. To the extent that resource management costs vary on a regional basis, the present uniform, resource management charge creates cross subsidies.

Some water user groups have disputed the water resource management charge. Murray Irrigation Limited (MIL) argues that its members are already meeting any resource management costs internally through DLWC and EPA licence charges and through implementation of the Land and Water Management Plan.⁴⁸ MIL claims its members are paying twice for at least some elements of resource management. A uniform statewide charge is unable to take account of the varying amounts that users contribute towards resource management.

The Ricegrowers Association, while not rejecting contributions to water management costs in principle, suggest that charges should depend on the proportion of total system flows extracted by users.⁴⁹ The Tribunal notes that this approach is unlikely to provide an equitable outcome. Even though extractions may be only a small proportion of total flows in a valley, they may require significant management costs to ensure that the right quality of water is provided at the right time during low flow periods.

Sydney Water Corporation, has questioned the transparency⁵⁰ and legality⁵¹ of the water resource management charge. Some resource management activities, such as soil conservation programs in catchments supplying Sydney Water and a variety of water quality and environmental impact studies required of Sydney Water for legislative compliance, are being carried out by Sydney Water or supported by Sydney Water within the DLWC. Sydney Water claims that it is well placed to undertake any further resource management studies in those catchments.

Recommendation 7.2

The DLWC must justify its resource management charges on metropolitan water authorities by identifying the resource management tasks that are additional to those being performed by Sydney Water and Hunter Water Corporations or other government providers, and demonstrating that it is the most cost effective provider of these.

48 MIL submission, p 9.

49 The Ricegrowers Association of Australia submission pp 3 & 17.

50 Hearing transcript volume 6, 13 March 1996, pp 215-224.

51 Sydney Water Corporation submission p 4.

The DLWC argues that some asset maintenance costs should be recovered through the resource management charge and that maintenance of weirs has not been recovered from users in the past.

However, the Murrumbidgee River Management Board asserts that since 1990-91 the Murrumbidgee River operations account has included:

1. \$800,000 a year over the past three years for:
 - (a) maintaining regulatory and diversionary weirs
 - (b) maintaining the river channel itself
 - (c) refurbishment, automation and environment related works at weirs
2. an average of \$240 000 a year for resource evaluation
3. an average of \$250 000 a year for resource planning.

The absence of clear and detailed accounting of costs has led to disputes over the legitimacy of components of these charges. Resource management charges should recover the costs of resource management activity. Asset and natural river system **maintenance** costs should be recovered in product delivery charges.

Recommendation 7.3

The DLWC must account for operations and resource management costs by reporting regionally in a transparent way that assures water users are not being asked to pay twice for some services.

Table A3.1 in Appendix 3 shows that water resource management charges will recover an estimated \$7.35m (being 50% of \$14.70m) as a share of the costs of infrastructure maintenance. The Tribunal believes that the costs of asset maintenance should be recovered from beneficiaries, but a statewide resource management cost is not the correct way to recover these costs.

An appropriate share of the costs of maintaining each dam or weir should be recovered by a region-specific water supply charge. The actual infrastructure costs to be recovered should be shown in the river operations account for the region that benefits from that dam or weir.

In summary, the Tribunal accepts that a share of resource management costs should be recovered in bulk water charges. However, the current water resource management charge is not satisfactory because:

- it averages all costs across the state, creating cross subsidies between water users
- it does not attribute costs to regions or particular groups
- it is not offset where the costs of a resource management activity by water users have resource management benefits outside their own area or catchment
- it is calculated to recover some infrastructure maintenance costs which should be recovered by a much more region-specific water delivery charge

- the cost base for the charge is not transparent and the justification for and efficiency of each activity cannot be scrutinised.

The water resource management charge should be restructured and costs should be recovered through charges based as far as possible on region-specific costs.

7.4 Regional costs in the Barwon and Murrumbidgee regions

The Tribunal has emphasised the need to recover an appropriate share of full economic costs at a regional level. Given the reservations expressed about the DLWC's cost information, the Tribunal has had to substantially rework the available information to present a regional picture. To date, the Tribunal has focused only on water charges for regulated rivers in two regions to produce a snapshot of the situation. The Tribunal has requested the DLWC to prepare similar cost allocations for each of other regions and for unregulated rivers and groundwater use.

Table 7.3 gives the Tribunal's best estimate of the costs that are attributable to regulated water users in the Barwon and Murrumbidgee regions. It is estimated that water users on regulated rivers in the Barwon region need to contribute \$5.41 million of a total cost share of \$7.89 million and those in the Murrumbidgee need to contribute \$5.91 million of a total cost share of \$9.23 million.

These totals exclude all non regional costs. In chapter 10, a share of non regional costs is added to these totals and they are used to calculate indicative water charges to achieve full cost recovery in these two regions by the year 2000. The purpose of this exercise is to give those making submission to the Tribunal a better idea of the likely effect of the Tribunal's pricing principles on final water charges.

Table 7.3 Estimated Regional Cost Recovery

COAG definitions of cost categories that comprise the "economic costs" of water	DLWC equivalent estimated by Tribunal for current review	Barwon (Excluding Non Regional Costs)				Murrumbidgee			
		Cost \$m	% of Total	Recovery \$ m	% of Cost	Cost \$ m	% of Total	Recovery \$ m	% of Cost
Externalities eg salinity impacts	Resource management and environmental maintenance - planning - evaluation	0.60 0.71	8% 9%	0.30 0.36	50% 50%	1.75 1.46	19% 16%	0.87 0.73	50% 50%
Opportunity cost of capital	Finance costs Rate of return	Not separately identified New assets only				Not separately identified New assets only			
Depreciation based on replacement cost of assets	Renewal and maintenance of infrastructure assets	2.74	35%	1.92	70%	2.10	23%	1.47	70%
	Replacement of other assets	0.37	5%	0.26	70%	0.48	5%	0.34	70%
Administration costs	Administration Licensing (direct recovery)	0.32	4%	0.22	70%	0.14	2%	0.10	70%
Operations and maintenance Costs	Operations - running the rivers - metering	2.66	34%	1.86	70%	3.01	33%	2.11	70%
		0.49	6%	0.49	100%	0.29	3%	0.29	100%
Total		7.89	100%	5.41	68.5%	9.23	100%	5.91	64.0%

7.5 The structure of charges

Once the amount that needs to be recovered in water charges is known, an appropriate price structure must be set to recover these costs.

7.5.1 Current charges

Delivery service charges are generally made up of a usage charge and a minimum annual charge. The Tribunal's issues paper⁵² illustrates how this structure results in charges which are largely volumetric in the south and often largely fixed in the north. The water resource management charge is a fixed charge based on entitlement only.

Some water users groups emphasise the need to shift the balance in water charges away from the fixed component towards the variable component that depends on actual use. In their submission the Macquarie Cotton Growers' Association (MCGA) states:

'as a general principle, the MCGA would like to see a charging structure adopted where the agreed costs are allocated so that the component of variable costs are maximised on a per megalitre delivered basis, and overhead costs minimised' (p 9).

⁵² Government Pricing Tribunal, Pricing of Bulk Water Services in NSW: an Issues Paper, Discussion paper No. 13, December 1995.

Others, such as Murray Irrigation Limited (MIL) take a different view. MIL states in its submission:

'MIL would prefer a fixed charge which has advantages for stability of the revenue of the authority' and noting that 'most of the costs are fixed irrespective of volume sold' (p 33).

MIL accepts that an access charge combined with a volumetric charge would be a reasonable compromise.

These different points of view on the balance between the fixed and variable components of charges reflect the regional differences in reliability of supply that occur across the state.

7.5.2 A two part tariff for bulk water

The advantages of appropriate two part tariffs with a fixed and a usage component are that, if properly devised, they include only variable costs in the volumetric component of charges — those costs that vary directly with the volume of water delivered. The fixed component then contributes to the recovery of all other costs. In this way water users get the correct signal as to those (variable) costs that can be avoided by using water more efficiently.

This 'short run marginal cost' approach to the usage component would see all other costs, including infrastructure renewal costs, recovered through a fixed charge. Most maintenance costs relate to maintaining capacity rather than to actual water use. However, the costs of maintaining the waterways themselves may be more closely aligned with the flow and timing of actual water delivery, rather than the overall quantity of water extracted from the river.

In the longer term, costs such as maintenance, renewals and some resource evaluation costs are likely to vary with average long run volumes of water supplied. Outlays are needed to maintain the capacity to service users' entitlements. If part of a region reverts from irrigated agriculture to dryland farming, it is likely that some costs will fall as the need to maintain weirs diminishes, and the complexities of delivering water are simplified. In the short term, however, these costs are fixed costs.

The allocation of fixed costs across users is largely an equity consideration. Unless fixed charges are so high that they influence the quantity of water used through their impact on farm profitability, they will not affect efficiency in water use.

7.5.3 The basis for a fixed charge component

To recover those components of full economic costs which do not vary directly with water use in the short term, the DLWC must spread these in some equitable way across beneficiaries. Cost sharing rules for differentiating the burden falling on extractive users have already been discussed in chapter 6. The problem which remains is to how to allocate the large share of fixed costs among individual users.

Sharing fixed costs of a system on the basis of entitlements is one obvious method. A flat fixed fee common to all users is another. A 'common access charge' would see all irrigators in a region pay the same dollar access charge. While such an approach may have merits as a basis for charging domestic users of retail water, it is highly inequitable when applied to rural systems where entitlements to water vary greatly from user to user.

Entitlement based fixed charges for individual users have the advantage of spreading system costs approximately according to the relative potential private benefits represented by each entitlement holder's claims on system capacity, whether those claims are exercised or not.

Entitlement based fixed charges would mean that holders of sleeper licences would contribute to fixed costs on an equal basis with full users.

The present minimum annual charge is also entitlement based, but because it is calculated using the volumetric (per ML) charge as a component of the calculation, it is not independent of the water use charge. The water use charge should be based only on the variable costs of delivering water, and should not affect the fixed/access charge.

Recommendation 7.4

The Tribunal recommends that the fixed fee component of charges be set independent of usage charges.

In regions where normal security users receive an average allocation that is only a fraction of their entitlement, and actual allocations are often zero, any significant fixed charge (including the present arrangement) impact hardest on agricultural users at times when their cash flow is abnormally low. Some inquiry participants from the north west have advocated 'no water — no charge'. A fixed access charge has the effect of stabilising DLWC revenue streams while exacerbating farm fixed costs problems.

Colly Cotton Farms Ltd has submitted that 'water charges including licence fees, should only be levied when water is available. That is, the total water charge should be a per ML used charge'.⁵³

The burden of fixed charges and their longer term impact on entitlement holders where water allocations are most variable is a matter of concern. It will be a factor influencing the value of water entitlements and the price determined in any permanent transfers of such entitlements. However, in regions where allocations are low and variable, water costs at the point of extraction from rivers are likely to remain a relatively small fraction of total farm costs, and they are a relatively small problem in the management of risky and variable farm income streams. Chapter 9 presents some indicative statistics on the proportion of variable costs attributable to water for some typical crops.

7.5.4 Charging structure and security levels

High security users enjoy superior access to bulk water systems and any additional costs they impose are unlikely to be directly volume related. Thus, higher access charges may be the most appropriate way of imposing different charges on this group of users. To the extent that their presence raises operating costs, they should also pay a higher per megalitre usage charge.

However, the Tribunal has had no quantitative evidence placed before it demonstrating how the costs of servicing high security users differ from those of normal security users. The claim that high security users' needs lock up water in dams in the form of 'precautionary water balances' is challenged by the MIA Council of Horticultural Associations which states in its submission,

⁵³ Colly Farms' submission, p.15.

'the argument that high security (water) is locked up in the dams and unavailable is a furphy. In the past the historically unused portion of high security (water) was factored into the resource outlook for the low security users — essentially the under-utilisation was socialised among all water users. With the advent of water transfers there has been a decreasing level of under-utilisation' (p 15).

Where irrigators are not river pumpers but are served through largely privatised or semi autonomous schemes, the scheme operators may bear the main costs of providing the higher level of security to horticulturalists and town supplies. The Tribunal understands these costs are factored into their charges at present.⁵⁴ It is not clear to the Tribunal what, if any, additional high security costs are incurred by the DLWC in delivering to these area and district schemes.

Commenting on the case for differential charges for high security water, the DLWC in its submission⁵⁵ concedes that while there is no direct impact on operational costs in supplying high security water when water is abundant, the need to retain high security water in storage reduces the flexibility of its operation. During droughts, when normal security water is not available, operating and maintenance costs are largely attributable to high security water users.

Existing differential charges distinguish high security and normal security water based on a formula which does not differ by region. Costs do differ from valley to valley, as the DLWC acknowledges.

The Tribunal requires more evidence on the effect on the DLWC's costs of satisfying high security users' needs, given that these costs may differ significantly from region to region.

7.5.5 Charges and reliability

Irrigators in the north west have argued that the value of their entitlements is being eroded as the result of over allocation of licences. Narromine Irrigation Board of Management suggests that the granting of excessive riparian licences, combined with transferability of entitlement has, over time, undermined the bulk entitlement given to its scheme. While demonstrating that its share of water allocated from Burrendong Dam has fallen over time, Narromine's figures illustrate that the total volumetric allocation to its scheme has risen over the same period. This illustrates the important point that irrigators' own decisions about the level of development of their licensed areas are a contributing factor to reducing reliability.

In its submission, Colly Farms Cotton Ltd refers to,

'the problem of over allocation [in the Gwydir Valley] prior to the time that an embargo was placed on the river systems.'

Colly Farms calculates that in order for the Gwydir to achieve 100% water reliability, the area which is developed needs to be halved.⁵⁶ The point is made that approximately 40,000 hectares have been developed for irrigation at a cost of \$100 million, but a regular return cannot be expected because of unreliable allocations. This contrasts with the situation in the state's south where 100 per cent allocation is typical.

⁵⁴ Information provided by Murray Irrigation Limited.

⁵⁵ DLWC main submission, 7 January 1996, p.B44.

⁵⁶ Colly Farms Submission, p 15.

Past licensing decisions by the predecessors of the DLWC and the development decisions of irrigators have combined with natural conditions and dam sitings to produce a situation of diminished reliability of allocation water in the state's north west. The Tribunal is not satisfied that the lower reliability justifies any lower charge for water than for areas which receive 100 per cent of entitlement as a rule.

Given that the target for administratively set water charges is recovery of an appropriate share of full economic costs, the Tribunal does not consider that discounting water charges to compensate for past reductions in expected allocations is appropriate. Any reduction in reliability has not reduced the costs to the DLWC of delivering water efficiently to all users.

7.5.6 Demand responsiveness and charging structures

One argument against imposing a two part tariff for bulk water questions the effectiveness of volumetric charges in promoting efficient water use. NSW Agriculture has raised doubts about this in its submission. It states 'increasing the price of water does not necessarily impact upon the level of use by irrigators or other users', and cites examples of inefficient use by Sydney region market gardeners and unresponsive use by horticulturalists in the face of rising charges as examples. It further claims:

'In many instances, the price paid for the water component of the production system does not form a significant component of overall farm costs and therefore is considered as a necessary overhead that must be met. The availability of scarce water has a far greater impact upon the efficiency of use than any other single factor'.⁵⁷

The Tribunal considers that the available evidence on the price responsiveness of rural water use is mixed. NSW Agriculture's own submission shows that the responsiveness increases at higher prices. Differences across regions are likely. The Tribunal acknowledges elasticities are likely to be low, especially where the share of water costs in total costs is low.

The Tribunal, nevertheless, considers that cost reflective prices assist rational water allocation and user decisions. Only if water use was **completely** unresponsive to volumetric charges would the structure of charges be irrelevant. The DLWC has indicated that it is conducting further research into the likely effects of two part tariffs as part of its Critical Action Program. Unless this research can produce compelling contrary arguments, the Tribunal regards regionally based, two part tariffs with fixed and usage based components, as a step forward in the process of reforming charging structures.

57 NSW Agriculture, p 3.

7.6 Conclusion

This chapter has argued there are opportunities to deliver better and more efficient bulk water services by DLWC moving to a greater regional focus for its activities.

The DLWC should make the following charges for bulk water services:

Bulk water charges

1. A bulk water charge made up of:
 - (a) A **water supply component** to recover an appropriate share of the efficient costs of the operation, maintenance, administration and capital costs of bulk water services. This includes costs generated while dealing with any environmental impact and any threat to sustainable supply presented by current water consumers.
 - (b) A **resource management component** to recover an appropriate share of the efficient costs of managing and resolving competing claims to water resources.
2. A separate **licensing charge** to fully recover regulation related costs which are all attributable to extractive users.
3. **Environmental levies** on water users and other beneficiaries where appropriate to recover a share of the costs of providing diffuse public benefits.

The Tribunal supports a two part charge for bulk water supply with the usage component reflecting that part of costs which varies with water usage.

7.7 Summary of recommendations

Recommendation 7.1

Where costs of operating and maintaining systems, including river channels differ because of complexities in sharing access to the resource, these cost differences should be reflected in regional charges.

Recommendation 7.2

The DLWC must justify its resource management charges on metropolitan water authorities by identifying the resource management tasks that are additional to those being performed by Sydney Water and Hunter Water Corporations or other government providers, and demonstrating that it is the most cost effective provider of these.

Recommendation 7.3

The DLWC must account for operations and resource management costs by reporting regionally in a transparent way that assures water users are not being asked to pay twice for some services.

Recommendation 7.4

The Tribunal recommends that the fixed fee component of charges be set independent of usage charges.

8 ENVIRONMENTAL COSTS

The greatest unknown future activities and costs of the DLWC are environmental costs. To date, the Tribunal has not been presented with sufficient information on the potential growth of these costs. This chapter sets out information available to the Tribunal regarding the type of costs the DLWC might incur in rectifying external costs. The DLWC needs to provide the Tribunal with substantially more information on environmental problems associated with water extractions and how the DLWC proposes to deal with these costs. Much of this information may not be currently available. Strategies to collect or create this data need to be developed.

This chapter discusses:

- 8.1. The level and pattern of current water use**
- 8.2. Resource management and environmental costs of water use**
- 8.3. Management options to deal with environmental costs**
- 8.4. The costs of the management options**
- 8.5. Selecting and implementing management options**

The recommendations developed in this chapter related primarily to pricing principle 5.

Pricing Principle 5

Pricing policy should promote ecologically sustainable use of water and of the resources used to store, manage and deliver that water.

8.1 The level and pattern of current water use

Water is used for a great variety of purposes including agricultural, industrial, domestic, recreational and “in-stream” environmental uses. Many water users also make use of the river systems without necessarily diverting water. Those water users who discharge into river systems are receiving a benefit by saving the cost of disposing of their waste in some other way. Recreational water users and the general NSW community derive a benefit from water remaining in the river system and the riverine environment that this water sustains. In this sense they may also be seen as water “users”.

There are a number of ways of measuring the extent of water “use”. Water use can be expressed as the proportion of total water flow in the river from which a user draws.⁵⁸ Alternatively, water use can be expressed as a proportion of total diversions from the river. The choice of how to express water use will depend upon the issue being addressed.

⁵⁸ As suggested in the submission received from the Gwydir Valley Irrigators Association.

8.1.1 Total water diversions

The Murray-Darling Basin Commission's Water Audit⁵⁹ expresses water use as a proportion of total water diverted from the Murray-Darling Basin. Table 8.1 shows that total water diverted from the NSW rivers in the Basin has grown significantly between 1988 and 1994.

Table 8.1 Growth in diversions between 1988 and 1994

River Systems	1988 Development Diversions (GL)	1994 Development Diversions (GL)	Increase in Diversions (GL)	Percentage Change in Diversions (%)
Border Rivers	165	228	63	38.2
Gwydir	378	393	15	4.0
Namoi	274	288	14	5.1
Macquarie/Castlereagh/Bogan	375	400	25	6.7
Upper Darling	103	136	33	32.0
Lower Darling	128	139	11	8.6
Murrumbidgee	2220	2300	80	3.6
Murray	1907	1977	70	3.7
Total NSW	5550	5861	311	5.6

Source: Extract from Table 3, page 9, Murray-Darling Basin Ministerial Council, An Audit of Water Use in the Murray Darling Basin, 1995.

Table 8.2 shows the shares of average water diverted from the Murray-Darling Basin for irrigation and other extractive uses between 1988/89 and 1992/93. With the exemption of the Lower Darling system, the vast majority of water diverted in the Basin is for irrigation.

Table 8.2 Surface water diversion in NSW rivers in the Murray-Darling Basin

River System	Diversion for Irrigation		Domestic, Industrial Stock and Town Use		Total Water Diversion (GL)
	(GL)	% of Total	(GL)	% of total	
Border Rivers	221	99.5%	1	0.5%	222
Gwydir	299	99.7%	1	0.3%	300
Namoi	244	98.4%	4	1.6%	248
Macquarie/Castlereagh/Bogan	465	98.7%	6	1.3%	471
Upper Darling	188	99.5%	1	0.5%	189
Lower Darling	128	60.1%	85	39.9%	213
Murrumbidgee	2,424	99.2%	19	0.8%	2,443
Murray	2,024	98.6%	29	1.4%	2,053
Total NSW	5,993	97.6%	146	2.4%	6,139

Source: Extract from Table 1, Page 7, Murray-Darling Basin Ministerial Council, An Audit of Water Use in the Murray-Darling Basin (Figures are the average actual diversions for 1988/89 to 1992/93).

The purpose of the Murray-Darling Basin water audit was to track increases in total diversions from the river system. The split of total diversions between irrigation and other uses is the correct choice of measurement in this instance because it makes clear what has driven the increase in water diversions.

8.1.2 Allocation and off-allocation water from regulated rivers

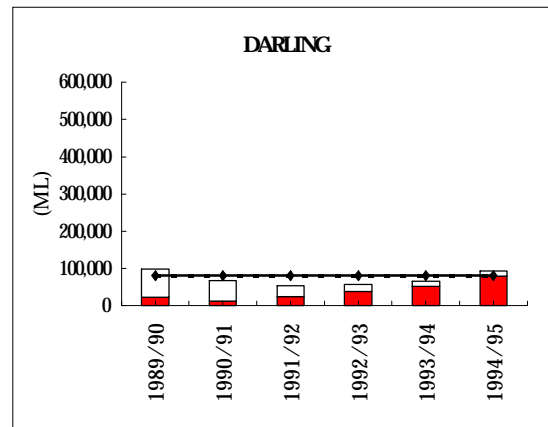
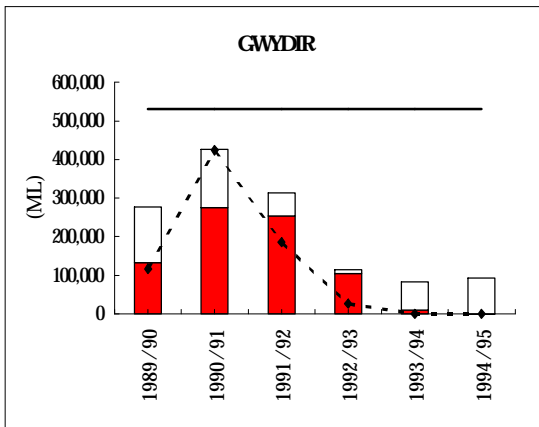
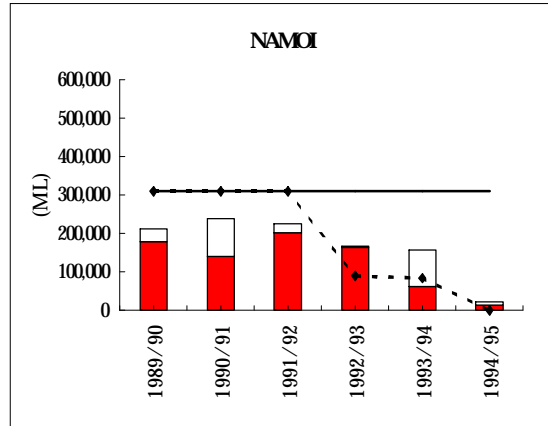
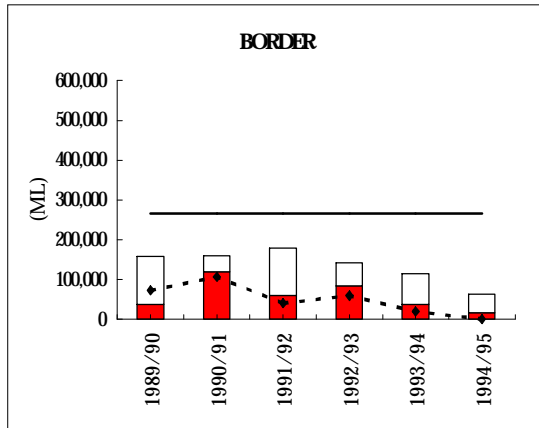
The DLWC has comparatively good information on the total water usage in each region. Figure 8.1a and 8.1b show the actual megalitres of water delivered in each region for 1988/89 to 1994/95. The most striking features of the graphs are the variable nature of

⁵⁹ Murray-Darling Basin Council, An Audit of Water Use in the Murray-Darling Basin, June 1995.

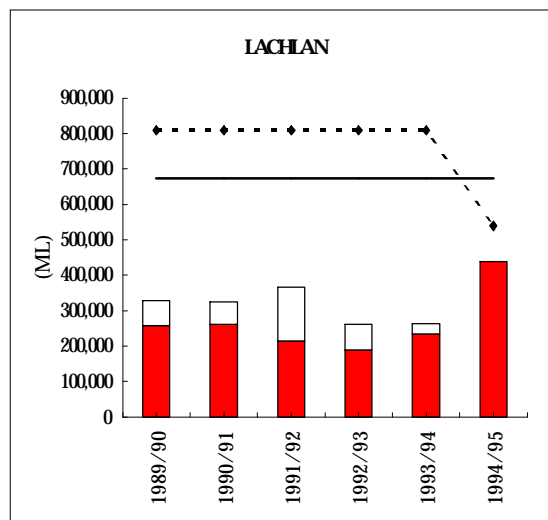
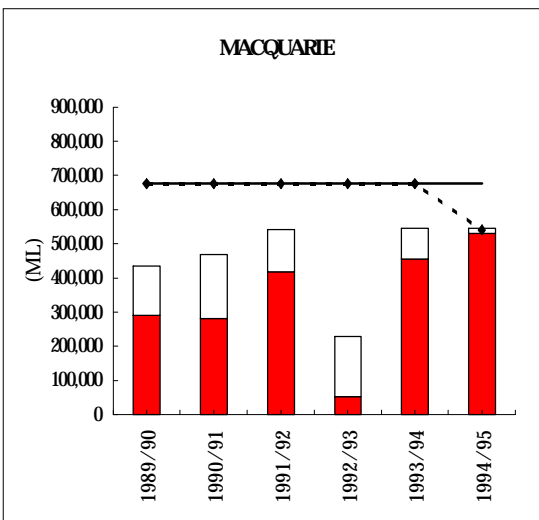
water supply and the fact that total water usage is significantly below the level of entitlements and final announced allocations. This gives a vivid picture of the amount of unused 'sleeper' licences in each region.

Figure 8.1a Proportion of on-allocation and off-allocation water (ML)

'North'



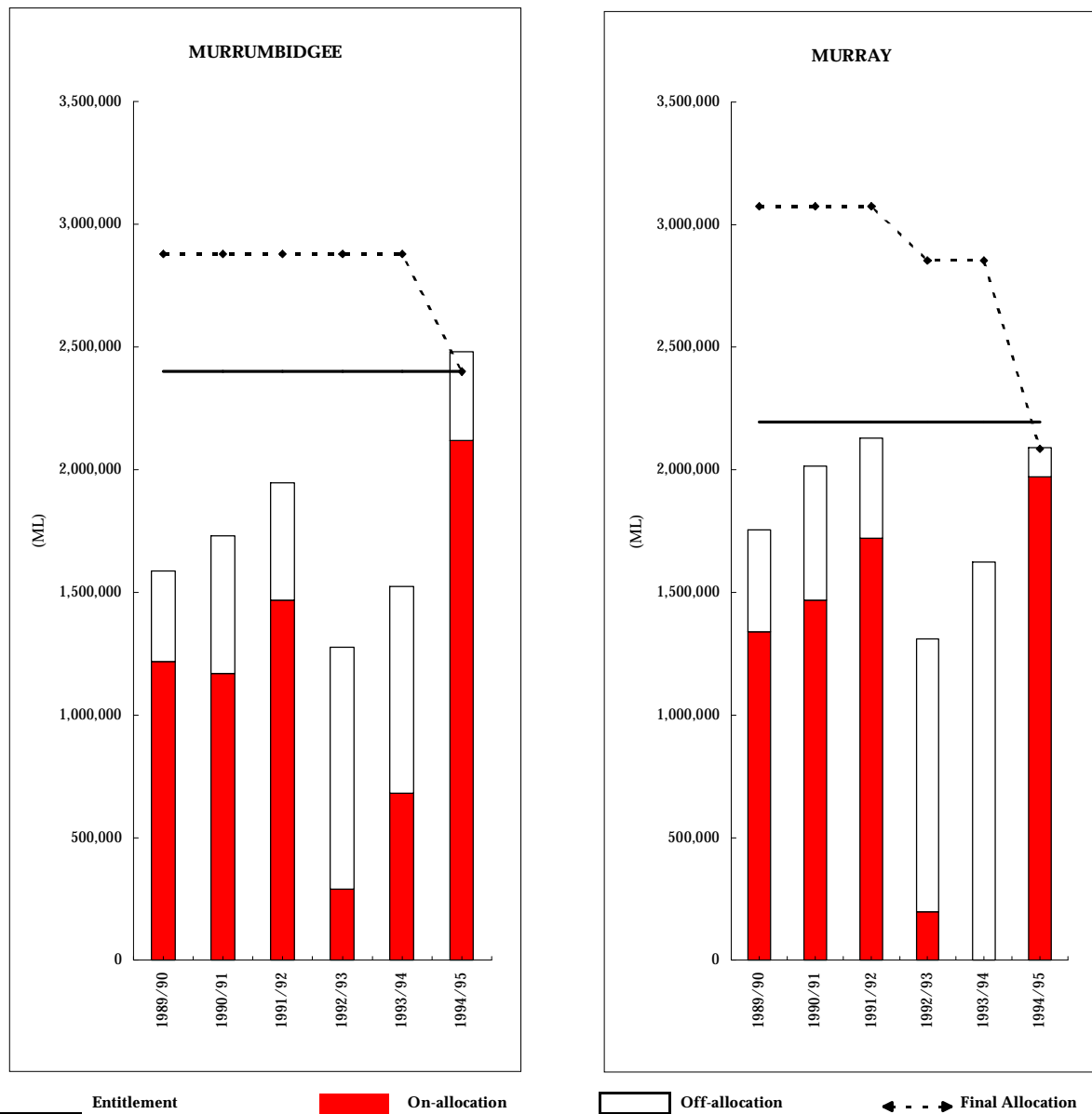
'Central'



— Entitlement ■ On Allocation □ Off Allocation ◀ ... ▶ Final Allocation

Figure 8.1b Proportion of on-allocation and off-allocation water (ML)

'South'



Note: Irrigation areas and districts were assumed to have diverted on the same allocative basis as private diverters.

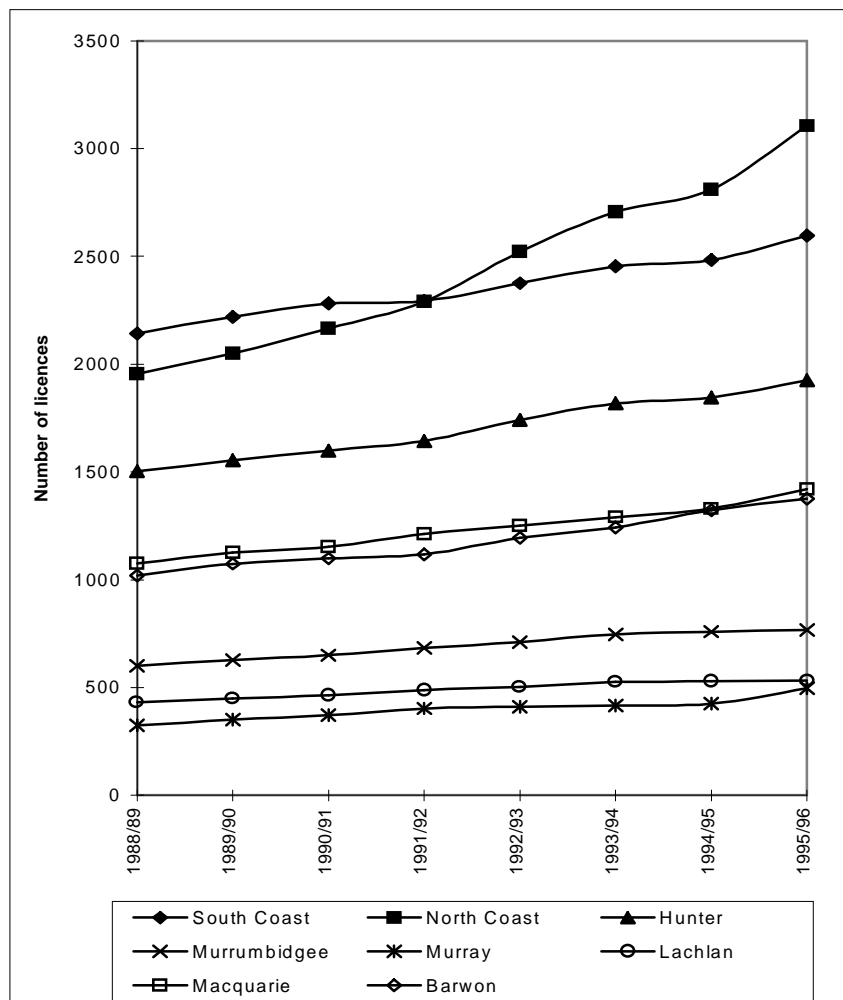
The DLWC has indicated that the breakdown of total water usage may not be accurate, particularly in the southern valleys of the Murrumbidgee and the Murray.

8.1.3 Water from unregulated rivers

Irrigation licenses on unregulated rivers typically specify a pump size and an area to be irrigated. They do not specify a volume limit and are generally not metered. The Barwon-Darling river is the only river in which some water users are metered. Of a total of 221 licence holders, 103 are now metered in the Barwon-Darling. These users are all larger entitlements and the DLWC estimates they represent 80 - 90% of total water use.⁶⁰

Information on the scale of total water extraction from unregulated rivers is not available because of the lack of metering. The only information available is the number of separate licences. Figure 8.2 shows that the greatest growth in licences issued has been on coastal rivers. This is to be expected, given that there are very few inland rivers that are not regulated by dams or weirs.

Figure 8.2 Growth in licences on unregulated rivers 1988/89 to 1995/96



60 DLWC, Parramatta office.

Since the MDBC capped extractions in 1995, the DLWC has reduced its issuing of new licences, although the Tribunal understands new licences may still be issued in some regions.⁶¹ Unfortunately, the number of licences alone is misleading. The extent of actual water diverted from unregulated rivers is unknown because no one knows how much each licence holder diverts.

The DLWC has recognised that as demands for water in unregulated rivers grow, the need to meter the water taken increases. Its efforts in the Barwon Darling river show that the DLWC is going some way towards measuring water extractions from unregulated rivers. However, installing and servicing meters on all unregulated rivers will be very expensive and presents a significant barrier to achieving sustainable use of water from unregulated rivers.

Given the increasing constraints that are being imposed on the use of water resources, the problem of how to manage unregulated rivers becomes more pressing. The DLWC must find a way to measure the actual water diverted from unregulated rivers if it is to sustainably manage unregulated rivers.

Since some unregulated rivers are tributaries of regulated rivers, diversions from both regulated and unregulated streams should be considered together. Other unregulated rivers, particularly coastal rivers, are likely to come under much greater pressure from local economic development.

Recommendation 8.1

The Tribunal recommends that the DLWC work cooperatively with water users to improve its monitoring of extractions from unregulated rivers. Improved metering of extractions is one way in which this could be achieved.

Recommendation 8.2

The DLWC should provide the Tribunal with an assessment of unregulated rivers, including which unregulated rivers should have metered water usage, how the DLWC proposes to meter this usage, and the costs of this metering.

8.1.4 Groundwater

Most stock and domestic bores and about 90% of irrigation bores are licensed, but most groundwater use is not subject to a volumetric limit.⁶² There is no standard type of groundwater licence. Depending upon when a licence was issued, it may be subject to a volumetric limit, an area limit or no limit at all.⁶³ The DLWC has begun to change some of the older licences to volumetric allocations, targeting specific high demand aquifers.⁶⁴

Without volumetric limits and metering of bores, DLWC is unable to tell how much groundwater is being used. The lack of any consistent approach to licensing makes the task of reforming licensing all the more difficult.

61 DLWC, Parramatta office.

62 DLWC main submission dated 7 January 1996, p B21.

63 Prior to 1972, licences did not limit the volume of water that could be taken. Between 1972 and 1982 licences were limited only by the area that could be irrigated. Since 1982 licences specify a volumetric limit, usually based on property size.

64 DLWC main submission dated 7 January 1996, p B22.

Pressure on groundwater will increase as potential irrigation areas are developed and as more restrictions are placed on access to surface water. This is particularly a problem where the DLWC does not have a clear picture of the water being drawn from an aquifer or its recharge rate.

Because many aquifers are closely linked hydrologically to regulated and unregulated rivers, increased use of groundwater may ultimately reduce the amount of water available for use in rivers. Figures 8.3 and 8.4 show that the number of renewable and non-renewable groundwater licences issued has continued to grow, particularly in inland regions where access to surface water is already restricted by release sharing arrangements.

Figure 8.3 Growth in renewable groundwater licences

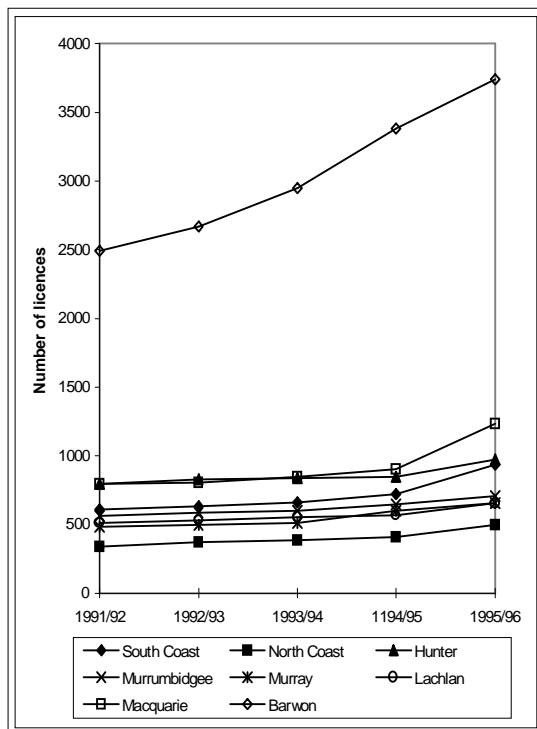
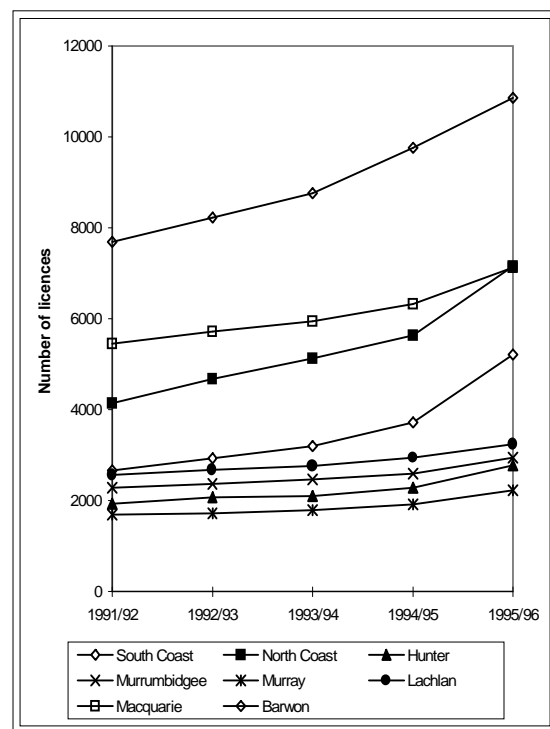


Figure 8.4 Growth in non-renewable groundwater licences



The DLWC has provided the Tribunal with information on groundwater usage in the Lower Namoi and Upper Lachlan valleys. Outside these areas, the DLWC's information on groundwater use appears to be very patchy. Again, the lack of knowledge about the resource and its level of use make resource management very difficult.

Recommendation 8.3

The Tribunal recommends that the DLWC work cooperatively with water users to improve monitoring of extractions from groundwater sources. Improved metering of extractions is one way in which this might be achieved.

Recommendation 8.4

The DLWC should provide the Tribunal with an assessment of the groundwater use which it considers should be metered, how it would propose to meter this usage and the costs of this metering.

8.2 Resource management and environmental costs of water use

The Tribunal has discussed the difference between activity to manage water resources and activity to rectify the external environmental costs of water use. The key issue in measuring resource management costs is to determine the activity required to balance the claims of those who want to “use” the water in order to achieve the best overall outcome for the community. The key issue in measuring the costs of external environmental effects is to determine which costs water users impose on the environment. While there is a strong link between these two activities, the distinction is vital to make sure water charges show the true costs of using water.

8.2.1 Evidence of environmental impacts

The Murray-Darling Basin Commission’s Water Audit (1995) provides a substantial body of evidence on the environmental impact of development of the Basin. The audit documents how reduced river flow levels and altered seasonal flow patterns have:

- made algal blooms more common
- increased water salinity, making the water increasingly unsuitable for domestic and agricultural use
- reduced wildlife populations and biological diversity of floodplains and wetlands
- caused serious reductions in the numbers of many species of birds, fish, amphibians, insects and plants. Commercial catches of native fish species have fallen dramatically while European carp have flourished.

8.2.2 DLWC’s Critical Action Program

The DLWC’s submissions list urgent additional work required to sustainably manage water resources, and list which water users should contribute. This Critical Action Program is projected to cost \$20.83 million across the following four program areas:

Community action program, estimated at \$3.75m in 1996/97

- support Rivercare which maintains and restores riverine corridors
- support Streamwatch which enables school students to monitor streams
- support Phosphorus Action and Model Towns program to reduce phosphorus in rivers, lakes and wetlands.

Asset management program, estimated at \$7.8m in 1996/97:

- review flood security
- assess asset and dam safety
- complete asset audit
- complete inventory of the 46 non-diversionary weirs and 400 irrigation weirs used for rural water management
- replace and upgrade safety equipment

Natural resource management program, estimated at \$7.9 million in 1996-97:

- make data bases accessible to the community
- introduce environmental flow requirements for users
- develop operating plans which incorporate environmental flows
- monitor riverine environments
- assess health risks from poor water quality
- implement the state Wetland Management Policy
- model and measure groundwater usage
- install variable level water off-take towers at major dams to improve downstream water quality

Water management in the Hawkesbury-Nepean catchment, estimated at \$1.38 million in 1996/97:

- Sydney Water Corporation uses an average 85% of water extracted from this catchment. According to the DLWC, this constitutes a special complex management case that requires individual funding separate from other statewide works.

For many activities in the Critical Action Program, the Tribunal has difficulty understanding a linkage with either the environmental costs caused by water users or the resource management costs of managing competing claims to water.

Before any of the expenditure in the Critical Action Program can be recovered from water users, the DLWC needs to explain:

- why these specific work programs are needed and whether this need has been created by water use or will generate some benefits to water users.
- how these programs are to be carried out and whether this is the most efficient way of providing these services.
- who benefits from each component of the works and hence, how they should be paid for.

The DLWC's submission indicates that it is conducting a case study of the Central West region to measure the full economic cost of making water available, including the effect on the riverine environment and downstream users. The Tribunal looks forward to reviewing this case study.

The Tribunal regards environmental costs as an increasing component of the DLWC'S costs. The extent of this growth will depend on whether environmental impacts are dealt with by the DLWC, or whether other more effective means can be developed to address these. Activity by the DLWC should be seen as just one management option for dealing with environmental costs. Land and Water Management Plans appear to show that actions by farmers can be coordinated to address some environmental issues without hands-on activity by the DLWC.

8.3 Management options to deal with environmental costs

The Tribunal has stressed that the most effective way of dealing with environmental issues often involves a combination of price and non price measures. The Tribunal has been requested to set maximum prices for bulk water services only and is not able to make a determination of non price measures available to the DLWC.

However, non price measures will often have cost consequences for the DLWC, water users and other beneficiaries, so it is important that the Tribunal consider the impact of any increased water charges in the context of non price measures that may be in place.

Many of the non price measures discussed here are currently being debated and have yet to be finalised. While it is not the Tribunal's role to conclude these debates, the Tribunal is aware of the importance of non price measures for the future of water charges.

8.3.1 Murray-Darling Basin Commission cap on water extractions

Appendix 3 of the Tribunal's issues paper sets out the NSW Government's actions to improve environmental flows associated with the MDBC's interim cap on extractions, announced in 1995. State governments agreed to cap extractions from the Basin and are now working towards a more certain definition of this restriction.

The variable pattern of rainfall and announced allocations in the Basin mean the final cap will be expressed in terms of a long term pattern of water usage which lessens the environmental impact of water use in the Basin.

The final cap will be a global control within which each state government and water users must operate. The cap will be most effective where state governments, water user groups and other interested parties can create catchment-specific, practical means of operating within the cap.

8.3.2 Water quality and river flow objectives

The NSW government has convened two interdepartmental working groups chaired by the EPA, to set interim water quality and river flow objectives for NSW catchments. The water quality working group has had the benefit of an existing national water quality framework established in the National Water Quality Management Strategy.⁶⁵ River flow standards are more recent innovations and the river flow working group has developed a new format for the objectives. The EPA expects to release a discussion paper on water quality and river flow objectives for public comment early in 1997.

Once set, water quality and river flow objectives will place limits on how the DLWC releases water from its storages. The EPA has modelled the effect of a range of possible objectives on irrigation farming and other water users.

8.3.3 The Healthy Rivers Commission

The Healthy Rivers Commission recently completed its interim report on the Williams River. The report follows an in-depth study of the specific features of the river catchment.

⁸ Australia & New Zealand Environment and Conservation Council, *National Water Quality Management Strategy: Australian Water Quality Guidelines for Fresh and Marine Waters*, November 1992.

It identifies and costs specific land and water management options to achieve better outcomes for water use in catchments.

Investigating a catchment in such a comprehensive way has the benefit that any management options derived are based on a through understanding of the catchment's problems and practical solutions to these. However, the Commission is not charged with implementing the management options that are selected. The success of the Commission's recommendations for the Williams will depend upon the degree to which they are implemented.

The Commission will next investigate management options in the Hawkesbury Nepean catchment and may study inland catchments.

8.3.4 Land and Water Management Plans

During the Tribunal's inquiry process, irrigator groups have presented Land and Water Management Plans as examples of a planning process for improving resource management with meaningful community input.⁶⁶ These plans deal with resource management within irrigation areas and districts. Plans for four communities in the Murray valley were completed in December 1995.⁶⁷ Other areas and districts are working towards their own plans.

The Tribunal is interested in the possible application of this planning process outside the irrigation areas and districts. The key features of these plans may be used as templates for resource planning and management in other contexts. They are:

- balancing the objectives of sustainable environments, sustainable economies and sustainable communities
- using contracts and licences to codify the commitment of those implementing the plan to the agreed management plans and desired outcomes
- being community driven, but in partnership with government agencies and wider interests. Land and Water Management Plans start with community proposals. These are the basis for negotiations which ultimately result in licence conditions.
- including monitoring by agreed performance indicators and reporting these to all parties
- making the plans subject to periodic review and making further financial contribution by governments conditional on the outcomes of those reviews
- keeping the plans flexible by allowing the details to be varied within the overall budget of the plans. This allows the plan to be adapted as resource managers learn how the plan works in practice.
- ensuring the funding of the plans over time. The Murray valley plans have programs of work planned out beyond 15 years and corresponding financial commitments. Coleambally Irrigation Area's plans call for a commitment of \$146 million over 30 years, with irrigators paying up to 90% of this.⁶⁸ The sustained support and financial commitment of all parties to a resource management plan distinguishes the resource management plans.

⁶⁶ See for example the submission of Murray Irrigation Limited.

⁶⁷ Plans were completed for the communities of Berriquin, Denimein, Wakool and Cadell within the Murray Irrigation Limited Irrigation Area and District.

⁶⁸ Hearing transcript volume 5, March 7, 1996, p 118.

To apply this planning process to wider catchment and basin resource management would require substantial changes to DLWC's decision making process and creates the need for community-based institutions which could mobilise and coordinate community input and guarantee community implementation of the plan.

During the Tribunal's hearings, many participants commented on the relative success they experienced in communicating with regionally based representatives of the DLWC, EPA, CSIRO and other agencies.⁶⁹ An important first step to improving resource management may be to make more resource management decisions at regional offices, but within a coordinated basin-wide approach. This would involve devolving both authority and funding.

The Tribunal asked DLWC and many participants to comment on the ability of Catchment Management Committees (CMCs) to produce and implement catchment plans with the features of Land and Water Management Plans. Most participants had a mixed view of the representative success of Catchment Management Committees. It appears not all CMCs can draw members from the full breadth of the community that they represent. The Tribunal notes that a review of the Catchment Management process is underway.

A common view is that CMCs do not have the funding to coordinate input into a plan and do not have the power to ensure financial input from the community or enforce compliance by the community.⁷⁰ Legislative changes to strengthen CMCs may be one way to equip them to provide more extensive community input into resource management planning and implementation processes.

The DLWC has suggested that the Hunter Valley Catchment Management Trust is one community-based institution which has the ability to raise funds for resource management and environmental spending from the wider catchment community.⁷¹

While irrigator groups have suggested creating a Valley Management Company to deliver water and manage the resources of each river, they recognise that this model is not appropriate for managing wider resource management issues such as dryland salinity and basin-wide resource management.⁷²

The Tribunal seeks further submissions on the applicability of land and water management plan approach to wider resource management issues. In particular, the Tribunal seeks submissions on how the approach could be modified to suit existing institutions or what different institutions might be appropriate.

Whatever the appropriate vehicle for coordinating regional and catchment based community input, it is vital that water resource management planning be coordinated with existing federal and state programs. Programs such as Landcare already mobilise community input and government funding of important resource management work. The importance of reforming and coordinating existing structures and funding programs must be recognised.

⁶⁹ For example, the Murrumbidgee River Management Board, hearing transcript volume 5, March 7, 1996, p 151.

⁷⁰ For example, MIA Council of Horticultural Associations, hearing transcript volume 5, March 7, 1996, p 144.

⁷¹ Mr Des Cleary, hearing transcript volume 5, March 7, 1996, p 114.

⁷² For example, Coleambally Irrigation, hearing transcript volume 5, March 7, 1996, p 126.

8.3.5 The COAG Strategic Water Reform Framework

A communique issued following the 1994 COAG meeting committed all states and territories to a water reform framework. The water pricing aspects of this framework are discussed in chapters 2 and 3. The framework also includes reforms to the system of entitlements to use water and to trade in these entitlements. These are:

- “4 In relation to water allocations or entitlements:
- (a) the State Government members of the Council, would implement comprehensive systems of water allocations and entitlements backed by separation of water property rights from land titles and clear specification of entitlements in terms of ownership, volume, reliability, transferability and, if appropriate, quality,
 - (b) where they have not already done so, States would give priority to formally determining allocations of entitlements of water, including allocations for the environment as a legitimate user of water,
 - (c) in allocating water to the environment, member governments would have regard to the work undertaken by ARMCANZ and the Australian and New Zealand Environment and Conservation Council (ANZECC) in this area,
 - (d) that the environmental requirements, wherever possible, will be determined on the best scientific information available and have regard to the inter-temporal and inter-spatial water needs required to maintain the health and viability of river systems and ground water basins. In cases where river systems have been over-allocated, or are deemed to be stressed, arrangements will be instituted and substantial progress made by 1998 to provide a better balance in water resource use including appropriate allocations to the environment in order to enhance/restore the health of river systems,
 - (e) in undertaking this work, jurisdictions would consider establishing environment contingency allocations which provide for a review of the allocations five years after they have been determined,
 - (f) where significant irrigation activity or dam construction is contemplated, appropriate assessments would be undertaken to, inter alia, allow natural resource managers to satisfy themselves that the environmental requirements of the river system would be adequately met before any harvesting of the water resource occurs”.⁷³

The aim of these recommendations is to encourage water use to generate the greatest sustainable benefit to the community as a whole. As part of this, recommendation 4(b) advocates formally determining an entitlement of water to the environment as a legitimate user of water.

Where a formal allocation to the environment has been established, an environmental manager would draw upon this allocation to change the pattern of river flows to benefit the environment. This allocation system is a marked change to the current system under which the DLWC includes environmental requirements in its release sharing decisions.

⁷³ Excerpt from attachment to the Communique issued following the 1994 Council of Australian Governments' meeting.

The implementation of such an approach is complex because it must integrate current release sharing arrangements, water quality and river flow objectives and the MDBC cap on extractions. Ultimately, these are matters to be decided by state governments in consultation with water users and other interested parties. At this time the Tribunal is not able to determine the likely cost consequences for the DLWC of making water available.

8.3.6 Trading in entitlements to water

The Tribunal has received a number of responses concerning trading in water entitlements. Within irrigator groups there is considerable diversity of attitude to, and practice of, water trading. The MIA Council of Horticultural Associations, for example, is a strong supporter of trading in water, advocating fewer restrictions,

“As far as water transfer (is concerned), our growers are big players in the transfer market. Our organisation acts as a broker in the market. We will transfer inter-valley and intra-valley this year up to 50,000 ML and we believe this is the way to a much more efficient use of water coming about. It is not being imposed from the top.

We would have to say that in the water transfer market we have been impeded by the fact that because it is new there are always, as we see it, impediments being put in place by the Department [of Land and Water Conservation] in particular and the [Murray Darling Basin Commission]. We believe all that needs freeing up so there can be proper, uncorrupted, free trading in water.”⁷⁴

However, the MIA Council and many other irrigator groups caution that the environmental and other impacts of trading in water need to be considered before transfers are made, particularly permanent transfers. Many irrigation areas and districts do not allow permanent transfers of water out of their area because this would erode the water base for their infrastructure and channels.⁷⁵

Many irrigators outside areas and districts echo these concerns that trading in water should proceed only after a detailed assessment of the impact of that trade on the river and surrounding landholdings.

If sufficient environmental, social and other constraints can be included in a planning and regulatory framework, there seems to be potential for trading in water to encourage the more efficient use of water. The MIA Council of Horticultural Associations says some of its members have installed tiled drainage, saving considerable amounts of water, and sold their surplus allocations to recover the costs of installing the drainage.⁷⁶

While more efficient water use should be encouraged, it is the aggregate water usage from this water “saving” that is of primary concern to the environment. Tiled drainage has the attractions of preventing waterlogging of land and improving yields per megalitre, but the true benefits are associated with reductions in the total water used.

⁷⁴ Hearing transcript volume 5, March 7, 1996, p 136.

⁷⁵ For example Coleambally Irrigation, hearing transcript volume 5, March 7, 1996, p 128.

⁷⁶ Hearing transcript volume 5, March 7, 1996, p 139.

Trading in water entitlements could increase the total water extracted where licences holders who do not use some or all of their allocation, temporarily transfer their annual allocation or permanently transfer their entitlement. Figures 8.1a and 8.1b give an indication of the scale of unused licensed entitlements. The reasons some licences are not fully used include:

- some entitlement holders meet a significant part of their water requirements from off-allocation water, allowing them to reserve any allocated water. This is particularly the case where irrigators have installed extensive on-farm storages
- some entitlement holders' farm soil types may not suit irrigation
- some river channels may not have the capacity to handle full allocations
- the licence may be in excess of the holder's needs, (this appears to be more common among country towns than rural landholders)
- the licence holder may not have the capital required to irrigate on the scale indicated by the entitlement
- the licence may be used only for drought proofing.

Where licences holders can freely trade their surplus entitlements, trading could increase total water usage and may increase pressures on the environment. Under present allocation procedures it will also reduce the long term expected allocation of all entitlement holders.

Table 8.3, drawn from the MDBC Water Audit, again shows of the potential for growth in total water usage. The table shows there is significant potential for growth in total water diverted within the current level of licensed entitlements.

Table 8.3 Limits to diversions imposed by the allocation system

River system	Limits to diversion imposed by the allocation system (GL)	Actual water diverted (GL)	Water diverted as a % of diversion limit (%)
Border Rivers	292	222	76
Gwydir	316	300	95
Namoi	387	248	64
Macquarie/Castlereagh/Bogan	823	471	57
Upper Darling	549	189	34
Lower Darling	255	213	84
Murrumbidgee	4268	2443	57
Murray	3362	2053	61
Total NSW	10252	6139	60

Source: Extract from Murray-Darling basin Ministerial Council, An Audit of Water Use in the Murray-Darling Basin, Table 2, p 87.

Table 8.3 reveals that local constraints on trading water nominated by water users need to be accompanied by state and basin-wide constraints. While trading in water entitlements has the potential to allow water to move to its most economically productive use, environmental and other constraints on this trade need to be built into comprehensive trading rules.

8.3.7 Using price to deal with external environmental effects

The Tribunal has received a wide variety of views on the effectiveness of using price measures alone to deal with the external effects of water use. The Australian Conservation Foundation (ACF) argues that providing water at less than the full economic cost has distorted investment and water consumption decisions, creating unsustainable use of water.⁷⁷ The ACF holds that charging full economic costs, including a rate of return on assets, will encourage water to be used more efficiently and promote rationalisation of irrigation industries.⁷⁸ By contrast, irrigator groups argue that water pricing will not be effective in improving environmental impacts.⁷⁹

One of the central themes of this report is the Tribunal's view that water charges should be forward looking. Water charges should not recover sunk infrastructure costs, but should seek to recover an appropriate share of the full economic costs of making water available, including the full external environmental costs of water abstraction. Environmental costs are likely to be the most significant growth area in the DLWC's expenditure.

This requires DLWC to link specific environmental problems to specific water users wherever possible and to recover these costs from them. Where this linkage can be found, but cannot be made more specific than, for example, a whole catchment, levies may be an appropriate way of funding environmental works in that catchment. Where no linkages can be made, a beneficiaries approach should be applied.

8.4 The costs of management options

This section presents some examples of the types of activity that are often used to achieve environmental benefits and the costs of these activities. The information is presented here as a reference for further submissions to the Tribunal on the costs of environmental improvements and to elicit comment on the reasonableness of these estimates.

8.4.1 Water monitoring programs

To manage water effectively it is vital that the DLWC understand the present condition of available water resources and the impact of water use on these resources. Monitoring programs can be time consuming and expensive, but they are essential for sustainable management. Tables 8.4 and 8.5, prepared by the former Office of Water, identify deficiencies in understanding the condition of existing water resources and the usefulness of this data for management and analysis.

⁷⁷ Australian Conservation Foundation, Submission, January 1996, pp 8-16.

⁷⁸ Op cit, p 25 and 35.

⁷⁹ See for example the Irrigators' Council submission, p 4 and pp 18-22.

Table 8.4 Nature, cost, coverage and integrity of water resource data

Parameter	Nature of parameter	Ease and cost of collection	Data coverage	Integrity of data
Quantity	This is a single parameter that measures flow rate at a given time and location. It will be highly variable because of the unpredictable nature of weather which drives the system	Relatively easy and economical to collect, store and analyse.	Good at state level Adequate at regional level Ranges from none to good at local level <i>This data set is the best of the three.</i>	Data integrity ranges widely over the state. Data integrity has continued to increase over time, but as costs have gone up, coverage has had to be curtailed.
Physico-Chemical Quality (indicating the degree of contamination of water)	This is a series of simple parameters describing the physical & chemical characteristics of water.	Good data sets are costly. The relative ease and cost of collecting, storing and analyse this data varies greatly with the parameter. In general, the development of a baseline monitoring data set is time consuming and expensive.	Poor to fair at the state level. Non-existent to adequate at the regional level. Ranges from none to good at the local level. <i>Only recently has this data set been collected systematically. It is not as good as the quantity set.</i>	The integrity of the data varies widely and depends on the available budget, sampling protocols used and the sophistication of the analysis.
Biological Health	This parameter is not easy to measure or describe. Often the health of a waterway is measured in terms of key biological indicator species. The presence or absence of these is used to measure the water's ability to maintain a diverse ecosystem.	A comprehensive database is expensive and time consuming to establish. It needs to be constantly monitored as its health can change dramatically in a short time. Certain aspects can be correlated back to quantity and quality parameters.	In general, data coverage is poor and collected only recently. <i>This data set is the poorest of the three. Good experimental design and the use of appropriate indicator organisms will accelerate its reaching its critical thresholds.</i>	The integrity of the data is highly dependent on the experimental design, the collection protocols used, and the testing procedure adopted.

Source: Policy papers prepared by the former Office of Water for the Water Council of Chief Executive Officers, March 1995.

Table 8.5 Availability and integrity of water resource data for management and analysis

Spatial aggregation	Assessment purpose			
	Determining health of and stress on waterways	Assessing environmental flow needs	Determining the degree of resource utilisation	Identifying new development & redevelopment opportunities
State wide	Poor to fair	Poor	Fair	Good
Regional catchments	Non-existent to fair	Poor	Adequate	Fair
Sub-catchments for local management projects	Usually none unless data is generated for another purpose.	None to poor	Poor unless an extensive program of local monitoring has been implemented and correlated to national grid.	Poor unless supplemented.

The Tribunal understands that the DLWC's 1995/96 water monitoring budget for all NSW surface water supplies is \$4.5 million, and a further \$2.25 million for groundwater sources.⁸⁰ This is a surprisingly small amount given the extent of deficiencies in knowledge of the resource.

⁸⁰ Advice from Parramatta office of DLWC.

By comparison, Sydney Water Corporation spent \$5 million over three to four years to develop a comprehensive model of water quality in the Hawkesbury-Nepean River alone,⁸¹ and Murray Irrigation Limited spends \$500,000 per annum monitoring its irrigation area to comply with its operating licences.⁸²

Recommendation 8.5

The Tribunal recommends that the DLWC develop a detailed, costed proposal for an expanded resource monitoring program. The program should prioritise and separately cost proposed monitoring by water source and by region, catchment or sub-catchment where appropriate. The program should include the methods proposed to collect the monitoring data and detail who would carry out this work.

8.4.2 Riverside land management

The condition and management of the land immediately adjoining a river, the riparian zone, can significantly affect water quality in that river. Protecting and restoring vegetation on this land, especially native vegetation, creates a buffer zone along the river bank which can produce significant environmental benefits.

The restored vegetation stabilises the river banks, avoiding bank slump and the consequent mobilisation of sediment and phosphorus. Fencing this buffer zone further improves water quality, particularly where cattle and other livestock would otherwise have direct access to the river. Protecting native species in this buffer zone will help to preserve biodiversity within the river.

The main costs of creating such buffer zones are purchasing (or compensating where restrictions are placed on use of this land), fencing, revegetating, weeding and maintaining the land.

8.4.3 Other management options

The DLWC's submission refers to the installation of variable off-take towers in its major water storages. Variable off-take towers are used to improve the quality of water release from dams. The water outlet from a dam is at the base of the wall and so, without off-take towers the water released is from the deepest strata of the dam water. This water is typically the poorest quality in the dam, being cold, low in oxygen and high in phosphorus. The cold, de-oxygenated water harms fish populations and the high phosphorus content may promote algal blooms downstream. Variable off-take towers draw water from different depths within the dam, diluting the effect of the poorer quality water.

The estimated cost per tower presented to the Tribunal varies from \$1 million to over \$20 million. While variations in costs could be attributable to whether the dam was dry or full, and the size of the water storage and tower, the Tribunal feels certain that sharper estimates of the range of possible costs should be possible.

Some fish species migrate up rivers to breed. Dams and weirs stop this migration and disturb breeding cycles. Fish ladders allow fish to pass weirs by a variety of means which allow them to swim "uphill". The costs of fish ladders is site specific, depending on construction requirements, size of the weir and the condition of the existing structure. The

⁸¹ Telephone advice from Sydney Water Corporation.
⁸² Hearing transcript volume 7, March 14, 1996, p 233.

Tribunal understands that the costs of fish-ways can range from simple rock-ramps at a costs of \$30,000 to \$70,000 to more elaborate structures costing up to \$750,000.

The Tribunal understands the DLWC is currently reviewing the condition of all its weirs and is participating in the State Fish-Ways Project.

8.5 Selecting and implementing management options

A consistent theme throughout the Tribunal's inquiry process was the benefit of consulting with the water users and other interested parties when selecting resource management options. However, the effectiveness of community input into planning processes will depend on making information accessible to the public and providing well resourced channels to coordinate community input.

Management of water resources will have its greatest impact where landholders, water users and the general community develop a sense of ownership of the various problems and develop options for their respective solutions. Unstructured and under-resourced community consultation runs the risk of overwhelming water users and community representatives with invitations to participate in consultative processes without the benefit of the comprehensive information required to make informed comment.

Where water users are to be asked to contribute to the costs of remedial environmental works, the need to provide for effective community input becomes even more critical. While institutions such as Catchment Management Committees and River Management Boards exist to assist community input, the predominant feedback to the Tribunal is that the impact of these organisations on the DLWC's planning process is limited.⁸³ When the NSW government sets water quality and river flow objectives, Catchment Management Committees will design catchment plans to meet these objectives and the DLWC will implement these plans. The views presented to the Tribunal during its hearings suggest that Catchment Management Committees may need considerably more funding and authority to perform this role well. The Tribunal notes that there is currently a review of Catchment Management Committees and awaits the result of this review.

8.6 Conclusion

The level and pattern of current and past water use has produced some serious environmental consequences. The extent of environmental degradation is not well understood and requires a much deeper understanding of the resource. Similarly, the costs associated with rectifying environmental damage are not well understood. In fact, it is doubtful that all environmental costs can be known with certainty, since some aspects of environmental degradation become apparent only over a long time scale.

Given these uncertainties, it is the Tribunal's view that the first step to dealing with this issue is to improve our knowledge of the resource. Greater knowledge will help identify many of the more serious environmental problems which, in turn, will inform the development of management options and techniques to address these problems.

⁸³ See for example the views of the Murrumbidgee River Management Board, hearing transcript, volume number 5, March 7, 1996, p 152 and generally, and the far South Coast Catchment Management Committee, hearing transcript volume 6, March 13, 1996, p228.

The Tribunal notes that non-price measures and management options are likely to provide a more appropriate response to many environmental issues than the use of price mechanisms alone. Important among these non-price measures are the NSW government's water quality and river flow objectives.

8.7 Summary of recommendations

Recommendation 8.1

The Tribunal recommends that the DLWC work cooperatively with water users to improve its monitoring of extractions from unregulated rivers. Improved metering of extractions is one way in which this could be achieved.

Recommendation 8.2

The DLWC should provide the Tribunal with an assessment of unregulated rivers, including which unregulated rivers should have metered water usage, how the DLWC proposes to meter this usage, and the costs of this metering.

Recommendation 8.3

The Tribunal recommends that the DLWC work cooperatively with water users to improve monitoring of extractions from groundwater sources. Improved metering of extractions is one way in which this might be achieved.

Recommendation 8.4

The DLWC should provide the Tribunal with an assessment of the groundwater use which it considers should be metered, how it would propose to meter this usage and the costs of this metering.

Recommendation 8.5

The Tribunal recommends that the DLWC develop a detailed, costed proposal for an expanded resource monitoring program. The program should prioritise and separately cost proposed monitoring by water source and by region, catchment or sub-catchment where appropriate. The program should include the methods proposed to collect the monitoring data and detail who would carry out this work.

9 IMPACTS OF REFORM ON IRRIGATED AGRICULTURE

The Tribunal's pricing principles for bulk water services are likely to raise water charges from their current levels. Chapter 10 gives indicative increases in water charges for the Barwon and Murrumbidgee regions. Increased water charges are likely to affect farm and industry profitability.

The Tribunal is not responsible for deciding how much water should be available for extractive water use. However, the Tribunal must consider the impact on water users of increases in water charges in the context of other changes, especially reductions in the availability of water.

The Murray Darling Basin Commission's cap on water extraction and the NSW government's water quality and river flow objectives will reduce the amount of water available for extractive water use in some regions. The impact of increased water charges should be assessed in the context of possible reductions in the amount of water available.

Increased water charges could lead to some adjustments at the farm level. The effect of reforms at an individual farm level and at regional level must be studied. Transitional arrangements may be required to lessen the impact of some changes. The Tribunal has asked the DLWC to study the impacts at the farm level of increasing water charges and restrictions in access to water.

The specific economic models needed for this task have not been developed by the DLWC before and it will be some time before enough information can be collected on the operating costs and profitability of representative farms.

The aim of this chapter is to describe the type of economic modelling the DLWC should develop to study the impact of increased water on farm profitability.

This chapter discusses:

- 9.1 The potential impacts of reforms**
- 9.2 The DLWC's Catchment Economic Impact Model**
- 9.3 Individual farm data for water cost**
- 9.4 A recommended modelling approach**

The recommendation at the end of this chapter relates to how the impact of the Tribunal's pricing principles should be assessed. This will be used to determine whether any transitional measures are needed to smooth the impacts of any increases in water charges.

9.1 The potential impacts of reform

The impacts of changes to water charges will depend on levels and patterns of use. In order to measure these impacts the DLWC needs to be able to quantify the financial sensitivity of water users to increases in charges.

In the case of irrigators, increased water charges will increase farm operating expenses. If a 'two part' water charge is adopted, the fixed access charge will affect the farms' fixed costs and the usage charge will affect the farms' variable costs. Increases could have flow on effects to net cash surpluses, ability to repay debt and longer term farm viability. The Tribunal considers it important to identify the likely behaviour of farmers in terms of their decisions regarding land use, investments, water consumption and trading in entitlements and their viability.

Irrigated agriculture in NSW differs greatly between regions in terms of enterprise mix, climate, land use, water use, geology and topography. Water charges also vary considerably between and within regions. Consequently, a disaggregated modelling framework will produce more meaningful results.

The main objective of modelling the effect of increased water charges should be to measure farms' ability to remain profitable and withstand other pressures on their profitability from, for example, falls in commodity prices. To reflect the true financial position of the farms, the structure of farm equity and debt have to be taken into account. Changes in water charges and allocations are likely to influence the pattern and level of water usage for irrigation. It is important to examine the implications for managing existing water resources, the availability of alternative sources of water, and investment in water saving technologies.

Farms may require time to adjust to higher water charges. It is important that a long term horizon be structured in the modelling to allow for these adjustments to take place.

9.2 The DLWC's Catchment Economic Impact Model

The Tribunal has asked the DLWC to study the impacts on farms of a range of hypothetical increases in (a) water charges and (b) restrictions on access to water.

The DLWC does not have a specific economic model or the data required to model the impacts of water charges and water allocations at the farm level in this way. However the DLWC does have a Catchment Economic Impact Model (CEIM) developed to model the aggregate effect of hypothetical river flow objectives on each region. This model measures the effect of restricting access to water on the gross margin of a region. This is a measure of the total revenue less the variable costs of farm production in a region. To predict aggregate regional impacts the model treats the whole region as one large farm. It is not designed to predict the impact on individual farms.

The DLWC model compared predicted impacts on the Murrumbidgee Irrigation Area (MIA) and the Gwydir region. These two areas were chosen as being representative of 'southern' and 'northern' regions. There are fundamental differences between southern and northern regions. Irrigators in southern regions tend to receive larger allocations of water each season than those in the north. Water use is substantially more intensive in southern regions, where rice is the main irrigated crop. The major irrigated cropping enterprise in the north, cotton, is much less water intensive.

The DLWC used the model to consider the effects on the regional gross margin of increasing water charges, changes in water allocation and combined changes in water charges and allocation, given the existing land and labour constraints in both regions.

The model predicted results for a one year period. Overall, the anticipated impact of increased water charges and reduced access to water depends on the relative importance of the water for irrigation in the region considered. The model predicts that changes to both water charges and allocations would show notable impacts in both the MIA and the Gwydir. Both regions are likely to be more responsive to water allocation changes than to water charge increases.

The impact of increased water charges is likely to be more significant on the gross regional income from irrigation in the MIA than in the Gwydir. The model predicts that increases⁸⁴ in water charge would reduce gross regional income by 4.1% in the MIA and 1.7% in the Gwydir.

The impact of restricting water allocations⁸⁵ is considerably greater in both regions. The model predicts that restricting water allocations to 75% less than the average water usage reduces the gross regional margin from irrigation by 33% in the MIA and 58% in the Gwydir. These results indicate that the availability of water is a more important factor for irrigated agriculture in both regions. The greater impact of changes in water availability in the Gwydir might be explained by the lack of alternative water resources and the already low water allocation to that region.

While gross regional margins are a useful indicator of aggregate effects, they are not suitable for modelling the impact of water charges on farms' profitability. Therefore, it is important that the DLWC's modelling be able to estimate the profitability and viability of farms from the likely prospects of rising water charges and restrictions on water availability. This means that representative farms' likely responses and reactions in the short to medium term should be identified. To do this the DLWC needs to collect information on individual farms' physical and financial positions.

9.3 Individual farm data for water cost

The impact of changes in water charges on farms' production decisions depends on the extent to which water is used. Therefore it is important to consider water costs as a proportion of total variable costs.

The DLWC will take some time to gather sufficient information to build representative farm models. However, the Tribunal has been provided with some information which provides some indication of the proportion of water costs to other farm operating expenses. Available data is presented in the following sub-sections.

⁸⁴ The full range of water charge increases used in the study includes \$13.00/ML to \$16.54/ML in the MIA (this includes water charges within the MIA), and \$2.52/ML to \$7.22/ML in the Gwydir.

⁸⁵ Water allocation changes incorporated in the study were taken directly from figures simulated by the DLWC Hydrology Unit model for the MIA and Gwydir under different river flow objectives. The average water allocation used was determined from 100 years of simulated water diversions based on weather conditions from 1892 to 1992. The full range of water allocation changes considered in the study includes a maximum allocation 25% greater than the average allocation to a minimum allocation 75% less than the average allocation.

9.3.1 Gwydir region

The DLWC has provided some financial information from its data sources of costs incurred by a large cotton grower in the Gwydir region in 1994/95. These costs, shown in Table 9.1 as percentages, are considered to be representative of the region.

Table 9.1 Proportions of variable costs of cotton production in the Gwydir region

Variable Costs	Percentage
Cartage	6.6%
Chemicals	36.1%
Chipping	4.6%
Consultants	2.7%
Contract Picking	7.8%
Contract Sowing	3.1%
Sundries	0.7%
Electricity	0.9%
Fertiliser	9.7%
Fuel and Oil	6.8%
Plant Hire	0.9%
Seed	2.6%
Water	5.5%
Repairs and Maintenance	12.1%
Total variable cost	100.0%

Source: DLWC, Project Services Research, July 1996

The costs associated with water are quoted as being 5.5% of total variable costs. This suggests that increases in the charge for water are unlikely to have a major impact on total costs for this type of enterprise.

9.3.2 Murrumbidgee Irrigation Area

Information from the Ricegrowers Association of Australia on the variable costs of a typical rice farm in the Murrumbidgee Irrigation Area (MIA) is presented in Table 9.2. The proportion of water costs is based on a typical MIA farm with an allocation of 1400 ML and actual usage of 1300 ML. Since rice is a high water usage crop, and water costs include irrigation scheme costs as well as bulk water charges imposed by the DLWC, it is not surprising to see that the proportion of water costs is 27% of total variable costs.

Table 9.2 Proportions of variable costs of rice production in the MIA

Variable costs	Percentage
Seed	3.5%
Fertiliser	16.4%
Herbicides/Insecticides	12.0%
Water	27.1%
Machinery operations	41.1%
Total variable cost	100.0%

Source: Ricegrowers Association of Australia

The above information indicates significant differences in the contribution of water cost to farms' total variable costs for two major irrigated cropping enterprises in the Gwydir and MIA.

9.4 A recommended modelling approach

The DLWC does not have sufficient information or economic models to estimate the impact of increased water charges on individual representative farms. The CEIM measures the impacts of changes at a regional level. However it is possible that changes in water charges may have a relatively minor impact at an aggregate/regional level, but have quite a major impact on individual farms in certain sectors.

It is therefore critical that the DLWC be able to:

- indicate the relative importance of water to total farm costs for various enterprises and regions
- quantify the sensitivity of different land uses to changes in water charge and water volumes
- estimate the impact of increasing water charges on the viability and profitability of farms which may be subject to restrictions in water availability

Farm enterprises and regions will be affected by increased water charges in different ways. Many water users will make structural adjustments as a result of changes in water charges and allocations. During the implementation of these changes, it is important that the DLWC be able to anticipate the likely responses and behaviour of farms over the short term, medium term and long term. If the DLWC is able to identify any potential problems, transitional arrangements should be developed to alleviate these.

Recommendation 9.1

The DLWC should develop a modelling framework and gather information to model the impact of changing water charges on individual farms. The modelling framework should include the following features:

- 1. A representative farm approach**
 - **model each region using a number of representative farm types**
 - **allow for differences in the technology and production coefficients of different farm types, and important variables that reflect different levels of management**
 - **minimise aggregation bias by developing disaggregated regional representative farm models.**

- 2. A time dimension which considers adjustment options over the medium term, and viability over the long term.**

- 3. Profitability: defined to reflect net cash surplus after tax. This should take into account**
 - **all farm income generating activities including interests earned from off-farm investments**
 - **all farm production costs, variable and fixed**
 - **the treatment of taxation**
 - **repayments of debts.**

- 4. Land, labour and water resources, specifically**
 - **land classes**
 - **different soil types**
 - **land categories**
 - **salinity classes**
 - **sources of water**
 - **water entitlements**
 - **access to off allocation water**
 - **ground and reuse water**
 - **the purchase of temporary and permanent water entitlements**
 - **ability to purchase additional labour as required.**

- 5. Investments, specifically**
 - **on farm investments**
 - **additional land**
 - **on farm storage of water**
 - **pumping facilities to make use of groundwater**
 - **water reuse system**
 - **off farm investments**

10 SCENARIO ANALYSIS

The Tribunal's intention in this interim report is to provide an indication of the future direction of bulk water charges in NSW. In order to do this properly, the Tribunal needs to understand the DLWC's cost structure and level of cost recovery. The DLWC needs to gather this information and present it to the Tribunal in its price proposal in December 1996.

For the purposes of this interim report the only information available to the Tribunal on the DLWC's costs is the 1994/95 budget of the former Department of Water Resources (DWR) amounting to \$118m, as shown in Table 4.2 in chapter 4. In its price proposal, the DLWC needs to replace this costs information with detailed estimates of future expenditure to sustainably manage water resources and to maintain or renew the infrastructure assets used to deliver bulk water.

Water charges should reflect the efficient costs incurred in delivering water at a regional level. As explained in chapter 5, the costs recovered should be the full economic costs involved in providing bulk water services. While awaiting 'hard' cost data on which to base its analysis, the Tribunal has carried out a scenario analysis to provide some guide to future water prices.

The range of possible water charges calculated in this chapter are indications of where future water charges may go, depending on a series of assumption. These scenarios are presented to help those making submissions to this interim report understand:

- how the Tribunal's interim cost sharing pricing principles operate
- the factors likely to determine water charges in the future
- the importance of achieving efficiency improvements within the DLWC.

This chapter discusses:

- 10.1 Approach taken to generate scenarios**
- 10.2 Scenario details**
- 10.3 Infrastructure renewals and maintenance**
- 10.4 Results of scenarios**
- 10.5 Comparison with interstate prices**

The recommendation made in this chapter relates to pricing principle 1.

Pricing Principle 1

Water charges should be based on the most efficient way of providing water services.

10.1 Approach taken to generate scenarios

For this interim report the Tribunal has developed scenarios for water charges on regulated rivers in the Barwon and Murrumbidgee regions. The bulk of the DLWC's costs are incurred on regulated rivers and the Barwon and Murrumbidgee regions were chosen as

being representative of the 'northern' climatic zone, in which there is considered to be a relative shortage of water, and the 'southern' climatic zone respectively. The Tribunal has limited the scenarios to two regions because the DLWC's costs information requires much refinement before it can be used as a starting point.

The Tribunal has asked the DLWC to produce similar scenarios in its January 1997 price proposal for:

- water users on regulated rivers in regions other than the Barwon and Murrumbidgee
- water users on unregulated rivers in all regions
- groundwater users in all regions
- urban water authorities in all regions.

The current cost structures for the Barwon and the Murrumbidgee, as shown in Table 7.3, are merely a starting point for projecting future charges. The Tribunal will need to assess the efficiency with which costs are recovered in these regions too. Chapters 3 and 5 raised the issue of efficient costs in relation to transparency and accountability. In projecting costs, the Tribunal has assumed that the DLWC is able to substantially improve the efficiency with which it carries out its activities in the regions studied.

Recommendation 10.1

The Tribunal recommends that the DLWC publish its proposed efficiency improvements on a regional basis. The DLWC should establish regional efficiency benchmarks to enable performance to be monitored.

As discussed in chapter 5, the DWR's budget for 1994/95 is based on *accounting* costs. In the scenario analysis the Tribunal has sought to use *economic* costs by adopting a renewals approach to infrastructure as well as by taking into account the impact of external costs.

The scenarios were evaluated separately for 'regional' costs only, and regional plus non regional or 'central' costs. Non regional costs were allocated to the two regions in proportion to each region's total budget as determined by the DLWC for 1994/95. Rates of return on capital have not been included because the scenarios assume that no new infrastructure is to be built in either region at this stage.

10.2 Scenario details

To evaluate implications for average water charges, projections from 1995/96 to 2000/2001 have been made on the basis of three different cost escalation scenarios. Table 10.1 details the users' share of regional and non regional costs recovered under each scenario, as well as the annual escalation applied under each scenario for each of the various cost categories.

The scenario structures were chosen by making assumptions regarding efficiencies, externalities and costs to show the sensitivity of water prices to each component. It is stressed that the scenarios are hypothetical, and are intended to provide only an indication of the sensitivity of future water charge movements to improvements in efficiency, changes in the cost of externalities, and the recovery of costs. There is insufficient information available from the DLWC to accurately quantify those areas at present.

As detailed below, the first scenario is based on CPI increases only. It is a background case, assuming nothing else changes. It can be thought of as the 'steady state' case.

The second scenario is based on large improvements in efficiency, again with no increases in activity.

The third scenario combines fewer efficiency improvements than the second scenario, but greatly increased activity and costs due to resource management measures. This estimate of costs for additional work is not based on specific work programs of the DLWC, but is included to demonstrate the relative sensitivity of prices to movements in costs in areas such as resource management where the DLWC claims additional work is required.

The Tribunal feels that the most likely outcome will be a combination of scenarios 2 and 3, reflecting efficiency improvements and increased costs due to externalities.

Table 10.1 Users' Share of Costs and Scenario Details

Function	Users' Share of Costs		Cost Escalation Scenarios								
	Regional	Non Regional	1			2			3		
			CPI only	Efficiency	Growth	Including CPI	Efficiency	Growth	Including CPI		
Resource management and environmental maintenance											
- planning	50%	30%	3%	-8%	1%	-4%	-5%	25%	23%		
- evaluation	50%	30%	3%	-8%	1%	-4%	-5%	25%	23%		
Renewal and maintenance of infrastructure assets	70%	30%	3%	-8%	2%	-3%	-5%	2%	0%		
Replacement of other assets	70%		3%			3%			3%		
Administration	70%		3%	-8%	1%	-4%	-5%	1%	-1%		
Licensing (direct recovery)	100%		3%	-8%	2%	-3%	-5%	2%	0%		
Operations											
- running the rivers	70%	30%	3%	-8%		-5%	-5%		-2%		
- metering	100%	30%	3%	-8%	1%	-4%	-5%	1%	-1%		

Scenario 1: steady state

This scenario assumes continuation of the status quo. It allows for all the DLWC's costs to escalate on the basis of inflation only. Inflation has been assumed to remain constant at 3% until 2000/2001. The same inflationary expectation has been built into the other two scenarios.

Scenario 2: efficiency

The primary focus in the second scenario is substantial efficiency improvements within the DLWC. In most areas it has been assumed that an 8% annual improvement in efficiency is achievable every year to 2000/2001. This figure is intended to give some indication of potential efficiency gains. Murray Irrigation, for example, has claimed it was able to achieve workplace efficiency gains of 30% to 40% after privatising its irrigation area, which used to be controlled by the DLWC.⁸⁶

⁸⁶ George Warne, General Manager, Murray Irrigation Limited, hearing transcript volume 7, March 14, 1996, pp 237 & 238.

It is likely that the DLWC will increase its expenditure in the resource management area in order to internalise at least some of the external costs arising from environmental impact management. To the extent that these externalities can be addressed through the non price measures discussed in chapter 8, and their costs can be met by local communities, the DLWC's expenditure will be reduced. However, to allow for some increase in resource management, expenditure has been assumed to grow by 1% per annum.

Licensing costs have been excluded from the analysis because they are expected to be fully recovered from licensees. However, they are shown in the table for completeness, with expected efficiency improvements of 8% and growth in expenditure of 2% due to an expected increase in surveillance and compliance monitoring.

Efficiency improvements of 8% are assumed in maintenance. As the focus shifts away from new infrastructure development, it is likely that the DLWC will develop better asset management programs. Expenditure on maintaining current assets may increase. Consequently, annual growth of 2% has been factored in.

Efficiency improvements of 8% are also expected in the 'operations' functions of running the rivers and metering. An expected increase in surveillance and compliance monitoring may lead to increased metering costs. Hence, growth in metering expenses of 1% has been allowed for.

Scenario 3: externalities

The focus in this scenario is on greatly increased resource management and environmental maintenance costs due to externalities. Unlike the 'efficiency' scenario, it is assumed here that the role of the DLWC in managing resources and carrying out remedial environmental maintenance is not diminished by the efforts of local communities. Accordingly, the DLWC bears a much larger proportion of the expenses, which are assumed to increase by 25% each year.

This figure has been chosen simply on the basis that it represents a 'significant' increase in resource management and environmental maintenance costs. In its main submission, the DLWC has advised that it has already experienced increased demand ranging from 13% to 335%⁸⁷ for some of its water management activities.

Efficiency gains have been reduced to 5% per year in scenario 3. Escalation in other areas is assumed to be the same as in the 'efficiency' scenario.

10.3 Infrastructure renewals and maintenance

The Tribunal recently received a copy of the DLWC's draft 'Asset Maintenance Strategic Plan 1997/98' which contains 10 year projections for maintenance expenditure. The DLWC has indicated that there is unlikely to be any need for additional infrastructure on regulated rivers during this period, apart from flood security related spillway upgrades which will not be charged to regulated river users.

⁸⁷ Submission DLWC, 7 July 1996, p B36.

For the scenario analysis the infrastructure renewals and maintenance amount for each region have been determined by averaging the 10 year total amounts quoted in the Asset Maintenance Strategic Plan.

It should be noted that variations in the infrastructure renewal and maintenance amounts could affect the scenario outcomes significantly.

10.4 Results of scenarios

Tables 10.2a and 10.2b present the results of the scenario analyses for the Barwon and the Murrumbidgee respectively. The first column in each table lists the three scenarios considered, as detailed in Table 10.1.

The second column shows the **effective water charge per ML** in 1995/96 for an entitlement of 1,000 ML. Based on annual usage between 1989/90 to 1994/95 it has been assumed that in the Barwon on average only 50% of this entitlement is diverted. In the Murrumbidgee 100% diversion has been assumed.

The third column presents the **effective water charge per ML** of average supply required to recover all of the users' share of costs as projected to 2000/2001 for each scenario (when non regional costs are excluded). The effective water charge per ML for each region is obtained by dividing the total revenue required by the average supply. In the Barwon, average supply has been assumed to be 50% of the region's total entitlement of 1,106,000 ML. The Murrumbidgee's average supply has been assumed to be 100% of the total regional entitlement of 2,399,000 ML.

The fourth column shows the implied annual percentage increase per ML required to achieve full cost recovery over the four years from 1997/98 to 2000/2001.

The last two columns present the corresponding amounts when non regional costs are included. In the Barwon, for example, in order to recover all of the water users' share of costs (including non regional costs) in the year 2000/2001, the average water charge required per ML of water supplied ranges from \$8.84 to \$13.77. This implies annual increases ranging from 0.4% to 12.2% (depending on the scenario) compared to the charge shown for 1995/96.

Table 10.2a Barwon region - Summary of Scenario Analysis Results

Scenario	Effective Water Charge (\$/ML) for 1,000 ML entitled and 50% diverted in 1995/96 (b)	Projected Water Charge per ML of Average Supply (a) for Recovery of Users' Share of Costs			
		Excluding Non Regional Costs		Including Non Regional Costs	
		2000/2001 (\$/ML)	% Increase per year (c)	2000/2001 (\$/ML)	% Increase per year (c)
1. 'Steady State'	8.70	11.33	6.8%	12.33	9.1%
2. 'Efficiency'	8.70	8.14	-1.6%	8.84	0.4%
3. 'Externalities'	8.70	11.62	7.5%	13.77	12.2%

(a) Average supply in the Barwon assumed to be 50% of entitlement.

(b) See Table 7.2.

(c) Over 4 years from 1997/98 to 2000/2001.

Table 10.2b Murrumbidgee region - Summary of Scenario Analysis Results

Scenario	Effective Water Charge (\$/ML) for 1,000 ML entitled and 100% diverted in 1995/96 (b)	Projected Water Charge per ML of Average Supply for (a) Recovery of Users' Share of Costs			
		Excluding Non Regional Costs		Including Non Regional Costs	
		2000/2001 (\$/ML)	% Increase per year (c)	2000/2001 (\$/ML)	% Increase per year (c)
1. 'Steady State'	2.83	2.85	0.2%	3.13	2.5%
2. 'Efficiency'	2.83	2.05	-7.8%	2.24	-5.7%
3. 'Externalities'	2.83	3.61	6.2%	4.17	10.2%

(a) Average supply in the Murrumbidgee assumed to be 100% of entitlement.

(b) See Table 7.2.

(c) Over 4 years from 1997/98 to 2000/2001.

Given the cost estimates that have been made, the escalation assumptions of the scenarios, and the water users' share of costs adopted, a comparison of the outcomes for the Barwon and the Murrumbidgee shows that Scenario 1 'steady state', - maintenance of the status quo while allowing for escalation in costs due to inflation only - can be taken as the 'base' case. Scenario 2, 'efficiency', which focuses on efficiency improvements becomes an indication of the lower bound and Scenario 3 'externalities', which factors in the cost of externalities indicates an upper extent for the amount of revenue to be recovered from users.

If considerable efficiency improvements are possible within the DLWC and water users are effective in reducing the impact of their water use on the environment, a scenario 2 type of outcome is more likely. If, on the other hand, there is less scope for efficiency improvements within the DLWC and it must deal with growing resource management and environmental problems due to the external environmental costs of water use, an outcome akin to scenario 3 is more likely.

The Tribunal will scrutinise the DLWC's business processes and set performance standards for its activities. The DLWC will be accountable to the Tribunal, water users and local communities for the efficiency with which it completes its activities. The Tribunal will insist that the DLWC improve its cost reporting system to enable this scrutiny to occur.

The prices per ML quoted in Tables 10.2a and 10.2b are 'average' amounts based on the average supply to each region in recent years. The corresponding price per ML of water will depend on the manner in which actual, two part charges are divided between an access charge and a usage charge.

The Tribunal seeks further submissions on how water charges should be structured in each region and how these structures may be determined at a regional level.

The Tribunal does not intend to retain the DLWC's water resource management charge in its current form, but to absorb it into other water charges. The equivalent price component will be based as much as possible on costs within each region.

Bearing in mind the assumptions made in this scenario analysis, a comparison of the water charges per ML in 1995/96 with the scenario projections (particularly the steady state case of scenario 1) indicates that total costs are under recovered in the Barwon region. If full recovery of the water users' share of the cost structure is to be achieved by 2000/2001, indications are that charges for water services will have to increase in the Barwon region. In the Murrumbidgee, however, it appears that substantial recovery of the costs considered here is already occurring, and increases in water charges may be relatively lower.

In both cases it is clear from scenario 3 that increased resource management and environmental maintenance expenditure by the DLWC will place upward pressure on prices. Scenario 2 shows that increased efficiency can contribute significantly to mitigating this upward pressure.

10.5 Comparison with interstate prices

Charges for water services in New South Wales, Queensland, South Australia and Victoria are all based on varying levels of cost recovery, regional factors and other criteria unique to each state. Consequently, any conclusions drawn from interstate price comparisons can be only of a very broad nature. Bearing in mind this strong qualification, Tables 10.3 and 10.4 have been assembled to provide some idea of comparable charges for water in the other states. Also shown in the lower part of each table are possible prices in 2000/2001 based on the scenario analysis for NSW compared with CPI escalation for the other states.

Table 10.3 Comparison of Interstate Water Charges - Southern States

South Australia	Victoria	New South Wales
Current Charges		
\$3.00 /ML ¹ catchment environment levy for irrigators on the Murray.	\$5.66 /ML ² average charge for existing agricultural customer groups in the Murray system. (\$15.89 ² , new agricultural customers - 2-3% of users)	\$2.49 /ML ³ Murray region for 1,000 ML entitled and 100% diverted. \$2.83 /ML ³ Murrumbidgee region for 1,000 ML entitled and 100% diverted.
Estimated Charges - 2000/2001		
\$3.37 /ML (escalated @ CPI of 3% per annum)	\$6.37 /ML (escalated @ CPI of 3% per annum)	\$3.13 /ML - Scenario 1 \$2.24 /ML - Scenario 2 \$4.17 /ML - Scenario 3 Murrumbidgee region (100% diversion of entitlement)

Sources

1. Media Release of 5 June 1996 re River Murray irrigation levy, Minister for the Environment and Natural Resources, South Australia.
2. Discussion Paper, 'Bulk Water Charges for Interstate Trade', Water Bureau, Department of Natural Resources and Environment, Victoria.
3. See Table 7.2. (Includes one-off rebate of \$0.10 / ML diverted in Murray region only.)

Table 10.4 Comparison of Interstate Water Charges - North

New South Wales	Queensland
Current Charges	
\$8.70 ML Barwon region - except Border Rivers, for 1,000 ML entitled and 50% diverted	
\$18.10 ML ¹ Barwon region - Border Rivers for 1,000 ML entitled and 50% diverted	\$9.90 /ML ² Dumaresq region
Estimated Charges - 2000/2001	
\$12.33 /ML - Scenario 1 \$8.84 /ML - Scenario 2 \$13.77 /ML - Scenario 3 Barwon region - except Border Rivers (50% diversion of entitlement)	
\$22.91 /ML - Scenario 1 \$19.42 /ML - Scenario 2 \$24.35 /ML - Scenario 3 Barwon region - Border Rivers (Pindari Dam Levy escalated @ CPI of 3% per annum)	\$11.14 /ML Dumaresq region (escalated @ CPI of 3% per annum)

Sources

1. Table 7.2, includes Pindari Dam Levy of \$9.40 /ML diverted.
2. Water Resources (Rates and Charges) Amendment Regulation (No. 1) 1995, SL no 277 of 1995, Water Resources Act 1989, Queensland.

Table 10.3 shows that charges for extraction from the Murray in southern NSW are currently significantly lower than for Victoria and slightly lower than for South Australia. Table 10.4 shows that charges for extraction from the Border Rivers in the north of NSW are substantially higher than for Queensland, primarily due to the Pindari Dam levy.

It should be noted that the prices quoted above for NSW are the effective charge per megalitre for bulk supply to the extraction point only. The cost of delivering water to the farm gate is likely to be considerably greater. In the north of the state, for example, the NSW Irrigators' Council claims that the cost of delivery from the river to farms costs farmers an additional \$20 to \$25 to cover the cost of installing and operating their own pumps and to supply infrastructure from the river⁸⁸.

These particular costs do not exist in the south because in the irrigation areas and districts water is largely gravity fed to properties. The cost of providing the latter service from the river is reflected in the delivered price of water through additional charges levied by the irrigation areas and districts. For example, the NSW Department of Agriculture has estimated an average water price of \$10.90 in the Berrequin Irrigation District of the Murray Valley⁸⁹.

⁸⁸ NSW Irrigators' Council Submission, p 8.

⁸⁹ Summer Irrigation Crop Budgets 1995, Murrumbidgee and Murray Valleys, NSW Agriculture, 1995.

11 SUMMARY OF RECOMMENDATIONS

Recommendation 3.1

The DLWC should improve the transparency of its operations by:

1. detailing the bulk water services it provides
2. specifying the means by which those services are delivered and the costs incurred
3. publishing detailed information on which costs are to be recovered for those services.

Recommendation 3.2

Where those receiving the benefits of bulk water service have sufficiently similar interests, they should be able to negotiate the level of service they receive from the DLWC and the best way of delivering those services.

Recommendation 3.3

That competing claims on water resources be resolved so that water users and other beneficiaries can effectively hold the DLWC accountable for the efficiency with which it delivers bulk water services.

Recommendation 3.4

Benchmarking, performance monitoring and incentive regulation should be used to improve the overall efficiency of operations of the DLWC.

Recommendation 3.5

Where activities can be identified as providing no private benefit, these should be regarded as core government activities and funded by taxpayers. Where activities can be identified as providing no public benefit, they should be funded by particular water users.

Recommendation 3.6

Where costs are incurred by the DLWC in providing both private and public benefits, costs should be shared between beneficiaries according to agreed ratios. The justification for all cost sharing ratios should be determined in an open and transparent process.

Recommendation 3.7

In the absence of competitive pressures, pricing principles must be developed to ensure that water charges encourage allocative efficiency in the use of the community's water resources and the other resources used to store, manage and deliver that water.

Recommendation 3.8

Bulk water charges should be based on an appropriate share of the total costs that the DLWC incurs in regulating, managing and supplying water.

Recommendation 3.9

Charges for bulk water services should reflect the full economic and environmental costs of making water available. The value of water entitlements should continue to be determined by the market.

Recommendation 3.10

Charges should be based on a two part tariff with an access charge and a usage charge based on fixed and variable costs respectively. Where the quantum of these costs is uncertain, a pragmatic balance should be struck between them.

Recommendation 3.11

Trading in water entitlements, subject to appropriate trading rules and environmental constraints, should encourage water to be used in the most efficient way.

Recommendation 3.12

The most effective means of dealing with environmental degradation of water resources is likely to rely significantly on non-price measures. Pricing policies to promote ESD are likely to require the careful coordination of a number of price and non-price measures.

Recommendation 3.13

Where a cost is incurred due to water use by an identifiable beneficiary and an estimate can be made of this cost, the cost should be recovered from that beneficiary directly.

Recommendation 3.14

Where costs imposed by a group of beneficiaries cannot be disaggregated, costs incurred should be recovered by area-wide average charges imposed as area levies.

Recommendation 3.15

Regional differences in the costs of bulk water services should be reflected in the water charges to each particular region.

Recommendation 3.16

An assessment should be made of the impact of any changes to current pricing policies and appropriate transitional measures should be established to manage those impacts.

Recommendation 3.17

Institutional and regulatory obstacles to the establishment of efficient prices for water itself and for making water available should be identified and removed where it is economic to do so.

Recommendation 4.1

Only those costs incurred by the DLWC in performing the functions of the Ministerial Corporation should be considered when setting bulk water prices.

Recommendation 4.2

The DLWC should set specific timeframes and work schedules in its efforts to separately identify costs incurred to perform the functions of the Ministerial Corporation, being the management, supply and regulation of bulk water. Separate identification of these costs is a precondition for pricing reform.

Recommendation 4.3

The cost of activities which contribute to more than one function should be shared between functions proportionate to the contribution that the activity makes to each function. While some arbitrariness in the sharing of joint costs is unavoidable, the decisions made should be open and transparent.

Recommendation 4.4

The DLWC should, as far as possible, record its expenditures in categories which give a clear indication of outlays on the functions of operator, manager and regulator. It should ensure that the 'infrastructure outlays' category contains only the costs related to capital items.

Recommendation 5.1

The Tribunal accepts that proper maintenance of some infrastructure assets will extend their useful lives indefinitely. No depreciation charge should be levied against them.

Recommendation 5.2

Where decisions are made that it is worth maintaining service flows from an infrastructure asset, provision should be made in **current** charges to maintain the asset's service capacity.

Recommendation 5.3

The Tribunal recommends that the DLWC extend its asset management plan to include refurbishing and replacing its assets over a longer time horizon. This information should form the basis for an infrastructure annuity approach to charging beneficiaries for the costs of maintaining the service potential of existing assets.

Recommendation 5.4

Where existing assets have no opportunity cost, no rate of return element is warranted in water charges.

Recommendation 5.5

The efficient costs of operations and maintenance activity should be included in the economic costs of providing bulk water services to water users and other beneficiaries.

Recommendation 5.6

The DLWC should separately identify administrative costs of performing each function of the Ministerial Corporation on regulated rivers, unregulated rivers and groundwater sources. Efficient level of these administrative costs should be included in the economic cost of providing bulk water services.

Recommendation 6.1

The DLWC should develop a cost of service model to apply to the majority of its expenditure for which the shares of public and private benefits can be negotiated by water users and the DLWC.

Recommendation 6.2

The DLWC should further refine its reporting of the costs of resource management. In particular, further efforts should be made to identify DLWC costs for managing and correcting environmental damage created by extractive users in individual valleys.

Recommendation 6.3

The DLWC should develop a framework for implementing the cost sharing process recommended by the MDBC to share the costs of those of its resource management and environment activities where the shares of public and private benefits may be more difficult to determine.

Recommendation 7.1

Where costs of operating and maintaining systems, including river channels differ because of complexities in sharing access to the resource, these cost differences should be reflected in regional charges.

Recommendation 7.2

The DLWC must justify its resource management charges on metropolitan water authorities by identifying the resource management tasks that are additional to those being performed by Sydney Water and Hunter Water Corporations or other government providers, and demonstrating that it is the most cost effective provider of these.

Recommendation 7.3

The DLWC must account for operations and resource management costs by reporting regionally in a transparent way that assures water users are not being asked to pay twice for some services.

Recommendation 7.4

The Tribunal recommends that the fixed fee component of charges be set independent of usage charges.

Recommendation 8.1

The Tribunal recommends that the DLWC work cooperatively with water users to improve its monitoring of extractions from unregulated rivers. Improved metering of extractions is one way in which this could be achieved.

Recommendation 8.2

The DLWC should provide the Tribunal with an assessment of unregulated rivers, including which unregulated rivers should have metered water usage, how the DLWC proposes to meter this usage, and the costs of this metering.

Recommendation 8.3

The Tribunal recommends that the DLWC work cooperatively with water users to improve monitoring of extractions from groundwater sources. Improved metering of extractions is one way in which this might be achieved.

Recommendation 8.4

The DLWC should provide the Tribunal with an assessment of the groundwater use which it considers should be metered, how it would propose to meter this usage and the costs of this metering.

Recommendation 8.5

The Tribunal recommends that the DLWC develop a detailed, costed proposal for an expanded resource monitoring program. The program should prioritise and separately cost proposed monitoring by water source and by region, catchment or sub-catchment where appropriate. The program should include the methods proposed to collect the monitoring data and detail who would carry out this work.

Recommendation 9.1

The DLWC should develop a modelling framework and gather information to model the impact of changing water charges on individual farms. The modelling framework should include the following features:

- 1) A representative farm approach
 - model each region using a number of representative farm types
 - allow for differences in the technology and production coefficients of different farm types, and important variables that reflect different levels of management
 - minimise aggregation bias by developing disaggregated regional representative farm models.

- 2) A time dimension which considers adjustment options over the medium term, and viability over the long term.

- 3) Profitability: defined to reflect net cash surplus after tax. This should take into account
 - all farm income generating activities including interests earned from off-farm investments
 - all farm production costs, variable and fixed
 - the treatment of taxation
 - repayments of debts.

- 4) Land, labour and water resources, specifically
 - land classes
 - different soil types
 - land categories
 - salinity classes
 - sources of water
 - water entitlements
 - access to off allocation water
 - ground and reuse water
 - the purchase of temporary and permanent water entitlements
 - ability to purchase additional labour as required.

- 5) Investments, specifically
 - on farm investments
 - additional land
 - on farm storage of water
 - pumping facilities to make use of groundwater
 - water reuse system
 - off farm investments

Recommendation 10.1

The Tribunal recommends that the DLWC publish its proposed efficiency improvements on a regional basis. The DLWC should establish regional efficiency benchmarks to enable performance to be monitored.

