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COMMISSION

WATER RESOURCES AND WASTE WATER DISPOSAL

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INDUSTRY COMMISSION

17 April 1992

The Honourable J Dawkins, M P
Treasurer
Parliament House
CANBERRA ACT 2600

Dear Treasurer

In accordance with Section 7 of the *Industry Commission Act 1989,* we have pleasure in submitting to you the Commission's final report on *Water Resources and Waste Water Disposal.*

Yours sincerely

M L Parker
Presiding Commissioner

T J Hundloe
Commissioner

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Associate Commissioner

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Acknowledgment

The commission wishes to thank those staff members who contributed to this report.

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ABBREVIATIONS

Abbreviations used for inquiry participants who made a written submission are given in Appendix A. Other abbreviations used in the report are listed below.

ABS	Australian Bureau of Statistics
ANZECC	Australian and New Zealand Environment and Conservation Council
AWRC	Australian Water Resources Council
BAT	Best Available Technology
BATEA	Best Available Technology Economically Achievable
BOD	Biological/Biochemical Oxygen Demand
BRIA	Burdekin River Irrigation Area
CBD	Central Business District
CMC	Catchment Management Committee
CMT	Catchment Management Trust
COWSIP	Country Towns Water Supply Improvement Program
CPI	Consumer Price Index
CSO	Community Service Obligation
DASET	Department of Arts, Sport, Environment and Territories
EC	Electrical Conductivity
EPA	Environment Protection Authority
EWS	Engineering and Water Supply Department
FWRAP	Federal Water Resources Assistance Program
GBE	Government Business Enterprise
HEC	Hydro-Electric Commission
HIA	Highland Irrigation Area
ICM	Integrated Catchment Management

LWRRDC	Land and Water Resources Research and Development Corporation
MDBMC	Murray-Darling Basin Ministerial Council
MEA	Modern Equivalent Asset
NHMRC	National Health and Medical Research Council
NPV	Net Present Value
NRMS	Natural Resources Management Strategy
NSCP	National Soil Conservation Program
PAWA	Power and Water Authority
QWRC	Queensland Water Resources Commission
RAS	Rural Adjustment Scheme
RCMC	Regional Catchment Management Committee
RRR	Real Rate of Return
RWC	Rural Water Corporation
RWSC	Rivers and Water Supply Commission
SCMCC	State Catchment Management Co-ordinating Committee
SCS	Soil Conservation Service
SDS	Salinity and Drainage Strategy
SEPP	State Environment Protection Policies
TCM	Total Catchment Management
TWE	Transferable Water Entitlements
VDWR	Victorian Department of Water Resources
WSD	Water, Sewerage and Drainage

CONVERSION TABLE:

Gigalitre (GL) = 1 000 ML = 1 000 000 KL = 1 000 000 000 Litres

Megalitre (ML) = 1 000 KL = 1 000 000 Litres

Kilolitre (KL) = 1 000 Litres

PART I: MAIN REPORT

TERMS OF REFERENCE

I, JOHN CHARLES KERIN, in pursuance of my powers under Section 7 of the Industry Commission Act 1989, hereby:

1. refer water resources and waste water disposal for inquiry and report within twelve months of the date of receipt of this reference;

2. specify that the Commission report on institutional, regulatory or other arrangement subject to influence by governments in Australia which lead to unsustainable and inefficient resource use and advise on how these institutional, regulatory or other arrangements might be revised;

3. specify that the Commission in dealing with Item 2 is to have regard to the established economic, social and environmental objectives of governments; and

4. specify that the Commission is to avoid duplication of any recent substantive studies undertaken elsewhere.

JOHN KERIN
18 JULY 1991

OVERVIEW AND RECOMMENDATIONS

Water, sewerage and drainage (WSD) services are vital to the health and well-being of Australians. The challenge facing governments around Australia is to provide services to the current generation while ensuring that quality water supplies are maintained for future generations.

This report seeks to promote more efficient and sustainable water use. It recognises the strengths of the reforms already underway; it builds on the current foundation of public ownership of service providers; and it accepts that a mix of market incentives and regulation is required.

Reform is urgent. The problems now confronting Australia in the water area demand an end to the political expediency which has so often thwarted worthwhile reforms in the past.

Sustainability of Australia's water use

Water required for household supply and waste water disposal accounts for around 10 per cent of water use in Australia. Most of the remainder is used to irrigate crops and pasture.

Most of Tasmania and parts of northern Australia have abundant water supplies. However, in many of the major population centres and in the Murray-Darling Basin, the continued availability of quality water is under threat.

Salinity and waterlogging in many irrigation areas are major environmental problems and recent outbreaks of toxic blue green algae have highlighted the adverse impacts of nutrient contamination of rivers and water storages. In urban centres, there are problems of disposing of sewage, trade waste and stormwater without excessive impacts on the environment and at reasonable cost.

Developing new water supplies is extremely costly. And in any event, water storages and the regulation of river flows generally affect ecosystems and environmental amenity. Thus, making better use of water is becoming ever more important.

Undercharging for water and waste water disposal has been a major contributor to many water-related environmental problems. But policies of cost recovery need to be tied in with other policies to promote sustainable water use. The twin goals of efficiency and sustainability can be brought closer together.

Efficiency of service provision

Governments and water authorities throughout Australia are seeking to improve the efficiency with which WSD services are provided. A major thrust in many areas has been to link charges more closely to the cost of services provided -- the so called user-pays philosophy. At the same time, WSD authorities are being increasingly called upon to reduce their costs.

While these changes have produced appreciable benefits, the reform process still has a long way to go. Prices charged in most parts of Australia do not cover all the costs of making water services available. Government acceptance of cost under-recovery has not only encouraged excessive demand for water services, but has reduced the pressure on water agencies to resist those demands. It has therefore contributed to premature augmentation of systems and to investment which has had little prospect of providing a worthwhile return to the community.

By the standards of the past, water authorities are more efficient and client oriented. However, most are frustrated by the unclear and sometimes conflicting objectives under which they operate. Many of them have not been publicly accountable for poor performance. This has reduced their incentive to provide appropriate levels of service at the lowest possible cost.

It has to be asked whether Australians can any longer afford the problems that follow from poorly specified and sometimes conflicting objectives or the political expediency which has so often prevailed over commercial good sense in the provision of water services.

Pricing reform

Like any good or service, demand for water will depend on the price charged. At the same time, consumers' responses to price signals convey information to water authorities on the value that they place on those services.

Improved pricing of WSD services will therefore help ensure that scarce water is not wasted and in doing so promote better environmental outcomes. Improved pricing is also necessary to guide the timing and nature of investments in WSD works. Excessive investment in, and premature augmentation of those works, has cost the community dearly. A vast amount of capital -- over $50 billion -- is tied up in providing these services. In future, all of the costs of providing both urban and irrigation water services should be recovered from customers (see Recommendations 1, 7 and 9).

Cost recovery is complex. For example, it should not be pursued solely through price increases. Pressure must be placed on water agencies to reduce their costs. Care is also needed to ensure that when urban customers are added to the network, they are not charged twice for the development costs of supplying the services. And, for large parts of the public irrigation network, water demand may be insufficient to permit the costs of capital to be fully recovered (see Recommendations 6, 8, 10 and 11).

As well as pricing to fully cover costs, users should pay for each litre of water consumed (see Recommendation 2). Giving households a 'free' water allowance in return for the payment of a fixed charge to gain access to services, or charging irrigators for their allocation of water irrespective of whether they use it, provides no incentive to use water wisely. Substantial reductions in water consumption are observed where users are charged directly for every litre. This means that expensive system augmentations can be deferred and the costs of treating wastewater, and the environmental impacts of wastewater discharges, can be reduced. Pay-for-use pricing also increases the incentives to re-use water.

Pay-for-use pricing can extend to sewerage services and to the treatment of industrial trade waste (see Recommendations 4 and 5). It can also involve higher prices for water during drier months (see Recommendation 3). Dispensing with property-based charges for WSD services is yet another aspect of pay-for-use pricing (see Recommendation 12).

Pricing reform should extend to the payment of dividends to governments. Just as interest payments on borrowed funds are a cost of making water services available, so too is a payment on the community's investments in water undertakings. Entitlements to dividends should reside with the legal owners of water assets (see Recommendation 17). In some cases this may be Local Government.

The Commission has also examined how community service obligations imposed on water authorities by governments should be funded; and how long-lived water assets should be valued (see Recommendations 13, 14, 15 and 16).

Taken as a package, the pricing reforms proposed by the Commission will result in higher charges for many water users.

However, the required increases will vary considerably across authorities. Where authorities are already recovering most of the costs of their capital, or where there is considerable scope to improve performance by reducing costs, aggregate price increases will be small. By contrast, in many irrigation schemes and in some country towns, significant water price increases will be required.

Pricing reform will also have uneven impacts within particular communities. For example, while the phase-out of property-based charges for WSD services will reduce the water bills of many commercial and some domestic customers, for other domestic customers charges will rise sharply. But adverse impacts for some water users is not a reason to delay necessary pricing reforms. Disadvantaged groups can be protected using the sort of explicit assistance measures already in place to reduce the costs of WSD services to pensioners and other low income earners.

While the reforms will mean increased prices for many water customers, higher returns on the community's investments in the water sector will reduce government calls on other sources of revenue.

It is of course important to ensure that revenue needs do not drive governments to increase prices beyond efficient levels. Accordingly, the Commission has discussed how dividends paid to governments on behalf of the community should be determined in order to prevent water prices being used as a tax.

What institutional changes are required?

In most parts of the economy, competition between suppliers can be relied upon to promote efficient service provision. In the water sector, competition from private contractors is possible for many inputs used by WSD agencies. However, at the present time, WSD services are most cheaply provided through single networks.

The issue is not simply whether water services should be provided by regulated public or private monopolies. Effective management of catchments, rivers and other water bodies is also required. The challenge is to find the right incentives and institutional arrangements to pursue these multiple objectives. A blanket model of reform is not appropriate, if only because of the diverse arrangements which already exist throughout Australia.

Urban services

Unclear and conflicting objectives, insufficient accountability for performance and government interference are often regarded as inevitable consequences of government ownership. Countries such as the United Kingdom and France have responded by giving the private sector responsibility for providing water services.

Privatisation and the profit motive would undoubtedly provide a commercial edge to certain aspects of service provision, and add to incentives for both cost recovery and cost containment.

However, the overseas experience suggests that there would also be costs to the community, not the least of which would be a need for even greater regulation of WSD providers to prevent overcharging of customers and unwarranted reductions in the quality of service provided.

There is considerable scope to improve arrangements for the provision of urban water services while maintaining government ownership. The Commission has therefore attempted to build on the current foundation of public ownership in a way which does not preclude an increased role for the private sector in the future, should that prove desirable.

Governments must put in place administrative structures which will give WSD authorities a strong commercial focus. This is necessary to promote full cost recovery; allow charges which are directly linked to the costs of services received by users; and ensure that authorities seek to reduce the costs of service provision. Providing water agencies with clear goals, giving them greater freedom to pursue those goals and making them accountable for their performance are central to more efficient service provision (see Recommendations 18, 19, 20, and 22). But, because of differences in the way that urban WSD services are provided, these broad principles cannot be pursued in a uniform way Australia-wide.

Amalgamation of some small country urban service providers in the eastern States may help to reduce the costs of service provision (see Recommendation 23). Particularly for larger water authorities, corporatisation may be a logical progression from the process of commercialisation (see Recommendation 24).

The many problems associated with urban run-off call for changes that will better integrate drainage with the whole water cycle of towns and cities (see Recommendation 25).

Irrigation

In the irrigation sector, pricing reform to achieve higher levels of cost recovery is the immediate priority (see Recommendations 9, 10 and 11). However, the necessary reforms extend to management and ownership.

Action is underway in most States to refurbish run-down public irrigation distribution systems. Yet decisions on refurbishment have been taken with little regard to the viability of those systems in the face of commercial pricing for water and of expanded trade in the rights to use water. And in many localities, there is the added complication that the full extent of waterlogging and salinity problems has yet to emerge. There is thus the risk that more taxpayers' money will be directed into unproductive and unsustainable irrigation investments.

The management of government irrigation systems can be devolved to regional bodies. This has begun in New South Wales and is soon to commence in Victoria. Devolution to the regions will provide those paying for services with a greater say in their management, and is therefore a way of bringing a more commercial focus to bear.

However, devolution will not reduce the pressure on governments to maintain a financial commitment to non-commercial irrigation infrastructure. In the Commission's view, privatisation of irrigation distribution schemes is the only way to ensure that decisions to maintain and refurbish existing works are based on commercial realities (see Recommendation 26).

Making service providers more accountable

While a strong commercial focus is needed in the provision of WSD services, measures are also required to ensure that service providers do not seek to improve their commercial performance by misusing their monopoly power to increase prices or reduce service quality. With continued government ownership, monitoring is also necessary to ensure that services are provided cost efficiently and that there is proper analysis of proposed new investments.

Better specification of objectives and performance targets in business plans will make WSD authorities much more accountable for their performance. However, some external monitoring of performance covering prices, costs, investment performance and service quality is also required (see Recommendation 21).

Water management and environmental goals

Responsibility for water management and related environmental controls is typically fragmented. For example, some 20 bodies have roles affecting water quality and use in the Brisbane River.

Fragmentation inhibits co-ordination of policy, with resulting duplication of effort, and on occasion, the absence of effective control. The requirement to deal with a range of bodies increases the costs for firms, WSD agencies and the general public in discharging their environmental obligations.

As well as lowering costs, rationalisation of functions would allow integration of policies governing the use of water and land. Land use practices often have important implications for water quality.

While consolidation of related water management functions is desirable, it is equally important that responsibility for setting environmental standards is not left to the agencies which provide water services. Environmental goals must be pursued through regulated standards, supplemented by external monitoring of service providers to ensure that any failures to meet standards are made public (see Recommendation 34).

Although environmental regulation is crucial, there is a complementary role for market mechanisms. For example, in appropriate circumstances, tradeable discharge permits can reduce the cost of meeting pollution targets (see Recommendation 32).

Major investments are required to deal with water-related environmental damage. For example, the Sydney Water Board is to spend $600 million over the next 10 years to improve the quality of effluent discharged into the Nepean Hawkesbury River System. Combatting salinity and waterlogging in many irrigation areas will also be very expensive. Water users should meet the costs of these investments to ensure that expenditure on any particular environmental restoration initiative is not excessive.

Giving equal weight to the costs and benefits of enhanced environmental outcomes should be an integral part of the process for setting environmental and water quality standards (see Recommendation 33).

Integrated (or total) catchment management is a recent initiative to involve the community in decisions affecting the quality of local water resources and the management of catchments. It is an important trial which warrants support from both governments and the community.

However, community involvement through integrated catchment management will not deal with the fundamental trade-off between current and future use of water resources. How the needs of current and future generations for access to quality water resources should be reconciled is an ethical judgment which must ultimately be made by governments.

Tradeable water entitlements

Tradeable water entitlements are another means of bringing together efficiency gains and more sustainable water use.

In many of Australia's irrigation systems, demand for water at current prices exceeds supply. All States, other than Western Australia, have water entitlements systems which allow for limited trade in water between irrigators. The aim is to ensure that available supplies are used in the way which maximises the benefits to the community.

In New South Wales alone, the limited use of tradeable water entitlements has increased the value of irrigated agriculture by more than $40 million over seven years.

However, current arrangements can be significantly improved. In most areas, transfers of water can only be made for one season at a time. Allowing permanent as well as temporary water transfer would provide greater certainty to purchasers about the availability of water in subsequent seasons and therefore a greater incentive for beneficial trades to occur. Permanent transfer would also facilitate the retirement of highly saline or waterlogged irrigation land (see Recommendation 27).

Even greater gains will be made if there is provision to allow the transfer of water currently used for irrigation to metropolitan and environmental uses (see Recommendation 28). Indeed, formalising water allocations for environmental purposes is crucial if efficiency and sustainability considerations are to be integrated (see Recommendation 31). Provision should also be made to allow irrigators to carry-over unused water entitlements into the subsequent season through 'continuous accounting' and for the auction of new water entitlements (see Recommendations 29 and 30).

Gains from more efficient water use

The Australian Water Resources Council estimates that reductions in the operating costs of water authorities would provide an annual saving of about $180 million. Cost savings of this order would permanently increase Gross Domestic Product by some $270 million. Even greater cost savings are realisable as current asset systems are replaced through the adoption of cost lowering new technology.

These productivity gains are clearly valuable. Even so, they represent only part of the available gains. The effects of many other improvements are much harder to quantify -- for instance, the

efficient pricing of water services and reforms which allow water to be moved to its most productive uses. On top of this are the environmental benefits that the Commission's proposals would bring.

What are the priorities?

The pace of reform must be increased even though for some in the community -- particularly the rural sector -- the adjustment pressures will be significant. The challenge facing governments is to ensure that a concern to minimise adjustment pressures does not unduly delay change.

The Commission's recommendations are very much a package to enhance efficiency and sustainability across the sector as a whole.

However, within this package there are a number of priority areas. Pricing reform and increased cost recovery are crucial to improving the efficiency and sustainability of Australia's water use. Making WSD service providers more accountable is necessary to ensure that cost recovery targets are not achieved by exploiting water users or by a loss of environmental amenity.

Inaction will mean that the benefits of improved national income are forgone, governments will continue to invest in poorly performing assets and the environment will be placed in further jeopardy. In areas such as the Murray-Darling Basin, the magnitude of the problems is only now becoming apparent. If the pace of reform is not increased, the resulting environmental degradation will force more significant and disruptive adjustment in the future. In the urban centres too, many governments have been reluctant to directly link charges to the costs of services provided. Hard decisions must be taken now to avoid imposing even bigger costs in the future.

Recommendations

Pricing of urban water services

Section 4.2

1. Except where subsidisation of costs is an explicit government policy, investment in new urban WSD infrastructure should be premised on full cost recovery, including the designated rate of return on capital. The authority concerned should consider whether the willingness to pay of customers who will benefit would be sufficient to permit full cost recovery, if differential charges could be set for those customers.

Section 4.3

2. Urban authorities should pursue full cost recovery on the provision of water through a two part tariff, comprising an access charge plus a usage charge for each KL of water supplied. The usage charge should be set to cover the costs of making additional water available plus a loading to ration supply when capacity in the system is scarce. The access charge should be set so that, in total, the desired revenue yield is achieved over the life of an asset system.

3. WSD authorities should investigate the benefits and costs of seasonal water pricing arrangements and time of day pricing. The effects of seasonal pricing could be captured either through charges which vary over the year or through tiered usage charges.

4. WSD authorities should consider charging for sewerage services according to the percentage of water returned to the sewerage system.

5. WSD authorities which are faced with significant trade waste discharges should have in place charges based on the quantity and strength of the waste discharged.

Section 4.4

6. Prices for urban WSD services should be sufficient to cover operating, maintenance, administration and depreciation costs and to provide the designated rate of return on the adjusted asset base. Where quantifiable and attributable, the costs of environmental damage associated with the use of these services should be reflected in prices.

   Some flexibility should be provided to authorities to increase their rates of return over time as usage of systems increases, subject to the requirement that they earn the designated rate over the life of asset systems.

   When calculating the rate of return component, the value of assets used to provide community service obligations which are not fully funded by government, should be written down by capitalising the resulting on-going losses to the authority and deducting them from existing asset values. Similar adjustments to asset values should be made to account for poor investment decisions. The basis for adjustments to authorities' asset bases should be documented in their financial statements.

   When calculating capital charges, authorities' asset bases should include assets provided by developers or funded through developer charges. However, the rate of return earned on those assets should be refunded to customers in new sub-divisions in the form of lower access charges for water services.

7. The target real rate of return for investments in urban WSD infrastructure should generally be 5 per cent. This target should be adjusted in the future if there is a significant change in the real long term bond rate. If an authority can publicly demonstrate that a particular investment entails a significant element of risk, a higher rate of return should be sought.

Section 4.5

8. Urban WSD authorities earning less than 5 per cent real rate of return, should progressively increase their rate of return, at a pace determined in negotiation with owner governments (and their regulatory authorities), until such time as the 5 per cent rate is achieved. The price

increases necessary to achieve the agreed increase in the rate of return should be determined taking into account the scope for productivity improvements. An annual increase of 0.5 of a percentage point in an authority's RRR would be a useful starting point for these negotiations.

The negotiated annual increase in an authority's charges should have regard to the need for improved cost recovery on existing assets, and the need to ensure that, for new investments, there is full cost recovery over the life of the asset systems in question.

Once an authority has achieved 5 per cent real rate of return on its (adjusted) asset base, further price increases should be subject to a negotiated revenue cap.

Pricing of irrigation water and drainage

Section 5.1

9. Public investment in new irrigation schemes should only proceed if the authority concerned can publicly demonstrate that demand for water will support prices sufficient to fully cover costs, including a return on capital. The minimum real rate of return should be 5 per cent. A higher rate should apply if the project involves a significant degree of risk.

Section 5.2

10. Prices for irrigation water supplied from existing bulk water systems should at least cover irrigators' share of the costs of operating and maintaining those systems, including dams and storages. For systems where demand for water is sufficiently strong, a return on capital should also be sought. Where quantifiable and attributable, the costs of environmental damage caused by irrigation should be reflected in prices.

    Irrigators' share of the full costs of refurbishments to existing bulk water supply systems, including a minimum 5 per cent real return on capital, should be factored into bulk water charges.

11. Bulk water suppliers should immediately increase the price of water to a commercial level. Depending on the strength of demand, this would require them to earn a real rate of return of between 0 and 5 per cent. For an interim period, prices charged to irrigators may need to be subsidised.

    The rate of price increases faced by irrigators, and the combination of price increases and cost reductions required to provide a commercial rate of return, should be determined by negotiations between governments and bulk water suppliers.

    Until such time as charges to irrigators are sufficient to provide commercial rates of return, the shortfalls in revenues should be directly funded by the owner government.

General pricing issues

Section 6.1

12. WSD agencies should phase out property based access charges for water and sewerage. In the longer term, access charges should be directly linked to the size of the connections provided.

Section 6.3

13. Community service obligations imposed on water authorities should be directly funded in full by the government concerned.

14. The Australian Water Resources Council should formulate and disseminate guidelines for valuing Community Service Obligations in the water sector. Underlying these guidelines should be a valuation method which estimates the long run avoidable cost of meeting the obligation less the revenue received from beneficiaries.

Section 6.4

15. Water agencies should generally value their assets for pricing purposes according to the Australian Water Resources Council's Modern Equivalent Asset methodology. However, if there is a need to write down asset values to account for unfunded Community Service Obligations or poor investment decisions, the resultant reduction in the earnings potential of the assets in question should be the basis for the revaluation.

    The Australian Water Resources Council should initiate discussions with the accounting profession and the relevant areas of government to secure any changes necessary to general accounting requirements.

16. Through the Australian Water Resources Council, water agencies should further investigate the merits of renewals accounting in the Australian water sector.

Section 6.5

17. Returns to equity earned on the provision of WSD services should be payable to the legal owners of the assets used to provide those services.

Institutional arrangements

Section 7.3

18. Governments should ensure that providers of WSD services are commercially focussed. Responsibilities should be clearly set out; relationships between water management, service provision and regulatory functions clarified; and processes for resolving conflicts clearly defined.

19. Governments should establish clear lines of accountability for their WSD agencies and ensure that performance results are made publicly available.

20. All WSD agencies should be required to prepare publicly available corporate plans and annual reports, indicating commercial and other objectives. Any major changes to the corporate plan should be reported publicly.

21. All WSD agencies should submit to their relevant State body their achievements against an agreed list of performance indicators. This information should then be published by the Australian Water Resources Council.

22. WSD service providers should be free to use inputs offering the best value, whether they be in-house or external to the agency. Accounting systems should be modified, as required, to allow a comparison of the costs of acquiring inputs in-house or from outside contractors.

23. Governments should look for ways to realise economies of size in the provision of their country urban WSD services. In some cases this may warrant amalgamation of service providers.

Section 7.4

24. Governments should consider corporatisation of WSD service providers on a case by case basis, to assess whether there are gains to be had beyond administrative reforms.

Section 7.6

25. State Governments should ensure that Local Governments are accountable for stormwater and other run-off leaving their boundaries.

Section 7.7

26. Management of public irrigation distribution systems should be devolved to regional bodies with a view to their privatisation. Transfer of ownership should occur before refurbishment of assets.

Tradeable water entitlements

Section 8.3

27. Permanent water transfers should be introduced in all irrigation systems, for both groundwater and surface water. Where feasible, provision should be made to allow for permanent transfer of water between schemes.

28. Arrangements to allow the transfer of water from irrigation to other uses should be implemented in all States.

29. States should introduce continuous accounting within the release sharing system. In systems where security of supply is an issue, States should consider whether capacity sharing would provide a superior form of risk management.

Section 8.4

30. Entitlements to any new water supplies should be auctioned and the scope for bulk water suppliers to act as brokers of existing supplies should be investigated.

Environmental matters

Section 9.2

31. The States should formalise water entitlements for environmental purposes. Where systems are fully, or close to fully committed, water for the environment should be purchased from licence holders.

32. Governments should investigate the application of tradeable discharge permits.

Section 9.3

33. Regulators, before setting standards, should undertake an assessment of benefits and costs, including an assessment of alternative technologies. This process should explicitly canvass consumers' willingness to pay for improved environmental outcomes. Such analysis would be one input into a decision-making process which would also embrace issues of sustainability and intergenerational equity.

Section 9.4

34. Environmental monitoring by an agency or authority other than the service provider is necessary to ensure that failures to meet standards are made public. Summary results of monitoring should be released in a form readily accessible to the media.

The Commission draws attention to its comments on:

- developer charges (Sections 4.4 and 6.2);
- charges for water distribution in government irrigation systems, pending privatisation of those systems (Section 5.3);
- the income distribution effects of pay for use pricing (Section 6.1);
- the taxation treatment of maintenance and new capital investment (Section 6.4);
- the basis for determining dividends (Section 6.5);

- capital subsidies (Section 6.6);
- ways of facilitating the privatisation of public irrigation distribution systems (Section 7.7)
- dam capacity sharing (Section 8.3);
- pricing to promote better environmental outcomes (Section 9.2);
- charging for works designed to restore the environment (Section 9.3);
- integrated catchment management (Section 10.1);
- non-price measures to encourage water conservation (Section 10.2);
- water research and extension (Section 10.3);
- the likelihood of recouping public investment in the Burdekin River Irrigation Area (Section R4); and
- the Kimberly pipeline proposal (Section R5).

1 THE INQUIRY

For both economic and environmental reasons, the importance of using Australia's water resources wisely is beyond dispute.

Yet, for much of our history, little thought has been given to the efficient provision and use of water resources or to the impact of water use on the environment. The legacy has been much wasteful investment in water infrastructure, charging arrangements that do little to encourage people to use water services efficiently and a host of water-related environmental problems.

But things are now changing. There is increasing recognition that improved practices in the water sector will provide significant benefits to the community. In many parts of Australia, new policies are being put in place in an effort to rectify the mistakes of the past.

However, many problems still remain. The reform process has generally been slow and progress has varied markedly between and within States and across individual water services. Worthwhile changes continue to be thwarted by the outcomes of past policies and the attitudes that those policies have engendered in both water users and government. And, as evidenced by problems such as river pollution, there are major challenges for policy makers in reconciling the often competing interests of the environment and those using and disposing of water.

Against this background, the Commission has been asked to report on institutional, regulatory or other arrangements subject to influence by governments in Australia which lead to unsustainable and inefficient resource use and advise on how these arrangements might be revised. The Commission's terms of reference are set out at the beginning of the report.

1.1 Scope of the inquiry

This inquiry is very broad. The activities under reference include:

- the supply of water to households and to industrial, commercial and agricultural users, and to the environment;
- waste water disposal, encompassing sewage and liquid trade waste disposal services;
- drainage, encompassing systems or watercourses draining both urban and irrigation lands; and
- the management of Australia's water resources.

In preparing this report, the Commission has drawn on information from a variety of sources. It released an issues paper early in the inquiry (IC 1991b) and received evidence in submissions and at an initial round of public hearings. The Commission released its draft report in March 1992 and received comments on it in further submissions and at a second round of public hearings. More than 220 submissions have been made to the inquiry (see Appendix A). The Commission also held informal discussions with government interests (Commonwealth, State and Local), water and environmental agencies, irrigators, professional associations and private environmental interests (see Appendix A). Two consultancies were arranged: one to examine the international experience with private provision of water services and the other to investigate the distributional effects of pay-for-use water pricing (London Economics 1992, Tasman Economic Research 1992).

1.2 The water sector

The resource[1]

Low rainfall in many areas of Australia, the highly seasonal nature of precipitation in others and generally high rates of evaporation combine to limit Australia's available water resources. As a consequence, much effort and money has been spent on harvesting the country's available supplies. Australians derive their water from both surface and groundwater supplies.

Surface water provides around 86 per cent of water used in Australia for consumption purposes (see below). Very large dams have been built in all States except South Australia. While many of these have a range of purposes including the generation of hydro-electric power, flood mitigation and recreation, they are the major sources of water for domestic use and irrigated agriculture.

Australia-wide, only 13 per cent of estimated available surface water is used.

However, this aggregate figure hides wide variations in usage between regions. In Tasmania, the eastern coastal region of Queensland, the Gulf of Carpentaria and the Timor Sea drainage division (in northern Western Australia and the Northern Territory), which together account for nearly three-quarters of estimated exploitable surface water, on average, only 1.5 per cent of the available supply is used. By contrast, in the Murray-Darling Basin within which some 75 per cent of total surface water use in Australia occurs, the level of commitment is estimated at 85 per cent. In the South Australian Gulf drainage division, the figure is around 33 per cent.

1 Most of the data in this section is drawn from Department of Resources and Energy 1983.

Groundwater is available throughout much of Australia. The bulk of it is in sedimentary basins, the largest of which -- the Great Artesian Basin -- has an area of about one-fifth of Australia.

Groundwater is also found in shallow unconsolidated sediments and fractured rocks. In aggregate, exploitation of groundwater supplies is much lower than that of surface water -- only 3.5 per cent of available groundwater is used. Again, however, aggregate figures conceal wide variations in usage. For example, in arid parts of Australia, groundwater is often the only source of water. In the South Australian Gulf drainage division, usage is well in excess of sustainable yields.

Data on potential yields of water bodies also abstract from the major capital expenditures often necessary to bring new supplies on stream. Around many of the major population centres in Australia -- particularly those on the east coast -- readily available water supplies have already been tapped. In these areas, and in the Murray-Darling Basin where irrigation places heavy demands on available water sources, an increasingly important issue is how to make better use of existing supplies. With this in mind, there is growing interest in the potential to trade water -- that is, to allow water users to buy and sell entitlements to a supply of water. Trade in water is also a way of integrating the competing demands of water users and the environment.

The data on potential yields also abstract from the quality of the water concerned. Salinity and eutrophication[2] are major environmental problems threatening the quality of a significant portion of Australia's water supplies. And, while groundwater in many areas is of good quality, there is growing evidence of pollution from agricultural activities, urban run-off and sewage.

Patterns of water use

Water can be used either for consumption or non-consumption purposes. Use for consumption includes domestic water and sewerage services, water for industrial and commercial concerns and rural use, including irrigation. Non-consumption uses include the provision of environmental flows and habitats for native flora and fauna, recreation and generation of hydro-electric power.

Irrigation accounts for around three-quarters of consumption water used in Australia. Most irrigation activity occurs in the Murray-Darling Basin. When account is taken of supplies used to water stock, rural usage accounts for an estimated 82 per cent of total water use.

[2] Eutrophication occurs when a water body becomes enriched with nutrients, such as phosphates, resulting in excessive plant and algal growth. In turn, this reduces the capacity of the water body to provide for the needs of humans, fish, bird and animal life.

Over half of Australia's irrigated land is used for fodder production -- much of it to feed dairy cattle. The other main irrigated crops in Australia are rice, oilseeds, cotton, sugar and horticultural crops. The annual value of irrigated agriculture is around $4.6 billion or about one quarter of total agricultural output in Australia.

Non-rural water use is divided between the provision of water and sewerage services to households (10 per cent of total use), industrial and commercial use (7 per cent) and other urban use (1 per cent). Reticulated water supplies are available to households in all but the most remote areas of Australia. On the other hand, significant population centres, including parts of Perth, have septic systems as opposed to full sewage treatment.

Water infrastructure

A vast amount of capital is tied up in providing water services in Australia. Although it is difficult to value this infrastructure precisely, the estimate of a written down replacement value of $50 billion for water, sewerage and irrigation assets (IC 1990) is widely accepted. Investment in drainage infrastructure, though substantial, has not been valued on an Australia-wide basis.

Although dams, pumping stations, water treatment works, sewage treatment plants and sewage outfalls -- commonly referred to as headworks -- are major capital assets, their total value is smaller than that of the pipes (or mains) and channels required to transport water, sewage and stormwater. Evans and Reynolds estimate that mains account for more than 70 per cent of the total value of water and sewerage assets (IC 1990, p 44). The Sydney Water Board alone owns and operates 39 000 kilometres of water, wastewater and drainage pipes and channels.

Reflecting the dominance of mains in the sector's capital base, the large majority of assets (88 per cent) are used in the provision of services to households, industrial and commercial users. While irrigation accounts for three-quarters of consumption water used in Australia, it accounts for only 12 per cent of the sector's capital assets (IC 1990, p 44).

Employment

Direct employment in the provision of water, sewerage and drainage services in Australia has been estimated at around 35 000 (Watson 1990).

However, the Water Industry Training Association estimated that when account is taken of those employed in areas such as water management and monitoring, plumbing, trade waste treatment and the manufacture of equipment used in the sector, employment would be of the order of 250 000. Various farming organisations also pointed to the employment associated with irrigated agriculture.

The institutions

Resource management

The management of water resources and the provision of water, sewerage and drainage (WSD) services is primarily a State or Local Government responsibility. The Commonwealth's role has been mainly limited to: providing broad policy direction; providing information and promoting research into water-related issues through bodies such as the Australian Water Resources Council (AWRC); performing hydrometeorological services through the Bureau of Meteorology; providing financial assistance for water infrastructure in country towns and for water projects considered to be in the national interest; and coordinating the management of water resources that transcend State boundaries, through, for example, the Murray-Darling Basin Ministerial Council (MDBMC) and the Murray-Darling Basin Commission (MDBC).

At the State and Territory level, responsibility for managing the use of water resources usually rests with single departments or agencies.

However, management functions can be delegated to other State Government departments and regional and local bodies. In New South Wales, Victoria, Queensland and Tasmania, many managerial functions are devolved from the central agency to those departments, authorities and local government bodies responsible for the provision of services. In the Australian Capital Territory (ACT), water management functions are split between several government departments. By contrast, in Western Australia, South Australia and the Northern Territory, the single agencies which are responsible for the provision of water services throughout these jurisdictions also undertake most water management functions.[3]

Some management functions call for cooperation between State Governments. New South Wales, Victoria, Queensland and South Australia along with the Commonwealth are joint participants in the Murray-Darling Basin Ministerial Council and Commission.[4] A joint New South Wales and Queensland body is responsible for providing advice on the sharing of water in the border rivers of these two States as well as the construction of water conservation, flow regulation and distribution works. A similar arrangement applies to the management of groundwater located across the border of Victoria and South Australia.

[3] In Western Australia, the Waterways Commission and the Swan River Trust have responsibility for management of certain public waterways.

[4] Queensland is not a formal participant in the Salinity and Drainage Strategy designed to reduce the salinity of Murray River water flowing into South Australia (see Appendix B).

Service provision

There are marked differences between the States in the arrangements for the provision of water services.

The metropolitan centres of Sydney, Melbourne, Perth, Newcastle, Canberra and Darwin are serviced by statutory authorities. In the Brisbane region services are provided by the Brisbane City Council and a number of adjoining city councils, while in Hobart services are provided by a number of city councils purchasing bulk water from the Hobart Regional Water Board. Adelaide is serviced by a government department.

Arrangements also vary between the States for country urban services. In New South Wales, Queensland and Tasmania, local councils and shires generally provide services often from locally operated storages, although some purchase bulk water from government agencies with State-wide responsibility for water resource management. In Victoria, service provision is split between local councils, the Rural Water Corporation and numerous regional water boards. In South Australia, Western Australia, and the Northern Territory, country services are provided by the same single agencies responsible for the provision of metropolitan services.[5]

There are also diverse institutional arrangements for public irrigation schemes. In New South Wales, irrigation water is supplied by that State's Department of Water Resources via regional Irrigation Management Boards. Water for irrigation is also released from the Snowy Mountains Hydro-Electric Scheme. In Victoria, Queensland and Tasmania, water is directly supplied to irrigators by each State's rural-based Water Commission or Corporation. In Tasmania, the Hydro-Electric Commission also supplies water for irrigation use. In South Australia and Western Australia, irrigation services are predominantly provided by the same agency responsible for urban services. An exception is the Loxton scheme in South Australia which is owned by the Commonwealth but managed by that State's Engineering and Water Supply Department. In all States, each irrigator's entitlement to an allocation of water is specified in a licensed water right. Licences are administered by the State agencies responsible for distributing bulk irrigation water.

Sewerage services are generally provided by the same authorities responsible for the provision of urban water services. In Victoria and Western Australia, however, some authorities supply sewerage services only.

Disposal of toxic wastes which cannot legally be disposed of in sewers is undertaken by both government and private concerns. In areas where sewerage is not provided, the pumping of septic tanks is also shared between the government and private sectors.

[5] In Western Australia, water services to the towns of Bunbury and Busselton are provided by separate statutory water boards.

Stormwater drainage in urban areas is provided mainly by local councils. Off-farm irrigation drainage is generally provided by, or under the control of, the State-based agencies responsible for the provision of irrigation water.

Environmental control

Control over water-related environmental matters rests mainly with State and Territory Governments. Local Governments are empowered to impose additional controls but these can be overruled by State Governments.

Policies, programs and regulations addressing the environmental impact of water use, water quality etc are variously administered by Commonwealth, State and Local Government agencies. The main Commonwealth or joint Commonwealth/State bodies are the Department of Arts, Sport, Environment and Territories (DASET) incorporating the recently formed Commonwealth Environment Protection Agency, the Department of Primary Industries and Energy, the AWRC, the Land and Water Resources Research and Development Corporation, the MDBMC and MDBC, the Snowy Mountains Council, the Australian and New Zealand Environment and Conservation Council, CSIRO and the National Health and Medical Research Council. At the State level, an array of statutory authorities and government departments are usually involved, the notable exception being South Australia where the agency responsible for the provision of water services also administers environmental control. In New South Wales, Victoria and Western Australia, Environmental Protection Authorities (EPAs) have been established to coordinate environmental policy and enforcement in a range of areas including water use. An EPA has also been proposed for South Australia.

A recent initiative which embraces both water use and environmental issues is integrated or total catchment management. It recognises that land use and water availability and quality are interconnected and that local communities should have a say in how catchments are managed. The approach has been formalised in New South Wales, where legislation provides for the formation of regionally-based catchment committees, comprising community, landholder and water agency representation, to provide advice on the management of water resources within defined catchment boundaries. Similar, although non-legislated, arrangements have been introduced in some of the other States.

Details of the institutional arrangements in the water industry are in Appendices B and E of the report.

1.3 The Commission's approach

This reference extends the Industry Commission's examination of goods and services provided by the government sector.

Many of the lessons that have emerged from the Commission's previous reports into government business enterprises -- such as the need for a more commercial focus in these enterprises -- are clearly relevant to the water sector. Indeed, the impetus for many of the reforms now occurring in the sector is a recognition by governments that past policies, which have isolated consumers and service providers from commercial realities and channelled taxpayers' funds into investments with little prospect of providing a worthwhile return to the community, have served Australia badly.

Characteristics of the water sector

There are specific features of the water sector which are relevant to the nature and/or pace of future reform:

- at least in the short to medium term, the prospect for competition between suppliers of core WSD services appears limited. Thus within specific localities, water services will continue to be provided by single suppliers, resulting in the sector being dominated by `natural monopoly' provision;

- the absence of competition means that irrespective of whether WSD suppliers are publicly or privately owned, monitoring and regulation of performance will be crucial to encourage efficient outcomes;

- public health benefits provided by WSD services have implications for levels of service provision and how services should be funded;

- a considerable amount of irrigation infrastructure has little commercial value, so that attempts to fully cover costs could see that infrastructure lie idle; and

- the environmental effects of water use and waste water disposal are critically influenced by the way `rights' to use water are specified and the price at which water services are supplied. Thus sustainable water use and efficient service provision are linked.

The water sector is also characterised by diversity across regions and States in institutional arrangements for both service provision and water management. The nature of problems faced and progress in overcoming those problems also varies widely. This means that future reform measures must often be tailored to suit the circumstances of individual regions or States.

What are the important issues?

In looking at efficiency of service provision and water management, the Commission has focussed on those areas where reforms hold out the prospect of the biggest gains; namely the pricing of water services, institutional arrangements governing service provision and better systems for allocating water between competing uses. Pricing regimes which more closely link charges to services provided are central to improving the information available to suppliers on the value to

users of water services. Reforms in this area help avoid much of the wasteful investment in water infrastructure that has occurred in the past. Institutional change is important not only in facilitating pricing reform, but also in promoting more cost-efficient service delivery. Improved water rights systems will help ensure that water is directed to its highest value uses.

In looking at the sustainability of water use in Australia, problems such as eutrophication of waterways, salination and waterlogging in irrigation districts, sewage pollution in rivers and oceans, and degradation of groundwater systems loom large.

However, the scientific and technical issues associated with these problems are outside the Commission's area of expertise. So too are the technical considerations which underlie the determination of water quality standards.

Accordingly, the Commission has looked at the scope for improving environmental outcomes through improved water rights and more efficient pricing of water services. It has also examined how the processes for developing regulations governing water use and land use in catchments could be improved, and the scope to better coordinate environmental policy in the water area.

The Commission's policy guidelines

In keeping with its policy guidelines, the Commission has adopted an economy-wide view. That is, it has looked beyond the immediate interests of water users as consumers of water, to consider the impact of policies on other groupings in the community such as taxpayers and on the environment.

The Commission's guidelines also require it to have regard to the need to facilitate adjustment to change and to ease social and economic hardships arising from such change. For some in the community, the adjustment pressures from reform in the water sector are likely to be significant. This is particularly so where rural communities have come to rely on cheap supplies of water or unsustainable water use practices. However, pricing reform will also see some residential customers and some industries paying more for WSD services.

Some aspects of reform in the water sector inevitably involve an element of gradualism -- it is unrealistic to expect that problems built-up over many years can be addressed overnight. The challenge facing governments is to ensure that a concern to minimise adjustment pressures does not unduly delay change and deny the wider community the significant benefits that reform in the water sector will deliver.

The structure of the report

The remainder of the report looks first at the way WSD services are supplied. Chapter 2 examines current pricing regimes and identifies some shortcomings while Chapter 3 identifies ways in which the costs of making services available could be reduced. Chapters 4 and 5 look at some specific pricing reforms required in the urban and irrigation sectors, while Chapter 6 examines more general pricing issues such as the valuation and depreciation of water assets and dividend policies. The role of institutional reform and performance monitoring in improving efficiency is examined in Chapter 7. Water right issues are considered in Chapter 8. Issues relating to sustainable water use, the management of Australia's water resources and research and extension are discussed in Chapters 9 and 10.

Part II of the report draws together the Commission's findings and recommendations in regard to rural water, examines developments in the Burdekin River Irrigation Area in Queensland and comments on the Kimberly pipeline proposal.

2 PRICING PRACTICES AND PERFORMANCE

Throughout Australia, water agencies are increasing the commercial focus of water services delivery. Some changes have been directed at more closely linking charges to services provided -- the user pays philosophy. Others have been directed at reducing the costs of providing those services, and ensuring that investments in new assets are determined in a more commercial fashion. To ensure that better use is made of available water supplies, there have also been changes to 'water rights' governing the allocation of irrigation water.

This chapter examines current pricing regimes for water, sewerage and drainage (WSD) services.

2.1 Pricing of urban WSD services

Cost recovery

Charges for urban water and sewerage services in most areas of Australia are designed to cover operating, maintenance and administration costs, the cost of interest on borrowings and, to varying extents, depreciation on assets/the cost of asset refurbishments.

Where levied, depreciation charges are generally based on historical asset values. However, a number of the metropolitan agencies have moved to set depreciation charges on the basis of current replacement costs, as have a few agencies operating in country areas -- the Campaspe Region Water Authority in Victoria is one example.

Only some of the major metropolitan agencies make explicit provision for other capital costs in the form of a return on government equity in water assets. Requirements to pay dividends to government currently apply to Melbourne Water Corporation, the Sydney Water Board (SWB), the Hunter Water Corporation (HWC) and ACT Electricity and Water (ACTEW). The Water Authority of Western Australia (WAWA) is required to pay a portion of its revenue in lieu of a dividend.

Where services are provided by local councils, net revenues from water and sewerage services are often appropriated by local governments as a de facto dividend. The Victorian Government said that this practice is actively discouraged in Victoria and any such transfers are identified in the annual audit of councils' WSD undertakings. However, it acknowledged that these de facto dividend payments are still made.

The level of cost recovery on urban water and sewerage services is indicated by the Australian Water Resources Council's (AWRC) interagency performance review. Tables 2.1 and 2.2 below

reproduce the AWRC's estimates of real rates of return (RRR)[1] for both metropolitan and country urban water and sewerage for 1988-89.

The RRR is calculated as income less operations, administration and maintenance costs together with replacement cost depreciation, divided by the written down replacement value of assets. It is calculated before deducting interest on debt. Thus a zero RRR means that, at current levels of charging, the service provider has no capacity to service debt or pay a return on equity without running down its asset base.

Care is required in interpreting RRRs. As discussed later in the report, measured rates of return are likely to increase over the life of a system as demand growth absorbs excess capacity. Uncertainties about how water assets should be valued and the question of whether asset bases used for the rate of return calculation should include assets provided at no cost to authorities by developers or funded by developer charges, serve to further complicate the exercise.

However, Table 2.1 indicates that, with the exception of the ACTEW, in 1988-89, all the major metropolitan authorities had some capacity to service debt and/or pay a return on equity.

Table 2.1: **Real rates of return[a] for metropolitan water and sewerage, 1988-89**
(per cent)

Service	*NSW* *HWB*[b]	*SWB*	*Vic* *MMBWc*	*Qld* *BCC*[d]	*WA* *WAWA*	*SA* *EWS*[e]	*ACT* *ACTEW*	*Average*
Water	1.1	2.1	1.5	2.8	4.3	3.0	0.6	1.8
Sewerage	3.9	3.3	6.0	2.3	3.7	1.3	-0.8	4.0
Total	**2.5**	**2.4**	**3.4**	**2.6**	**4.0**	**2.2**	**-0.1**	**2.8**

a For the purposes of these calculations, authorities' asset bases (valued using the Modern Equivalent Asset methodology - see Chapter 6) include assets provided at no cost to authorities by developers and assets funded by developer charges. Exclusion of these assets from asset bases would increase the rates reported in the Table.
b Hunter Water Board - now the Hunter Water Corporation.
c Melbourne and Metropolitan Board of Works - now Melbourne Water Corporation.
d Brisbane City Council.
e Engineering and Water Supply Department.
Source: AWRC 1991, pÿ6

For country urban water and sewerage services there is considerable variation between States in the level of cost recovery (see Table 2.2). In Victoria and New South Wales, local authorities and regional water boards are, on average, earning a RRR not greatly different from the metropolitan agencies.

1 The real rate of return, as distinct from the nominal rate of return, adjusts for the effects of inflation.

Of course, these State-wide figures conceal under-recovery of costs by some local authorities. For example, in Broken Hill, water users (other than the mining industry) meet less than 60 per cent of total costs, with the resulting deficit jointly funded by the State Government and mining companies.

Table 2.2: **Real rates of return[a] for country urban water and sewerage, 1988-89**
(per cent)

Service	*NSW*	*Vic*	*Qld*	*WA*	*SA*	*TAS*	*Average*
Water	2.9	1.7	0.0	-1.8	-1.7	1.0	0.2
Sewerage	2.6	3.1	1.6	1.5	-1.2	na	2.1
Total	2.8	2.3	0.5	-1.3	-1.7	na	0.8

a As for footnote (a) to Table 2.1.
In some States, for example New South Wales, no account is taken of administrative and advisory services provided to local water agencies free of charge by State Government bodies. Inclusion of the costs of these services would result in a minor reduction in the rates reported in the Table.
Source: AWRC 1991, p 7

In South Australia and Western Australia, where country users are supplied by the single agency responsible for providing metropolitan services, government policy is that total charges for a given level of service should be roughly the same, irrespective of the location of users relative to bulk supplies etc.[2] As a result of the higher costs of supply, charges to country consumers for water in both States (as well as sewerage in South Australia) fall well short of covering operating costs and depreciation. Hence maintenance of the asset base in the country areas of these States requires ongoing subsidies funded either by government or from charges levied on metropolitan customers. Common tariffs also apply across the Northern Territory. While the AWRC's 1991 Interagency Comparison did not provide RRR data for the Power and Water Authority in the Territory, the Authority's submission to this inquiry suggests that the RRR is negative for water and possibly for sewerage.

In most jurisdictions the costs of providing stormwater drainage are met from general rates and thus the level of cost recovery cannot be determined. Melbourne Water Corporation, which is one of the few authorities to levy a specific drainage charge (WAWA and the SWB are two others), said that it more than covers operating costs and depreciation.

Many WSD authorities which deal with discharges of trade wastes levy specific charges to reflect the additional demands placed on sewerage systems by those wastes. Separate charges may also apply to the disposal of toxic wastes which cannot legally be disposed of in sewers.

2 The structure of charges nonetheless varies between city and country areas in these States.

The degree of cost recovery on trade waste services varies across jurisdictions but under-recovery is common. The Geelong and District Water Board said that industry had been undercharged in the past. The Brisbane City Council said that its charges for both trade waste and liquid waste disposal are insufficient to provide a rate of return on the investments necessary to provide those services. In Adelaide, no charges for the disposal of trade wastes are levied.

Tariff structures

Water

Charging structures for urban water depend on the type of property receiving the water -- residential, business or industrial -- and whether supplies are metered.

For metered supplies to residential properties, most water authorities levy an access charge based on property value, which usually entitles the user to an allowance of water for which no additional charge per KL is levied. In some instances the size of the base allowance is linked to the property based charge -- that is, owners of higher value properties who pay a larger access charge get a bigger allowance.

Charges applied to water use above the base allowance may be either uniform or block-based. For example, in the ACT a uniform charge for 'excess' usage of 56 cents per KL applies. In Perth charges increase from 51.4 cents per KL for usage between 151 and 350 KL to 96 cents per KL for usage over 1950 KL.

Whether uniform or block, usage charges seldom reflect the effects on costs of supply of distance from the source of water supply. Similarly, prices are not varied to reflect the increased demands placed on supplies at particular times of the day or year, nor to reflect increased scarcity during periods of drought. Rather, non-price mechanisms such as water rationing are used to allocate scarce supplies.

Although property charges and base allowances continue to dominate charging arrangements, there has been a move towards so-called 'user-pays' tariffs. As early as 1978, WAWA moved to reduce base allowances for customers in Perth and to set a uniform access charge for all residential customers. In the early 1980s, the then Hunter District Water Board abolished base allowances and property based access charges, and replaced them by access charges related to the size of the water connection provided and a usage charge for all units of water supplied. Authorities such as the Geelong and District Water Board have followed the Hunter's pricing strategy, while Melbourne Water Corporation, the SWB and the Shepparton Water Board, amongst others, have dispensed with base allowances. Other authorities have progressively reduced base allowances and plan to eliminate them in the future.

In spite of these initiatives, the move away from reliance on property charges has been slow. For example, it has taken Melbourne Water Corporation five years to reduce the share of property

based charges in total revenues from 86 per cent to 69 per cent. And, in contrast to the trend towards pay-for-use pricing, a new system recently introduced in Adelaide retains property based access charges and a base water allowance (see Appendix C).

For non-metered residential properties, charges for water are generally levied on the basis of property value. However, in some jurisdictions, for example the Johnstone Shire in Queensland, a flat charge per household is levied.

The reliance on property based charges is even more pronounced for commercial customers. Although there is notionally a pay-for-use component in charges levied on most commercial customers, the majority do not exceed the basic water allowances which accompany property based access charges.

The reliance on property based charging for commercial properties, in conjunction with the relatively high value of those properties, means that businesses pay a very high average price for the water they use. Melbourne Water Corporation provided information which indicates that the effective price per KL of water for some business users in Melbourne's Central Business District (CBD) is around 15 times higher than the price to residential users (see Table 2.3).

Table 2.3: **Price of water by type of property, Melbourne, 1990-91**

Type of Property	*$ per KL*
House	0.66
Flat	0.91
Suburban shop	4.27
Office tower (CBD)	10.16
International hotel[a]	0.57
Large chemical manufacturer	0.57

a While typically located in the CBD, international hotels and motels use much more water than is provided with the property based access charge. Accordingly, the 'average' price they pay for water is effectively determined by the charge applying to consumption in excess of the base allowance.

Source: Melbourne Water Corporation

In Perth, these disparities are even more pronounced. Data compiled by WAWA indicate that, in 1990-91, effective water prices per KL for a house, a suburban shop and a CBD office tower were $0.60, $5.76 and $10.90 respectively.

In some jurisdictions, high charges for commercial properties are used to offset losses made on supplying residential services. For example, the SWB said that under-recovery of costs of $273 million on residential services was partly offset by overcharging of non-residential customers to the

extent of $157 million.[3] Similarly, the Western Australian Chamber of Commerce and Industry said that non-domestic customers in Perth provide 40 per cent of WAWA's metropolitan water revenue, but use only 25 per cent of total water consumed.

In contrast to commercial users, industrial users are not greatly disadvantaged by property based charges for water. This is because industrial users are usually located in areas where land is cheaper, and they use large volumes of water. Penrice Soda Products, a soda ash producer which purchases about 1 per cent of all reticulated water in Adelaide, said that the base allowance attached to its property-based access charge is insignificant in terms of its total water usage. As a consequence, the usage charge applying to excess consumption (85 cents per KL) effectively applies to all water purchased. Authorities in some jurisdictions negotiate specific contracts with bulk industrial users.

Sewerage and drainage

For sewerage services, most WSD authorities levy a single charge. This is generally based on property values combined with a minimum charge. However, ACTEW, the Campaspe Region Water Authority and the Brisbane City Council (BCC) (for residential properties only), among others, impose a uniform charge.

As in the case of water, there have been some attempts to relate sewerage charges to the demands that users place on the system. For example, the Hunter Water Corporation levies an access charge related to the size of the connection and a usage charge based on the percentage of water supplied presumed to be returned to the sewerage system.[4] The Geelong and District Water Board intends to introduce the same system at the beginning of 1993. Charges for multiple pedestals apply in some jurisdictions.

Special environmental levies are included in sewerage charges in some places. In Sydney, an $80 annual charge is payable for specific purpose upgrading such as ocean outfalls. In South Australia, 10 per cent of the sewerage charge represents a levy to assist in financing works to upgrade the standard of sewage treatment. A property-based environmental levy applies in Geelong to upgrade sewage treatment works. And, in the ACT, sewerage charges include a $25 component earmarked for environmental improvement projects such as the design and construction of grease traps and oil interception facilities.

[3] Based on a notional 4 per cent RRR. Figures include both water and sewerage. The non-residential sector includes both commercial and industrial users.

[4] For domestic users, a constant 50 per cent of water supplied is presumed to be returned to the sewerage system. For non-domestic users, the percentage applied is either 25, 50, 75 or 100 per cent, depending on the type of user.

Where specific stormwater drainage charges are levied, they are almost exclusively linked to property values. The SWB does, however, levy a flat access charge for residential and non-residential premises as well as a property-based charge.

Trade waste

Trade waste charges (when they exist) are generally based on both the quantity and the quality of the waste discharged. In most instances volumes of discharge are metered, although in the case of the BCC volumes are based on an agreed percentage of water supplied to the premises concerned.

Typically the per KL charge is based on the cost of treating trade wastes of the same strength as domestic sewage. Any loading for additional costs that stronger wastes place on a sewerage system is usually related to the biological/biochemical oxygen demand (BOD) of the waste and sometimes to particular solid materials it contains.

Augmentations and new works

A feature of the water industry in Australia is the increasing reliance on assets provided by land developers. Typically, developers are required to provide water and sewerage reticulation within new subdivisions and to transfer these assets to the relevant water authority without charge at the time of land sale. Developers recoup their costs through the price charged for the land. Around one-eighth of assets in the water sector have been provided in this way (AWRC 1991).

In addition to a component for the cost of providing reticulation within a subdivision, prices for developed land usually include a component to reflect charges levied on developers as a (partial) contribution to the costs of extending water and sewerage systems to new developments -- for example, trunk main extensions. However, in Tasmania, local councils have no power to levy developer charges.

Unlike charges for the supply of water and the disposal of sewage, developer charges sometimes reflect differences in the cost of providing extensions of services to different areas in a region. For example, the SWB said that terrain and strata in water supply zones and catchments have a significant bearing on its charges to developers for major works. These range from $43 700 per hectare in Campbelltown to $96 100 per hectare in West Pennant Hills.

In most areas, including the major metropolitan areas, charges levied on developers recoup less than the full cost of system augmentations. The SWB said that, despite increases in charges since the mid 1980s, it only recovers around 88 per cent of extension costs. Moreover, it indicated that it recoups only about 2 per cent of the cost of major headworks required for system augmentations. Additional charges of between $14 000 and $36 000 per hectare would be required to cover these costs, excluding dams. The Western Australian Chamber of Commerce and Industry estimated that developer charges in Perth only recover 33 per cent of extension costs.

Community service obligations

Like many other government agencies engaged in providing goods and services, WSD authorities are often directed to provide non-commercial services or to price services at less than cost in accordance with social and developmental objectives of government. These requirements are commonly referred to as community service obligations (CSOs). Where water authorities are required to fund CSOs internally, this may result in the collection of 'excess' charges from other users. This practice is commonly referred to as cross subsidisation.

As discussed in Appendix C, identification of what constitutes a CSO is open to interpretation. That said, a range of mandated non-commercial practices relating to the provision of urban WSD services can be identified.

One important type is mandated uniform pricing arrangements across areas with significantly different costs of supply.

The most notable examples are the State-wide uniform pricing arrangements for water and sewerage in South Australia, Western Australia and the Northern Territory. South Australian Government policy, for example, endorses the view that 'equal services be charged equally' irrespective of the proximity of the customer to bulk supplies or treatment facilities. These uniform State-wide charging policies help to explain the low or negative RRRs reported in Table 2.2 for country water and sewerage in South Australia and Western Australia.

The Shepparton Water Board argued that a requirement to engage in non-commercial uniform pricing is part of the Victorian Government's policy of merging small water authorities with larger ones. It said that:

> A principle objective of the Victorian Government in merging small, high cost water authorities with larger regional bodies is to reduce the cost of water and sewerage services in those small communities, through cross subsidisation from the larger authority.
>
> Such explicit Government policy forces the amalgamating authority to incur additional business operating costs and to spread those costs over its customer base. No commercial orientated organisation willingly accepts such cost impediments to its efficiency -- but what choice does the public authority have?

This claim was disputed by the Victorian Government. It acknowledged that under a previous policy, cross subsidies had been negotiated on an ad hoc basis to encourage voluntary amalgamation. However, it went on to argue that the policy applying over the last 12 months, which provides for compulsory amalgamations, does not require, or indeed encourage, uniform pricing across merged authorities:

> The principle objective to mergers among non-metropolitan urban authorities is to reduce the cost of service provision and/or improve the quality of service provided to the smaller community. ...
>
> Obviously, the immediate attraction for the smaller community is reduced rates and the decision to rate uniformly is often taken by the new authority as a matter of policy. However, there have also been a number of instances in which rates have not been charged uniformly. In these cases, the smaller communities have still benefited significantly through somewhat reduced rates and/or improved service delivery.

The provision of rebates or concessions to pensioners is government policy in all States and Territories. The rates of subsidy are provided in Appendix C. Some authorities also provide assistance to low income earners. Churches, hospitals, nursing homes, child care centres and government departments receive free or heavily subsidised WSD services in some jurisdictions, and some authorities provide free water for use in parks and other municipal areas.[5]

The costs of this group of CSOs are significant. For example, pensioner rebates in Sydney and Melbourne alone total around $30 million and $20 million per annum, respectively.

With the exception of pensioner rebates, direct government funding is not generally provided to meet the cost of these CSOs. For pensioner rebates, the level of government funding varies being, for example, close to 100 per cent in Victoria but only 50 per cent in New South Wales (see Appendix C).

There are also requirements to extend services to areas which it would not be sensible to supply on commercial grounds alone. In some instances, this is achieved without commercial penalty to WSD authorities through the payment of capital subsidies (see Chapter 3). However, in other instances authorities have been required to fund non-commercial augmentations. The Hunter Water Corporation, for example, is required by the New South Wales Government to extend sewerage services to fringe areas. While this CSO is now fully funded, prior to the recent corporatisation of the authority, its existing customers met 50 per cent of the cost.

Property based charges for WSD services are sometimes thought of as a CSO in the sense that, at a broad level, they redistribute income from business to households, from wealthy households to poor households etc.

The extent to which the use of property based charging reflects a direction from government is unclear. At least in Victoria, there are no requirements for WSD authorities to pursue income redistribution through this form of charging. As the Latrobe Regional Commission stated:

[5] As discussed in Appendix C, it is unclear whether some of these concessions are mandated or provided at the discretion of the authorities concerned.

> The Water Act [in Victoria] enables water authorities to charge prices which reflect payment for use, so cross-subsidies which derive from rate based pricing are voluntary rather than compulsory obligations.

However, the many property based charging systems still existing in that State can be seen as a legacy of legislation applying until 1990 requiring that property value be the sole determinant in general pricing arrangements.

The SWB said that government concerns about redistributive impacts meant that water authorities in New South Wales had not been able to phase out property based charging at the speed which they desired. And, as noted earlier, Adelaide's new water pricing policy relies heavily on property based charges.

While property based charging has some CSO characteristics, it also has a number of redistributive impacts seemingly at odds with the concept of a CSO. For example, a small business using relatively little water will pay a much higher price per unit than will say a large motel in the CBD (see Table 2.3). Similarly, occupants of flats and home units may be required to subsidise the water use of more or equally affluent people residing on standard suburban blocks. The distributional impacts of property based charging are discussed in Chapter 6.

Capital subsidies

Subsidies provided for infrastructure in country areas are another factor influencing the price of water services. Capital subsidies are discussed in the following chapter.

2.2 Pricing of irrigation water

Cost recovery

Current pricing practices for irrigation water and drainage are largely an outcome of past governments' social and development policies, rather than sound commercial practices. As the Ricegrowers' Association of Australia stated:

> Political water pricing was sometimes based on reasonably commercial principles but in many years political expediency overruled commercial judgement.

The legacy is charges which, although sometimes covering the direct costs of operating and maintaining irrigation and drainage systems, generally make little provision for depreciation of assets, let alone any return on the capital invested in dams and irrigation networks. Also charges make little or no allowance for the costs of countering salinity and waterlogging in a number of Australia's irrigation areas.

The low level of cost recovery Australia-wide is reflected in the AWRC's estimates of RRRs on irrigation services (see Table 2.4).

The cost shortfalls underlying the negative RRR figures in Table 2.4 were discussed by the rural water agencies in their submissions to the Commission.

Table 2.4: **Real rates of return[a] for irrigation and rural drainage services, 1988-89**
(per cent)

Service	*NSW*	*Vic*	*Qld*	*WA*	*SA*	*TAS*
Gravity irrigation	-3.5	-1.2	-2.0	-	-5.2	-1.7
Pumped irrigation	-3.8	-1.6	-1.9	-3.2	-1.3	-
Private diversions	-1.9	-0.9	-1.5	-	-	-
Drainage	-3.2	-2.2	-2.4	-5.0	-	-

a For the purposes of these calculations, assets are valued using the Modern Equivalent Asset methodology (see Chapter 6).
Source: AWRC 1991, pp 31-35

In New South Wales, where a new irrigation water pricing policy introduced in 1989 places emphasis upon user pays, substantial under-recovery remains. The costs of metered water diversions by private river pumpers and the costs of distributing water within the Irrigation Areas and Districts,[6] including depreciation costs, are now recovered. Irrigators also pay for 70 per cent of the costs of running the rivers -- that is, the cost of delivering water from the dams to the point where it is diverted from the river. The remaining 30 per cent is met by the Government 'in recognition of the public benefits they generate'. However, the costs of operating and maintaining the dams continue to be fully met by the Government. It has also waived all debt previously incurred on the operations of the Irrigation Areas and Districts and has agreed to meet 50 per cent of the cost of asset rehabilitation necessary to maintain current levels of service. The New South Wales Department of Water Resources (1990) estimated that the implementation of fully commercial pricing, including a return on capital, would require increases of the order of 50 per cent. The MIA Council of Horticultural Associations said that if irrigators were required to pay the full costs of capital replacement and a 5 per cent return on assets, price increases of around 250 per cent would be required.

The Rural Water Corporation (RWC) in Victoria said that it recovers less than 50 per cent of its total costs excluding superannuation benefits to RWC employees and costs of overdraft facilities. These costs, and the costs of refurbishments or enhancements, are met by the State Government or through borrowing. The RWC estimated that the loss to the Victorian Government on its operations, including the forgone return on equity, was more than $130 million in 1988.

6 Regions serviced by government irrigation schemes.

The magnitude of this shortfall was disputed by the Victorian Farmers' Federation. Drawing on information presented in the McDonald Report on the future of the RWC (Gutteridge Haskins and Davey 1992), the Federation claimed that in 1990-91 the shortfall in revenue was only $45 million. However, this estimate does not appear to include any provision for a return on government equity in Victoria's irrigation assets.

The Queensland Government estimated that to move to a zero RRR would require average water price increases of 150 per cent, while to earn a 4 per cent RRR an increase of 470 per cent would be required.

Similarly, WAWA (1990) estimated that irrigation charges in Western Australia would have to increase by at least 90 per cent to achieve a zero RRR. For the Ord River Scheme, which only recovers about 25 per cent of operating costs, far bigger increases would be required.

Tariff structures

Tariff structures for irrigation water vary considerably throughout Australia.

In New South Wales, charges within the Irrigation Areas and Districts comprise three components: a service delivery charge to cover 70 per cent of the costs of running rivers downstream from dams; a water distribution charge to cover the costs of distribution and drainage within each irrigation district; and an asset rehabilitation levy. River pumpers on regulated streams pay the same delivery service charge as Area and District irrigators together with a metering charge.

In Victoria, charges in public irrigation systems comprise a fixed charge for the volume of water allocated to a particular block of land and a variable charge for any additional water used. Licensed private diverters pay a uniform rate per megalitre (ML).

In Queensland, a flat charge per ML is levied on irrigators for water use within nominal allocations. In schemes where existing supplies are fully committed, or close to fully committed, increasing block tariffs apply to use above announced allocations. Separate drainage charges, based on the area of land serviced, apply in those areas where publicly funded drainage infrastructure has been provided.

In South Australia, uniform volumetric charges for water use within allocations also apply, with an increasing block tariff applying to water use above allocation in all the irrigation areas. Separate drainage charges apply where relevant.

Western Australia has a range of charges. In the Harvey, Waroona/Collie and Carnarvon schemes, there is a fixed charge based on the area of land irrigated together with a volumetric charge. In the Preston Valley, only a volumetric charge is levied, and in the Ord Irrigation Scheme all revenue is derived from a fixed charge based on area irrigated.

In Tasmania, a flat per ML charge is levied on government irrigators for their water allocation and a volumetric charge for usage in excess of that allocation. There are no charges levied on private diverters.

In all States charges vary between irrigation schemes. For example, per unit charges in Victoria in 1989-90 ranged from $13 per ML in the Goulburn Murray Irrigation District to $62 per ML in the Werribee District.

Within irrigation schemes there is little differentiation in charges. This may partly reflect the fact that differentiation can be administratively costly. However, uniformity in charges also reflects non-commercial objectives. The Queensland Government said that internal cross subsidisation through charging regimes is commonplace to promote regional stability and development.

A commercial approach to setting charges could be expected to result in some differentiation, particularly when different crops are grown. In New South Wales, the requirement to fully cover costs within the Irrigation Areas and Districts has led the Murrumbidgee Management Board to increase charges substantially for small farms (horticulture) in recognition of the higher levels of service required relative to large area farms.

In some States, irrigation pricing regimes include a minimum charge which means that water must be paid for even if it is not used. In Victoria and Tasmania, minimum charges are based on an irrigator's full allocation of water, while in South Australia, the minimum charge is based on 50 per cent of the allocation. In Queensland, a minimum charge is based on between 50 and 100 per cent of the nominal allocation, depending on the scheme.

Individual irrigators in all States other than Western Australia, have the option to purchase entitlements to additional water from other irrigators. Trade in water and the basis on which water entitlements are allocated is discussed in Chapter 8.

2.3 Participants' views on shortcomings in current pricing

As discussed in later chapters, establishing what are efficient prices for WSD services is a complex matter, involving difficult and sometimes contentious conceptual and implementation issues.

But these difficulties notwithstanding, participants argued that there are a number of inefficiencies in current pricing arrangements for WSD services in Australia. For some WSD services, including publicly funded irrigation and water and sewerage in many country towns, charges do not cover

operating and maintenance costs and depreciation, let alone any return on the investment required to provide infrastructure. Even so, there is the implicit assumption that these schemes will continue to operate.

Some participants argued that cost under-recovery, in conjunction with inappropriate usage charges (see below), makes it difficult for WSD authorities to make appropriate decisions on when to invest in infrastructure and what level of service to provide. They claimed that this is because the normal role of market prices -- that of conveying information to consumers on the costs of various supply options and transmitting information back to authorities on the value that consumers place on services -- is muted. The Victorian Government said:

> ... suppliers have lacked information to make investment decisions in the best interests of their consumers and the broader community. Tariffs not related to consumption tell suppliers nothing about the price/volume tradeoffs consumers would be prepared to make if given choice. Nor do they provide any indication of the willingness of consumers to pay for the products of the water utility.

In a similar vein, the Western Australian Department of Agriculture said that:

> The Water Authority has been left with the problem of determining what level of investment in infrastructure replacement is warranted and how it can be paid for. It has done this with no direct information on the value to farmers of the water that would be saved (because there is no user pays) so that it becomes very difficult for the Water Authority to make decisions on the appropriate level of investment.

Some participants also argued that the subsidies resulting from cost under-recovery provide an artificial advantage to factories or farms which use WSD services in their production processes. WAWA said:

> It can be argued that, as commercial enterprises, irrigation farmers should be meeting the full cost of providing services. For example, irrigated dairy farms in the South-West of Western Australia are receiving a subsidy that non-irrigated farms do not receive, to no obvious benefit to the community. Unless such farms can compete while paying full cost of irrigation services, the community would be better off not renewing irrigation assets.

Participants said that the structure of water charges is deficient in many jurisdictions.

Of chief concern were the arrangements which make available an allowance of water in return for the charge for access to the service. Many argued that such arrangements provide no incentive to avoid wasteful use of water. The HWC noted that its move to user pays pricing, including the abolition of base allowances, has reduced overall consumption by 30 per cent and peak demand by even more. The Campaspe Region Water Authority said that user pays pricing had reduced peak water consumption in the Rochester area by more than 20 per cent between 1985 and 1992, despite an increase in the number of properties serviced over the period.

Over-use of water can bring forward the need for expensive augmentations to systems -- new dams, pumping stations etc. The HWC said that its introduction of user pays pricing has permitted the deferment of major works including the construction of a large dam by about 30 years.

The need for sewerage and drainage facilities is directly related to water use. Consequently, some participants said that unnecessary environmental degradation and/or the need for premature investment in sewage treatment facilities are often adverse consequences of the failure to impose appropriate usage charges. In criticising the arrangement in Victoria where irrigators pay for their full allocation of water irrespective of whether they use it, the Victorian Government said that:

> ... the Tragowel Plains, Campaspe and Shepparton Region draft Salinity Management Plans have all pointed out that the present irrigation tariff structures encourage irrigation inefficiency or 'over watering'. Additional pressure on drainage systems and groundwater levels result when volumes greater than plant requirements are applied.

Some participants argued that subsidised water encourages the inefficient use of inputs. The Western Australian Department of Agriculture said, for example, that cheap water:

> ... discourages adoption of alternative sources of water (eg on-farm supplies) which might be lower cost [and] ... discourages adoption of water saving technology (eg drip irrigation), efficient scheduling techniques and methods of production in which other inputs might substitute for water (eg grain feeding dairy cattle).

Many saw the lack of direct funding for most CSOs performed by WSD authorities as another problem with current pricing arrangements, in that it may require cross subsidisation by other users. However, the South Australian Government said that caution is required in advancing this argument because few water services fully recover costs (including a rate of return on equity). In relation to its mandated uniform pricing arrangements for water and sewerage it observed:

> ... a financial loss is incurred on country water supply compared with a financial surplus in the metropolitan area. ... [But] this is not a conventional cross subsidy from metropolitan to country customers because metropolitan customers are paying less than true costs.

Finally, many participants said that property based charging systems are inefficient. They argued that, in addition to the problems associated with the provision of 'free' water which typically accompanies property based access charges, this form of charging involves a cross subsidy from commercial/industrial customers to residential users. As noted earlier, the SWB identified substantial 'overcharging' of business customers as a consequence of its property based charges.

At the draft report hearing a different view was taken by the South Australian Government. It argued that for commercial premises, property based water charges are a reasonable proxy for the value of the insurance benefits provided by a fire fighting capability. The South Australian Government also contended that property based charges for sewerage can be justified as:

> ... a way of collecting money through a taxation base for what can be regarded as a system which provides general community benefit rather than immediate benefit user by user.

2.4 Institutional arrangements affect pricing policies

The efforts of WSD authorities to price in a more commercial fashion are inhibited by current institutional arrangements.

To cushion the impact of pricing reform on users, State Governments have imposed constraints on price increases for water services. Generally price increases to individual customers have been limited to the level of increase in the Consumer Price Index. Such constraints also apply to a range of other services provided by government enterprises. Participants said that these constraints have severely curbed the scope for WSD authorities to restructure charging regimes and, in particular, to reduce their dependence on property based charges.

Even where no explicit pricing constraint exists, water authorities have been sensitive to the concern of State Governments to limit price increases. ACTEW indicated that its perception of the political sensitivity of water pricing means that substantial increases, even if justified on economic grounds, would not be acceptable, at least in the short term. The SWB said that political considerations prevent it setting developer charges which fully reflect the cost of extending systems to new developments.

Representatives on regional water boards and local councils are elected, rather than appointed on the basis of their commercial expertise. The Brisbane City Council said that this places further constraints on commercially warranted pricing reform:

> None of the administrations governing the City for many years has explicitly made a public connection between the costs and prices of providing water supply and sewerage to each premise. There has no doubt been a recognition that prices should more than cover costs on a cash basis, but the over-riding consideration in determining pricing policies has clearly been one of electoral acceptance.

In summary, the various constraints on pricing reform illustrate the consequences of the lack of an arms-length relationship between government and water authorities.

3 ARE COSTS OF SERVICE PROVISION TOO HIGH?

Part of the reform process is to ensure that water services are provided in the least cost fashion.

The Commission received a wealth of information on the ways in which individual water, sewerage and drainage (WSD) agencies determine levels of service provision and investment in new assets, and the safeguards in place to ensure proper decision making.

The major water agencies in particular provided evidence of efficiency gains achieved in recent years through administrative reforms. These include heightening the commercial focus of their operations through, for example, greater use of outside contractors, removing inefficient work practices, flattening management structures and improving asset management.

Nevertheless, there is considerable potential to further reduce costs.

3.1 Sources of cost reductions

Improved labour and management practices

Improved labour market practices are important in lowering the costs of service provision. The Sydney Water Board (SWB) said that work classifications (particularly in semi-skilled areas) limit multi-skilling and flexible working arrangements. For instance, the Board said the traditional spread of hours of work and the accompanying penalty rates inhibit its ability to respond to customer demands. ACT Electricity and Water (ACTEW) identified cost savings from reducing the number of unions involved in its operations and moving to an enterprise award. These savings would stem from fewer demarcation problems, streamlined work practices, lower administrative costs and greater flexibility in the deployment of staff. Melbourne Water Corporation acknowledged that work practices are a source of inefficiency, citing its experience with the South Eastern Purification Plant. It said that the plant had been designed and built as a fully automated system but has been manned as if it were not automated. Full recognition of the plant's design capabilities and the contracting out of much of the maintenance work could reduce staffing levels from 280 to about 130.

A number of participants commented on the scope for cost savings from flatter management structures. The National Farmers Federation, for example, was critical of top heavy organisational structures which it said result in excessive overheads in the supply of irrigation water. Other participants referred to the gains achieved in some of the major authorities through eliminating levels of management.

Irrigators argued that more devolution of management responsibilities to the regions would reduce the cost of supplying irrigation water. The NSW Irrigators Council said that the impetus for the recent creation of irrigation management boards in New South Wales had been the concern to regionalise and localise management. Participants commented favourably on the steps already taken to regionalise the operations of the Department of Water Resources (DWR) in New South Wales. The New South Wales experience and recent devolution initiatives in Victoria are discussed in Chapter 7.

Better asset management

A number of participants referred to the 'gold plating' of assets. The SWB said that a recent review by the Australian Water Resources Council (AWRC) of small scale sewerage options concluded that it would be possible to halve costs with little loss of functionality by installing less costly plants. The Public Works Department of New South Wales (PWD) indicated that further savings are available through setting lower sewer design standards, using smaller diameter and lower grade piping, reducing trench width and using off the shelf equipment. The Department said that savings could also be made to the cost of providing water to small communities by, among other things, maintaining less reservoir storage and stand-by capacity. Mr French from the University of New England argued that from the perspective of safety, dams have been over-engineered in the past, and that structural modifications continue to exhibit this tendency. However, this claim was disputed by the Australian National Committee on Large Dams which is responsible for the publication of guidelines on dam safety.

Efficient service provision requires that assets are neither replaced prematurely nor belatedly. Indeed, the AWRC's 1991 interagency comparison pointed to:

> ... the importance of careful economic evaluation of new capital works and the need to pay greater attention to monitoring the age conditions of assets and their likely replacement schedules. The whole question of asset management is clearly a major issue for the 1990s in the water industry. (AWRC 1991, p 20)

The need for asset refurbishments in many of Australia's metropolitan water and sewerage systems is well known. The Townsville City Council argued that asset replacement is the greatest single problem facing local authorities in Queensland. The SWB said that a major program of asset renewals is required to maintain service delivery standards in the Sydney area. The run-down condition of assets in government irrigation schemes around Australia is well documented and major investments are required in the Murray-Darling Basin to deal with problems of waterlogging and salinity.

While infrastructure in some major cities is in need of refurbishment, it is not clear that the bulk of this asset replacement has been excessively delayed at least in terms of providing existing levels of service. Whether sewerage services etc, need to be upgraded is a separate issue.

However, many participants said that the depleted condition of much of Australia's irrigation infrastructure is largely a reflection of the failure of pricing policies to make provision for asset refurbishment. The Salinity Program Advisory Council said that:

> ... the lack of maintenance over the last 100 years has resulted in an infrastructure which requires enormous capital injection to bring it up to a satisfactory standard. ... The policy not to collect satisfactory depreciation charges was a Government policy ...

Similarly, some participants claimed that the underpricing of country urban services has led to unwarranted delays in asset replacement. The Shepparton Water Board said that:

> Asset run-down we suggest, can be readily found in many water authorities around Victoria. Some authorities continue to stay in business by consuming their assets, ie preventative maintenance is inadequate, depreciation is unfunded (often at Government direction to reduce rates) and in other instances water and sewerage revenue is being hived off to fund other areas of Local Government activity.

In urban systems, there is scope to prolong asset lives through better asset monitoring and improved maintenance procedures. In an unpublished AWRC paper, Manoel and Reynolds (1989) argue that recent innovations in condition monitoring and maintenance management systems, together with improved maintenance technology, could feasibly increase the lives of tanks and storages and pumping stations by 15 per cent. For tanks and storages this equates to about 11 years. The authors also argue that WSD authorities have been overly conservative in their estimates of the lives of small and medium diameter water and sewerage mains. They estimate that, in total, these factors could increase prospective asset life by 30 per cent. This would equate to about 20 years for sewer mains and 24 years for water mains. Information provided by the AWRC updates these figures (see Section 3.4).

More contracting out

In addition to WSD assets provided by developers as part of new subdivisions, major construction works are typically contracted out. In some jurisdictions, contracting out extends to such things as design engineering, legal and computing services, vehicle maintenance and meter reading. In Melbourne and Sydney, build, own, operate and transfer schemes which involve the private sector in the design, construction and operation of infrastructure, are now in place. The Rouse Hill development[1] in Sydney's west is a notable example. However, typically, the operation and maintenance of water and sewerage schemes is undertaken in-house.

[1] In Rouse Hill a consortium will fund and project manage the provision of water, sewerage and drainage services. All costs are to be recovered from developers, including headworks, major works and financial servicing costs. The SWB will receive ownership of the assets constructed by the consortium in return for a refund of developer contributions.

There is widespread recognition of the scope for efficiency improvements from greater use of contracting out. The Geelong and District Water Board said that:

> Downsizing of an organisation may, based on economic considerations promote greater efficiencies and better concentration on the core activities of the business. Fundamentally, service and management of activities should be the main objective of an authority, particularly in metropolitan type areas, where private contract services are readily available. A downsizing of the organisation by contracting out will not only have the benefits of reducing the work force but reducing associated overheads. Overheads are a large imposition for any organisation ... Moreover any initial attempt to downsize an organisation will have a secondary effect in that administrative practices and needs should also be lessened.

Similarly the SWB said that it:

> ... has for some time recognised the advantages that can be obtained by contracting out much of its activities which it previously performed 'in house'. With the Government's demands for efficiency in the delivery of services and diminishing available resources to meet the demands of the community, contracting out has enabled the organisation to overcome the lack of fiscal resources by the more efficient use of resources.

A number of participants provided estimates of the gains from contracting out. The Hunter Water Corporation (HWC) said that contracting out all of its major construction projects had led to cost savings of 30 to 40 per cent. The VFF claimed that cost reductions of the order of 30 per cent could be achieved by extending contracting out in Victorian irrigation systems to include routine maintenance and water distribution.

Evans and Reynolds (IC 1990, p 51) argue that significant reductions in the cost of asset replacement are possible from the use of contractors 'partly because contracting provides the opportunity for the accelerated introduction of improved technology'. They cite evidence from the UK which suggests that trenchless pipelaying techniques have the potential to reduce urban mains laying costs by around 30 per cent, and estimates by the SWB that the margin between in-house and contract mains laying costs can be of the order of 15 to 20 per cent. Evans and Reynolds suggest that these estimates are confirmed by the fact that authorities which exclusively use contractors for asset replacement (for example, ACTEW) are able to replace mains at a substantially lower cost than other authorities. The South Australian Government acknowledged that the Engineering and Water Supply Department (EWS) would have difficulty in competing with private contractors in this work, especially in the provision of small diameter water and sewerage mains.

While acknowledging the potential for greater contracting out, a common view was that some services are supplied most efficiently in-house. The Local Government Engineers Association of Queensland, for example, suggested that some construction activities are most cost effectively undertaken by local councils. Some participants spoke of the opportunity for WSD authorities to profitably contract-in -- the DWR in New South Wales has entered the market for a number of

contract technical support functions. Participants also spoke of the need to maintain in-house capabilities to supervise private contractors, while Melbourne Water Corporation spoke of the importance of comparing in-house and out-house costs over a period of time rather than on a single job or item basis.

Some participants, particularly in country areas, referred to the poor quality of some work performed by contractors and the difficulties of attracting private operators to remote areas. The Shepparton Water Board, for example, stated:

> It is becoming increasingly difficult to attract good contractors outside of the capital cities, particularly for difficult and dangerous sewer construction work.
>
> Many of the contractors today have extremely poor business management skills, are under-capitalised, have poor standards of workmanship and appalling attitudes to occupational health and safety standards, requiring an excessive and costly amount of onsite supervision by the principal.

Amalgamation of authorities

Consolidation of small WSD authorities is another source of potential cost reduction.

In Victoria, the number of water authorities has been reduced from 400 to around 120 over the last decade, and further amalgamations are in train. The Victorian Government said that:

> ... a fragmented industry structure has created the untenable situation where a number of water utilities across the state are unviable without ongoing government assistance because of their small rating bases and lack of scale economies.

According to the Victorian Government, amalgamations have provided important benefits including:

- savings of up to $150 for the average household on combined water and sewerage bills;
- greater scope for system augmentation and investments to improve water quality;
- improved customer services -- for example, 24 hour emergency services; and
- a more integrated approach to water resource planning.

Melbourne Water Corporation said that, until recently, there had been 16 authorities providing WSD services around Port Phillip Bay and that this had led `to duplication of functions and activities, little or no competition and a complex and interwoven network of boundaries with no apparent logical definition'. Melbourne Water Corporation has since absorbed the functions of six adjoining water authorities and is now responsible for providing services to 80 per cent of the Port Phillip region.

Some participants also saw benefits in amalgamations of water agencies in New South Wales, Queensland and Tasmania. The Tasmanian Government said that fragmentation of services in that

State is a major source of inefficiency with some of the 68 regional water schemes and 80 sewerage schemes servicing less than 100 people. The Johnstone Shire Council suggested that joint water/sewerage systems for adjoining local authorities in Queensland could provide major savings to ratepayers.

However, a number of participants questioned whether the savings from amalgamations observed in Victoria would be replicated in other States. The PWD said that amalgamations in New South Wales in the late 1970s had reduced the number of country councils from over 170 to 125. It argued that the current arrangements in country New South Wales, under which WSD services are provided by 122 general purpose councils in conjunction with six county council-run regional water supply schemes, are highly cost-efficient. In support, the PWD pointed to a rate of return on services in country New South Wales which is not greatly different from rates achieved in a number of the major metropolitan authorities (see Table 2.2) and to an average operating cost per head of population for water and sewerage services of $97 which also compares favourably with the metropolitan agencies (see Table 3.1 below). The Department acknowledged that both the above calculations exclude the cost of administrative and advisory services that it provides to local councils free of charge.[2] Also, low operating costs may in part reflect overly capital intensive water and sewerage systems, encouraged by the availability of significant capital subsidies (see Section 3.3).

The PWD's stance on the cost effectiveness of local council provision of WSD services, was endorsed by a number of local government bodies. For example, the Narranderra Shire Council said that, for geographic reasons, the provision of services to small country towns entails some inefficiencies which would not be reduced by amalgamation. It said that:

> ... amalgamations will [not] improve efficiencies in areas of administration, technical and financial services. Local government bodies now have in place adequate facilities for provision and operation of these services and for collecting revenue for maintaining them; amalgamation of supply authorities into a separate organisation will duplicate these facilities, create additional bureaucracy, and increase costs.

A number of participants also pointed to a range of other advantages from local government provision, including the ability to better co-ordinate the provision of sewerage and drainage services and the greater accountability of service providers to local communities. These issues are discussed in Chapter 7.

[2] The PWD estimated that the inclusion in operating costs of the cost of managing the Country Towns Water Supply and Sewerage Program ($7.7 million in 1991-92) would have the effect of reducing the average RRR for New South Wales country authorities by about 0.1 of a percentage point.

Urban consolidation

CSIRO referred to savings in infrastructure costs that would accompany greater urban consolidation. According to the CSIRO, savings would arise from:

- the ability to take advantage of excess capacity in established networks;
- economies of serving higher density areas; and
- lower maintenance costs through, for example, reduced travelling times.

CSIRO referred to studies conducted for Melbourne and Sydney which indicate that consolidation would reduce infrastructure costs by several thousand dollars per lot. These cost savings are underpinned by the potential to use surplus capacity in existing systems and an assumption that technologies used in developed areas are also used in fringe developments. CSIRO said that alternatives such as localised sewage treatment would make fringe development more cost effective.

Research and development

A number of participants argued that research and development into improved water and sewerage technologies offers the prospect of significant cost savings.

On the urban front, participants spoke of the potential cost savings from the development of local sewage treatment systems and more water efficient appliances.

Irrigators drew attention to the potential cost savings from improved on-farm water use practices. The Australian Irrigators Council stated:

On-farm water use efficiency varies widely; from as low as 30% to as high as 90%. Very real gains have been made over the past 25 years through the adoption of better management and application technologies. ...

However, adoption of the better application technologies and advanced irrigation scheduling methods has by no means reached an optimum level and much still remains to be done.

There are still significant gaps in the research effort towards better technologies.

Research and development in the water sector is discussed further in Section 10.3.

3.2 Comparisons of costs across authorities

AWRC data on the cost per head of providing urban water and sewerage services in metropolitan and non-metropolitan regions across Australia are provided in Table 3.1. To improve compatibility between agencies, these costs include a notional 4 per cent RRR on assets.

The AWRC's data show very large variations in the cost of service provision.

As acknowledged by AWRC, caution is required in comparing costs between States and across agencies. For example, the use of a population base for costs does not account for the impact on costs of differences in the size of the industrial base serviced by different authorities. Nor does it allow for differences in geographic or topographic characteristics which influence the costs of service provision. Further, because major long-lived water assets such as dams or pumping stations are not used at full capacity immediately after their installation, per capita costs are likely to be higher in jurisdictions where the asset base is relatively new. This may in part explain the very high costs incurred by ACTEW. Finally, no account is taken of differences in standards of service, impacts on the receiving environment etc.

Table 3.1: **Cost of providing water and sewerage services[a], 1988-89**
($ per head of population)

Service	*Lowest*		*Highest*		*% difference*[b]
metropolitan water					
operating cost	45	Melbourne	84	Hunter	87
total cost	118	Perth	196	Hunter	66
metropolitan sewerage					
operating cost	35	Adelaide	67	Hunter	91
total cost	114	Melbourne	193	ACT	69
metropolitan total					
operating cost	84	Melbourne	151	Hunter	80
total cost	264	Perth	357	ACT	35
country urban water					
operating cost	44	Tas	154	WA	350
total cost	101	Tas	559	SA	554
country urban sewerage					
operating cost	40	Qld,Vic	53	SA	33
total cost	99	Vic	202	SA	104
country urban total					
operating cost	86	Vic	203	WA	136
total cost	216	Vic	761	SA	353

a Includes a 4 per cent RRR
b Highest minus lowest as a percentage of lowest
Source: AWRC 1991, pp 6-7

Nevertheless, it is unlikely that all of the differences in Table 3.1 can be attributed to such factors. In regard to the high operating costs incurred in the Hunter, the AWRC said that:

> [These] may be partly explained in terms of the local geography which enforces a higher degree of pumping and treatment requirements than is typical for the other agencies. In addition, the relatively high industrial component of the customer base can bring about some distortion of 'per head of population' or 'per service' indicators. However, at $84 the almost 100 per cent variation with respect to [Melbourne] ... is difficult to explain solely in terms of technical difficulties. (AWRC 1991, Appendix 1, p 1)

A feature in Table 3.1 is the very high cost of country water services provided by WAWA in Western Australia and the EWS in South Australia. While this is in part explained by topography, the AWRC said the figures also reflect the cost of maintaining extensive networks with relatively small customer bases (AWRC 1991, Appendix 1, p.9).

The AWRC estimated that if all metropolitan authorities could reduce their operating costs to the level achieved in Melbourne, the average RRR for metropolitan authorities would increase from 2.8 per cent to 3.7 per cent (AWRC 1991 p 12).

3.3 Institutional arrangements affect the costs of service provision

Lack of a commercial focus

Until recently, there have been few disciplines on WSD authorities to behave in a commercial fashion. Participants said that one outcome has been that many smaller authorities and councils have limited knowledge of the assets they control. The Queensland Government stated that:

> There is a general lack of accurate information within Local Authorities regarding assets (less than 20 per cent have effective asset registers) and their reserve capacities and current levels of service.

The Queensland Government indicated that a lack of accountability has allowed WSD authorities and governments alike to ignore the problem:

> It is only in recent years that valuation of assets has become an issue in itself. Since there were no requirements for contributions to sinking funds (even based on book value), nor formal financial performance indicators, the issue of asset values and valuation methods was not considered to be important.

The Tasmanian Government said that asset valuation in Tasmania is in its infancy. The main problem is to determine the condition of assets.

Participants also argued that lack of accountability has reduced the incentive for WSD authorities to investigate ways of reducing the cost of service provision.

Acceptance of performance monitoring as a means of improving the performance of WSD service providers is a recent phenomenon. To date, detailed monitoring has been mainly confined to the major metropolitan and regional water authorities, although in New South Wales, the PWD has compiled State-wide performance indicators for local council WSD operations since 1986.

According to participants, efforts to implement more commercial provision of WSD services are often frustrated by legacies of the past. The Water Authorities Association of Victoria, for instance, said that the state of asset registers in many Victorian authorities will delay their response to a State Government request to submit financial returns using current cost accounting techniques.

And, it appears that the accounting systems used by many WSD agencies do not allow for the proper comparison of the costs of undertaking work in-house and of employing private sector operators. The Murray River Management Board stated that:

> The inability of the existing accounting systems to clearly cost the comparisons between contract and employee based functions has been a serious impediment to developing contracting (p 13).

The South Australian Government acknowledged that accounting methods used by the EWS are not designed to produce 'equitable' cost comparisons with private contractors.

Irrigators claimed that the lack of accountability of WSD authorities means that water users have little opportunity to influence the type of services provided and the way in which these services are delivered. In regard to the Burdekin Dam, the Burdekin Dam Landowners Committee said that:

> The point must be made that the public subsidisation of the Queensland project is really subsidisation of the [Water Resources] Commission's inefficient use of manpower and waste of money in over-designed non-commercial reticulation construction. These inflated costs are then being applied as irrigation charges and capital costs that farmers are expected to pay under the glowing philosophy of 'user pays' which is fine if the user had sufficient say in what was being spent in the first place.

Government imposed constraints

Under the current institutional arrangements, governments have considerable discretion to impose non-commercial requirements on WSD authorities.

Many participants said that the requirement that WSD authorities observe public service labour market conditions and conventions imposes significant cost penalties. For example, WAWA stated:

> The Authority is ... required to conform to rigid public sector employment practices developed by agencies such as the Public Service Commission and the Department of Productivity and Labour Relations. This requirement acts as a significant constraint to the ability of the Authority to achieve targeted productivity gains (p 12).

In a similar vein, the Murrumbidgee Irrigation Management Board argued:

> The speed of change in work practices continues to be hindered by the Public Service unions and the archaic structure they have erected to stifle change. Even the NSW Government is powerless.

The close working relationship between government and WSD agencies is also viewed as an impediment to overcoming general inefficiencies in working arrangements -- for example, fragmented union coverage. Melbourne Water Corporation said that greater separation from government would provide it with the opportunity to:

- negotiate enterprise awards specifically tailored to match the nature of the organisation and its work

- significantly reduce the number of unions [with which it deals]
- foster a more commercial `mindset' with staff
- reinforce management prerogatives and speed up the appointment process by, for example, eliminating unnecessary long term acting arrangements engendered by the public service appeals system
- provide greater autonomy in industrial relations decisions
- offer flexible rewards based on performance, thus gaining enhanced commitment. (p 19)

The Australian Federation of Construction Contractors said that the maintenance of non-commercial day labour teams reduces the use of more efficient outside contractors.

Like other government utilities, water authorities are subject to borrowing restrictions. Some authorities commented that these restrictions inhibit commercial decision making. The Shepparton Water Board, for example, stated:

> Authorities generally are constrained in establishing their desired mix of borrowed and internally generated funds, through Government and Loan Council borrowing constraints. As far as the Victorian Government is concerned, it will not approve of any new authority borrowings whilst that authority has reserves of any kind, regardless of the purpose for which these funds have been generated.

That said, such constraints appear to have been a lesser problem for WSD authorities than for some other government utilities. This is because much infrastructure has been funded either by internally generated funds or directly by government. According to some participants, government constraints on price increases, which have reduced the ability of WSD authorities to generate investment funds, have therefore been more of a problem. The Mosman Council in Sydney argued that:

> With existing rate pegging, and the demand for a wide range of services by ratepayers on Local Government, financial resources are limited to such an extent, that upgrading of stormwater lines will be carried out at an unacceptably slow rate.

The Brisbane City Council said that because of financial constraints it has not been able to implement improvements in areas such as metering at the optimal rate.

Capital subsidies

In some country areas, the costs of water infrastructure are subsidised by either State or Commonwealth Governments.

At the State level, the New South Wales Government provides capital grants to local authorities for up to 50 per cent of the capital cost of approved new works after deducting developer contributions. Assistance is means tested to exclude some larger regional cities. In Queensland, subsidies of 20 per cent are payable for dams, bores, pumping stations, treatment plants, trunk

delivery mains, sewerage treatment and effluent disposal works and 10 per cent for urban stormwater drainage. Subsidies are not provided on components of the works funded from other grants or developer contributions. There is also provision for assistance through mechanisms such as interest holiday loans. In Tasmania, subsidies are provided on municipal borrowings for water and sewerage infrastructure. Operating costs of smaller authorities are also subsidised.

As discussed in Appendix B, through the Country Towns Water Supply Improvement Program (COWSIP), the Commonwealth provides financial assistance to State and Local Governments to improve the quality and quantity of water supplies for communities of fewer than 5000 people. Some $5 million was expended under the program in 1990-91.

Some COWSIP funds are spent on developing and improving Aboriginal water supplies under priorities determined by State and Territory Governments. Additional Commonwealth funds for this purpose are available under the Aboriginal and Torres Strait Islander Commission's (ATSIC) community infrastructure programs. Since 1988-89, more than 30 water supply systems and 23 sewerage systems have been funded.

While many participants acknowledged that capital subsidies had been important in promoting regional, social and public health objectives, there was disagreement as to whether these subsidies had encouraged efficient investments in water infrastructure.

The PWD argued that, in New South Wales, close scrutiny of proposed capital works in combination with limited government funds has ensured that capital subsidies have not led to wasteful investment in infrastructure.

In contrast, the Victorian Government argued that the availability of subsidies had encouraged investment in non-economic facilities and over-engineering of systems. It said that:

> There has been little incentive to search for lowest cost solutions since the subsidy and grants schemes have guaranteed that a large proportion of initial and ongoing costs would be picked up by government. As a result many schemes were overdesigned or oversized since water authorities knew that their consumers would be buffered from meeting the full cost of service provision (p 26).

The Victorian Government observed that capital subsidies have also contributed to the fragmentation of the industry in Victoria:

> The widespread availability of subsidies to the non-metropolitan sector was one the main reasons for the proliferation of often tiny water and sewerage utilities across the State. Cheap money in the past meant that there was little incentive for small towns to seek service provision from larger authorities in the area in order to achieve economies of scale in operations and thereby reduce total costs.

The Tasmanian Government said that capital subsidies tend to encourage complacency in the management of schemes. It argued that because consumers do not have to meet the full cost of subsidised schemes, the discipline on management to improve efficiency is diminished.

3.4 The gains from more cost-effective service provision

As input to this inquiry, the Commission sought updated information from the AWRC on potential cost savings in the WSD industry.[3] In contrast to the earlier work which estimated savings for urban water only, the information supplied by the AWRC to this inquiry separately identifies potential cost savings for five sub-groups within Australia's WSD industry -- metropolitan water, metropolitan sewerage, non-metropolitan water, non-metropolitan sewerage and irrigation.

The information focuses on the savings from reducing asset replacement costs and from lowering operations, maintenance and administration costs.

Given that capital represents around two-thirds of the cost of providing WSD services, asset replacement costs have a major bearing on the overall cost of service provision. The potential reductions in asset replacement costs identified by the AWRC are:

- 30 per cent for most medium and small size water and sewerage mains;
- 15 per cent for service reservoirs and water and sewerage pumping stations in metropolitan areas;
- 10 per cent for large water and sewerage mains, treatment plants and dams; and
- 5 per cent for irrigation channels (see Appendix D).

The differences in the estimated cost savings reflect: the varying extent to which project management and control is already applied in the different types of construction work; the extent to which competitive tendering for asset replacement is used; and whether emerging technologies such as trenchless main laying and replacement are applicable.

The greatest scope for savings lies in reducing the replacement costs of medium and small size mains. These are still frequently installed by agencies themselves. While such mains are individually small capital items compared to say a dam, collectively they account for around half of total water and sewerage assets.

Overall, these individual cost reductions translate to an average 18 per cent decline in the replacement cost of water and sewerage assets. Based on 1989-90 asset values, this equates to an annual saving of close to $390 million (see Appendix D).

Of course these savings can only be realised at the time of asset replacement. As discussed below, it will therefore be many years before the full savings can be realised.

[3] Earlier work is reported in IC 1990 (Chapter 5) and Manoel and Reynolds 1989.

The AWRC information also identifies possible cost savings of around 10 per cent from improved staffing practices in the administrative and maintenance areas. This equates to an annual saving of around $180 million. These savings would be available immediately the reforms are introduced. The SWB commented that, in its view, the AWRC had underestimated the potential for cost savings in this area. The Board said that if awards and agreements continue to give increased flexibility at the current rate, savings of up to 15 per cent in some urban authorities could be realised in the next few years.

When the flow-on effects to the wider economy are accounted for, the benefits of more cost-effective WSD service provision are even more significant. Using its ORANI model of the Australian economy, the Commission estimates that reducing costs in the water sector by $570 million -- the total saving identified by the AWRC -- would permanently increase Gross Domestic Product (GDP) by 0.21 per cent, worth around $800 million (in 1990-91 dollars). Around two-thirds of this gain comes from reducing the cost of metropolitan WSD services (see Appendix D).

However, as discussed in Appendix D, the majority of current assets will not be replaced for 25 to 45 years. Indeed, some recently installed storage dams may continue in operation for more than a century. Accordingly, the economy-wide gains associated with reduced asset replacement costs, worth around $530 million, will not be fully realised until the end of the 21st century. Moreover, the AWRC indicated that the water sector is currently in a period of relatively low investment in asset replacement. Asset replacement in the sector is not expected to return to its long-run norm until about 2010. This suggests that only a fraction of the gains from reduced asset replacement costs are potentially realisable in the next 20 years.

Given the above, the principal source of savings over the next few years would come from the identified reductions in operating costs. These savings are simulated to lead to an increase in GDP of around $270 million.

4 PRICING REFORM FOR URBAN WATER SERVICES

Despite the reform initiatives of recent years, pricing and charging arrangements for WSD services can be improved.

As discussed in Chapter 2, inefficient pricing has been associated with institutional arrangements which have not required, or even encouraged, WSD authorities to adopt a commercial approach to the provision of services. Institutional reforms in the water sector will therefore provide a spur to more efficient pricing (see Chapter 7).

However, pricing reform is important in its own right. There is much that can be done to improve pricing and charging practices in the WSD sector, as part of, or even before, institutional change. This chapter considers reforms to the pricing of urban WSD services.

4.1 Promoting better investment decisions

Like any good or service, the level of demand for water services will depend on the prices charged. At the same time, consumers' responses to price signals convey important information on the value that they place on those services.

Appropriate pricing is therefore necessary to ensure that the best use is made of existing systems and to guide the timing and nature of investments to augment system capacity. Given the very high cost of augmenting urban water systems, this latter function of pricing is crucial.

However, determining what constitutes efficient pricing of water services raises conceptual and implementation issues. For the reasons set out below, in practice, 'efficient' pricing regimes must inevitably depart from some aspects of text-book rules. A significant element of pragmatism is called for.

A starting point is to ask whether it is efficient to fully recover the costs of making WSD services available. Given the monopoly power of service providers (see Chapter 7), the long lives of water assets, the large increases in capacity which typically accompany system augmentations, and public health benefits, this is a very complex issue.

Moreover, once water assets are in place they rarely have alternative uses. Thus, it can be efficient to use those assets provided that charges at least cover operating costs. If an additional charge to recoup the cost of capital meant that assets lie idle, this would be inefficient.

Some would also argue that provided the expected benefits from an investment in water infrastructure exceed the expected costs, then it should go ahead irrespective of whether governments or users pay the capital costs.

But, as a general principle, this argument is deficient. It fails to account for the way government funding of infrastructure affects demand for WSD services. If people in a particular region or city know that a significant part of the costs of their infrastructure will be borne by taxpayers as a whole, they will have an incentive to demand a level of service which exceeds their true willingness to pay. Just as importantly, where governments pick up the bill, water authorities have few incentives to resist unreasonable demands.

The general consensus amongst both water agencies and governments is that past government acceptance of cost under-recovery has been the main reason for the plethora of ill-judged investments in infrastructure in the Australian water sector.

For this reason, the Commission considers that, as a general principle, WSD service provision should be underpinned by an objective of cost recovery.

As discussed in Chapter 5, some modification of this general principle is required in the irrigation sector given the substantial amount of irrigation works with little or no commercial value.

But non-commercial infrastructure is not a significant problem in the large majority of urban systems. Most continue to be augmented both to serve more customers and to provide higher levels of service. To promote better decision making on the level and timing of future investments in capacity and quality enhancement, pursuit of cost recovery (including a return on capital) is paramount.

4.2 New investments in urban infrastructure

One important step in achieving cost recovery is to place new investment decisions on a commercial footing. In its draft report, the Commission proposed that except where subsidisation of costs is an explicit government policy, new investment in urban WSD infrastructure should be undertaken only if the authority concerned can publicly demonstrate that there is a reasonable expectation that customer charges will be sufficient to cover costs, including the designated rate of return on capital.

While most urban authorities supported this proposal, two concerns were raised.

A number of participants argued that provision should be made for circumstances where an investment has significant environmental benefits or costs. For example, ABARE commented:

> The IC has specified that infrastructure investment should achieve a ... real rate of return. However, the IC should also outline what criteria infrastructure investment proposals should satisfy to meet the dual objectives of economic and ecological sustainability.

As discussed below, a policy of full cost recovery would, in principle, require that prices for urban WSD services include a component for any environmental damage associated with the use of those services.

Who should pay for investments to restore or promote the environment is a complex question. A version of the user pays principle -- the polluter pays -- suggests that those who have caused environmental damage should pay to remedy it. However, there are sometimes problems in sheeting home responsibility for pollution. Moreover, in urban centres, the community at large is often both the polluter and the beneficiary of environmental investments (eg enhanced sewage treatment facilities). In these circumstances, environmental levies are an appropriate way of ensuring full cost recovery on the investment concerned (see Chapter 9).

The Townsville City Council argued that a requirement for full cost recovery on new investments would be detrimental to growth:

> Infrastructure extensions at marginal cost in lieu of average costs has not been the financing logic upon which the existing infrastructure has been developed. To introduce such a new investment policy excluding subsidisation of costs would suggest the cost of infrastructure extension will rise inordinately with subsequent adverse effects on growth ...

In the Commission's view, a desire to encourage growth is no justification for subsidising infrastructure costs. As noted above, extensive subsidisation in the past has been a major contributor to investment in non-commercial water assets. There is also the question of whether governments should be encouraging new development at the fringes or looking to closer settlement of existing urban areas.

However, the comments made by the Townsville City Council raise the important issue of how to ensure cost recovery on new investments to enhance or expand existing systems, when those systems are not fully covering costs (including a commercial rate of return on capital). This problem arises because charges do not typically differentiate between customers in different parts of a city or town. Once an investment to extend services to a new area has occurred, for the purposes of calculating customer charges, the assets concerned are amalgamated with the pre-existing asset base.

In the Commission's view, this feature of current pricing systems does not remove the need to undertake a cost benefit analysis of proposed new investments. Such analysis should assess whether the willingness to pay of those customers who will benefit would be sufficient to permit full cost recovery, including the designated rate of return on capital, if differential charging were possible. Beyond this, the Commission suggests that the need to ensure full cost recovery on new investments be explicitly accounted for during the transition to full cost recovery on existing asset systems. As discussed later in the chapter, this would require adjustments to the caps placed on the permissible increases in authorities' charges or revenues to account for new investments.

Except where subsidisation of costs is an explicit government policy, investment in new urban WSD infrastructure should be premised on full cost recovery, including the designated rate of return on capital. The authority concerned should consider whether the willingness to pay of customers who will benefit would be sufficient to permit full cost recovery, if differential charges could be set for those customers.

4.3 Pricing structures

In pursuing cost recovery, prices must also have regard to the marginal costs of supplying services. As noted earlier in the report, marginal (usage) charges are the key determinant of how much water is demanded and therefore how intensively existing water infrastructure is used. Responses to changes in usage charges are crucial in signalling consumer valuations of additional services and thus in guiding the timing of new investment.

Accordingly, efficient pricing of urban WSD services is about finding a system of charges which gives a reasonable prospect of cost recovery on sound investments, while at the same time signalling to users the 'opportunity cost' of additional water services.

A number of alternatives can be considered including marginal cost pricing and two part tariffs.

Marginal cost pricing

Under a marginal cost pricing regime, a single price would be charged for services equal to the cost of supplying an additional unit of water or removing and treating extra sewage etc. Immediately after investments in new system capacity had been made, marginal charges would only cover ongoing operating costs and therefore make no contribution towards capital costs. But as demand increased over time, capacity constraints would signal an increase in the opportunity cost of supplying services using existing infrastructure and therefore the need to increase charges. That is, scarce capacity would be rationed through higher prices. This is in contrast to current arrangements where non-price rationing methods, such as restrictions on garden watering, are typically used.

In principle, marginal cost pricing has the advantage of ensuring that prices reflect the true opportunity cost of services and therefore that consumers' use of services is optimal. For sound investments it would also mean that, by the time the expected benefits of the next augmentation in capacity exceed the expected costs, an initial period of losses would have been followed by a period of surpluses associated with the price rationing of scarce capacity. Full cost recovery over the investment cycle would be possible.

However, while marginal cost pricing has theoretical appeal, it has drawbacks. Determining the marginal cost of supplying individual water services is complicated because many costs incurred by WSD authorities are 'common' -- that is, they cannot readily be split between, say, water and sewerage or between customers in different locations. Further, as Paterson has argued:

> Unfortunately, reality always complicates the application of the marginal rules and we are then transported from the world of science to the world of art. This is because any real world system of production and distribution has literally scores of variables in its production function and hundreds of marginals. ... We must choose, at most, a handful of these to price on. In that choice we express a quite subjective vision of what is to be considered both important and suitable for the exercise of consumer choice. (Paterson 1991, p. 1)

Further, unacceptably high costs of metering in small municipalities may preclude any form of marginal charging.

Also, marginal cost pricing would involve significant price fluctuations. This is because systems are generally expanded through the addition of large blocks of capacity -- for example the construction of a new dam -- while demand grows more evenly over time. This means that after each new augmentation there is surplus capacity and hence under marginal cost pricing, prices would fall sharply. Thus consumers who did not accurately foresee future price increases, would be encouraged by low prices to develop and maintain gardens, only to have water rationed through price increases when the next capacity constraint was approached. Following new investment in capacity, water would again return to a low price. ACTEW said that such fluctuations would lead to customer confusion:

> For all members of the community, it means adjusting their lifestyle which takes years of reinforcement. ... Most members of our community are not economists and do not understand why water prices should vary so greatly. They will resent being forced to change their lifestyle to conserve water only to discover later that water is no longer scarce.

The problems created by periodic price rationing of sewerage services would be even more pronounced.

Experience suggests that, for these sorts of reasons, governments will not allow WSD agencies to ration services solely by means of price even though this may be desirable on efficiency grounds. Typically, as capacity constraints emerge the response has been to augment systems. If this happens, marginal cost pricing abandoned at full capacity would not avoid the problem of premature system augmentation and would be an ineffective tool for pursuing cost recovery. As Melbourne Water Corporation commented:

> ... at best we can approach marginal cost pricing in a muted sense because if you look at it in a purely theoretical sense, you're looking at pricing spikes that can't be achieved in reality ... marginal cost pricing ... as it's set out in theory [is] unworkable.

Two part tariffs

In view of the problems with pure marginal cost pricing of water, authorities have looked to pricing systems which retain a central role for marginal or usage charges but which avoid undue price fluctuations. In particular, a number of agencies have introduced two part tariff arrangements comprising a consumption charge and an access charge. The Victorian Government summarised the rationale for, and the basis of, one version of this charging system:

> The consumption charge covers the short run marginal costs (ie the day to day running expenses) of the authority as well as the marginal capacity costs of the authority's next investment.
>
> As the authority moves closer to the need for augmentation works, the marginal capacity cost component of the tariff increases as a proportion of the total price faced by consumers. This effectively signals to consumers the cost of the authority's next investment. They in turn, through their consumption responses, allow the supplier to determine the timing and scale of the supply augmentation.
>
> The service charge component of the tariff is aimed at addressing the deficit problem associated with decreasing average costs and natural monopolies. The charge is calculated as a residual to achieve an independently determined revenue yield. Because it does not depend on consumption, it is a non-distortionary method of raising the required revenue to meet the remainder of short run average costs not covered by the consumption component (eg capital servicing costs).

Under a two part tariff arrangement, the usage charge increases over time in much the same way as under a pure marginal cost pricing system.

However, while the usage charge increases, the access charge will remain stable or perhaps even decline[1]. Thus total water bills will show less volatility over time than under the pure marginal cost pricing approach. In fact, for those with below average consumption, water bills may decline (in real terms) over time -- rewarding them for their frugality as capacity constraints are approached or realised. On the other hand, those with above average consumption may see their bills rise, encouraging them to economise.

Greater stability in total water bills in turn eases political pressure to build new capacity as soon as marginal costs begin to rise in response to capacity constraints. Thus premature augmentation of systems is likely to be less of a problem than under the pure marginal cost pricing approach.

[1] If an authority seeks to maintain a roughly constant revenue yield over the life of a system, then increased usage charges over time must necessarily be offset by reduced access charges. This effect is reinforced by the addition of new customers to the network. If, however, charges are structured to provide increasing total revenues over the life of the system as utilisation increases, it may be that access charges are simply held constant.

On balance, the Commission believes that for urban water, two part tariffs represent the most practical way of marrying the need for cost recovery on infrastructure and the requirement that usage charges are related to the opportunity costs of making water available.

A desirable characteristic of any two part tariff arrangement is the requirement for consumers to pay for every unit of water used. That is, there should be no water allowance provided in return for the payment of an access charge.

It is true that demand for 'inside' water for drinking and washing is less price responsive than demand for 'outside' water for gardens etc. However, there is scope for households to economise on their use of inside water, given the availability of water saving devices such as shower roses and dual flush toilets. Decisions to install such devices should have regard to the value/cost of the water saved.

Reductions in the use of inside water stemming from pay-for-use pricing will in turn reduce the costs of sewage treatment. This effect has been observed in a number of jurisdictions including the Hunter and Toowoomba.

Urban authorities should pursue full cost recovery on the provision of water through a two part tariff, comprising an access charge plus a usage charge for each KL of water supplied. The usage charge should be set to cover the costs of making additional water available plus a loading to ration supply when capacity in the system is scarce. The access charge should be set so that, in total, the desired revenue yield is achieved over the life of an asset system.

Variations to the usage charge are possible. As noted in Chapter 2, a number of authorities already have in place increasing block tariffs for water.

The usage charge can be linked to other initiatives such as seasonal or time of day pricing of water. In its draft report, the Commission proposed that WSD authorities introduce a seasonal differential in per KL water charges. The rationale was that increased water demand during drier months contributes to the need for expensive system augmentations and entails costly excess capacity in wetter months and wet years. The Commission argued therefore that prices charged for water during drier months should reflect the additional demand placed on systems, particularly as there is some discretionary element involved in the use of water on gardens etc.

At the draft report hearings some participants supported the concept, but said that the same effect could be achieved through tiered usage charges in combination with seasonal billing, as opposed to different charges at different times of the year. Melbourne Water Corporation said that it:

> ... supports the principle of higher charges in summer to reflect the higher cost of supply. However, different tariffs for different seasons are not necessary if the tariff structure includes an increasing price step and reading and billing are conducted at least twice a year to coincide with the high and low demand periods.

Other participants were more cautious about the benefits of seasonal pricing. The Geelong and District Water Board pointed out that while residential consumption may vary in response to seasonal factors, commerce and industry have much more stable demand. The Western Australian Water Authority (WAWA) referred to a study suggesting that the cost differential of providing winter and summer water for Melbourne is only 5 cents per KL (Dixon and Baker 1992), and to the administrative costs of implementing seasonal pricing:

> Changing to seasonal pricing would require all meters to be read in a relatively short time period, so as to correctly capture summer and winter consumption. This would involve either a completely different meter reading procedure or alternatively installation of meters that could record time of year consumptions. Both options, at the current stage of labour practices and technology would involve an increase in costs.

ACTEW, amongst others, argued that seasonal tariffs may be ineffective because there is a lag between consumption, meter reading and billing.

However, implementation costs and difficulties notwithstanding, there was widespread agreement that seasonal pricing could be valuable in some circumstances. WAWA said that seasonal pricing could be desirable 'in some country schemes which confront real supply scarcity and high potential augmentation costs', and the Townsville City Council stated:

> We would see some advantage in putting a seasonal differential in ... October, November, December, where our peak daily consumptions occur ... and show up all of the inadequacies of our distribution system.

Given the different circumstances applying in various parts of Australia, the Commission considers that individual authorities should investigate the benefits and costs of seasonal water pricing implemented either through seasonal charges or through tiered usage charges. Both approaches would require seasonal billing. The investigation could usefully extend in larger centres to time of day pricing. This already applies to services such as electricity. Melbourne Water Corporation is investigating time of day pricing in relation to the significant impact on system capacity of consumption between 5pm and 9pm. More even consumption throughout the day would therefore reduce the pressures for system augmentation. The Corporation is currently trialling the automatic meter reading technology which would be required to implement time of day pricing.

WSD authorities should investigate the benefits and costs of seasonal water pricing arrangements and time of day pricing. The effects of seasonal pricing could be captured either through charges which vary over the year or through tiered usage charges.

The preceding discussion presumes that customers are metered. However, the costs of metering some communities may be high relative to the efficiency gains available from the implementation of pay for use pricing. This could be the case in those areas where available water supplies are more than adequate to meet demand in the foreseeable future. In such cases, access charges set to fully cover an authority's costs over the life of a system would be appropriate.

Pricing arrangements for other urban services

Sewage disposal

Demand for domestic sewerage services is unlikely to be influenced by price to the same degree as demand for water. This is because, as noted above, households have less scope to adjust their use of 'inside' water for cleaning and toilet flushing etc in response to price changes, than to adjust 'discretionary' use of water for gardens etc. This observation led the Commission to conclude in its draft report that fixed charges for sewerage services are compatible with the efficient pursuit of cost recovery.

This conclusion was challenged by a number of participants at the draft report hearings. The Geelong and District Water Board, for example, argued that volumetric charges for sewage disposal will enhance the efficiency gains available from pay-for-use water pricing. It stated that a volumetric system:

> ... brings home to the customer the consequences of excessive usage and the needs and costs for proper environmental disposal.

The Board is soon to introduce the type of pay-for-use sewerage charge applying in the Hunter. There, a usage charge is imputed based on a percentage of water inflow presumed to be returned to the sewerage system. The Board rejected the concept of a usage charge related to the number of pedestals claiming that the link between the number of plumbing fixtures and usage is weak, particularly in the domestic sector.

There is some scope to influence the level of waste water disposal through the sort of imputed usage charge levied in the Hunter, and thereby to enhance the efficiency gains available from pay-for-use water pricing. However, calculation of the fraction of water supplied presumed to be returned to the sewerage system could prove contentious, given differences in patterns of water use between households.

WSD authorities should consider charging for sewerage services according to the percentage of water returned to the sewerage system.

Drainage

As discussed in Chapter 2, in most parts of Australia, there are no specific charges for urban drainage. Rather, drainage works are funded from local government rate collections.

The interconnection between specific drainage works and drainage provided as part of the road network, is a significant constraint on the scope to levy stand alone drainage charges. Even where specific charges can be levied to cover the cost of separately identifiable drainage works, it is debatable whether a workable pay-for-use charging system could be devised. Relating charges to the size of the property drained would be one possibility. However, as pointed out by the Local Government Engineers Association of Queensland, the benefits of drainage are more closely related to a property's location -- high or low lying etc -- than to its size. Institutional change rather than pricing reform is the key to dealing with urban drainage problems (see Chapter 7).

Trade waste

As set out in Chapter 2, many WSD authorities impose specific trade waste charges linked to the quantity and the strength of wastes discharged. This is an appropriate response to the additional demands placed on sewerage systems by trade wastes.

However, many authorities faced with major trade waste discharges have yet to implement pricing systems which recognise the differential impacts of trade wastes and standard sewage discharges. Without such differentiation, an unfair cost burden is placed on other users of the sewerage system.

WSD authorities which are faced with significant trade waste discharges should have in place charges based on the quantity and strength of the waste discharged.

4.4 What costs should be covered by prices?

This issue is best approached by asking what is the cost to a water authority of doing business. If these services were to be provided on a continuing basis by a private operator, that operator would need to generate sufficient revenue to cover operating, maintenance and administration costs,

depreciation of infrastructure and debt servicing requirements and to pay a satisfactory return on equity funds. A private operator might, of course, incur losses when utilisation of new water infrastructure is relatively low. However, over the life of that infrastructure, the private operator's objective would be to earn a commercial rate of return.

The need to recoup operations, maintenance and administration expenses, depreciation and a component to meet interest charges is widely accepted by WSD agencies.

However, the need to earn a return on government or community equity in infrastructure is more contentious. Much of this contention concerns who should receive the return on equity rather than whether such a return should be sought. This issue is canvassed in Chapter 6. At least among the major authorities, there is general recognition that a return on equity is a cost of making water services available.

How should capital costs be calculated?

One issue is whether interest and equity costs should be directly calculated or whether they should be implicitly covered by setting charges which will provide a prescribed rate of return on an authority's asset base after operating expenses and depreciation have been accounted for.

In principle, direct calculation of debt and equity costs would be preferable. It would make it easier, for example, to adjust charges to reflect short term fluctuations in the costs of capital, and to reflect the impact of differing debt equity ratios on the 'average' cost of capital to individual authorities.

However, in practice, direct calculation of capital costs is not possible, because with government ownership, there is no direct market assessment of the cost to an authority of equity funds. Accordingly, the Commission sees little alternative to authorities setting prices to achieve an overall rate of return on their assets.

But there are significant drawbacks with this approach.

As discussed below, a number of adjustments must be made to authorities' asset bases to ensure that owner governments rather than customers bear the consequences of bad investment decisions and that customers are not charged twice for assets provided by developers or funded by developer charges. These adjustments are not without their problems.

Further, given the long-lived nature of water assets, asset valuation in general is a contentious issue (see Chapter 6). Yet asset valuations are central to the rate of return approach.

Also, under a rate of return approach, it may be difficult to provide flexibility in levels of cost recovery over the life of systems. As noted above, in a commercial environment, it is conceivable that losses would be incurred in the years immediately following the installation of major new

capital equipment. What is important is not whether the required rate of return is achieved in any particular year, but rather that (for sound investments) it is achieved over the full life of the asset systems in question. Of course, the addition of new customers to the network will naturally operate to increase an authority's rate of return over time. Increases in usage charges when capacity constraints are approached will have the same effect.

What adjustments to authorities' asset bases are required?

As noted above, a number of adjustments to authorities' asset bases must be made to ensure that customers do not pay unwarranted capital charges.

In its draft report, the Commission proposed that asset bases be adjusted to exclude assets with no commercial value and assets provided by developers or funded through developer charges.

Assets with limited or no commercial value

Two groups of assets with limited or no commercial value can be identified.

First, there are assets used to provide community service obligations for which no government funding is provided, or which are funded at a level insufficient to allow an authority to fully cover its costs, including the designated rate of return on capital. A requirement for an authority to earn the designated rate of return on an asset base which included these assets, would imply overcharging on remaining assets.

Second, where poor investment decisions have been made, it may not be possible for an authority to set charges to fully cover costs without unduly exploiting its monopoly power. Thus, for example, where demand projections have proved overly optimistic, full cost recovery may require excessive access or usage charges.

A number of government agencies and major authorities supported the approach of adjusting asset bases to make provision for assets with limited or no commercial value when setting capital charges. Melbourne Water Corporation said that the exclusion of assets used to deliver CSOs is the current practice.

WAWA, while supporting the thrust of the Commission's approach, argued that adjustments for non-commercial assets should be made on a consistent basis across authorities to facilitate performance comparisons. It went on to suggest that:

> ... the AWRC may be the appropriate body to develop a definition as to what constitutes an 'asset with no commercial value'.

The New South Wales Treasury argued that a practice of netting out assets with no commercial value potentially conflicts with a related Commission proposal to value assets using the Modern Equivalent Asset methodology. As discussed in Chapter 6, this approach values an asset with

reference to the lowest cost of replicating its service potential. However, the New South Wales Treasury supported the exclusion of assets necessary to meet community service obligations for which there is no expectation of a financial return.

The Commission sees no need to alter the broad thrust of its draft proposal for the treatment of non-commercial assets.

However, provisions for asset write down would give authorities wide scope to achieve the required rate of return and it is therefore important to consider how these adjustments might be made to minimise the potential for misuse.

For assets used to provide CSOs, a policy of government funding to make up the shortfall in revenue, including the designated rate of return on capital, would obviate the need for any adjustment to the authority's asset base. In Chapter 6, the Commission has recommended that CSOs be fully funded by the government concerned. And while it suggests that the methodology used to estimate the cost of a CSO should be determined on a case by case basis, the basic thrust of the Commission's approach is that the valuation should approximate long run avoidable cost. This would generally include a capital component.

If, however, funding for a CSO is not provided, or is insufficient to cover capital costs, the assets required to meet the obligation could be written down to a level which reflects their actual earning capacity. In essence, these assets would be revalued by capitalising the resulting on-going losses to the authority and deducting them from existing asset values.

The same sort of adjustment could be made to the value of asset systems installed as a result of poor investment decisions. However, the need for such adjustments in urban systems will be rare.

Of course the danger with this approach is that authorities could conceal poor performance by simply making adjustments to their asset bases, or write down asset values to reflect government price caps. In one sense, any asset system which is not earning a satisfactory rate of return for whatever reason, could be regarded as non-commercial. Clearly, adjustments of this sort would defeat the objectives underlying a requirement for authorities to earn the designated rate of return on assets under their control.

There is no easy solution.

A requirement for authorities to publicly document and explain adjustments to asset bases, will go some way to preventing misuse of such provisions. There might also be a role for a body such as the AWRC to develop industry guidelines on what constitutes an asset with limited or no commercial value.

Owner governments would also have strong financial incentives to ensure that unwarranted asset write downs do not occur. A write down in asset values would automatically reduce an owner government's entitlement to dividends. Indeed, given that interest costs on assets funded by debt must be met even if the value of the assets is subsequently written down, all of the costs of the write down would reside with the equity holder.

Developer provided and funded assets

The Commission's proposal to exclude assets provided by developers or funded from developer charges from authorities' asset bases was the subject of much debate at the draft report hearings. The proposal was based on the argument that consumers pay for these assets when they buy land, and accordingly a WSD authority incurs no liability to service a debt on these assets or pay a return on equity. Thus their inclusion in the asset base used to determine capital charges would represent double charging.

The South Australian and Victorian Governments and Melbourne Water Corporation argued that all commercially viable assets under the control of an authority should earn a rate of return, irrespective of how their purchase was funded. The Victorian Government, for example, stated:

> The only difference between developer-funded assets and those funded through rates and charges are that the former are paid for up-front rather than over time. Consequently, it is no more double charging to earn a rate of return on developer funded assets than it is on assets funded through rates and charges.

The South Australian Government concluded that:

> ... it is difficult to sustain the view that double charging is implicit in a combination of developer funded infrastructure provision with economically efficient service pricing practices. It would also follow that there may be no justification for reducing the asset base by the amount of developer provided or funded assets in order to measure rates of return. [s7.14]

WAWA drew a distinction between those assets provided by developers or funded by developer charges which an authority has an obligation to maintain and replace, and those for which no such obligation exists. It argued that in the former case, efficient pricing would require that both depreciation and a rate of return be charged on the assets concerned, but that in the latter case, netting out from the authority's asset base would be efficient. In support WAWA contended that:

> This difference of obligations, must be reflected in differences in the required treatment of capital contributions which directly relate to increases in service obligations. Where a developer contributes assets or funds assets by way of headworks contributions, then the developer is obtaining a right to an ongoing level of service, for the properties involved. The right obtained, it is the authority's continuing obligation to provide the standard level of service, in respect to the properties concerned, into perpetuity.

> As such, the capital contributed adds to the authority's underlying stock of physical assets available to maintain these services. As the value of the assets diminish over time through depreciation, this additional capacity should be retained within an authority by way of an Asset Replacement Provision or Reserve...
>
> This is the accounting rationale for charging depreciation on assets contributed by developers and for these assets to form part of the capital base of an authority when assessing ROI.

The NSW Treasury claimed that the Commission's draft recommendation was inconsistent with accounting standards which require that all assets controlled by an organisation be treated equally. Other participants expressed strong support for the position taken by the Commission in the draft report. The Geelong and District Water Board argued that:

> Clearly, developer provided assets have been handed over "free of charge" and apart from replacement (via depreciation) should not be expected to provide further return.

The Board went on to say that if depreciation is not charged on developer provided assets, fluctuations in prices would increase when asset renewals are required. The SWB acknowledged a potential problem of double dipping, although it argued that this is not a problem in practice, because developer charges do not meet the full costs of extending systems to new areas.

In assessing the merits of the competing arguments, it is important to separate the question of whether depreciation should be charged on assets provided or funded by developers from the question of whether authorities should seek a return on the capital costs of those assets.

The Commission considers that depreciation charges should apply to developer provided or funded assets. The primary reason for this is to allow authorities to make gradual provision for the replacement of these assets in the future. If depreciation is not provided for, replacement would be funded by up-front capital charges or through borrowings. In the former case, the volatility of WSD charges would increase. In the latter case, customers would finance depreciation as the loan is paid off.

Despite contrary arguments, the Commission remains of the view that, in principle, it is unnecessary for authorities to seek a rate of return on developer provided or funded assets.

A rate of return is designed to provide an authority with sufficient revenue to service its debt and to pay the community a return on equity in a WSD authority. In this sense, equity holders are only entitled to a return on the capital they have contributed (directly or through retained earnings) to the authority. In the Commission's view, capital provided to authorities free of charge by developers or through developer charges does not change the wider community's equity in that authority.

Accordingly, the addition to an authority's asset base of this capital -- which has been fully paid for by customers purchasing serviced land -- does not necessitate an increase in capital charges.

However, the Commission accepts that this approach would see similar assets treated differently depending on the source of funding, and might thus contravene accepted accounting standards. Moreover, given the regionally aggregated billing arrangements that apply in the water sector, netting out assets provided by developers or funded by developer charges would see all customers benefit from lower charges, rather than only those in new sub-divisions.

An alternative, and in the Commission's view preferable, approach would require authorities to earn a return on assets provided by developers or funded by developer charges, but to refund that return to the customers who have funded these assets through lower (access) charges. In effect, customers in new sub-divisions would become equity holders and receive their dividends through reduced charges for water services. While involving possibly higher administrative costs, this system would ensure that only those customers who pay for their capital in the price of serviced land, benefit from lower charges.

Should prices include a component for environmental damage?

A policy of cost recovery requires that prices for urban WSD services include a component for any environmental damage caused through water use or waste water disposal.

To some degree this already happens. For example, environmental levies to upgrade sewage treatment works etc apply in a number of Australian cities. Where the community as a whole is both the polluter and the beneficiary of such environmental works, the Commission supports the use of environmental levies.

As discussed in Chapter 9, conceptual and methodological problems make it very difficult to calculate a component for environmental damage which could be incorporated in the price charged for the provision of WSD services.

However, considerable research effort is being devoted to finding better ways of measuring environmental damage. As progress is made in the future in quantifying and attributing responsibility for water-related environmental damage, water authorities should respond by increasing their prices for services accordingly.

Prices for urban WSD services should be sufficient to cover operating, maintenance, administration and depreciation costs and to provide the designated rate of return on the adjusted asset base. Where quantifiable and attributable, the costs of environmental damage associated with the use of these services should be reflected in prices.

Some flexibility should be provided to authorities to increase their rates of return over time as usage of systems increases, subject to the requirement that they earn the designated rate over the life of asset systems.

When calculating the rate of return component, the value of assets used to provide community service obligations which are not fully funded by government, should be written down by capitalising the resulting on-going losses to the authority and deducting them from existing asset values. Similar adjustments to asset values should be made to account for poor investment decisions. The basis for adjustments to authorities' asset bases should be documented in their financial statements.

When calculating capital charges, authorities' asset bases should include assets provided by developers or funded through developer charges. However, the rate of return earned on those assets should be refunded to customers in new sub-divisions in the form of lower access charges for water services.

What is an appropriate rate of return?

The appropriate target rate of return for WSD assets is another contentious issue.

In its draft report, the Commission argued that, unlike many other government business enterprises, water authorities currently face no competition from either other government enterprises or private sector operators and that accordingly, the risk to investors is commensurately lower. The Commission concluded that the target rate of return could be set equal to the long term bond rate -- or around 5 per cent real -- with little risk of encouraging over-investment in WSD infrastructure. It also said that this target could be adjusted in the future if there are significant changes in the bond rate.

At the draft report hearings, participants variously argued that the proposed rate of 5 per cent was too high, too low or about right.

Those arguing that the rate was too high were concerned about the price increases for services it would entail and about the difficulty of securing this level of return on investments directed at environmental enhancement. The South Australian Government said that:

> Actions by government to either reduce pollution impacts of waste water treatment or to improve drinking water quality in accordance with public health standards require large capital investment. It is not clear that it will be easy to achieve improved rates of return on such investments given that the same basic general service is still being provided.

Those arguing that the rate was too low said that the Commission had underestimated the risks faced by WSD operators. Some said that uncertainties about the imposition of more stringent environment controls increase the risks of doing business, given that regulations governing pricing may not allow cost pass-through. Melbourne Water Corporation said that the risk faced by an authority could not be assessed in isolation from the regulations governing increases in prices, revenues etc. It said that in the UK, the actions of the regulator constitute the greatest risk to investors in the privatised water authorities.

In the light of these sorts of risks, the SWB argued that the target rate of return should be 6 per cent, while the Victorian Government argued that a rate of 8 per cent is appropriate. A rate of 8 per cent is also specified in guidelines recently issued by the Commonwealth Department of Finance (1992) for cost-benefit analyses for Commonwealth Government projects. These guidelines do, however, make provision for a lower rate to be used in circumstances 'when the intended action has a cash flow which is known with virtual or complete certainty and is not subject to any significant amount of risk ...'

Melbourne Water Corporation argued that while 5 per cent was too low, it is inappropriate to set a uniform target across the water sector. It said that:

> The target rate of return for any business should reflect that business' cost of capital which is the opportunity cost of funds employed in the business.
>
> Each business has different risk, both financial and operational. To prescribe a universal rate of return is to ignore the individual circumstances of a business. The application of a universal rate of return target in the water industry therefore depends on whether or not the component businesses have similar risk profiles.

The Commission rejects the argument that 5 per cent is too high. In approximating the real long term bond rate, it represents the premium required on a riskless investment. From this perspective, 5 per cent should generally be viewed as the baseline return for WSD services. Of course, some projects which provide benefits extending beyond direct water users (for example, projects which provide significant environmental or public health benefits), may warrant some government subsidy. In such cases, explicit government payments to an authority to cover the shortfall in revenue should be made. That is, such projects should be treated in the same way as community service obligations.

As to the argument that a 5 per cent real rate of return is too low, the Commission accepts that the provision of WSD services is not risk free. While suppliers do not face competition, government controls on prices and/or revenues have the potential to squeeze operators in the face of more

stringent environmental requirements etc. And there is also some risk associated with population movement between cities and regions.

However, in the Commission's view these risks are not large. The introduction of environmental levies in a number of Australian cities demonstrates a willingness on the part of governments to introduce specific charges to fund environmental enhancements. At least in major cities, the risk that population outflow will lead to chronic excess system capacity is very small.

There is an argument for tailoring rates of return to the circumstances of individual authorities and of individual investments. For example, investments needed to supply a major industry are likely to be more risky than those required to supply households. Thus it would be inappropriate to preclude the possibility of a rate of return above the general benchmark in some circumstances.

The Commission concludes that 5 per cent real should be regarded as the baseline rate of return for investments in urban WSD assets. Where an authority can demonstrate that an investment is risky, a higher rate of return could be appropriate. However, this is unlikely to be the case for most investments in urban systems.

The target real rate of return for investments in urban WSD infrastructure should generally be 5 per cent. This target should be adjusted in the future if there is a significant change in the real long term bond rate. If an authority can publicly demonstrate that a particular investment entails a significant element of risk, a higher rate of return should be sought.

4.5 Phasing in cost recovery on existing assets

The preceding discussion abstracts from the rate at which cost recovery on existing assets should proceed. Also, the scope for improved cost-efficiency (of service provision) to contribute to higher rates of return has been put to one side.

Of the metropolitan authorities, Melbourne Water Corporation currently achieves a RRR of 5.8 per cent, which suggests that Melbourne water consumers as a group may be overcharged. Realisation of the potential cost savings identified in Chapter 3 would allow some of the other metropolitan agencies to achieve a 5 per cent real rate of return without the need for price increases.

Of course, improving the cost-efficiency of service provision takes time. Indeed, the savings potentially available from reduced asset replacement costs will take many years to fully materialise. Best practice is also a moving target -- new sources of savings continue to emerge. Thus in those areas where charges for water services are not sufficient to provide a 5 per cent real rate of return, price increases should not be delayed until all identified cost savings have been achieved. This is

particularly important in many country urban systems, where charges will have to rise quite significantly to achieve a 5 per cent real rate of return, even after adjustments to asset bases have been made and cost savings realised.

The issue is therefore how best to marry necessary price increases with the need to encourage authorities to look to cost savings to improve their commercial performance.

One approach is to set limits on the rate at which WSD authorities can increase prices. Most water agencies in Australia already face explicit or implicit price caps. As discussed in Chapter 2, the cap is typically set equal to the rate of inflation.

As currently applied, these price caps relate to both prices as a whole and prices charged to individual customers. That is, authorities are often not permitted to increase charges to any customer by more than the rate of inflation. This places significant constraints on their efforts to restructure patterns of charging -- for example, to reduce dependence on property based charges.

A slightly different approach is to impose a cap on the permissible increase in an authority's total revenues. This is very similar to a price cap on the overall basket of services provided by an authority. Indeed, in systems where there is no demand growth, or where the revenue cap explicitly accounts for the addition of new customers to the network, the two mechanisms may be identical.

Like price caps applied at the individual customer level, revenue caps encourage authorities to pursue the required rate of return by reducing costs as well as increasing prices. They also give authorities much greater flexibility to restructure charges and thereby improve the efficiency of their pricing regimes.

But revenue caps are not without problems. Like price caps, they make it more difficult to use higher prices to ration scarce capacity as the next system augmentation is approached. And, as the potential cost savings associated with asset replacement will not be realised for many years, there is the danger that the imposition of stringent revenue caps will see the move to full cost recovery proceed too slowly. Conversely, generous revenue caps will reduce the discipline on authorities to reduce costs.

In its draft report, the Commission argued that, despite these shortcomings, revenue caps would be an acceptable way of permitting necessary increases in prices, while at the same time putting a discipline on WSD authorities to reduce their costs.

There was a mixed response to this proposal.

A number of participants, drew attention to implementation problems. For example, the Geelong and District Water Board argued that revenue caps should make explicit provision for a range of circumstances:

> ... revenue caps should be established having regard to the need for systems improvements, levels of service and operating conditions etc. and should be developed for each agency as appropriate. Such an approach would be similar to that of the CPI plus k factor imposed upon British authorities.

A similar view was expressed by the Victorian Government which went on to argue that a business plan approach is more appropriate.

> In the opinion of the Victorian Government, a more effective tool to protect the ratepayers is the business plan. In Victoria, business plans for non-metropolitan urban water authorities separately identify revenue, prices, costs and rates of return each year...

The use of a revenue cap within a business plan was supported by the Colac District Water Board. The SWB argued that revenue caps cannot be set in isolation from a time frame for achieving the target rate of return. It went on to suggest that the Commission 'should be more forthright in suggesting a suitable timeframe for attaining the target return'. The Board also drew attention to the important issue of how new and existing investments should be treated within the revenue cap given the Commission's draft proposal that new investments only proceed if they can generate the target rate of return.

The arguments put by participants have convinced the Commission that a simple revenue cap is not appropriate.

While it is possible to build considerable flexibility into a revenue cap to make provision for annual changes in the consumption of water, the need for environmental enhancements etc, a more fundamental problem is the relationship between a revenue cap and the time frame for achieving the target rate of return. If a time frame is not specified, much of the discipline on an authority to reduce costs is lost. The outcome would be to simply increase the time taken to achieve the target rate of return.

One approach would be to require all urban WSD service providers to achieve the 5 per cent target rate of return within a specified period.

However, given the current spread of rates of return across authorities, this approach has major shortcomings. A time frame based on some notion of the current position of the average WSD authority, could put too much pressure on those authorities with very low rates of return and reduce the pressure on those authorities already achieving a rate of return close to the 5 per cent target.

An alternative, and in the Commission's view preferable, approach is to require all authorities to increase their rates of return by an agreed percentage each year, until the target rate is achieved. The combination of price increases and productivity improvements required to deliver the increased rate of return each year, would be left to authorities and their owner governments (and any other price setting tribunals) to negotiate within the sort of business planning framework operating in Victoria. Negotiations on productivity improvements could have regard to the

achievements of other authorities in reducing costs. By introducing an element of 'yardstick' competition, the pressure on authorities to improve productivity would be determined, in the first instance, by best practice in the sector.

The experience of two metropolitan authorities provides one indication of the magnitude of the annual increase in the rate of return which might be required under this sort of arrangement. In the late 1980s, the then Hunter Water Board increased its RRR by around 0.8 per cent over two years while holding the rate of increase in its charges below the CPI. Melbourne Water Corporation's RRR has increased from around 4 per cent in 1988-89 to 5.8 per cent currently, again within the constraints of a CPI-based price cap.

While other authorities may have less scope to improve their productivity, the possibility of real increases in charges should be considered. Indeed, for authorities with very poor commercial performance, price increases well above the increase in the CPI are almost certainly warranted. Information provided by the AWRC indicates that to increase average RRRs for urban services by 0.5 per cent through price increases alone, would require real increases of 6 per cent for metropolitan water, 5 per cent for metropolitan sewerage, 9 per cent for country urban water and 6 per cent for country urban sewerage.

Under an arrangement where the required annual increase in an authority's rate of return is negotiated with the owner government, it is important that explicit provision be made for new investments to extend or augment the network. As set out in Section 4.2, such investments should only proceed if customers' willingness to pay would be sufficient to provide a 5 per cent RRR, if separate charging were possible.

But under the regionally aggregated charging systems and uniform tariffs which apply across the whole of cities such as Sydney, assets necessary to augment systems, once installed, are simply added to the asset base for pricing purposes. While some differentiation of charges between areas in cities such as Sydney would be feasible, separate charging for many new investments will not be possible.

Accordingly, the Commission considers that, in setting annual limits on permissible increases in an authority's prices or revenues, the owner government should have regard to both the need for improved cost recovery on existing assets and the need to ensure that, for new investments, there is full cost recovery over the life of the asset systems in question.

Finally, there is the question of how to maintain a discipline on authorities to improve productivity once the target rate of return of 5 per cent has been achieved. That is, a mechanism is required to ensure that potential productivity improvements are realised and passed on to customers.

The Commission considers that a standard revenue cap is appropriate in these circumstances. The cap would be negotiated between an individual authority and its owner government (or the relevant

price setting authority) taking into account such things as levels of demand, increases in the price of inputs, scope for productivity gains and the need for new investments. Again, such a cap could be determined within a business planning environment.

Urban WSD authorities earning less than 5 per cent real rate of return, should progressively increase their rate of return, at a pace determined in negotiation with owner governments (and their regulatory authorities), until such time as the 5 per cent rate is achieved. The price increases necessary to achieve the agreed increase in the rate of return should be determined taking into account the scope for productivity improvements. An annual increase of 0.5 of a percentage point in an authority's RRR would be a useful starting point for these negotiations.

The negotiated annual increase in an authority's charges should have regard to the need for improved cost recovery on existing assets and the need to ensure that, for new investments, there is full cost recovery over the life of the asset systems in question.

Once an authority has achieved 5 per cent real rate of return on its (adjusted) asset base, further price increases should be subject to a negotiated revenue cap.

5 PRICING OF IRRIGATION WATER AND DRAINAGE

5.1 General issues

The principles underlying the pricing of irrigation water and drainage are similar to those relevant to urban water. In particular, prices charged for commercially sound irrigation systems should be sufficient to fully cover costs, including a return on the capital invested.

The Commission rejects the argument advanced by irrigators that the wider benefits provided by irrigation justify subsidisation of water costs. Typifying this argument were the views expressed by the National Farmers Federation:

> Irrigators recommend that the Commission, in its report, make the widest possible assessment of the benefits of irrigation to recognise the major and pervasive contribution irrigation makes to the economy generally, and in particular to our export income, regional economies and property values; and the substantial benefits flowing to the community by way of rates and taxes.

All activities have linkages with other parts of the economy and therefore generate flow-on benefits or 'multiplier' effects. But these flow-on effects do not equate to increases in economic welfare. This is because multipliers do not address the question of whether the benefits of increased activity in one area outweigh the costs. Nor do they evaluate the economic merits of other investment options. Reliance on multipliers to direct investments could see Australia's pattern of economic activity even more heavily focussed on activities at the end of the production chain, simply because they have more linkages or multiplier effects.

General acceptance of the 'wider beneficiaries' arguments advanced in this inquiry in respect of irrigation would see all productive inputs in the economy subsidised. But most subsidies, like other forms of industry assistance, divert resources from more productive uses and thereby reduce community well being. Thus just as the Commission has argued that high tariff assistance for some Australian manufacturers is detrimental to Australia's economic interests, so too will be a policy of continuing subsidies for irrigated agriculture through artificially cheap water.

This is not to suggest that the multipliers associated with irrigated agriculture have no policy relevance. They provide important information on the significance of irrigated agriculture to surrounding regions and are therefore one indication of the likely adjustment costs from changes to arrangements governing the provision of irrigation water. Communities such as Leeton and Griffith are highly dependent on irrigated agriculture. But the benefits that these areas derive from subsidised water prices must be set against the costs of subsidies to the wider community. Thus multipliers tell only part of the story.

As in urban areas, it is therefore important that any future public investments in new irrigation schemes only proceed if the government authority concerned can demonstrate that demand for the water will support prices sufficient to cover costs, including a return on capital. While investment in irrigation systems is not risk free, the Commission considers that 5 per cent should be the base real rate of return. As in urban systems, if the investment entails a significant element of risk, a higher rate of return should be built into prices.

Public investment in new irrigation schemes should only proceed if the authority concerned can publicly demonstrate that demand for water will support prices sufficient to fully cover costs, including a return on capital. The minimum real rate of return should be 5 per cent. A higher rate should apply if the project involves a significant degree of risk.

Setting efficient prices for existing irrigation assets is complicated by the fact that much of the public investment in the sector would not have proceeded had irrigators been required to meet the full costs, including the costs of capital. Given that these past investments have been made -- they qualify as what economists call 'sunk costs' -- it will be economically efficient to continue to supply water provided that charges are at least sufficient to cover operating costs. Of course, irrigators would have to be able to pay higher prices to justify refurbishment of these assets.

The pricing of irrigation water is further complicated by the link between prices for water and the value of 'water rights'. Trade in water rights is progressing in most States (see Chapter 8). Pricing policies for irrigation water are also bound up with questions of charging for asset refurbishment and who should own irrigation systems.

Against this background, the question of appropriate future pricing arrangements for irrigation water is best separated into the pricing of bulk water to irrigation systems and private diverters and the pricing of water distribution. The former is concerned with prices to cover the costs of operating and maintaining storages, 'running' the rivers and metering water extraction from the rivers. The latter is concerned with the costs of distributing water within irrigation systems which draw water from a river, the costs of providing drainage facilities for those systems and pricing to cover those costs. Of course, the distinction between bulk water supply and in-system distribution is not always clear cut.

5.2 Bulk water

Prices for bulk irrigation water currently fall well short of fully covering costs. In most cases, the capital costs of dams, weirs and other regulating structures are not included in prices. Some operating and maintenance costs are typically borne by the taxpayer. For example, in New South Wales, while irrigators are required to meet 70 per cent of the costs of 'running' rivers, they make no contribution to the costs of operating dams and storages. Also, bulk water prices do not include a component for the costs of the environmental damage associated with irrigation.

In the Commission's view, prices for bulk irrigation water should, at the very least, cover irrigators' share of the costs of operating and maintaining (including as appropriate refurbishment) all parts of bulk water supply systems. It rejects the argument advanced by the NSW Irrigators' Council and others that the costs of operating and maintaining storages should be met by taxpayers because:

> ... the benefits of the headworks storages are spread widely and diffusely across the community generally and especially throughout the regions concerned.

As the major user of water in these storages, there is no reason why irrigators should not pay their share of the costs of operating and maintaining these structures.

Implicit in the preceding discussion is the notion that irrigators should not have to pay for the benefits provided by water sources to other users. Recognition of multiple beneficiaries underlies the New South Wales policy of charging irrigators only 70 per cent of the cost of running regulated rivers. The remaining 30 per cent is borne by taxpayers.

A number of participants criticised the approach taken in New South Wales to the 'multiple beneficiaries' issue. The Victorian Government was critical of what it saw as the arbitrary allocation of benefits. Many irrigators argued that the 70 per cent share of benefits allocated to them in New South Wales is too high. The Victorian Government contended that in a commercial environment, the New South Wales approach would require an on-going government subsidy to the bulk water supplier to cover the 30 per cent of costs not charged for directly. Its preferred approach is to formally identify beneficiaries and charge accordingly.

There are arguments on both sides. The Victorian approach is more rigorous but considerable effort would be required to identify all beneficiaries. The cost-effectiveness of charging some beneficiaries -- for example, recreational water users -- is also open to question. Nevertheless, both approaches aim to ensure that irrigators are charged only in proportion to the benefits they receive.

In specifying that charges for bulk water should at least cover the costs of operating and maintaining bulk supply systems, the Commission does not rule out the possibility of provision for a rate of return on the community's investments. This may be feasible in some systems, depending on the strength of demand for water.

As noted above, investments in new bulk water supply systems should only proceed where water demand will support prices sufficient to provide at least a 5 per cent real rate of return on capital. Similarly, the full cost of refurbishments to existing bulk supply systems, including the designated return on capital, should be factored into bulk water charges.

Again there is the issue of whether bulk water prices should include a component for environmental damage. As in urban systems, there are numerous difficulties in identifying and evaluating environmental damage caused by irrigation. However, as progress is made in the future in quantifying and attributing responsibility for this damage, bulk water agencies should respond by increasing their prices accordingly.

Prices for irrigation water supplied from existing bulk water systems should at least cover irrigators' share of the costs of operating and maintaining those systems, including dams and storages. For systems where demand for water is sufficiently strong, a return on capital should also be sought. Where quantifiable and attributable, the costs of environmental damage caused by irrigation should be reflected in prices.

Irrigators' share of the full costs of refurbishments to existing bulk water supply systems, including a minimum 5 per cent real return on capital, should be factored into bulk water charges.

Phasing in higher charges for bulk water

One approach for moving to an efficient level of cost recovery for existing bulk water supply systems, would be to progressively increase prices subject to a price or revenue cap to ensure that there is discipline on suppliers to reduce costs. Price increases would continue until such time as revenues were sufficient to cover irrigators' share of the costs of operating and maintaining systems and, where demand is sufficiently strong, to provide a return on capital. The Commission proposed this approach in the draft report.

At the draft report hearings, participants raised concerns about the application of revenue caps in the irrigation sector. The Rural Water Corporation in Victoria said that major fluctuations in water demand due, for example, to climatic factors, would make it extremely difficult to set a revenue cap prior to the commencement of an irrigation season. Many irrigators argued that prices should be based on the cost levels that would prevail after water agencies have realised all potential cost savings.

In the Commission's view, pricing reform cannot be left until such time as best practice is achieved. Indeed, as noted in the previous chapter, best practice is a moving target. To adopt such an approach would run the risk of stalling necessary price reform indefinitely.

However, a revenue cap approach would leave unspecified the finishing point of the phasing process. That is, the process could continue until individual systems were delivering real rates of return anywhere between 0 and 5 per cent. Further, as discussed in the previous chapter, the use of a revenue cap without a timeframe for achieving the target rate of return, would remove much of the discipline on suppliers to reduce their costs. That is, a revenue cap may simply increase the period that an authority takes to achieve the required rate of return, rather than making it work harder at reducing its costs.

An alternative is to immediately lift the bulk water price to a commercial level, but subsidise irrigators in the short term by means of an explicit government payment to the bulk water supplier. This subsidy would be progressively withdrawn over time. To provide the supplier with an incentive to reduce costs, permissible charges to irrigators would increase over time by less than the reduction in the government subsidy. Thus to achieve the required rate of return, bulk water suppliers would have to reduce their costs.

In the Commission's view, this approach has a number of advantages.

It would impose a discipline on water agencies and owner governments to evaluate what rate of return, if any, is feasible in a particular bulk water supply system. This is in contrast to the current system where no end point for increased cost recovery is specified. Specification of a target rate of return for each bulk water system would assist irrigators to make informed decisions on such things as the merits of greater use of on-farm storages, the benefits of a shift to dry land farming etc. It would also facilitate the more efficient operation of tradeable water entitlements (see Chapter 8).

There would also be much stronger incentives for governments to ensure that the move to commercial pricing for bulk water is not unduly delayed by excessive caution regarding irrigators' capacity to pay. This is because the shortfalls in revenue necessary to bridge the gap between the agreed commercial rate of return for a bulk supply system and the return obtained from charges to irrigators' would be treated as a community service obligation. Thus governments would be required to explicitly fund their authorities to the extent of the revenue shortfall.

While it is often claimed that irrigators have little capacity to pay more for water, this sits uncomfortably with the significant value that water entitlements have in many irrigation systems. As discussed in Section 8.2, there are a number of reasons why prices paid at auction for new water entitlements or to transfer existing supplies will not reflect the additional value of water, over and above prices charged, across the irrigation sector as a whole. Nonetheless, prices paid for water entitlements indicate that, at least in some systems, there is capacity to increase prices without

undermining the viability of the irrigated activity concerned. Moreover, freeing up the water transfer system would allow water to move to higher value uses (see Chapter 8) and further increase the scope to raise prices. Indeed, some of the perceptions about the inability of irrigators to pay more for water reflect the previous absence of transfer mechanisms and the consequent failure to direct water to its most profitable use. Overall, there is a strong case for more significant increases in prices than have occurred in the past.

As noted above, a requirement for governments to explicitly fund the revenue shortfalls of their bulk water suppliers, should ensure that the move to commercial pricing occurs as quickly as is reasonably possible. The Australia-wide increase in revenue required to achieve a zero RRR on bulk water supplied to private diverters, would be around $40 million annually. To achieve 4 per cent, the required revenue increase would be around $120 million. Revenue increases of the same order would be required for bulk water supplied to public irrigation schemes.[1]

Bulk water suppliers should immediately increase the price of water to a commercial level. Depending on the strength of demand, this would require them to earn a real rate of return of between 0 and 5 per cent. For an interim period, prices charged to irrigators may need to be subsidised.

The rate of price increases faced by irrigators, and the combination of price increases and cost reductions required to provide a commercial rate of return, should be determined by negotiations between governments and bulk water suppliers.

Until such time as charges to irrigators are sufficient to provide commercial rates of return, the shortfalls in revenues should be directly funded by the owner government.

5.3 Charges for in-system water distribution and drainage

It would be possible to develop a pricing policy to recover the costs of in-system water distribution and drainage in public irrigation schemes, along the lines of the scheme for bulk water proposed by the Commission.

However, such a pricing system would be bedevilled by the longstanding problem of who should pay for the refurbishment of irrigation distribution systems which have been run-down as a result of the failure of past governments to make proper provision for maintenance.

Not surprisingly, irrigators are of the view that they should not have to pay for the mistakes of the past. Typifying this view was the NSW Irrigators' Council:

1 Based on information supplied by the AWRC.

> ... users in government constructed irrigation distribution systems should not be required to pay asset refurbishment/replacement costs in respect of any part of the past life of those assets which governments made no provision for depreciation funding...

From an efficiency perspective there is no basis to this argument. Investment to refurbish a system is little different from investment to build a new system. Indeed, building a new system could be viewed as a substitute for refurbishing an existing system. In both cases, efficiency considerations would demand that the investment only proceed if charges for water will be sufficient to cover all costs, including a return on the capital investment.

Thus the debate on who should pay for refurbishment is mainly concerned with questions of intergenerational equity and capacity of irrigators to pay. As discussed in Part II of the report, State and Commonwealth Governments have ostensibly accepted these arguments for assistance, and are heavily subsidising refurbishment costs.

In some instances, assistance to refurbish appears to have been provided without considering either the viability of the system with commercial water prices and an expanded system of tradeable water rights in place, or to the emerging environmental damage. There is thus the risk that the current round of refurbishment expenditures will do little to address the problem of an on-going government commitment to non-commercial and/or unsustainable systems.

As discussed in Chapter 7, the Commission sees the privatisation of public irrigation distribution and drainage systems as the only sure way to disentangle governments from a commitment to maintain non-commercial infrastructure.

Once irrigation distribution and drainage systems are privatised, charging arrangements would be a matter for the irrigators concerned to determine. The charges might well vary between users according to the volume of water received and the frequency of service required.

However, it may be a long time before some systems are privatised and therefore continued pricing reform in the interim period is important.

The Commission considers that, pending privatisation of systems, the following broad principles should govern pricing policies for water distribution and drainage:

- the current rate of increase in cost recovery should be accelerated;

- irrigators should contribute to the cost of any asset rehabilitation undertaken prior to privatisation; and

- tariff structures for in-system water distribution should be modified to better link charges to levels of service received. This would mean, for example, an end to the practice of charging irrigators for their full water allocations even if those allocations are only partly used.

5.4 The Burdekin Irrigation Area

The Burdekin River Irrigation Area in Queensland is significant in that government development of irrigated land is still occurring. In that scheme, cost recovery is being pursued through a combination of the sale of irrigated land and water charges which include a capital component.
The Burdekin Scheme is discussed in Part II of the report. There, the Commission suggests that financing of the purchase of properties in the Burdekin Scheme should be transferred to private financial institutions.

6 OTHER PRICING ISSUES

6.1 Property based access charges

As discussed in Chapter 2, access charges based on property value apply in most parts of Australia. However, many authorities are now looking to reduce or eliminate their dependence on property based access charges on the grounds that they entail cross subsidies both within customer classes (eg residential) and between classes of customers (eg commercial and residential).

In its draft report, the Commission argued that if property valuations were only used to determine access charges for residential WSD services, the adverse efficiency implications would be small. This is because the level of the access charge (within the bounds implied by property based charging) is unlikely to affect consumers' decisions on whether to connect to these services.[1] In this area, property based charging is primarily a redistributive mechanism.

However, the Commission went on to argue that the cross subsidy from the business sector to domestic customers that is typically evident under property based access charges, in effect constitutes a tax on production.[2] Accordingly, the Commission proposed that WSD agencies dispense with property based access charges as soon as practicable.

While many participants supported this proposal, the South Australian Government argued that property based access charges constitute an efficient tax for funding the public health benefits provided by sewerage. It also contended that, for commercial properties, a property based fixed charge for water is a good way of appropriating the value to business of insurance provided by the capability to fight fires.

Clearly sewerage services have public health benefits which extend beyond individuals. A broadly based property tax to subsidise access to these services may well be less distortionary than some other taxing instruments. However, government subsidies are only necessary if sole reliance on direct funding from user charges would lead to under-provision. This is unlikely to be the case outside small rural communities.

The argument that property based access charges are an appropriate way of paying for the provision of firefighting capacity also has merit. The need for very large water mains in business

1 In any event, building and health regulations may require connection to these services.

2 Of course, commercial land prices would tend to rise if this tax on business users were eliminated.

areas is in part a reflection of the water pressure required to fight fires in high rise establishments. Thus property based access charges for commercial properties may well bear some relationship to the cost of providing a fire fighting capability and therefore to the value of the implicit insurance premium.

However, the relationship between the actuarial value of firefighting insurance and the spread of charges under a property based charging system is unclear. It raises a number of questions about the correlation between property values and the type of building. For example, there may be little difference in the cost of providing a firefighting capability to a high rise building in the CBD and to the same type of building located on cheaper land in the suburbs.

The key reform to pricing structures for urban WSD services is to install appropriate usage charges for water. Ending the provision of the often substantial 'free' water allowances which typically accompany property based access charges is therefore crucial.

Nonetheless, as noted above, property based access charges for WSD services constitute a tax of dubious merit on the business sector as a whole. The costs of providing firefighting capability to business should be more directly targeted through access charges which are correlated to the size of the mains servicing commercial premises. In this way, discriminatory charges between similar buildings in different locations can be avoided.

The income redistribution benefits associated with property based access charges come at the cost of greater administrative expenses and therefore higher overall charges for customers. Apart from the additional costs for authorities of calculating and processing a different access charge for each customer, periodic changes in property values make the process of setting access charges to deliver full cost recovery over the life of an asset system more complex and uncertain. On these grounds alone, there is a case for WSD authorities to dispense with property based charges across the board. However, there is clearly widespread concern about the redistributive impacts of a move away from property based access charges. The political sensitivity of the issue has meant that initiatives to reduce dependence on property based charges have proceeded very slowly in most jurisdictions.

To assess whether these concerns are valid, the Commission engaged a consultant to report on the effects of dispensing with property based charging in Melbourne.

The consultant's report, which has been separately published by the Commission (Tasman Economic Research 1992), confirms that the distributional impacts would be significant for some groups.

The report is based on a sample of 421 Melbourne households drawn from the ABS 1985-86 Income Distribution Survey, supplemented with information on charges and water consumption for industry and commerce drawn from Melbourne Water Corporation's Annual Reports. Water use

for households in the sample was projected using a regression equation estimated for Melbourne (Aitken et at 1991) which relates water consumption to the number of household residents and property value.

The first scenario modelled assumed no change in usage charges. Rather a single uniform access charge was determined which would provide the same revenue for Melbourne Water Corporation as the present system of property based access charges. Separate distributional effects were calculated with the uniform access charge applied only to households, and to both households and industry and commerce.

A second scenario modelled a reduction in the access charge to the current minimum for Melbourne ($60) in combination with an increase in the usage charge to provide a revenue neutral outcome for Melbourne Water Corporation assuming no change in water consumption. But, of course, users would respond to a higher usage charge by reducing their consumption. This in turn would deliver them a saving on their water bills. The consultant did not spell out the implications of this reduction in consumption for Melbourne Water Corporation's revenue and hence its rate of return performance. One effect would be to delay the timing of the next augmentation in capacity. Again separate results were reported with this scenario applied only to households and to both households, and industry and commerce.[3]

The results of the two scenarios are set out in Table 6.1.

According to the data in Table 6.1, an across-the-board shift to uniform access charges would have major impacts on some groups. For home owners in the lowest income quintile, the average increase in the annual water bill would amount to $61, for low income renters $58, and for sole parents $72. Even larger projected increases for pensioners and other welfare beneficiaries could be cushioned to some degree by pensioner rebates. All but the wealthiest householders would finish up paying more, with industry and commerce as a whole experiencing an offsetting reduction of 30 per cent in its total water bill.

The data in Table 6.1 suggest that the adverse effects on householders could be reduced if the move to dispense with property based access charges was accompanied by greater reliance on usage charges. But as noted above, the immediate effects of a decision to place greater reliance on usage charges on Melbourne Water Corporation's total revenue and hence commercial performance, is unclear.

[3] A further scenario modelled the replacement of Melbourne Water Corporation's two tier usage charge with a single usage charge designed to produce a revenue neutral outcome for the authority.

Table 6.1 **Distributional impacts of dispensing with property charging in Melbourne, by demographic group**
(per cent change in water bills)

	Scenario 1		*Scenario 2*	
	Households only	*users*	*Households only*	*All users*
Home owners and buyers by gross income quintiles				
First	17	38	-4	2
Second	8	26	6	0
Third	-3	12	-11	-5
Fourth	2	18	-7	0
Fifth	-15	-4	-10	0
All home owners	-1	15	-10	-4
Renters by income class				
Low	14	34	-4	2
High	-4	10	-11	-5
Total renters	4	21	-8	-2
Households by demographic class				
sole parent	23	43	7	14
single person living alone	-13	2	-24	-19
childless couple	-9	6	-18	-12
one child family	2	18	-7	0
two child family	14	32	5	12
three child family	-7	5	-2	10
four child family	-13	-4	-11	0
single pensioner	63	97	20	26
couple pensioner	21	43	2	8
single beneficiary	46	75	12	19
couple beneficiary	32	55	12	19
household of single people	7	26	-7	-1
All households	0	16	-10	-4
Industry and commerce (all properties)	0	-30	0	-27

Source: Tasman Economic Research 1992

In its response to the consultant's report, Melbourne Water Corporation concluded that:

> ... the analysis is far too simplistic and, as a result, the impacts on various customer groups are significantly understated.

It argued, amongst other things, that the household sample used in the study is too small; the regression equation used by the consultant to estimate water demand explains only 50 per cent of the observed variance in water consumption; the analysis fails to identify the diversity of effects within the industrial and commercial sector; and the analysis incorrectly assumes that those people renting accommodation pay water rates.

Melbourne Water Corporation submitted alternative projections for the scenarios modelled by the consultant. In those projections, households are classified on the basis of property value rather than income quintiles (see Table 6.2). A summary of the Corporation's response is included with the separately published consultant's report.

Table 6.2 **Distributional impacts of dispensing with property based charges in Melbourne, by value of property**
(per cent change in water bills)

Tasman Scenario 1 (households only)	*consumption (KL)*						
	100	*200*	*270*[b]	*300*	*400*	*500*	*600*
Net annual property value[a] *($)*							
2000	91.4	64.0	52.9	49.2	36.6	27.2	21.7
3000	55.0	40.8	34.6	32.5	24.8	18.9	15.3
4000	19.7	15.5	13.5	12.8	10.2	8.0	6.5
4878b	-0.3	-0.2	-0.2	-0.2	-0.1	-0.1	-0.1
5000	-2.5	-2.1	-1.8	-1.7	-1.4	-1.1	-1.0
6000	-17.8	-15.0	-13.5	-13.0	-10.8	-8.8	-7.5
7000	-28.9	-24.9	-22.7	-21.9	-18.5	-15.4	-13.2
8000	-37.4	-32.8	-30.2	-29.2	-25.1	-21.1	-18.2
9000	-44.0	-39.1	-36.3	-35.2	-30.6	-26.1	-22.7
10 000	-49.4	-44.4	-41.4	-40.3	-35.4	-30.4	-26.7
Tasman Scenario 2 (households only)	*consumption (KL)*						
	100	*200*	*270b*	*300*	*400*	*500*	*600*
Net annual property value[a] *($)*							
2000	57.1	60.0	61.2	61.5	48.6	31.9	22.0
3000	27.2	37.4	41.8	43.4	35.8	23.3	15.6
4000	-1.8	12.7	19.7	22.1	19.8	11.9	6.8
487[b]	-18.1	-2.6	5.2	8.1	8.6	3.6	0.2
5000	-20.0	-4.4	3.5	6.4	7.2	2.5	-0.7
6000	-32.5	-17.1	-8.9	-5.8	-3.0	-5.5	-7.2
7000	-41.6	-26.7	-18.6	-15.5	-11.4	-12.3	-12.9
8000	-48.6	-34.4	-26.4	-23.3	-18.5	-18.2	-18.0
9000	-54.1	-40.6	-32.9	-29.9	-24.5	-23.3	-22.5
10 000	-58.5	-45.7	-38.3	-35.4	-29.7	-27.9	-26.5

a This is the assessed unimproved value of land.
b Average for Melbourne
Source: Melbourne Water Corporation

The bigger percentage changes reported in Table 6.2 are partly a function of the larger number of household groupings used by Melbourne Water Corporation. Thus, for example, under Scenario 1 where total access charges collected from households are held constant, the variance in impacts calculated for individual household groups must necessarily depend on the extent to which the household sector is disaggregated. Significantly, both sets of projections indicate that the distributional impacts of dispensing with property based access charges will be very significant for some households.

Incidence analysis on the impact of moving to uniform access charges conducted by the Public Works Department (PWD) in New South Wales is reported in Table 6.3. Consistent with the findings for Melbourne, the data in the table suggest some customers would face significant increases in their water bills. However, according to the PWD's projections, these effects could be mitigated by replacing single consumption charges with a two tiered usage tariff. Again the impact of a change in tariff structures on agency revenues is not spelt out.

Table 6.3 **Distributional impacts of dispensing with property charging in country New South Wales**

	Maximum increase in the average water bill for an individual customer class[a] (per cent)	
	Uniform access charge plus a \single per KL consumption charge	*Uniform access charge plus two tiered per KL consumption charge*
Inland town	37	13
Large regional scheme	29	7
Inland city	49	31

a Based on annual consumption of water.
Source: Information provided by the PWD

The preceding discussion illustrates that the move to dispense with property based access charges will have significant distributional effects. But despite these effects, some authorities have been able to accomplish this reform in a relatively short time. Significant distributional effects often accompany worthwhile reforms. The Commission also observes that the impacts reported in the preceding analysis are little different from the sort of changes that some customers experience in their general rate bills when property revaluations occur. Nevertheless, the Commission accepts that, in many areas, dispensing with property based charging will take a number of years to complete.

WSD agencies should phase out property based access charges for water and sewerage. In the longer term, access charges should be directly linked to the size of the connections provided.

6.2 Developer provided assets and charges

Water and sewerage reticulation and drainage in new sub-divisions is typically provided by developers as part of land servicing arrangements. Costs are recouped by developers in the price of serviced land. The price of serviced land also usually reflects a charge levied on developers by WSD authorities for the costs incurred in extending systems to new sub-divisions. The involvement of developers in the provision of water infrastructure has the advantage of ensuring full cost recovery on assets within sub-divisions, and allowing authorities to avail themselves of the savings from contracting out construction activity.

As discussed earlier, the Commission recommends that returns earned on assets provided by developers or funded by developer charges should be returned to the customers concerned through lower (access) charges for water services. This is one way of ensuring that customers in new sub-divisions are not charged twice for these assets.

However, as noted in Chapter 2, charges levied on developers often do not include a component for the cost of any new headworks required to service new subdivisions. The cost of these headworks is shared between new and existing customers.

But just as part of the cost of headworks required to service new areas is met by customers elsewhere, the ongoing water bills of residents in new developments will include a component to finance infrastructure used to provide services to pre-existing customers.

Resolving whether customers in new sub-divisions pay too much or too little to gain access to water services is important as these access costs will influence decisions on whether to cater for population growth in cities through urban expansion as opposed to, say, consolidation within existing developments. Patterns of land development will also be influenced by the degree to which developer charges reflect differences in the costs of extending services to different areas of cities and towns.

The impact of developer charges on patterns of land development is being considered in detail in the Commission's concurrent reference into land use planning. Therefore, the Commission does not propose to make recommendations on the structure of developer charges in this inquiry.

It notes, however, that as part of its advisory role to councils in New South Wales, the PWD has developed a formula for calculating developer charges which attempts to ensure that residents in new subdivisions pay only for that infrastructure necessary to provide the services they receive. It

does so by adjusting developer charges downwards by an amount equal to the contribution that customers in new sub-divisions will make to servicing a water agency's existing debt. The PWD said that an important corollary in the formula is the provision to charge customers in new sub-divisions their share of the full cost of any headworks necessary to supply new areas. In the Commission's view, the PWD's approach merits further investigation.

6.3 Funding community service obligations

As discussed in Chapter 2, CSOs which are not fully funded by government contribute to cost under-recovery in the water sector. Like other subsidies, CSOs may have adverse efficiency effects, although the incentives they provide to increase consumption must be weighed against any distributional benefits they provide. Some CSOs may also have a role in promoting improved public health.

Given their likely efficiency costs, it is desirable that governments scrutinise their existing CSOs to see whether the underlying objectives remain valid and, if so, whether there are better, or less costly, ways of meeting those objectives.

In the event that governments continue to provide some CSOs through their WSD authorities, these concessions should be directly funded in full by the governments concerned. Direct funding already applies, at least in part, to pensioner concessions. It ensures that the adverse efficiency impacts of subsidies are not multiplied by a requirement to fund the concessions by overcharging other users. Direct funding is also important in making assistance transparent.

Direct funding may also obviate the need to write down the values of assets used to deliver CSOs. As discussed in Chapter 4, such asset write downs are fraught with difficulty.

Identification of CSOs will not always be clear cut. As the Victorian Government argued:

> At present, there is a tendency in the water industry to assume certain activities are CSOs that are, in reality costs of doing business, good corporate citizenship or meeting accepted environmental standards.

And, as pointed out by the Public Sector Research Centre, amongst others, there is the danger that the concept of a CSO can be applied to any loss making activity and therefore used to cover up poor performance by a WSD agency.

But as discussed in Chapter 2 and Appendix C, grey areas notwithstanding, there are some requirements which can be clearly categorised as CSOs. Pensioner rebates and State-wide uniform pricing policies applying in Western Australia and South Australia are two examples.

Community service obligations imposed on water authorities should be directly funded in full by the government concerned.

As noted by the Geelong and District Water Board, the source of government funding will depend on the nature of the CSO:

> ... pension rebates, applicable on a whole of State basis are, and should be funded by the Government, as part of its social justice, income redistribution policies...
>
> However, ... concessional rates for parks and gardens, are a cost to be borne by the community within the sphere of operation of that agency and should be borne by the community. This is the only acceptable outcome given the wide disparity of so called concessional charges from agency to agency.

A policy of directly funding CSOs requires agreement between governments and their authorities on how those obligations should be valued. This is a contentious issue and one that is far from resolved.

The major basis for debate is whether valuation should be premised on 'avoidable cost' or 'fully distributed cost'. At the heart of the debate is the issue of whether system-wide costs which cannot be readily attributed to individual customers should be accounted for in the valuation of the CSO. Significant common costs characterise many government goods and services including WSD.

Under the 'avoidable cost' approach, the CSO is valued on the basis of the additional costs of delivering the concession (less revenue received from the beneficiaries). In cases where the CSO requires investment in new infrastructure, the cost of this infrastructure would be included in the valuation. However, where the beneficiaries of the CSO use an existing network, the avoidable cost approach would exclude any contribution to the capital costs of that network.

In contrast, the 'fully distributed' cost approach includes the beneficiaries' share of common system costs in the valuation. It will therefore generally place a higher value on the obligation.

However, given the regionally aggregated charging systems for water services, the reverse may sometimes be true. Consider, for example, a situation in which the cost of capital required to service a remote community is much greater than the average cost of capital needed to service customers in the network. The avoidable cost approach to valuation would reflect this difference. But under the fully distributed cost approach, the differential would disappear because the cost of capital required to service the remote community would be estimated on the basis of average system-wide costs.

In the Commission's view, what the valuation of a CSO should try to estimate is the long run cost -- both capital and operating -- of meeting the obligation. As WAWA stated:

> Where a CSO involves an ongoing use of capacity, the long-term cost of capacity augmentation needs to be considered in assessing the avoidable cost.

WAWA went on to distinguish three situations: one in which chronic overcapacity exists in a system, a second where system capacity is only temporary, and a third where augmentation is almost due. It argued that in the first case, the avoidable cost approach should be used to value a CSO, as a fully distributed cost valuation would include the capital cost of carrying unwarranted additional capacity. In the second case, however, it argued that the use of short-run avoidable cost to value the CSO would be erroneous if that CSO is to be ongoing because:

> ... [it] would send the wrong pricing signal to Government in that CSOs would be seen as easily or cheaply satisfiable.

In the third situation, WAWA argued that if provision of the CSO were to trigger augmentation, the short-run avoidable cost approach would provide the best measure of the resource costs. It would normally exceed long run avoidable cost and so deter government from introducing the obligation until after augmentation had taken place on its normal timetable.

In essence, WAWA's approach says that if a system is uneconomic because of chronic overcapacity, it will not be replicated at the end of its life. In the interim, it will be sensible to add customers to the system provided that charges, or government funding, at least cover operating (or short-run avoidable) costs.

But where a system is commercially viable, charges for the service should be sufficient to cover all costs including a return on capital. If the valuation method used to determine funding for the CSO does not include a capital component, then given a constraint of full cost recovery, non-beneficiaries will have to meet all of the capital costs of the network. Cross-subsidisation would therefore be required. Yet a policy of identifying and directly funding CSOs is designed to avoid cross-subsidisation in service provision.

The Commission agrees with WAWA's assessment that a case by case approach is required, having regard to the sort of considerations outlined above. The underlying principle should be that the valuation method estimate the long run avoidable cost of meeting the CSO (less the revenue received from beneficiaries). If this approach is followed, funding will generally be sufficient to obviate the need for cross subsidisation by non-beneficiaries and/or revaluation of the assets used to provide the CSO (see Chapter 4).

Commonality in the approach to valuing different types of CSOs across authorities is desirable to facilitate performance comparisons. The Commission considers that the AWRC would be an appropriate body to formulate guidelines to achieve this.

The Australian Water Resources Council should formulate and disseminate guidelines for valuing Community Service Obligations in the water sector. Underlying these guidelines should be a valuation method which estimates the long run avoidable cost of meeting the obligation less the revenue received from beneficiaries.

6.4 Calculation of capital charges

Given the objective of fully covering the costs of water service provision, proper asset valuation and provision for depreciation are crucial.

However, there is no commonly agreed basis for valuing the sort of long lived assets that characterise the water sector or for setting depreciation charges. It is an issue on which much has been written but which has yet to be satisfactorily resolved.

Asset valuation[4]

Outside the major metropolitan WSD authorities, water assets are typically valued by agencies on the basis of the purchase price. This is commonly referred to as historical cost accounting.

However, the worth of an asset to a WSD agency may bear little relationship to its purchase price. As Graham and Xavier observe:

> It has long been recognised that, particularly where inflation is significant, accounts drawn up on historical cost conventions are misleading especially where assets are long-lived. Balance sheet figures of original cost do not represent the values of assets to the business, profits and financial trends are misrepresented. If accounts are to show resource use and economic performance they must allow for general inflation, fluctuations in specific prices and costs, and for technological progress resulting in changes to the value of capital equipment. (Graham and Xavier 1987, p. 19)

Given the long-lived nature of many water assets, the use of historic cost accounting to value water assets is likely to understate the cost of capital employed in providing services.

It is true that many private companies in other sectors use historic cost accounting to value their assets. But competition between firms imposes important checks and balances which promote appropriate pricing of goods and services and penalise poor investment decisions. Asset revaluations are common in the private sector.

In contrast, the absence of competition in the provision of WSD services means that, under the sort of pricing regimes currently used and those proposed by the Commission, valuation of assets translates directly to the level of charges. Thus deficiencies in historic cost accounting techniques are much more critical than in a competitive market environment.

4 For a more detailed discussion of these issues see Temple-Heald 1991.

In response to the deficiencies in historic cost accounting, some WSD authorities have revalued their assets on the basis of current market values. This is commonly referred to as current cost accounting. In the Commission's view, the use of current cost accounting in all water agencies is an essential pre-requisite for setting efficient capital charges.

Ideally, the current worth of water assets would be based on the market price of similarly depreciated assets -- that is, what other service providers would be prepared to pay for them. But the absence of markets for used water assets precludes this approach.

Two approaches have been put forward to value water assets. The *discounted future income stream* approach estimates the value of asset systems with reference to the present value of the expected future income those systems will generate for their owners. In essence, this approach tries to estimate what a market price for these assets would be, if a market existed. *The replacement cost approach* estimates the cost of replicating the service potential of current assets.

The discounted future income stream approach

Conceptually, the discounted income stream approach has a number of advantages. In particular, it accounts directly for poor investment decisions:

> ... when a poor investment is made in durable assets which have little or no value in alternative uses, the purchase price is a sunk cost and the project may only continue operation because receipts from the assets do just cover operating costs ... The asset value would then be more appropriately the value reflecting its earnings potential in its current use if managed and operated efficiently. (Department of the Treasury 1990, p. 52)

However, the discounted income stream approach is not without its problems. In particular, there is the difficulty of estimating earnings potential in the presence of uncertainty about the willingness of users to pay for water services, future government regulation of prices for WSD services, environmental controls etc and about the likely improvements in the cost efficiency of service provision. Indeed, as noted in Chapter 4, there is an element of 'circularity' in the use of the discounted income stream approach to asset valuation. The value of an asset is imputed residually from expected revenues and the discount rate. Low asset values arrived at using this technique may therefore partly reflect poor asset management and/or pricing policies which do not fully recoup costs. Thus if the purpose of the asset valuation is to determine what an efficient capital charge would be, then only when assets are being used to their best advantage will it be sensible to value them on the basis of future expected earning capacity.

The replacement cost approach

The alternative of valuing assets at their (written down) replacement cost is also deficient because it ignores technological improvements which reduce the costs of providing services, and fails to directly account for ill-judged investments.

The former problem is overcome by the *Modern Equivalent Asset* (MEA) method of replacement cost valuation used by the AWRC in undertaking its interagency performance comparisons. In essence, the technique relies upon estimating the costs of replicating the service potential of existing assets, 'given the latest technology available in the normal course of business'.

Asset valuations using the MEA approach could be lower than those based on (written-down) replacement costs.[5] This is because the MEA technique mimics the role of market competition in forcing down prices if cheaper ways of producing water services emerge.

The Commission's view

Widespread cost under-recovery in the supply of urban WSD services means that the use of the discounted future income stream approach to value assets for the purposes of determining an efficient capital charge, will generally be inappropriate. Given that, through the AWRC, a start has been made in valuing assets using the MEA methodology, the Commission believes that this methodology should generally be the basis for future asset valuation in the water sector.

The Commission notes comments made by the Geelong and District Water Board and the Townsville City Council, among others, that the MEA approach may not be fully consistent with current accounting requirements for public sector entities. Thus implementation of this recommendation will require co-operative action by the water industry, the accounting profession and the relevant areas of government.

The Commission also notes that where write downs to an authority's assets are required to take account of unfunded CSOs or poor investment decisions (see Chapter 4), the revaluations should reflect the reduced earnings potential of the assets in question. However, provided that governments fully fund their CSOs, there will rarely be a need to write down the values of urban WSD assets.

[5] The relationship between historical asset values and those calculated using MEA will depend on the extent to which cost savings from technological change offset asset price escalation over time due to inflation.

Water agencies should generally value their assets for pricing purposes according to the Australian Water Resources Council's Modern Equivalent Asset methodology. However, if there is a need to write down asset values to account for unfunded Community Service Obligations or poor investment decisions, the resultant reduction in the earnings potential of the assets in question should be the basis for the revaluation.

The Australian Water Resources Council should initiate discussions with the accounting profession and the relevant areas of government to secure any changes necessary to general accounting requirements.

It would be impractical to revalue all of an authority's assets using the MEA approach each year. One possibility proposed by the Department of Finance (1988) is that all assets be revalued every five years with inflation adjustments in the intervening period. An alternative would be to revalue a portion of the asset base each year and adjust the value of the remainder on the basis of the inflation rate.

In the Commission's view, the latter approach has the advantage of permitting immediate adjustments to part of the asset base if cost-lowering new technology becomes available. It is therefore likely to remove some of the lumpiness in changes in asset values that would arise under the Department of Finance proposal.

Depreciation charges

The function of depreciation has been the subject of some dispute between economists and accountants. Depreciation has variously been viewed as a way of amortising the costs of investments over time, as a charge for capital 'consumed' in the production process and as a sinking fund to provide for asset replacement and refurbishment (see, for example, Temple-Heald 1991).

There is also considerable uncertainty about the effective lives of many long-lived water assets, and the impact of local conditions on those lives. Moreover, in the water sector it is more sensible to think about depreciation of asset systems rather than individual mains etc. Accordingly, prescribing depreciation schedules for individual asset types is fraught with difficulty.

Finally, the economic life of an asset depends, in part, on the level of maintenance performed. Thus maintenance and depreciation are inter-related. In the past, authorities have made decisions on whether assets should be restored or allowed to deteriorate on the basis of productive value. However, with the move to corporatisation in the Hunter and elsewhere, liability for tax may see authorities increase their maintenance of assets. This is because, in the presence of inflation, the Australian taxation system can encourage firms to prolong asset life rather than allow assets to run down (see Jones 1990).

Renewals accounting

In response to the difficulties of applying conventional depreciation regimes to water assets, a system known as renewals accounting has been introduced in the British water industry.

Renewals accounting starts from the position that core infrastructure is to be maintained in perpetuity. These core assets are recorded as being non-depreciable, with all the costs of renewal (ie maintenance and replacement of parts of the system) being treated as charges to operating expenditure. In effect, capital investments to replace parts of the system are treated as fully depreciable in the year of installation.

Proponents of renewals accounting argue that it sidesteps the difficult problem of setting depreciation schedules for long lived assets. That is 'renewals' expenditure is presumed to equate to the economic consumption of capital in the delivery of services.[6]

However, in the UK, to avoid lumpiness in charges when major parts of systems are renewed, an average expected renewals charge is levied. The problem of determining depreciation schedules is therefore replaced by one of determining average expected renewals expenditure. The need to forecast how assets are likely to deteriorate over time increases the complexity of renewals accounting and brings it much closer to a conventional depreciation system.

Critics of renewals accounting argue that it is inappropriate for uneconomic systems that should not be continued in their present form, and that it is difficult to apply where networks are expanding to provide services to new locations.

In the UK system, a distinction is made between enhancement expenditure (capital) and renewals expenditure (recurrent). Enhancement expenditure is expenditure which is expansionary in nature, for example, provision of services to new customers, improvements in efficiency or providing a greater level of service. Renewals expenditure is incurred for the purpose of preserving or restoring the condition of the system. It includes the ongoing maintenance work undertaken on any renewable asset system together with the replacement of any of its elements.

Similarly, the problem of uneconomic systems does not appear to constitute an insurmountable objection to renewals accounting. Elements of a system which should be allowed to run-down or

[6] As practised in the UK, renewals accounting differentiates between infrastructure assets and other assets. The former include networks comprising underground systems, channels, major storage service reservoirs, dams and major outfall sewers. The latter include above ground assets such as treatment plants, pumping stations and buildings etc. Conventional depreciation provisions apply to the latter asset group. However, there have been suggestions that the renewals approach should be extended to all network assets (London Economics 1992, p 20).

should be maintained at a lower level of service potential simply require identification. Thus in the context of, say, irrigation, renewals accounting need not presume that existing systems will be maintained in their present form in perpetuity.

Inquiry participants had mixed views on the merits of renewals accounting.

The South Australian Government said that a major advantage of the system is that it treats the whole of a network as the asset. The Murrumbidgee Irrigation Management Boards concluded that:

> ... there are more advantages than disadvantages from the use of the renewals accounting concept in dealing with long life, constantly maintained infrastructure such as that existing in the irrigation industry.

Other participants were less enamoured with the system. For example, Melbourne Water Corporation said that it has:

> ... carried out a review of renewal accounting as part of an Urban Water Research Association project on the valuation of assets. This review concluded that there was little to gain from the implementation of renewal accounting.

A number of irrigation interests, including the Condamine Balonne Water Board, argued that a depreciation sinking fund is preferable to a renewal charge for funding asset maintenance and refurbishment. However, in principle, a sinking fund appears to the Commission to be little different from some form of average renewals charge. The preference for a sinking fund seemingly reflects a perception that the costs of refurbishing run-down irrigation systems would be borne by irrigators under a renewals system but by the community under a sinking fund approach.

The Commission sees considerable merit in the renewals accounting approach, particularly if applied in its pure form -- renewals expenditure is charged up as it occurs rather than on some average basis.

That said, pure renewals accounting would introduce an element of lumpiness to WSD charges, particularly in those jurisdictions where the age profile of assets is not evenly spread. The extent of the lumpiness problem is also likely to be a function of the size of networks. That is, the larger the network, the smaller will be the impact of renewal of individual parts of the system.

Without further investigation, the Commission is unwilling to unequivocally endorse the introduction of renewals accounting in the Australian WSD sector. Rather it believes that the applicability of the system should be further examined by water agencies.

Through the Australian Water Resources Council, water agencies should further investigate the merits of renewals accounting in the Australian water sector.

6.5 Dividend policies

As discussed earlier, the inclusion in prices for WSD services of a rate of return on assets employed is important in signalling to users the true costs of providing services.

However, this leads to the further question of whether a return on equity in WSD agencies should be appropriated as a dividend by government on behalf of the community.

Many non-metropolitan water agencies argued strongly that local communities and not State Governments own their water infrastructure and that consequently any payment to State Governments is simply a tax. Their views were typified by the Shepparton Water Board which stated that:

> The real rate of return concept, based on current cost accounting, is being widely imposed in the public sector, by Governments, as the basis for the payment of substantial public authority dividend taxes into consolidated revenue.
>
> ... Government equity in the Shepparton Water Board is not significant, and continues to decline as the system is replaced and expanded from internally generated funds. It is therefore a "fallacy" to claim that the assets of the Board and its customers are the assets of the State and that the State is therefore entitled to a dividend or return on its investment. (pp. 9-10)

Government funding of infrastructure for urban systems has declined in recent years and, for many established authorities, has been non-existent.

But in the past, governments have not received any return on the equity they have invested in WSD authorities. It could be argued that governments have retained previous dividend entitlements in those authorities. As the Victorian Government argued:

> As in any business, after the initial injection of funds by the owners, assets are routinely replaced, refurbished and expanded with a combination of equity funds and borrowings. The equity may be in the form of additional injections of capital or retained earnings. In either case, ownership does not change simply because the asset base has been embellished from the retained proceeds of doing business.

While concurring with the thrust of the Victorian Government's arguments, the Commission doubts it would now be possible to determine whether State Governments were the sole equity contributors at the time many authorities were established. This means that a more practical solution is required.

In its draft report, the Commission proposed that returns to equity earned on the provision of WSD services should be payable to the legal owners of the assets used to provide those services. Not surprisingly, participants' views on this proposal depended on the interests they represented. The Geelong and District Water Board said that it:

> ... welcomes and endorses the Commission's recommendations that dividends should be payable to the legal owners of those assets. In our opinion that includes the community as ratepayers who are thus entitled to receive such benefits.

The Victorian Government stated that:

> ... the ultimate owner of water sector assets in Victoria is in all the cases the State Government as custodian for the community.

The view that local councils, or the authorities themselves should be recipients of any dividend ... is a nonsense argument.

The Colac District Water Board went so far as to suggest:

> The proposal ... that returns to equity should be payable to the legal owner is supported as long as the legal owner is the Board and its customers.

It would be unfortunate if disputes over who should receive dividends were to jeopardise the underlying and important reform -- namely that prices for WSD services include a component to reflect the cost of equity capital. Getting this component into prices is necessary to signal to water users the true costs of the services they receive.

However, positions on this issue will inevitably be determined by financial self-interest rather than economic efficiency. Indeed, there is a risk that water authorities and other GBEs could be treated as milch cows by State Governments under the banner of promoting economic efficiency. Thus apart from reiterating that entitlements to dividends should reside with the legal owners of water assets, the Commission sees no point in recommending hard and fast rules to sort out entitlements to dividends in individual cases. Rather it expects that entitlements will have to be negotiated between water authorities and State and Local Governments.

Returns to equity earned on the provision of WSD services should be payable to the legal owners of the assets used to provide those services.

The question of how dividends should be set is another complex and contentious issue.

Because of the low level of cost recovery in some country urban systems and in the supply of bulk irrigation water, many agencies would not currently have the capacity to pay dividends. Indeed, it may be a number of years before some agencies are able to do so.

As a general rule, dividends should only be payable once an authority is in a position to meet its operating expenses, to make proper provision for depreciation and to pay interest on debt. That is, as in the private sector, 'owners of the firm' should have the last call on funds, otherwise so-called dividends are nothing more than a tax.

In its draft report, the Commission proposed that liability for dividend payments should be based on the level of equity capital in an authority's asset base, not the whole of the asset base as is

sometimes suggested. Apart from an adjustment for developer provided or funded assets, the Commission proposed that a further reduction to the asset base be made to net out borrowed capital.

Some participants questioned the basis for such adjustments. For example, the SWB argued that assets funded by debt should not be excluded from the dividend calculation as:

> Any accretion in asset value should ... reside with the shareholders and they should be entitled to a return in respect of it.

And, as discussed in Chapter 4, a number of participants argued that a return on equity should be sought on assets provided by developers or funded by developer charges.

In the Commission's view, the broad thrust of its draft report proposal remains valid. As discussed earlier, it sees no reason why consumers should pay twice for assets provided by developers or funded by developer charges. However, rather than deducting these assets from an authority's total asset base, it now proposes that the rate of return earned on them be returned to customers in new sub-divisions in the form of lower access charges for water services. For infrastructure funded by external borrowing, a rate of return is provided for in the cost of servicing the debt. As this cost is passed on to customers, there is no efficiency reason to seek a further dividend. This is equivalent to saying that with the target rate of return calculated prior to the payment of interest costs, the return to equity holders is the amount left over after debt has been serviced.

That said, the Commission accepts the argument put by the SWB that increases (or decreases) in the value of assets funded by borrowed capital should accrue to equity holders.

Of course, the practicalities of striking dividends are likely to be more complex than these simple guidelines would suggest. In particular, there is the question of whether dividends should be automatically appropriated, or whether there should be provision for authorities to retain earnings. Retained earnings are an important source of funds for expansion in the private sector. As Melbourne Water Corporation commented:

> ... dividends should only be payable out of current year profits or retained earnings ... the decision on how much dividend to pay should be based on the objectives of the owners of business and in line with the owners' business strategies. The dividend payout will be between zero and the level of retained earnings, the exact amount being determined in light of: capital expenditure plans, liquid funds availability, owners' requirements, business viability and the overall business strategies and financial performance targets.

In the Commission's view, flexibility is very important, provided there are safeguards to ensure that any retained earnings are accounted for. Some form of net revenue sharing arrangement may be appropriate to ensure that owner governments receive some dividend, while at the same time giving water authorities more certainty about their capacity to fund expansions from retained earnings. Any such arrangement could be documented in an authority's business plan (see Chapter 7).

6.6 Capital subsidies

Capital subsidies have been instrumental in ensuring that minimum public health standards in respect of water and sewerage are met in small communities.

However, as discussed in Chapter 3, a number of participants argued that capital subsidies have encouraged investment in non-economic facilities in many country urban areas, and have provided incentives for the over-engineering, or gold plating, of systems.

While the PWD denied these effects in New South Wales, in the Commission's view, it would be surprising if subsidies had not had adverse efficiency impacts. Indeed, the primary rationale for these subsidies -- to enable the provision of services at an 'affordable' cost -- is premised on equity not efficiency.

Equity considerations, along with public health arguments, are clearly important. Nonetheless, it is important that capital subsidies be administered in a way which will reduce the accompanying adverse impacts.

First and foremost, no further subsidies should be paid to establish or expand irrigation schemes. Such developments cannot be justified on equity grounds. As proposed earlier, any future public investment in new irrigation schemes should only proceed if the water agency concerned can publicly demonstrate that water demand will be sufficient to support charges that cover all costs, including a minimum 5 per cent real rate of return on capital.

In the Commission's view, capital subsidies for WSD infrastructure are mainly relevant where it would otherwise be impossible to achieve acceptable standards of public health at an affordable price. This will sometimes be the case in smaller communities. In this sense, capital subsidies should simply be regarded as a CSO.

However, these subsidies should be delivered in a way which minimises their cost to the wider community. Thus it is important to assess whether amalgamations of small water agencies would lessen or obviate the need for capital subsidies.

The question also arises as to whether it is sensible to build the same types of systems as are used in larger population centres. The Western Australian Department of Health said that substantial water and sewerage treatment infrastructure in some remote communities has not been properly maintained because it has not been possible to set charges which cover operating and maintenance costs. In such circumstances, less elaborate and therefore cheaper and more easily maintained systems, may ultimately deliver better public health outcomes. Consideration of alternatives to fully reticulated and treated water supplies will be relevant in some cases.

Where it is difficult to recoup the costs of environmental works through charges on beneficiaries, subsidies may also be warranted. However, as discussed in Chapter 9, in many situations mechanisms such as environmental levies provide a means for the recovery of the costs of environmental investments.

In summary, capital subsidies to promote efficiency are only warranted where minimum acceptable public health standards could not otherwise be achieved, or where a project provides significant environmental benefits for which it is impossible to charge. Capital subsidies to enable the provision of services at an 'affordable cost' should be treated in the same way as other CSOs.

7 INSTITUTIONAL AND ADMINISTRATIVE ARRANGEMENTS

Pricing reforms discussed in the preceding chapters, would do much to improve efficiency. However, complementary administrative and institutional changes are required to reinforce those pricing initiatives, to ensure that costs of provision are minimised and the practices of WSD providers are compatible with society's goals for water quality and the environment.

7.1 Opportunities for introducing competition

In the right circumstances, competition can be the best incentive for improved performance. Firms which do not provide consumers with the products they want at competitive prices do not survive.

Typically WSD services have been provided by single suppliers, operating as regional monopolies. The perception has been that with available technologies, a single, vertically-integrated supplier responsible for operating dams right through to distribution of water to households, is the most cost efficient form of provision.

The monopoly nature of service provision is reinforced by the lack of substitutes in consumption for water. This is in contrast to the energy sector, for example, where consumers often have a choice between forms of power.

However, for some elements of WSD service provision, technologies are changing. For example, services using locally self-contained systems for treating and disposing of waste water are likely to become cheaper. Until recently, alternatives to large-scale sewage treatment, such as septic tanks, often had adverse environmental impacts -- pollution of groundwater is one example. Newer developments are more environmentally friendly.

As new technologies emerge, so do possibilities for introducing competition through structural break-up of some parts of the WSD sector. For example, for sewage treatment it may soon be possible for small firms to provide services to particular customers or groups within the existing network. For new areas, it may soon be more efficient to provide sewage treatment services as self-contained units, without the need for connection to existing sewerage networks.

For water supply, there remain significant cost advantages from integrated provision. These are likely to more than offset any benefits from structural break-up.

An alternative way to introduce competition is to franchise out the rights to supply services. Franchising operates in France. This option is discussed further in Section 7.5.

Competition at the boundaries of systems may be another avenue for injecting a degree of competition. In the United Kingdom, there has been competition between regional suppliers to provide water to major industrial concerns. Private sector competition to supply the many inputs required by WSD authorities is also an important source of competitive discipline.

Nevertheless, mechanisms other than direct competition are needed to ensure efficient delivery of services. This chapter concentrates on two means by which this may be achieved -- changes to institutional arrangements to enhance commercial focus and accountability; and performance monitoring.

7.2 General principles for administrative and institutional reform

The concern should be to introduce incentives which will encourage water authorities to intensify their efforts to allocate resources efficiently. Two aspects of reform, need to be developed in tandem. One is encouraging service providers to be more commercially focussed. The other is providing safeguards against misuse of monopoly power.

These two requirements are best met by institutional arrangements which ensure:

- specification of clear objectives -- commercial and non-commercial;
- arms length from government;
- greater accountability;
- the use of competition to discipline performance wherever feasible; and
- limits on the misuse of monopoly power, through performance monitoring and regulation.

A range of institutional structures could be compatible with these principles. Indeed, given the institutional diversity, approaches must be tailored to suit the circumstances of individual agencies.

7.3 Urban water and sewerage provision

Efficiency gains can be achieved within the existing administrative framework provided management has autonomy and authority to make decisions and is accountable for the performance of the business.

However, poorly specified or conflicting objectives can lead to poor performance and/or make it easier for governments to interfere arbitrarily in the operations of their authorities.

Providing clear objectives and functions

There should be a clear understanding between governments and their WSD providers on the objectives which the owner government wishes pursued. Where objectives conflict, there needs to be clear guidance on the trade-offs to apply and/or criteria and procedures for resolving those conflicts.

The tasks for governments are: to reconcile a commercial focus with the multiple objectives that society and governments have for water bodies; and to define how the roles of the State as a water manager, owner, service provider and regulator are to be handled.

Commercial objectives

In Chapters 4 to 6, the Commission outlines the major commercial obligations which should be met by WSD service providers and some of the ways by which conflicting obligations can be removed so that managers can concentrate on commercial targets. For example, requirements to provide subsidised services to some consumers can be separately identified and funded by the government concerned. And revenue caps, or like measures, can be used to encourage WSD providers to look to productivity improvements as a source of improved commercial performance.

Resource management, service provision and regulation

Conflicts of interest are inevitable where the functions of WSD service provider are combined with the roles of water resource manager and/or regulator of environmental and financial performance. For example, there can be tensions between providing services cheaply and managing water resources to ensure their long term sustainability.

Governments must decide whether to make WSD service providers also responsible for water (and land) resource management. Opinions differ on this. One view is that in combining these functions, it is easier for integrated decisions to be made. The contrary view is that resource management and service provision goals can conflict, and it is only by keeping them separate that the community can be sure that services are not provided at the expense of resource degradation. There is also the related question of whether water resource management and regulatory functions should be assigned to separate bodies.

The degree of separation of functions differs quite markedly across the water sector. For example, the Hunter Water Corporation (HWC) is primarily a provider of water and sewerage services, whereas Melbourne Water Corporation is responsible for maintaining the quality of waterways as well as providing bulk supply.

The appropriate degree of separation is under review in a number of States. The South Australian Government acknowledges that its Engineering and Water Supply Department (EWS) is required to deal with conflicting objectives, but considers that the EWS has been able to do this successfully:

> It is responsible for bringing together policy advice to Government on all aspects of water management, it carries out all State imposed regulatory action for inland water resources, it is the State's major provider of water supply and urban sewerage services and it is the largest single operator of irrigation schemes. Naturally this breadth of functions has the potential to internalise many conflicting objectives. It has been possible, nonetheless, for the EWS to operate successfully.
>
> Some separation of these roles is under active consideration. This relates to the changes needed to allow the SA Government to create a viable environmental protection agency (EPA) and in no way reflects any conclusion that the present form of EWS is inefficient or ineffective.

In Western Australia, corporatisation of the Water Authority of Western Australia (WAWA) is under consideration. There too, the problem is to clarify the separate roles of the organisation. WAWA said that it:

> ... is currently undertaking a review of its existing role and responsibilities. The objective is to identify the institutional framework which best meets the following requirements:
>
> - clear independence between resource management, regulatory and utility roles within the industry
> - effective vertical integration of water resource management activities, particularly strategic water planning, with water service provision
> - integration of natural resource management activities at a State level
> - administrative efficiency with minimal duplication of infrastructure and resources.

In its submission to the draft report hearings, WAWA said:

> ... the existing combination of water resource management and water service provision functions in one agency has significant advantages and that corporatisation should not necessarily involve the separation of these responsibilities. Should both functions be retained in a single corporatised agency, it would, of course, be necessary to establish mechanisms which provide for clear independence and accountability in decision-making with respect to water resource management issues.

The Northern Territory has dealt with some of the potential conflicts from overlapping responsibilities by having legislation for delivery of water supply and sewerage separate from that of management of water resources, even though both are administered by the same authority. The Government of the Northern Territory, said:

> New legislation ... maintains this position and keeps the issue of overall water resource management at arm's length from the provision of commercial water supply and sewerage services.

Notwithstanding the confidence of some State Governments that a range of objectives can be handled successfully within one organisation, it is important to at least clarify how these various objectives are to be reconciled. Even if these bodies retain their current roles, there is still scope to make service provision more commercially oriented.

Governments should ensure that providers of WSD services are commercially focussed. Responsibilities should be clearly set out; relationships between water management, service provision and regulatory functions clarified; and processes for resolving conflicts clearly defined.

Improving accountability, transparency and autonomy

At issue here is the best way to make suppliers accountable to those who pay for and use WSD services. This raises questions about who WSD authorities report to and what they are accountable for.

Accountability and transparency

In its draft report, the Commission proposed that water agencies should report to appointed boards (endowed with sufficient technical and commercial expertise), to ensure greater autonomy in meeting goals (or social and regulatory objectives) set by State Governments or Local Councils. There was a mixed response to this proposal. A number of participants said that accountability can be achieved without disturbing current institutional arrangements. For example, in the eastern States, efforts are being made to increase the surveillance of the performance of Local Councils, and provide technical and commercial expertise through co-ordinating or central agencies.

In New South Wales, the Local Government Act is being revised with a view to making procedures and operations more commercial, accountable and transparent (see Box 1). Queensland is currently amending the administrative and legislative framework governing provision of services by Local Councils, making them more accountable.

The Local Government Engineers' Association of Queensland, argued that Local Councils are fully accountable:

> The analogy is drawn to private enterprise in that firms which do not provide consumers with the products they want at competitive prices do not survive. The same holds for Local Authorities providing WSD services. ... The consumer, if not satisfied with the prices and standard of service received has the option to dispense with the Board of Directors - the Elected Members - at every election and replace it with a Board of Directors which it feels reflects more properly the standards of service and prices that the community requires. ... The community therefore does have a direct control over the standards provided and the costs associated with the standards in a continuing sense.

The City of Townsville argued that the anticipated introduction of performance indicators for Queensland Local Councils, will mean that as much accountability will be achieved through Local Council provision as through provision of services by an authority with an appointed board.

The problem with this argument is that voters choose a package of policies and may trade-off inappropriate WSD service provision against other gains.

Box 1: **Reform of Local Government in New South Wales**

Proposed revision to the *New South Wales Local Government Act* will require Councils to prepare annually management plans, statements of revenue policy and annual reports on their activities. In the case of water supply and sewerage, the management plans will be for a minimum period of 10 years. Copies of plans must be made available to the public for information and comment.

General Managers will be required to report to their Councils every three months on the extent to which performance targets in the management plan have been met.

In annual reports, Councils will be required to compare actual performance against projected performance in the management plans, and document reasons for any differences between the two. Annual reporting requirements will include performance indicators and other information on which the public and State Government can assess the performance of Councils.

Councils must keep proper accounts which are to be audited annually. Financial reports will be accessible to the public. Full accrual accounting will be introduced with current cost valuation of water and sewerage assets. Appropriate charges for current cost depreciation will be included in the new operating statements.

For services such as water and sewerage, a strong emphasis will be placed on user-pays and full cost recovery.

All certified positions in Local Governments will be abolished and Councils will be able to establish new structures and change employment practices within a flexible organisational framework.

The reforms are expected to take effect from the beginning of January 1993.

In principle, the Commission favours management of WSD provision by appointed boards. However, the changes in a number of States to ensure greater accountability and transparency of Local Council service provision may prove adequate. Performance monitoring (see below) will help to assess this.

Indeed, whatever the institutional arrangements, some form of regulation and/or monitoring of service providers is required. This is because WSD authorities are not subject to the normal market checks on poor performance. Accordingly, without oversight, there is scope for WSD providers to overprice, inflate costs and/or achieve commercial performance targets through reducing the quality of service and environmental amenity.

There are a number of ways in which this overview can be provided. One is to rely primarily on performance monitoring by independent agencies. Another is to use corporate or business plans to establish performance objectives for an authority and to specify the consequences of failing to meet those objectives. And, generally applicable regulation can be used to ensure appropriate environmental outcomes.

In some respects, performance monitoring by independent bodies and corporate or management plans are substitutes. Greater reliance on objective setting and monitoring within corporate plans would reduce the need for independent performance monitoring. Getting the appropriate balance, between these instruments, is an emerging issue in the water industry and for government business enterprise (GBE) reform generally.

Governments should establish clear lines of accountability for their WSD agencies and ensure that performance results are made publicly available.

The precise mix of instruments required will very much depend on individual circumstances. Hence, the Commission has simply commented below on the potential of these instruments to promote better outcomes.

Corporate plans and annual reports

One way to clarify objectives and increase accountability is to set out objectives in a statement of corporate intent, published as part of a corporate or business plan.

Most of the major WSD authorities and many of the smaller Water Boards and Local Councils already prepare corporate plans. Apart from the requirements in Victoria and New South Wales, referred to above, For example, under its amended Local Government Act,the Queensland Government requires all Local Governments to prepare detailed budgets and annual reports containing indicators of financial and non-financial performance. In Victoria, authorities are required to submit corporate or business plans to the State Government; and Tasmanian Water Authorities are required to prepare corporate plans and report to Parliament via annual reports.

The Victorian Government stressed the importance of corporate or business planning for all WSD service providers:

> Business plans are sometimes thought only to be important to major authorities. However, with increasing awareness of issues such as water quality (including blue-green algae), drought and floodplain management and effluent disposal, all authorities have to be able to strategically manage these issues. Business plans are a powerful tool in focussing even the smallest authorities on these issues, so they can plan for them, rather than merely react to them.
>
> Not only are business plans critical in identifying, avoiding and resolving conflicts, they are also an important planning tool for authorities to reduce costs, achieve pricing reform and ensure better investment decisions. In terms of benefits to the State, business plans enable Department of Water Resources to monitor the performance of individual authorities and the industry as a whole. They are also an input in policy analysis and assist in estimating global borrowing requirements and debt management of the industry.
>
> Business plans are also a critical link in the chain of accountability. In Victoria, the annual reports of non-metropolitan authorities are currently being aligned with their business plans so that the projected results in the latter may be compared with actual results in the former.

The following are key areas that should be covered by corporate plans.

- *pricing behaviour*

  There is the potential for authorities to increase rates of return by simply increasing their prices. Consequently, it is important to have information on prices and the rate at which they will be increased over the period of the plan.

  Part of pricing reform is to better link charges to the cost of services provided to individual customers. Thus the corporate plan should also deal with initiatives to improve the structure of prices through, for example, dispensing with free water allowances and phasing out property-based access charges (see Chapters 4 to 6).

- *cost performance*

  Owner governments and the wider community have an obvious interest in improving the cost efficiency of service provision. In addition to the range of indicators that might be used to identify cost efficiency, the Commission's recommendations in Chapter 4 would require a formal link between price increases, cost reductions and rate of return performance to be spelt out in corporate plans.

- *investment performance*
  Corporate plans can help to ensure that proper investment appraisal is undertaken. The corporate plan should make provision for the public to comment on all major proposed investments and to see what alternatives have been assessed, their impacts on the environment, their expected rates of return and their costs and benefits.

  The rate of return hurdle test for new investments, proposed in Chapter 4, and the assessment of alternatives (see Box 2) are both integral parts of investment appraisal. this process. Public comment should be sought on major proposed investments.

- *service quality*

  In order to ensure that improved commercial performance is not achieved through unwarranted run-down in service quality, corporate plans should establish quality of service targets and set out the consequences if an authority fails to meet those targets. For example, in the United Kingdom, the Customer Charter allows domestic customers to claim A$10 against the utility each time it fails o meet a performance target.

In this area there is overlap with environmental regulations covering permissible discharges into water bodies etc. Such regulations will necessarily overlay an authority's corporate plan.

Box 2: **Assessing investment alternatives**

The Sydney Water Board said that:

> In the past there was a tendency to merely develop engineering solutions to complex environmental problems that permeated the whole water and sewerage system. These problems actually required a multi-faceted approach.

The Australian Conservation Foundation (ACF) referred to the importance of processes to assess new and evolving technologies. In reference to a proposed new dam on the Shoalhaven River, the ACF said:

> This dam is only necessary if the major elements of pricing, population, water use, water re-use [and] urban planning cannot be integrated. This dam is an important test case and its construction will mean not only destruction of the Shoalhaven River but also a failure of water use planning and management in Australia.

The Institute for Science and Technology Policy (ISTP) at Murdoch University contended that existing institutional arrangements are not well placed to assess technologies which are not compatible with existing systems, such as the installation of point-of-entry or point-of-use technologies for treating water and sewage. ISTP pointed out that 20 per cent of total investment in sewerage treatment is spent on treatment and 80 per cent on reticulation, especially the main pipes. It argued that the ratio of investments could be changed if sewage were treated locally with more spent on treatment using emerging technologies such as wetland or solar-aquatic systems.

Melbourne Water Corporation, while acknowledging that current practices are less than perfect, said that it does canvass alternative technologies. It noted that there are implementation problems associated with grafting new technologies onto existing systems:

> ... one of the troubles with having long-term investment in such major capital areas is if there's a significant change in technology which allows you to build small localised plants that are very clean and sensitive to the local environment ... it raises an issue of how you would maintain the economies of scale by using the big plants.

Given the nature of the water industry, many aspects of business planning are long term and thus the period for which a corporate plan should apply will depend on individual circumstances. Any major changes to the plan, and the reasons for them, should be made explicit and reported publicly.

All WSD agencies should be required to prepare publicly available corporate plans and annual reports, indicating commercial and other objectives. Any major changes to the corporate plan should be reported publicly.

Independent performance monitoring

Independent performance monitoring, particularly if conducted at a national level, is an important source of information to governments on the performance of not only their own authorities, but also authorities elsewhere. It will thus assist in the formulation of corporate plans and ensure that an element of 'yardstick' competition is brought to bear.

As indicated above, state-based performance monitoring occurs to varying degrees -- some voluntary, some mandatory. Much of it is undertaken in-house and reported to the relevant Minister or Local Authority, without regular public scrutiny.

National and independent performance monitoring of WSD authorities is undertaken by the Australian Water Resources Council (AWRC). Through its interagency performance review, the AWRC documents and compares a range of financial performance criteria for the major water authorities. At a more aggregated level, it also monitors performance in the country urban and irrigation sectors.

The AWRC's role in this area should be expanded. It should be the body responsible for compiling and publishing a national register of performance results submitted by State Governments for all water authorities.

As national monitoring of WSD service provision is already in place, it is well placed to provide useful insights for the broader GBE national performance monitoring exercise, occurring as part of the agreement reached between the Commonwealth, State and Territory Governments. Co-ordination between the two will also be necessary to avoid unnecessary duplication of effort.

All WSD agencies should submit to their relevant State body their achievements against an agreed list of performance indicators. This information should then be published by the Australian Water Resources Council.

Because of the wide variations across regions in geography, weather patterns and demography, it is likely that a divergence in results for many of the indicators will be consistent with efficient service delivery. Monitoring results must therefore be used with care. If wide variations in performance across authorities are observed, it will be important to look first for explanations due to regional differences.

If States all agreed to implement national performance monitoring, the AWRC would need to consult with all States over how to set up procedures for collecting data, ensuring consistency and making results public. They would also need to agree on which indicators are to be included.

Regulating trade practices

Restrictive trade practices regulation in Australia is designed to deter anti-competitive behaviour by firms with a significant level of market power. While the legislation establishing the HWC makes the Corporation subject to the *Trade Practices Act* and the *New South Wales Fair Trading Act,* in general, GBEs are exempt. This exemption is the subject of discussions between the Commonwealth and the States, and is likely to be reviewed later in 1992.

Encouraging effective competition in the supply of inputs

WSD service providers should not be advantaged nor disadvantaged in purchasing inputs by virtue of their government ownership. There is a wide range of ancillary service inputs (such as plant, design, electrical engineering, construction, metering, accounting services) which can be provided by the private sector.

A number of authorities are seeking The Sydney Water Board (SWB) is embarking onincreased private sector involvement through having private consortiums both develop and operate WSD projects. For example, as noted in Chapter 3, a private consortium is to design, construct and operate WSD and other infrastructure in the Rouse Hill area of Sydney.

Greater freedom in setting employment conditions, unencumbered by public service labour market requirements, and in using outside contractors is an important part of reforms necessary to allow WSD service providers to operate in a commercial fashion.

Changes to accounting systems may be required to allow a proper comparison of the costs of inputs provided in-house or by private contractors.

WSD service providers should be free to use inputs offering the best value, whether they be in-house or external to the agency. Accounting systems should be modified, as required, to allow a comparison of the costs of acquiring inputs in-house or from outside contractors.

Achieving economies of size

A feature of the provision of country urban services in the eastern States is the small populations serviced by many authorities. Some water and sewerage schemes service less than 100 people.
To the extent that fragmentation is a source of inefficiency, amalgamation would allow realisation of economies of size, especially in administration, technical and financial services, and to a lesser degree in operations. As discussed in Chapter 3, amalgamations in Victoria over the last decade have produced substantial efficiency gains.

In its draft report, the Commission proposed that amalgamation of country urban water services should be pursued in all the eastern States.

Support for this draft recommendation came from a number of Victorian participants. The Tasmanian Government and some Queensland participants said that amalgamation could be beneficial in some areas of their States.

Others pointed to physical and geographical constraints on amalgamations such as the spread of population in the outback of New South Wales and Queensland. Participants from Queensland and New South Wales were also concerned that amalgamation would remove responsibility for WSD provision from Local Government.

The PWD argued that because many of the schemes in New South Wales are small, they are best operated at a local level in conjunction with other community services. The PWD said further amalgamation of WSD services would result in duplication of administrative, technical and financial services already undertaken by Local Councils.

Narrandera Shire Council in New South Wales said that there are administrative models which would reap some of the benefits associated with amalgamation, while at the same time retaining Local Government control:

> ... franchising areas to other supply authorities, purchasing the raw product from other sources and delivering through its own system, or by entering into any other arrangement with other authorities as may be mutually attractive. Any such arrangement would allow the local government body to control its own destiny in accordance with the wishes of its ratepayers.

The system in New South Wales is an example of this sort of arrangement. Similarly in Queensland, bulk water boards supply a number of individual WSD operations.

Given the diversity in geographic, demographic and institutional conditions, the need for amalgamation does not apply equally well throughout Australia.

Whatever the present institutional forms, there would be benefits from greater realisation of economies of size. This could mean formal amalgamations to form regional WSD authorities. Or it could involve franchising areas to supply other authorities. Or it could entail the approach already used in parts of New South Wales and Queensland, where bulk regional water boards or councils supply a number of Local Councils.

Governments should look for ways to realise economies of size in the provision of their country urban WSD services. In some cases this may warrant amalgamation of service providers.

In looking at the optimal size of region for WSD provision, water management concerns as well as cost efficiency are relevant. The ACF said:

> ... Local Government appears to be too small a unit to deal efficiently with catchments and State Governments too big a unit. There is an opportunity in the move towards regionalisation of water services ... to bring in, in natural resource management only, a regional scale.

Issues in relation to catchment management are discussed in Chapter 10.

7.4 Corporatisation of urban WSD service providers

While much can be achieved within existing administrative structures, there will be benefits from a more arms length relationship between governments and their water authorities. Corporatisation is one way of achieving greater day-to-day autonomy. However, the term corporatisation is often used without a clear idea of what it entails.

The Public Bodies Review Committee of the Victorian Parliament (Government of Victoria 1991) listed 27 different interpretations of 'corporatisation'. Sly and Weigall offer the following definition:

> The term corporatisation is defined widely. In a legal sense, corporatisation means the creation of a limited liability company incorporated under the Corporations Law, and the transfer of the business conducted by the Government (perhaps already commercialised) to that company. A GBE can alternatively be constituted in its own corporate form by legislation. The ownership and control of the company remain with the Federal Government or relevant State Government.
>
> The assets and liabilities are owned and borne by the company and the company makes the profits or incurs the losses, but the Government indirectly controls the company by virtue of its share ownership. (Sly and Weigall 1992, p 14)

These differing interpretations are already evident in the different models of corporatisation being examined within the States. Important features of the Hunter Water Corporation (HWC) -- the only corporation fully operational in the water sector -- are described in Box 3.

Box 3: **Corporatisation of Hunter Water**

In corporatising the Hunter Water Board in 1991, the New South Wales Government followed the approach used to corporatise GBEs in New Zealand. It involved the creation of a new legal entity.

The HWC has been issued with an operating licence which specifies, among other things, a cap on increases in revenues and prices and standards for quality of service. If the Corporation fails to comply with the licence it can be fined up to $150 000 or even have its licence cancelled, whereby the assets and undertakings of HWC would be vested in the Crown or a new service provider. The Corporation's obligations to customers are specified in a customer contract between the organisation and property owners in the area.

The responsibility for ensuring that the HWC meets its obligations resides in a board. The New South Wales Government is required to provide any special directions in writing, and has agreed to directly fund community service obligations.

Dividends are paid to the shareholder - the New South Wales Government. The two voting shareholders of the Corporation are the Premier and the Minister for Housing. They own the corporation on behalf of the people of New South Wales. In its role as shareholder, the Government is responsible for ensuring sound commercial performance, constrained by the requirements of the other arms of government. The HWC pays the State Government money in lieu of sales tax and income tax.

Water resource management and catchment management are vested in the Department so that ownership of water resources will be retained bythe Crown. Licences to extract water are issued by the Department of Water Resources.

Environmental and health matters are separately regulated by the Environment Protection Authority, and the New South Wales Department of Health.

The aim of separation of responsibilities is to allow each arm of government to pursue a clear objective, unhindered by other conflicting interests.

The approach taken for the HWC satisfies the reform principles listed in section 7.2. Objectives have been stated clearly. In order to reduce conflicts of interest, the HWC has been given the commercial responsibility for providing WSD services, while the key roles of regulation and

resource management, have been placed in the hands of separate arms of government. The Board of the HWC has been given the responsibility and independence to conduct the business on a commercial basis, but under clearly defined constraints. Performance is being measured and made public. And agreements have been made which specifically address potential areas of abuse of monopoly power -- prices and service quality.

Incorporation under Corporations Law means that the obligations on principals and directors are clearly spelt out, including their responsibilities to shareholders and creditors, and these are enforced by the Australian Securities Commission. Without this, some discipline on directors and distance from government is lost.

An alternative approach based on that used by the Commonwealth for Telecom is being used in the corporatisation of Melbourne Water Corporation.[1] In contrast to the approach adopted for the Hunter, directors will not be subject to Corporations Law.

As the system is not yet up and running, it is too early to judge whether it will provide the sort of arms length embodied in the Hunter approach. However, the Victorian approach currently lacks some of the explicit accountability instruments used in the Hunter such as an operating licence and customer contract. Moreover, objectives do not appear to be clearly spelt out. Rather these will be determined through the three-year corporate plan. It seems that the Victorian Government intends to have significant involvement in the Corporation:

> In matters of expenditure or policy direction the Minister becomes a powerful figure in the operation of the legislation. (Victoria Parliament Legislative Council 1992)

Corporatisation along the lines of the Hunter model, can provide a more commercial edge to the operations of WSD authorities than can be achieved solely with administrative reforms. It can place greater pressure on governments to clearly spell out the circumstances in which departures from commercial practice are required. And, the process of corporatisation can, in itself, help to focus authorities and their governments on setting priorities; establishing accountability; and devising ways to deal with potentially conflicting functions.

While corporatisation offers some efficiency benefits in addition to those available through modification of existing administrative structures, it can have drawbacks. For example, by making WSD authorities liable to pay tax, it will encourage them to substitute asset maintenance for asset replacement. This is because the tax system provides more favourable treatment to maintenance (see Chapter 6).

Corporatisation, particularly, for larger authorities, should be considered on a case by case basis.

[1] The Victorian Government corporatised the agency formed from the amalgamation of the Melbourne and Metropolitan Board of Works and six adjacent water authorities in July 1992.

Governments should consider corporatisation of WSD service providers on a case by case basis, to assess whether there are gains to be had beyond administrative reforms.

7.5 Privatisation of urban WSD service providers

Should commercially-oriented WSD authorities remain in government hands? Water services are privately provided in a number of countries. For example, in the United Kingdom, water authorities operate as highly regulated private monopolies. In France, while infrastructure remains government owned, services are provided through private franchises.

However, given the natural monopoly characteristics of the sector, change of ownership does not obviate the need for extensive government involvement. Thus in the United Kingdom, extensive economic regulation is imposed through the Office of Water Services (OFWAT), including the setting of tariffs, reviewing financial performance, assessing levels of service and monitoring investment and asset condition. Consumers have added representation through Customer Service Committees. Environmental and water quality controls are regulated by the National Rivers Authority, the Drinking Water Inspectorate and Her Majesty'sthe Inspectorate of Pollution (see London Economics 1992, for further details).

A number of problems have been encountered with privatisation in the UK. For example, under current rules, the costs of capital augmentation are passed on to consumers. Some observers consider that this removes much of the discipline on authorities to properly assess the need for new investments. It appears that OFWAT will be less lenient in allowing 'pass through' in the future. Also, there has been a continuing tension in the price setting arrangements between the need to protect consumers from unwarranted price increases and the need to allow water authorities to appropriate some of the benefits of cost saving initiatives.

In France, franchise contracts rarely change hands. As London Economics states:

> ... while it is widely acknowledged that bidding for the initial contract is fiercely competitive, it is doubtful that the subsequent renewal of contract is subject to any significant competitive pressure, ...

Participants had differing views on the merits of privatisation. The SWB considered that:

> The experience of some of the privatised UK Water Authorities suggest that there may be a number of important benefits to be gained from privatisation.
>
> ... Overseas models of privatisation which reportedly result in heavy costs, especially associated with the regulatory environment, would not necessarily need to be replicated in Australia.

However, Melbourne Water Corporation, in commenting on its own consultancy provided by London Economics, concluded that:

> On the basis of international evidence, and given the natural monopoly status of the major services involved, no clear advantage in efficiency could be gained associated with the transferral of the ownership of Melbourne Water from the public to the private sector. The report reinforces the approach that the most significant efficiency gains are most likely to derive from the stimulation of genuine competition for particular activities undertaken while still retaining overall control and accountability with a single organisation.

In the Commission's view, privatisation of urban service provision is not a high priority at this stage. It is preferable to build on the current foundation of public ownership in a way which would not preclude the possibility of privatisation at a later date, should that prove desirable. In some areas, a requirement for WSD authorities to behave in a more commercial fashion could provide the means by which the industry and regulators learn how a successful private system could work, and thus constitute a staging post for privatisation at some stage in the future.

7.6 Urban drainage

Across all States, drainage services in urban areas are predominantly a Local Government function. However, some major urban water authorities own and maintain the main stormwater trunk drains into which the various locally operated drainage systems discharge. The States have evolved different ways to manage drainage functions across Local Council jurisdictions, and a number are reassessing their approaches.

The challenge is to devise ways by which to co-ordinate drainage across an 'urban catchment', while at the same time providing incentives for both the efficient provision of drainage infrastructure and to make those responsible bear the costs of any 'downstream' effects. At present, the water and sewerage authorities sometimes find that their investments in sewerage treatment (aimed at improving environmental outcomes) are undermined by the effects of drainage.

As environmental concerns have emerged, pressures have increased for the integration of drainage into the whole water management cycle. Otherwise, drainage discharges can frustrate attempts to improve water quality throughout an urban area.

In Western Australia, drainage services are currently provided in a 'negotiated partnership' between Local Government and WAWA. WAWA is reviewing its role and objectives for drainage. While no decisions have been made, its likely preferred role will be to provide strategic planning so that drainage services and the development of infrastructure are co-ordinated. This will leave the construction of infrastructure and the provision of drainage services to Local Government. In this case:

> ... the Authority's utility role, [may] ... be limited to those schemes where water resource management objectives of sub-regional significance are paramount.
>
> Examples might be schemes to control the impact of urban development on the water balance of regionally significant wetlands, or drainage of development that might impact on public groundwater resources. This would be distinct from "urban flood protection" schemes where the management issues are more straight forward and local in nature.

Melbourne Water Corporation has significant responsibility for drainage in metropolitan Melbourne. It is investigating ways to meet its expanded responsibility for the greater part of the Port Phillip Bay catchment. For example, it is considering putting litter traps in drains at the council boundaries so that the cost of litter is borne by the community responsible for it. Melbourne Water Corporation said that the pollution of major waterways is largely attributable to the drainage system.

The Water Authorities Association of Victoria raised the likelihood that a study into the 32 water boards supplying the south-west of the State will result in fewer boards which will be given the added responsibility for river management, floodplain management and drainage.

In South Australia, the provision of drainage services other than irrigation is primarily the responsibility of Local Government. However, the State Government is considering using stormwater as a resource to be used for industrial, environmental and recreational purposes. It is investigating the appropriate institutional structures to manage this. Five alternatives are under examination, including a partnership agreement involving a new stormwater authority.

In Sydney, perhaps more than in any other Australian city, Local Council provision of drainage services has created significant environmental problems. Local Council boundaries often do not align with natural catchment areas, so that it is difficult to sheet home responsibility for the adverse environmental effects to the Local Councils concerned. Local Councils are responsible for the provision of drainage services, but it is the SWB which is judged on the condition of the waterways. The SWB contends that its efforts to improve the condition of waterways through improved sewage treatment are impaired by the effects of drainage.

The SWB is considering ways to improve outcomes, including:

- charging Local Councils for their discharges into the trunk drainage system, in the same manner in which the Board licenses and charges industrial users to discharge into its drains;

- physically integrating the sewerage system with the drainage system;

- countering Local Council fragmentation by assisting Local Government to prepare a regional waste-water management strategy as part of the wider water cycle management strategy for Sydney;

- in new areas, such as Rouse Hill, vesting ownership of drainage infrastructure with the SWB, so that infrastructure can be built in the most effective place in the catchment; and

- having the EPA set standards for and monitor discharges from Local Council drains.

There are advantages in having Local Councils provide drainage services. Savings can be achieved through the joint use of administrative and financial services and because it is often technically desirable to install drainage as a physical part of road construction. Narrandera Shire Council and other participants argued that since drainage is physically linked with road construction and maintenance, it is illogical to separately charge for this work. Where Councils are also responsible for sewerage, they have the option of integrating these two functions.

However, in the major cities, problems stemming from Local Council provision of drainage are likely to be ongoing. One option is to physically integrate drainage with sewerage. Alternatively, treating Local Councils as if they were industrial users may be an innovative approach, requiring less investment in large-scale infrastructure and therefore, worth trialling. Underlying this latter approach is the principle that Local Governments should be accountable for drainage run-off leaving their boundaries. This principle has much wider application. Even where Local Government provision of WSD services enables co-ordination of sewerage and drainage, Local Governments should still be made accountable for discharges that affect other regions.

State Governments should ensure that Local Governmentsand other urban water agencies with drainage responsibilities are accountable for stormwater and other run-off leaving their boundaries.

7.7 Irrigation water and drainage

There has been action taken in most States to improve the efficiency of both bulk water supply and the distribution of water and provision of drainage within government irrigation systems. Perhaps, the most significant of these reforms is the devolution of management of irrigation systems.

In New South Wales, the management of Irrigation Areas and Districts has been devolved to irrigator-dominated management boards. This has led to cost savings through, for example, greater use of outside contractors in performing maintenance work, flatter management structures and more flexible labour market arrangements. Greater input into the decision making process from those paying for services underlies these savings.

The New South Wales Government intends that eventually the management and control of the Irrigation Areas and Districts will be entirely separate from central administration. This will

achieve the separation of the function of water resource manager from service provider. In the Jemalong-Wyldes Plains Irrigation Area (Lachlan Valley) and the Coleambally Irrigation Area (Murrumbidgee Valley), final details of private management are being negotiated. Options being considered include full privatisation, corporatisation and the creation of public subsidiary companies, where the irrigation infrastructure would remain in government ownership.

The South Australian Government also favours devolution of management to the regions:

> The concept of Regional Management Boards is supported and already included as an interim step between Government and self management. The South Australian Government Highland Irrigation Districts have been moving towards a greater management involvement for the Irrigation Advisory Boards for service level requirements, developing and monitoring budgets, developing policy and considering annually the price of water.
>
> ... Devolution to regional bodies reduces administration and management levels whilst improving the ability to make decisions quickly and close to the customer base.

The Victorian Parliament recently passed a bill to devolve management of rural water to five regional boards, operating within the one organisation, renamed the Rural Water Corporation (see Part II of this Report). Bulk water supply and distribution assets will continue to be owned and controlled by a public authority.

However, the VFF questioned the degree of independence to be given the regions:

> It is critical to the success of the reforms that Regional Organizations have full autonomy in relation to decisions on levels of service, pricing, borrowing and expenditures. A structure in which regions have management authority, so long as their decisions are consistent with the policies of a strong Central Corporation, is not regionalisation at all.

In the Commission's view, devolution of the management of public irrigation systems to the regions will improve the efficiency of irrigation services. It will allow those responsible for service provision to concentrate on achieving commercial goals, while meeting externally imposed constraints regarding water quality etc.

The Salinity Program Advisory Council described how regional decision-making combined with the responsibility to pay for choices, can produce sound solutions:

> If you look at surface drainage which is part of the salinity management plan, ... we are doing everything possible to reduce the cost of the construction and the bridges because we have got to pay the depreciation in the future. ...
>
> ... if we had continued with the way that the drainage program was being extended across the region, it was going to be a $400 000 000 bill in 1986 dollars. ... by reducing the standard in more community drainage, we have reduced the total bill to $170 000 000 in today's dollars.

In the process of devolution, it would be necessary to clarify the separate roles of bulk water supply and management of systems. Devolution to the regions raises the question of how the remaining

service provision functions of central agencies -- for example, the supply of bulk water to regional irrigation bodies, towns and industry, maintaining dams and storages, running the rivers, the environmental impact of drainage practices -- should be organised. This must be made clear and negotiated before devolution of management or ownership to regions.

Devolution is a useful interim measure. However, in the Commission's view, so long as ownership of irrigation assets remains in public hands, a government commitment to maintain and refurbish potentially uneconomic systems is likely to remain. As discussed in Part II of the report, in some States an open-ended program of asset refurbishment has commenced with little regard to the viability of systems under commercial water pricing (see Chapter 5) and an expanded system of tradeable water rights (see Chapter 8). In the Commission's view, the only sure way to place commercial discipline on the refurbishment process and to disentangle government from an ongoing commitment to non-commercial infrastructure is to privatise the public irrigation distribution schemes.

Where schemes have yet to be refurbished, cash payments may be required as an incentive for irrigators to accept ownership of assets. This is because in their current state, and with commercial prices for bulk water in place, the assets concerned may have no commercial value. However, cash payments are preferable to across-the-board refurbishment, prior to privatisation. It means that decisions on whether or not to refurbish will be taken by irrigators (or groups of irrigators) in accordance with commercial self interest -- having regard to the viability of their systems in an environment of commercial pricing for bulk water and a much expanded system of tradeable water rights. Where refurbishment proceeds, it will be arranged and paid for by irrigators, partly from the cash transfer from government at the time of privatisation.

Some irrigators may decide that their system will not be commercially viable even if refurbished. For these systems, the cash transfers accompanying privatisation will provide adjustment assistance to the irrigators concerned.

The cash transfer to facilitate privatisation should be determined on a case by case basis. For schemes that have yet to be refurbished, it should not exceed 50 per cent of the estimated refurbishment costs. For schemes that have already been refurbished a lesser cash transfer would be appropriate.

The Murray-Darling Basin Commission estimates that the cost of rehabilitating irrigation infrastructure in the Basin over the next 15 years is about $600 million. With a 50 per cent contribution from government, this suggests that privatisation of irrigation distribution systems in the main irrigation region in Australia could be achieved at a public cost of $300 million.

Management of public irrigation distribution systems should be devolved to regional bodies with a view to their privatisation. Transfer of ownership should occur before refurbishment of assets.

8 WATER ENTITLEMENTS

In many parts of Australia demand for water at current prices exceeds supply. This means that water has a value to users above the price charged for its provision. This is particularly evident in some parts of the irrigation sector. It also occurs immediately prior to augmentation in urban systems when non-price methods are used to ration scarce supplies.

Where demand exceeds supply, a system of water entitlements could ration demand and help to ensure that water is directed to its most valuable use. Water entitlements do not necessarily require that ownership of water resides with private individuals. Under Australian water entitlements systems, the ownership of water remains with the State authorities. Water entitlements are simply designed to give the owner the 'right' to use a specified amount of water in the way that he or she sees fit. Thus water may be used by the owner of the entitlement or sold to another user.

The way in which water entitlements are specified will determine how efficiently scarce water is allocated.

This chapter discusses existing systems of transferable water entitlements (TWEs) and examines ways in which the specification of water rights could be improved.

8.1 Current allocation systems

Irrigation water is allocated to users by public agencies in each State through licensing systems. Generally, these entitlements are allocated free of charge, although some new allocations in Victoria and Queensland have been auctioned.

Until recently, allocations were tied to land rather than to the irrigator. This constrained transfer of water to more profitable irrigation activities and, indeed, to non-irrigation uses such as urban water supply or environmental enhancement. The Western Australian Department of Agriculture remarked:

> ... the absence of a mechanism to allow a market for irrigation water to develop ... impedes access to additional water by higher value agricultural users and efficient water users and provides no incentive to facilitate water transfer to soils which are more productive, or from soils which are marginally saline.

In recent years, most States have introduced transferable water entitlements. New South Wales and South Australia were the first to do so in 1983, followed subsequently by Queensland, Victoria and Tasmania. Western Australia permitted experimental transfers in the Collie and Harvey irrigation districts in 1987-88 and is currently giving consideration to a general policy of TWEs.

For the most part, water can only be transferred on a temporary basis. An exception is South Australia, where permanent transfers are permitted in both government and private irrigation areas. Permanent transfers are also permitted for private diversions on regulated rivers in New South Wales and the Bundaberg irrigation district in Queensland. Provision for permanent transfer in Victoria and in government irrigation schemes in New South Wales is expected shortly.

As set out in Table 8.1, all States regulate TWEs. For example, most only permit transfers within the same supply systems. There are also restrictions to mitigate negative effects of transfer on third parties and the environment.

Where water resources are overcommitted, reduction factors sometimes apply to transfers. For example, in South Australia transfers between irrigators are subject to a 10 per cent reduction in the volume entitlement, while transfers to industrial users are subject to a 70 per cent reduction.

To date, water transfers in most regions have generally represented a small proportion of total water allocated -- less than 5 per cent. However, in the government schemes in New South Wales, more than 20 per cent of allocations were transferred in 1987-88.

8.2 The value of water entitlements

Water entitlements will have value if the value of the water to an irrigator exceeds its cost. Hence, the value of water entitlements is one indicator of irrigators' capacity to pay more for water. There are two sources of information on the value of water entitlements: prices paid for water transfer and prices paid at auction for new water entitlements.

The Department of Water Resources (DWR) said that, in New South Wales, the prices paid for temporary water transfer appear to be in the range of $2 to $4 per ML. For permanent transfers between private diverters, prices have been much higher reflecting, amongst other things, the premium placed on the on-going availability of the water concerned. There have also been significant variations in price between regions reflecting differences in the use of irrigated water and the reliability of supply in the system, and whether an embargo on the issue of new licences exists. In the Barwon region, transactions have apparently occurred at $60 to $450 per ML; in the Lachlan and Murray regions at $100 to $150 per ML; in the Murrumbidgee region from nominal to over $400 per ML; and in the Macquarie-Western region at a weighted average of around $200 per ML.

Table 8.1: **Features of transferable water entitlements, by State**

State	*When & where introduced*	*Length of transfers*	*Transfers between*	*Spatial restrictions*	*Volumetric restrictions*	*Protection for third parties*	*Special conditions*	*Agency fee*	*Price determination*
New South Wales	1983 State-wide	One-year only in government schemes; permanent for private diversions	Irrigators only for temporary transfers; irrigators and other users for permanent transfers on a case-by- case basis	Within set zones of same river system and between systems but subject to consideration of third party effects	Total allocation transferable with provision for limitation on case-by-case basis	Agency can refuse transfer if third party effects significant capacity or environment	Must not significantly affect supply channel for permanent	$75 per transfer for annual; $250 per transfer	Negotiated between buyer and seller
Victoria	1987-88 Goulburn-Murray, Macalister, Campaspe & all private divertions	One-year only	Irrigators only	Within same supply system only	No volumetric limit on transfers of irrigation water, but must retain stock and domestic allocation	Agency can refuse transfer if third party effects significant	Must not significantly affect delivery and drainage channel capacity or salinity	$70 per transfer	Negotiated between buyer and seller
Queensland	1987-88 Border Rivers; 1988-89 St George &	Permanant in Bundaberg; one year only elsewhere Bundaberg	Irrigators only supply	Within same system only	10% of original nominal allocation for Bundaberg; none elsewhere	No explicit provisions	In Bundaberg, written consent of mortgagee for permanent transfers	In any year, $100 for first transfer, $150 for second, $200 for third and so on	Negotiated between buyer and seller.

Table 8.1 **(Continued)**

State	*When & where introduced*	*Length of transfers*	*Transfers between*	*Spatial restrictions*	*Volumetric restrictions*	*Protection for third parties*	*Special conditions*	*Agency fee*	*Price determination*
Western Australia	Temporary transfer trialled in 1987-88 in the Collie and Harvey Irrigation Districts								
South Australia	1982-83 River Murray private diverters; 1984-85 NAP[a] groundwater; 1988-89 River Murray Public Irrigation Areas	Permanent and temporary	For water drawn by private diverters transfers between irrigators and other users; in government irrigation areas, within the same area only	None on River Murray provided no effect on river; NAP zoned to prevent transfers to central core of depression	In NAP, 10% reduction of original allocation if to another irrigator; 70% reduction if to other sector	Agency can refuse transfer if third party effects significant	Must not significantly affect delivery and drainage channel capacity or salinity; private irrigators need to provide an appropriate irrigation management plan	$8.50 per ML transferred	Negotiated between buyer and seller
Tasmania	1989-90 in Winnaleah Irrigation Scheme	One year only	Irrigators only	Within Winnaleah Irrigation Scheme only	None	Application approved only if considered to be in best interest of the scheme	Transfers arranged by agency only	None charged in trial	

a North Adelaide Plains
Source: Submissions

Prices for water entitlements recently auctioned in the St George and Goondiwindi regions in Queensland were $300 to $600 per ML and $310 to $650 per ML respectively. In Victoria, an auction of 2000 ML of water from the River Loddon in 1988 realised prices of between $175 per ML and $775 per ML. In March 1991, an auction of 6000 ML of new entitlements in Gippsland realised between $160 and $200 per ML.

At the draft report hearings, irrigators and others criticised the Commission's use of the value of water entitlements as an indicator of irrigators' capacity to pay more for water.

One argument was that these values relate to the most efficient irrigators, rather than to the irrigation sector as a whole. For example, the New South Wales Irrigator's Council said that:

> There may indeed be some instances where prices paid for the permanent transfer of water entitlements might suggest that higher water prices can be afforded by a particular purchaser. But this should not be taken as evidence of the levels of charges that the rank and file irrigator can afford.

Another argument was that prices for small parcels of water do not reflect the general value of water. The Rural Water Corporation (RWC) in Victoria said that the value of water:

> ... depends not only on the demand situation but also the supply. 6000 megalitres is really quite a small amount of water to auction. If it were 60 000, the prices wouldn't be the same.

Others said that prices for water transfer often reflect the need for small parcels of water to finish a particular crop. For example, the Murray Irrigation and Districts Management Board argued that:

> It's worth paying a couple of hundred dollars per megalitre to finish a crop that you would have lost ... you can afford to pay a fair bit for those last couple of megalitres and it doesn't really reflect the value of water.

Further, many argued that the value of water will vary between regions and across crops.

As the Commission acknowledged in the draft report, caution is required in using the value of water entitlements to indicate irrigators' capacity to pay higher prices across the board. The current value of water entitlements varies considerably between regions reflecting such things as differences in crops grown and the underlying viability of irrigated agriculture. To some extent these differences are due to the absence of TWEs in the past. With a system of freely operating water transfers in place, geographical and technological constraints, along with restrictions on transfers to limit environmental effects, will prevent equalisation of the value of water entitlements.

There will also be situations when small quantities of water are needed to meet urgent short term requirements. As such situations are likely to coincide with high water demand, the high prices observed for transfer may not indicate 'typical' or average willingness to pay for additional water.

However, these qualifications do not undermine the general proposition that some irrigators value water over and above the price charged for its provision. The question is one of degree rather than principle. Indeed, irrigators' perception that prices for water entitlements do not indicate capacity to pay, can in part be attributed to past constraints on transfers which have precluded water flowing to those irrigators who derive the most value from it. As trade in water develops, the value of entitlements will increasingly become a more reliable indicator of capacity to pay higher prices.

While higher prices for irrigation water would reduce the value of a water right to an irrigator, in the Commission's view, pricing reform is unlikely to render water rights valueless. Indeed, if provision is made to allow water transfer from irrigation to other uses (see below), the value of water entitlements could conceivably increase.

8.3 Improving the system of water entitlements

There is widespread support for a system of TWEs in the irrigation sector. For example, the Australian Irrigation Council said that:

> [It] strongly supports the emphasis given by the Industry Commission to the adoption of transferable water entitlements. Efficiencies in management and use of water will increase as the practice in more widely adopted and the real value of water is realised. Sustainable use practices become more attractive when the returns from efficient use are high.

Recent moves to permit water transfer have produced modest efficiency gains. The DWR in New South Wales estimated that since their introduction in 1983, TWEs have increased the value of irrigation output in that State by $42.5 million, with an annual peak of $17 million in 1987-88. Gerrish (1984) estimated that the transfer of 1 per cent of allocations in Victoria would increase irrigated output by $2.5 million in that State each year (in 1990 dollars). The Australian Bureau of Agricultural and Resource Economics (1991) estimated that the more widespread use of transfers in the Murray-Darling Basin would increase output by around $40 million annually.

However, there is much that can be done to improve the current TWE arrangements.

Permanent transfer

Transfers of water on a temporary basis can bring efficiency gains. But uncertainty about the availability of that water in future seasons will constrain transfer and hence the efficiency gains available under a system that allows only temporary transfers. This is reflected in the fact that the price paid for temporary water transfers in New South Wales has been considerably lower than an imputed annual price of permanent transfer. For example, using a discount rate of 10 per cent, a price of $300 per ML for permanent transfer equates to an annualised value of $30 per ML. This

compares to the $2 to $4 per ML commonly paid by irrigators for a temporary entitlement. The redistribution of production within the irrigation sector which accompanies permanent transfer is likely to deliver much larger gains than have so far been achieved through temporary transfers. This is not to deny the benefits that temporary transfers can bring. It is important to have both avenues available.

A further benefit of permanent transfer is that it provides farmers with greater flexibility in their operations. For example, if irrigation activity becomes less profitable, irrigators have the option to sell part of their entitlement and convert the capital into other farm investments. The ability to sell 'excess' water will also reinforce the incentives for irrigators to introduce more cost efficient irrigation practices such as drip systems.

With permanent water transfers, a marginal irrigator can convert to dry land farming without having to buy new land or losing the value of the water allocation. A system allowing permanent transfer provides 'compensation' to those vacating irrigation activity. However, given that the introduction of permanent water transfers is likely to result in a one-off fall in the value of irrigated land, it is important not to overstate the value of such 'compensation'. In effect, the value of the 'compensation' provided will principally reflect the difference in the value of the water to the buyer and its continued use by the seller.

Permanent transfers may also facilitate the retirement of saline or waterlogged irrigation land.[1]

Most irrigators support permanent transfer. The Australian Irrigation Council said:

> Both temporary and permanent transfers of water entitlements have a place in developing more efficient use of water and recommendations proposing that permanent transfers be introduced to all irrigation systems are supported.

The First Mildura Irrigation Trust went even further suggesting that:

> The Trust fully supports this recommendation but would go further. The commodity pricing aspects of water distribution should permit growth of purchase, lease, put and call options, spot and futures markets ... subject to authority having input into and approving the transfer. Only in this way can the Trust and other WSDs utilise asset infrastructures to deliver a commodity with an independently verifiable marketable value, so that the Trust will in turn have a marketable value which growers and other investors may look to for capital appreciation or dividend income.

The benefits from permanent transfers do not come costlessly. The administration of water entitlements becomes more complex given, for example, the need for arrangements to moderate or prohibit transfer in circumstances where there could be adverse 'downstream' or environmental effects. At least until such time as adequate environmental regulations are in place governing the use of water generally, transfer should be subject to restrictions which would prevent the use of the

[1] It may be desirable to retain some water for environmental purposes.

water in environmentally damaging ways. In some instances, it may even be necessary to prohibit water transfers to areas already badly affected by salinity and waterlogging. As documented in Table 8.1, various restrictions apply to transfers in most States to cater for such effects.

Another concern is that the permanent transfer of water away from a particular region could add to the costs of those remaining in an area. For example, capital costs would be spread among fewer irrigators. The Australian Irrigation Council argued that a capital contribution to those irrigators from the sale price may be an acceptable way to deal with this effect.

However, a similar effect arises even without permanent transfers where some irrigators convert to dry land farming. The issue is a more general one -- how to facilitate adjustment in the irrigation sector. The Commission's proposals in Chapter 7 for the privatisation of water distribution assets, would encourage irrigators to take a collective view on the future viability of their system at the time the transfer of ownership occurs. This should help to promote orderly adjustment. With a permanent transfer system in place, adjustment difficulties will be eased by the returns on the sale of entitlements.

Arrangements for the transfer of water should also extend to groundwater. To date, only South Australia has made provision for permanent groundwater transfer. New South Wales permits temporary transfers.

The arguments in favour of permanent groundwater transfers are the same as for surface water, namely, that it helps to ensure that the water is used by those who value it the most. Additional flexibility could be achieved by introducing mechanisms which would allow for the temporary substitution of surface water rights by equivalent volumes of groundwater. In some places it might be appropriate to encourage groundwater use in order to create air space and draw down water tables or reduce pressure in deeper aquifers. Environmental regulations on groundwater transfers should be similar to those applying to the transfer of surface water.

Careful groundwater monitoring of hydrological conditions will be of particular importance for inter-basin transfers. In the North Adelaide Plains, where current allocations of groundwater are three times greater then recharge rates, transfers can only be made away from the central core of the depression. Also, as noted above, transfers are subject to a reduction in the volume of entitlements.

Permanent water transfers should be introduced in all irrigation systems, for both groundwater and surface water. Where feasible, provision should be made to allow for permanent transfer of water between schemes.

Intersectoral transfer

The benefits of allowing the transfer of water to other sectors are likely to exceed those from the introduction of permanent transfer within the irrigation sector. Given the costs of augmenting supplies in many urban areas, transfer of irrigation water to cities may provide major benefits. The Victorian Government has pointed to the potentially large benefits of allowing water transfers from the irrigation districts to metropolitan Melbourne:

> Most Victorians don't realise that nearly 80 per cent of Victoria's water use occurs in irrigation areas, mostly in northern Victoria. The majority of this water is sold to irrigators at about $16 per megalitre.
>
> Less than ten per cent of Victoria's water use occurs in the Melbourne Metropolitan area. The price for an extra megalitre of water in Melbourne is $570 ...
>
> The financial, social and environmental costs of [developing new water sources to meet growing demand] ... are enormous. Probably close to $60 billion in the cost of building new dams alone ...
>
> Bolte's divide has cost Victoria hundreds of millions of dollars to date in extra costs. (Crabb 1991, pp 3-4)

Of course major capital investment would be required to deliver water to Melbourne from north of the divide. Nevertheless, the differences between the price of water in Melbourne and northern Victoria indicate the potential gain from transfers. Large transfers to the cities could also reduce problems of waterlogging and salinity in irrigation areas.

Allowing transfers between sectors could also facilitate the use of water for environmental purposes. Indeed, the Commission sees this initiative as crucial if efficiency and sustainability issues are to be integrated. While pricing reform has an important role to play in improving environmental outcomes, providing the environment with rights to water offers the prospect of greater certainty in controlling environmental effects. However, as discussed in Chapter 9, there would be a number of important implementation issues, including the need for a 'sponsor' with resources to acquire entitlements on behalf of the environment.

Controls similar to those applying to transfers between irrigation systems would be required to ensure that intersectoral transfers do not have adverse environmental or 'downstream' effects. Integrated catchment management committees could give consideration to the impact of proposed transfers (see Chapter 10).

Although some irrigators acknowledge the potential benefits from transfers between sectors, there is concern about the impact on rural communities. The Australian Irrigation Council said that:

> The transfer of water entitlements to other sectors is supported provided that the vendors and their local community of interest receive a genuine compensation sufficient to cover all the losses in a broader context.

The much higher value of water in urban areas would mean that rural communities would be compensated for reductions in irrigation activity. Adjustment in the irrigation sector is a necessary outcome of more efficient pricing and allocation of water. Adjustment problems are best dealt with directly rather than by putting artificial constraints on the adjustment process.

Arrangements to allow the transfer of water from irrigation to other uses should be implemented in all States.

The denomination of water entitlements

Release sharing

In all States water entitlements are denominated in terms of 'release shares'. Release sharing defines entitlements in terms of a notional volume of delivered water. However, whether there is sufficient water to provide that allocation in any year depends on both available supplies and the level of demand. It is up to the operator of the storage, or other source of irrigation water, to decide the amount of water available for licence holders in any season and the amount to be carried over, bearing in mind such things as seepage and evaporation losses. Thus, historically based security of supply indicators are typically attached to water entitlements.[2]

Release sharing provides few incentives to conserve water. This is because, as currently practised, it does not allow users to carry-over unused entitlements for future use. Water which is carried over is shared among all users of the storage in the following year. The benefits of responsible rationing by one user are appropriated by other users. According to the DWR, the current process of release sharing in New South Wales operates to redistribute water underuse before the end of the season. The DWR said that:

> In the Lachlan, Murrumbidgee and Murray River systems in particular, the long-standing practice of DWR increasing allocations progressively throughout the season to redistribute under-use by some irrigators ... precludes the operation of what could be a legitimate and effective transfer market.

Release sharing is therefore likely to contribute to water wastage, overwatering and the related environmental problems.

The other major problem with release sharing is that an individual's security of supply is affected by the number of the licences issued and, in some circumstances, by the actions of other users. In heavily committed storages, the issue of new licences is a major concern of irrigators. The National Farmers Federation said:

[2] For example, a 70 per cent security level means that an irrigator can expect to receive the full allocation of water in seven years out of ten.

> The viability of ... investments should not be at the mercy of an irresponsible government, prepared to satisfy further applicants by resorting to over-allocation of present resources ... The fear is that they [the government] will take the easy but irresponsible course of meeting demands for water by ... stretching the present resources beyond their reasonable limits.

The Salinity Program Advisory Council argued that existing rights to water should be protected and noted that:

> The recent investigations into Melbourne's future water needs has identified the Big River as one of the most suitable sites for diverting 100 000 ML per year to sustain Melbourne's growth. This water is currently being used by irrigators, town suppliers and the environment.
>
> It will not be new water and if the water is to be diverted then Melbourne Water should be required to pay market value or opportunity cost to the present users.

More generally, a number of participants expressed concerns over the amount of discretion that government exercises in relation to water licences. The Condamine-Balonne Water Committee argued that the ability of government to change licensing policy without compensation means that there is not much accountability involved.

Continuous accounting

Within the confines of the release sharing system, incentives to conserve water can be provided through a continuous (long term) water accounting system.

This system already operates on a limited scale in some parts of Australia. In the northern irrigation valleys of New South Wales and Queensland irrigators are permitted to carry-over a part of their entitlement into the next season. However, carry-over has been limited to avoid the possibility of dam capacity being exceeded. Also in several areas of South Australia, groundwater users are able to carry-over a part of their entitlements.

Victoria and New South Wales now apply continuous accounting to water from the River Murray. This allowed the New South Wales Murray region irrigators to access 50 per cent of their 1992-1993 allocation during the 1991-1992 season. So far provisions have not been made to allow for the carry over of unused water.

There is considerable support for continuous accounting among irrigators. For example, the Australian Irrigation Council said that:

> The introduction of continuous accounting of water allocations will tend to encourage the efficient use of resources. The current release sharing systems can tend to reward the wasteful user at the expense of the prudent. Allocation systems assume that the volume of water required to irrigate a particular hectare of crop is constant and does not vary from year to year. ... Significant economic on-farm gains are available if continuous accounting allows carrying forward of unused allocation or limited borrowing from next year.

Capacity sharing

While continuous accounting would provide greater incentives to carry over unwanted water, as discussed below, this system would not always be fully efficient in this regard. There remains the problem of attenuation of supply security through the issue of new licences.

Capacity sharing is a different way of specifying water rights. The Victorian Water Act provides for capacity sharing, but the conversion of release shares to capacity shares has not yet occurred.

Under capacity sharing each owner of a share has a right to water at the source rather than at the point of delivery as is the case with release sharing. By estimating net inflows (ie inflows minus seepage and evaporation losses) the capacity share holder would be able to estimate future available water supply.

Capacity sharing resolves the problem of reduced supply through the issue of new licences. Quite simply, it is not possible to allocate more than 100 per cent of a storage.

Advocates of capacity sharing claim that, in contrast to release sharing, supply security is not influenced by the decisions of other users of a storage to carry over water etc. Further, they suggest that the system provides benefits through reducing the decision making functions of reservoir managers. For example, the Centre for Water Policy Research said:

> It [capacity sharing] provides users with clear information on the probabilities of future supply. ... Under release sharing, users need to know the release policies ... of the reservoir managers in order to estimate supply probabilities.

The Commission's view

In the Commission's view there is a need to modify the current system of property rights for water to ensure that, as far as possible, those who choose to carry over water are able to reap the benefits of that decision. This is an important part of improving the general security of supply attached to water licences.

Continuous accounting would go a long way to meeting this requirement, although in some circumstances, it would be less than fully efficient. For example, where carry-overs cause dam overspill, individual licence holders may not receive even their full nominal allocation in the subsequent season.

This attenuation of water rights due to the actions of others increases the difficulty and, therefore, the cost to users of managing risk. Such attenuation of rights is less of a problem under capacity sharing.

However, the New South Wales system of 'high' and 'low security' licences could provide greater security to holders of 'high security' licences than a simple capacity sharing system. Under that system, two security levels are available to private diverters, industries and towns drawing water from regulated rivers. 'High security' entitlements are serviced ahead of 'normal security'

entitlements. Rather than simply receiving a known share of storage capacity, 'high security' licence holders would know in advance in most years exactly how many megalitres of water they would receive. Of course this increased security is achieved at the expense of reduced security for normal licence holders.

This illustrates that there are a number of ways of dealing with security of supply issues. The situation is further complicated by the impact of allowing expanded trade in water. Trade in water may go a long way to overcoming the problems inherent in even the simple release sharing model. An expanded system of TWEs would provide increased opportunities for users to deal with fluctuations in security by buying and selling water. Thus, the importance of carry-over provisions may diminish. Of course, this additional instrument for managing risk has its drawbacks. For example, greater security of supply may come at the cost of less certainty about water prices. The price of water on the transfer market is likely to fluctuate with climatic conditions.

Nonetheless, given an expanded tradeable water rights system, the Commission is not convinced that a shift to capacity sharing is warranted at this stage. In systems where supply is relatively secure, administrative costs would clearly mitigate against change. As the RWC stated:

> In many cases, the additional benefits don't ... justify the additional cost, time and effort not only initially but operationally from that point on of keeping the records necessary to ensure the system [of capacity sharing] works. ... Ninety per cent of the benefits can be gained without going to that degree of precision...

Where supply security is more of a problem, it is not clear whether it would be practical to operate capacity sharing at the individual irrigator level even if the in principle case for its introduction was strong. Thus, if the implementation of continuous accounting within the release sharing system, possibly supplemented by high security licences, proves to be inadequate in fully committed systems, then more work will need to be done before capacity sharing could become operational.

Continuation of the release sharing system would mean that government policy towards the issue of new licences, where supplies are fully or close to fully committed, would remain an issue.

It is desirable that the responsible water authority make clear its policy on new licence applications. Any abuse of the flexibility inherent in the current arrangements will tend to undermine the development of markets in water and the efficiency gains those will deliver. Concern about the issue of new licences might also encourage farmers to shifts into crops which can withstand more variation in water availability, again with resulting efficiency losses.

States should introduce continuous accounting within the release sharing system. In systems where security of supply is an issue, States should consider whether capacity sharing would provide a superior form of risk management.

8.4 Auctioning of water entitlements

Water entitlements have been auctioned in Victoria and Queensland.

Under an auction system, water will be purchased by those who value it most highly. Thus auctioning ensures that water is directed to its best possible use. Where an effective system of TWEs is in place, an efficient distribution of water will also be achieved even if initial entitlements were allocated free of charge.

The major advantage of auction or tender is that the value of new water entitlements is captured by government. Apart from equity considerations, up front charging for new water supplies will further constrain investments in infrastructure which have little prospect of providing the community with a reasonable return.

In its draft report, the Commission proposed that all new supplies be auctioned. There was in principal support for this draft recommendation, but a number of participants drew attention to implementation issues. For example, Melbourne Water said:

> [The] recommendation is supported with the provision that the infrastructure be adequate to accommodate additional impacts of supply. This will include both land capacity, eg. salinity and water logging as well as the transfer and distribution capacity.

The Salinity Program Advisory Council referred to a recent auction in Victoria where water was bought for use in an area already subject to salinity. It said that:

> ... there should be some small environmental-type study made of areas that are going to have water on them for the first time, because these people will be looking for some sort of drainage, subsurface drainage assistance in the very near future.

Some environmental guidelines already apply to auctions in Victoria. For example, buyers have to demonstrate that drainage is adequate to manage the increased water use.
If environmental controls governing water use as a whole were adequate, there would not be the need for special regulations covering auctioning of water. Auctioned water would be treated the same as any other allocation. However, in the same way that environmental controls on water transfer are currently required, controls on auctioned water to prevent its use in environmentally damaging ways are also necessary.

The auction system could also be extended to allow bulk water suppliers to buy and sell entitlements on behalf of individual irrigators. The objective would not be to appropriate the value of existing entitlements but to allow central agencies to act as water brokers.

Entitlements to any new water supplies should be auctioned and the scope for the bulk water suppliers to act as brokers of existing supplies should be investigated.

9 ENVIRONMENTAL PRICING AND REGULATION

Australia faces a host of water-related management and environmental problems. Salinity and waterlogging are major problems in many of Australia's irrigation districts. There are also drainage problems in parts of tropical north Queensland. Land degradation due to, amongst other things, salinity and waterlogging, costs the Australian community as much as $600 million annually (DPIE 1989). In the Murray-Darling Basin, lost production alone is estimated at about $65 million per year. DWR NSW transcript

Toxic blue-green algae outbreaks in recent years have focussed community attention on the consequences of nutrient contamination of inland water bodies. Nutrient contamination and sedimentation due to, amongst other land uses, sugar cane cultivation, are causing damage to coastal ecosystems and possibly to the Great Barrier Reef. In the major population centres the problem is disposal of sewage, trade waste and stormwater without excessive impacts on the environment and at reasonable cost. Groundwater contamination is yet another problem confronting not only country water users, but also residents in cities such as Perth and Adelaide.

Natural phenomena have made these problems more difficult to manage. For example, the geological characteristics of the Murray-Darling Basin make it prone to salinity and waterlogging. The extent to which nutrient contamination of rivers leads to algal blooms is heavily dependent on river flows and water temperature, and hence on climatic factors. The impact of sewerage effluent on the environment depends much on the topography and geography of inland localities and, where ocean disposal is used, on the pattern of water currents.

The cost of overcoming these problems and enhancing water quality is significant. Large sums of money are being invested to ameliorate salinity and waterlogging in many of Australia's irrigation districts and to overcome the adverse impacts of the degradation of water resources on agricultural producers, urban water users and the environment. The CSIRO said that the Australian Water Resources Council (AWRC) Water Technology Committee has estimated that new investment of more than $2.5 billion in urban sewage treatment assets would be required to provide limited improvements in nutrient removal. The Sydney Water Board (SWB) alone is to spend $600 million over the next 10 years to improve the quality of the effluent discharged to the Nepean-Hawkesbury River system.

To offset these costs it is all the more important to achieve the savings in service provision costs identified in earlier chapters. Furthermore, it is important to ensure that net benefits accrue to the community from expenditure on environmental enhancement and that alternative ways of improving environmental outcomes are investigated.

Issues relating to water service provision and wider resource management cannot be divorced. This is reflected in the terms of reference for this inquiry which ask the Commission to look at factors which lead to inefficient and unsustainable resource use.

The water sector can be viewed as comprising two forms of capital -- natural capital represented by the basic resource, and the man-made capital used to harvest and provide water services. The benefits derived from the water capital stock will be influenced by the conditions attaching to the ownership and use of that capital -- that is, the allocation and/or specification of 'water entitlements' (see Chapter 8).

The key issue is how to ensure that the provision of services and questions of broader resource management are considered in an integrated framework so that all the benefits and costs of particular water use practices are taken into account. However, water resources managers face a difficult task in identifying and quantifying the environmental benefits and costs associated with water use.

Water use practices have implications for land use (and vice versa) and cannot be seen in isolation. As the Victorian Government remarked:

> [In] contemporary styles of water planning ... the environment is treated in an holistic way and planners can start to understand the diverse links which are crucial to the survival of most species. The environment can no longer be treated as a piecemeal externality, to be dealt with only after a deal to develop has already been sealed.

The many scientific and technical issues associated with problems such as algal blooms and salinity fall outside the Commission's area of expertise, as do the technical considerations associated with water quality standards. However, there are important links between environmental outcomes and the arrangements governing the provision of water, sewerage and drainage (WSD) services. Indeed, a major thrust of this report is that efficient pricing of water services can make a substantial contribution to the sustainable use of water resources.

This chapter looks at the complementary roles of market forces and regulation in promoting sustainable water use. It examines the operation of some specific market-based initiatives such as pollution taxes and tradeable discharge permits, and sets out some procedural principles for more co-ordinated and efficient development of environmental regulation. Better monitoring and enforcement of that regulation is also considered.

9.1 Sustainability and water use

General background

The issue of sustainability or sustainable development has been widely examined since it was brought to prominence by the Brundtland Report (WCED 1987). A recent focal point for debate in Australia has been a Cabinet discussion paper (Commonwealth of Australia 1990) which formed a starting point for Working Groups to examine ecologically sustainable development in nine different sectors of the economy. The definition of ecologically sustainable development adopted by the Working Groups was:

> Ecologically sustainable development means using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased (Commonwealth of Australia 1990).

Some participants said that sustainable resource use is a question for scientific resolution. However, as definitions of sustainability and sustainable development abound, it is unlikely that a universally accepted definition will be found. But without a clear definition, irrespective of scientific advances, it will not be possible to conclude with certainty whether a resource is being used sustainably. Thus, much of the value in the concept lies in the process of examination and debate that it engenders -- highlighting relevant information and analysis, examining community values and trade-offs that need to be considered, and choices that must be made.

While information and analysis are vital to support the decision-making process, in the Commission's view, sustainability is an ethical issue, which can only be resolved through community awareness, debate and decision -- in other words through the political process.

Much of the debate on the sustainability of water use concerns the difficulty of taking the needs of future generations into account. Future generations are affected by current decisions to consume or conserve resources but have no way of expressing their preferences. A market system driven by the preferences of the current generation would be deficient in allocating water resources between current and future generations. That said, there are a number of practical, market driven initiatives that can be taken, which, while not necessarily addressing the prescription for sustainability laid down by the Brundtland Report and others, will lead to improved environmental outcomes. These are among the matters on which the Commission has focussed.

Market failure and the environment

To date, regulation has been the primary method for pursuing environmental objectives. Apart from the difficulty of catering for future generations, where the environment is concerned, markets will not always reflect the current generation's preferences or willingness to pay, or ensure that

those who damage the environment are required to pay for that damage. However, market mechanisms can sometimes complement regulation in promoting better environmental decisions on water use.

External effects

The efficient operation of markets requires, amongst other things, that those who impose costs on others through, say, polluting activity, pay for the damage they cause. Some forms of water pollution can be traced to individuals or firms -- for instance industrial effluent, or effluent from feedlots.

However, in cases of non-point sources of pollution -- for example agricultural run-off contaminated with salt, fertiliser, or pesticides -- it is extremely difficult to isolate the contribution of individuals, much less recoup the costs. The fact that such 'externalities' are not reflected in prices means that, without some other form of control, there will be excessive polluting activity.
Provision of water for natural ecosystems

An area in which the market is likely to be deficient is in the provision of water for the maintenance of natural ecosystems. This is because the benefits of these ecosystems extend beyond particular individuals and also because future generations will benefit from their maintenance. These benefits are not reflected in market prices.

Yet, natural aquatic ecosystems play an important role in pollution control and in maintaining genetic diversity. Significant benefits can be lost if streams or wetlands are allowed to dry up because of changes in either quantity or quality of flows due to upstream dams or other related development. The Riverland Fishermen's Association, the Southern Fishermen's Association and the Lakes and Coorong Professional Fishermen's Association (Sub 144 and 145)said that reduced fresh water flows reaching the mouth of the Murray River at critical times during the year have deleterious effects on fish migration and breeding. According to some commentators, changes in the seasonal patterns of flows in many rivers and tributaries in the Murray-Darling Basin are threatening the long term survival of nearby forests and aquatic and riparian habitats (Maunsell 1991).

However, the effects on the environment of water use are not all negative. As the Australian Irrigation Council pointed out:

> Wetlands, wildlife and recreation benefit from the availability of water which has been stored for irrigation. Sub 163.

In the ACT the construction of Lake Burley Griffin created Jerrabombera Wetlands, which have become a major habitat for waterfowl and other aquatic life, in an otherwise relatively dry environment.

Measurement issues

Some environmental costs and benefits are difficult to identify, let alone value. While a number of methods have been developed to value the services provided by the environment, many people are uncomfortable expressing these in money terms. Typifying this concern, the Environmental Protection Authority of Western Australia said:

> For many environmental considerations there is no ready way of deriving valuations which can meaningfully be compared with the 'hard' dollar costs and prices applying elsewhere in the economy. Indeed, it is doubtful that the nominal 'valuations' derived can be meaningfully compared with each other to provide ordinal information. (Sub 152)

Some would argue that the value of environmental assets is infinite, making economic techniques like cost-benefit analysis irrelevant.

When attempts at valuation are made, future costs and benefits are discounted. This is because they are valued from the point of view of the preferences of the current generation, who are presumed to prefer services now rather than later.

Environmentalists often call for a lowering of the discount rate to zero. This is because positive discount rates mean that long lasting adverse impacts on the environment are ascribed relatively low value in present value terms. Of course, positive discount rates have the same effects on long lasting benefits. Some economists, such as Pearce, Markandya and Barbier (1989), argue that as an alternative to adjusting discount rates, the rights of future generations should be determined by governments. This is their solution to the ethical issues involved in ecologically sustainable development. Normal project appraisal can then be undertaken within those constraints.

Uncertainty and irreversibility

Uncertainty about environmental impacts means that all resource use decisions are taken in an environment of risk. But the consequences of a particular resource use decision can be irreversible. For instance, the construction of dams and reservoirs, the draining of wetlands and contamination of groundwater aquifers are as good as irreversible. Many would argue that market driven solutions will not give appropriate weighting to such risks. Indeed, some environmental groups advocate an approach that is so conservative as to be almost completely risk free.

9.2 Using markets to secure better outcomes

It follows from the previous discussion that if ownership of rivers and groundwater systems were vested in the hands of self-interested private individuals, unfettered private markets would not generate efficient and sustainable environmental outcomes. This provides the rationale for governments to involve themselves in water management and environmental matters associated with water use.

However, governments face a number of problems in ensuring that their intervention results in efficient and sustainable water use. Paramount among these are the very same information deficiencies and uncertainties which detract from the operation of private markets. In some cases, imperfect markets may result in better outcomes than imperfect governments.

Accordingly, a mix of market forces and government intervention is appropriate. There is a continuing and important role for regulation, both in establishing standards and in controlling potentially damaging water use. But much improvement can be achieved within a market framework. As the Australian Conservation Foundation (ACF) said:

> If our economic policy framework is to begin to change the structure of the Australian economy to accommodate [ecologically sustainable development], considerable changes are required. However fears that such a shift in economic policy must involve a move away from a market-based economy are groundless. Rather most of these changes involve the formal recognition of those economic costs and values associated with natural resources and the environment which are currently unaccounted for.

The remainder of this section looks at ways in which markets can be used to improve environmental outcomes or to achieve environmental goals at lower cost.

User pays pricing

In previous chapters the Commission has proposed that all water be charged for on a per unit basis. The impact of this proposal will be varied. In the many parts of Australia where residential customers currently receive a 'free' water allowance as part of the charge for access to water services, this initiative would see a substantial fall in water use. As noted earlier in this report, the introduction of pay-for-use pricing in the Hunter Valley reduced average water consumption by around 30 per cent.

In rural areas, there is considerable evidence that the low prices for water have encouraged overwatering by irrigators. This has had the effect of aggravating salinity and waterlogging problems. Furthermore, water in excess of plant needs is sometimes applied to flush out salts from the root zone. These salts, together with any dissolved fertilisers and pesticides, end up in rivers and waterways, exacerbating downstream problems.

Higher charges for irrigation water, combined with payment for water used, will increase the incentive for farmers to invest in water-saving technology and in other means of combatting salinity and waterlogging. They are also likely to cause some irrigators to leave the industry or change to dry-land farming.

In turn, reduced consumption will reduce the costs of treating waste water and possibly the level of environmental degradation. Higher prices will also make reuse and recycling more attractive, as well as provide an incentive for consumers to install water saving devices such as shower roses and dual flush toilets and for authorities to investigate alternative sewage treatment technologies.

Some environmental costs are already incorporated in prices, for instance in sewerage and trade waste charges. In the future, as work on quantifying and attributing water-related environmental damage proceeds, more environmental costs will be reflected in prices for services. This will further reduce consumption, with additional beneficial effects for the environment. However, pricing reform may cause some problems. The Australian Bureau of Agricultural and Resource Economics (ABARE) argued that increased prices will encourage the retention of water on the farm for re-use, instead of draining back into the system, with consequent deleterious effects for downstream uses and natural ecosystems. A suite of measures is therefore required.

As noted above, higher user charges for water would increase the incentives to investigate water reuse. Treated effluent is already used for the watering of parks, golf courses, and irrigated feedlots, and a number of water authorities have established experimental tree plantations. The Hamilton Water Board (in western Victoria) has installed a secondary distribution system to supply treated waste water for a variety of non-potable uses. A dual water supply system involving the recycling of water for non-potable use is part of the Rouse Hill development in Sydney's west. Australian Steel Mill Services uses up to 6 ML a day of treated sewerage effluent to cool molten slag, which can then be used as a construction material.Fin Review Other options are the recycling of water within industrial premises, and the use of stormwater to establish wetlands and recharge aquifers.

As noted in Chapter 2, many WSD service providers do not levy specific charges for trade waste disposal. Also, some local government authorities allow industries to discharge potentially toxic effluent into drains and local waterways. In 1984 more than 33 000 GL of industrial wastes were discharged to sewers and drains in Australia (ABS, 1992). The major dischargers were the food, textiles, chemicals and paper industries.

The Commission has proposed that those authorities which do not already have a trade waste policy introduce trade waste charges. Apart from ensuring that producers pay fully for services received, this would have environmental benefits by changing producer behaviour. The Brisbane City Council said:

> The results [of pricing according to the cost of treatment and disposal] have been varied -- some generators have gone out of business, others have installed their own pre-treatment facilities to substantially reduce the waste to be treated, others have amended their processes to provide for greatly increased internal recycling.

Urban run-off, so far as the Commission is aware, is seldom regulated, and in most places not monitored. Yet, the heavy metals, nutrients, oil and grease, organic material and suspended solids in the urban run-off, increasingly pose an environmental problem. In Melboune, urban stormwater is the major source of bacterial contamination and litter in the lower Yarra -- a river which consistently fails to meet State Environment Protection Policy (SEPP) standards for swimming. The SWB is examining techniques for charging local councils for their discharges into the trunk drainage system in the same manner in which it licenses and charges industrial users to discharge into its sewerage system.

In existing urban drainage systems it is difficult to identify 'users'. In most areas drains cross local government boundaries and it is not possible to attribute environmental damage to any particular council when the run-off finally flows into trunk drains, rivers or oceans. The Commission has recommended that State Governments should take steps to ensure that local governments are accountable for run-off leaving their boundaries (see Chapter 7).

Extending current water entitlements

In most States, transfers of water are only permitted between irrigators and, in most cases, only on a temporary basis (see Chapter 8). Such limitations reduce the efficiency with which water is allocated between uses and, in so doing, reduce the potential of trade in water to promote better environmental outcomes.

The lack of permanent transferability in many States (or any transferability in Western Australia) reduces the opportunity for transferring water from highly saline or waterlogged soils to less degraded and therefore more productive soils. Also, the opportunities for selling unwanted water are diminished. This is likely to reinforce the incentives for overwatering inherent in current price structures. The Commission has proposed that permanent transfers be introduced in all States.

As discussed in the previous chapter, the current way of denominating rights to water reduces the incentives for irrigators to conserve water. This is because any water savings made by an individual user will be shared by all other users in the subsequent irrigation season. This is yet another incentive to overwater. While an expanded system of transferable water entitlements would greatly reduce this problem by providing a market for unwanted water, the Commission has also proposed that continuous accounting, already in place to a limited extent in New South Wales, be extended to other States.

The Commission has proposed that water be transferable to other sectors and uses, including the environment.

An example where tradeable water entitlements might help the environment is in South Australia in the backwaters of the River Murray. Fish and crustaceans have been harvested there since early

settlement. Recreational fishing is also popular. However, the fishing industry in the area is heavily dependent on periodic flooding, in order to provide a habitat for fish breeding and recruitment. Upstream allocations from the river for irrigation reduce water flows, causing a deterioration in the aquatic habitat, affecting fish stocks. Minimum flow requirements could be established and water entitlements allocated. Since this is a matter of maintaining a habitat for a natural resource, the entitlements should probably be allocated to the environment rather than to the fishing industry in the area.

The allocation of water to the environment would entail decisions about who should be responsible for holding and allocating environmental entitlements. One option would be resource managers. Where systems are fully utilised, entitlements for the environment should be purchased. Government funding for purchases should be explicit. Such purchases would also provide adjustment assistance to irrigators.

The extension of tradeable water entitlements to environmental uses would not avoid the need for judgements on the value of environmental uses relative to consumption. Such judgements would be central to the decision on what funds to allocate to the purchasing agency and hence its capacity to purchase water for environmental purposes. That said, a system where an environmental agency could buy and sell water entitlements would generate a more disciplined approach to evaluating the environmental benefits of different water flows.

There is the contentious question of the initial allocation of water to the environment. Some considered that the current environmental allocation should be used as a base and that further allocations should be purchased from other holders. However, there are currently few formal environmental water entitlements in place. The ACF suggested that all currently unallocated water should be allocated to the environment.

The Victorian Government and Melbourne Water Corporation expressed concern at the dearth of knowledge about environmental water needs, and the Queensland Government said that:

> Whereas consumptive water entitlements can usually be defined in terms of a specific annual volume, an environmental allocation could have special delivery or operating requirements such as the flushing of algal blooms from time to time or only making a release at a particular stage of a flooding event. As a result, it is considered that it may be difficult to interchange environmental allocations with consumptive entitlements as they may not be calculated in comparable ways. Sub 201, p. 21

The Commonwealth Department of Primary Industries and Energy, while supporting the concept of tradeable water for the environment, said that the responsibility for developing policy and structures lies with the State Governments but that the Murray-Darling Basin Ministerial Council and the AWRC could play co-ordinating roles.

The States should formalise water entitlements for environmental purposes. Where systems are fully, or close to fully committed, water for the environment should be purchased from licence holders.

Trades of a slightly different kind could perhaps help resolve competing claims on water from catchments. For example, water yields in the Thompson catchment are depressed following logging and replanting, because mature trees consume less water than young regrowth. This reduces the quantity of water available from the catchment to Melbourne consumers. A study jointly funded by the Victorian Department of Conservation and Environment, and Melbourne Water Corporation, found that the status quo does not maximise the total value of timber and water outputs from the catchment (Read, Sturgess and Associates 1992). The study recommended a range of changes to catchment management policies. Alternatively, such problems could be resolved if Melbourne Water Corporation were allowed to pay timber producers not to log, or alternatively, if timber producers were required to compensate Melbourne users for reduced water yields. Determining who should be assigned the initial entitlements in such situations would be an issue for government to resolve.

Tradeable discharge permits

Tradeable discharge permits could, in the right circumstances, be used to reduce the cost of meeting environmental goals. As far as the Commission is aware, they have not been trialled in Australia.

In essence a permit system involves setting a quality standard for the whole receiving environment and issuing or auctioning permits entitling discharge of waste or effluent. The number of permits issued is set to ensure that the overall standard is met.

By allowing trade in discharge permits, the system can take advantage of the different costs for producers of reducing discharges. Producers with relatively high abatement costs will gain by buying permits rather than treating their waste. Producers with relatively low abatement costs will treat their own waste and sell permits to those whose treatment costs are higher. This means that the total cost of meeting the standard set for the receiving environment will be lower than (or equal to) when non-tradeable discharge limits are set for each producer.[1]

This market-based mechanism does not replace regulation, but rather complements it. For the system to function properly, standards must be established and discharges monitored. Also, a method to allocate permits must be determined. Thus tradeable pollution entitlements are best viewed as a cost saving initiative operating within the broad regulatory framework.

[1] For a formal proof see Pearce and Turner (1990).

Despite their conceptual attraction, the use of tradeable discharge permits has been limited on a world-wide basis (IC 1991d). Where industries are discharging similar types of waste, or where the concern is to control only one type of pollutant, then tradeable permits may be feasible. But even with similar substances there can be problems, because the chemical form in which a substance occurs can affect the damage it causes to the environment. For instance, the Murray-Darling Basin Commission (MDBC) said that the phosphorus in sewerage effluent is immediately available for algal growth, unlike much of the phosphorus from catchments.

It is not uncommon for industries to discharge a range of complex effluents into a water body, all or most of which need to be controlled. In such circumstances it may be difficult to devise a permit system which allows effective trading. One reason is that discharges of any individual pollutant may be insufficient to support trade in that pollutant. Kimberly-Clark suggested that a way round this problem would be to specify discharge entitlements in terms of toxicology. Biological oxygen demand is already used by water authorities as a basis for charging customers for effluent treatment.

Another reason for the limited use of tradeable permits may be the cost and/or difficulty of monitoring discharges and therefore of enforcing the conditions attaching to permits. If permits cannot be enforced, the foundations of the tradeable permit system are destroyed. However, Kimberly-Clark said that, at least for point-source pollution, measurement technology is available. There have been operational successes with tradeable discharge permit systems. The Colorado State Government instituted a plan to stem discharges of phosphorus into the waters of the Dillon Reservoir, which included, among other things, trading of discharge entitlements. Trading catered for both point and non-point sources of phosphorus discharges (Hahn and Hester 1989).

In Australia the Salinity and Drainage Strategy formulated in 1989 within the Murray-Darling Basin Commission to manage the Basin's river salinity, land salinisation and waterlogging problems, may provide a foundation for future trading in salinity credits. The aim of the Strategy is to reduce the level of salinity at Morgan, South Australia by a net 80 EC (units of electrical conductivity) through salt interception schemes to be funded by the States and the Commonwealth. In return for their contribution, New South Wales and Victoria each receive 15 EC salinity credits enabling them to discharge saline drainage into the river system. Additional salinity mitigation undertaken by the States, earns extra salinity credits. Penalties will be imposed for salinity levels above the agreed baseline.

The homogeneity of salt discharges, and the relative ease of monitoring salt levels, at least at State boundaries, suggests that there is considerable potential for trade in salinity credits between New South Wales and Victoria. If the cost of salt reduction varies between the two States, trading would reduce the cost of meeting overall discharge targets. A system of intrastate trade in salt credits is under consideration by the Department of Water Resources in New South Wales.

In summary, the scope for using tradeable discharge permits in the water area will generally be limited to circumstances where discharges are relatively homogeneous and where the sources of those discharges can be identified and quantified. This is not to deny the potential of tradeable discharge permits as a mechanism for environmental control. In certain circumstances they may significantly reduce the costs of meeting environmental standards.

Governments should investigate the application of tradeable discharge permits.

Pollution taxes

Pollution taxes have been advocated by some as a way of reflecting environmental damage in the price of goods or services. A pollution tax would charge for all environmental damage. This is in contrast to the 'acceptable standards' approach whereby no charge is levied up to the level prescribed. In this sense, pollution taxes are a form of user pays pricing, although the revenue raised need not be used to clean up pollution. If not used for restoration, it can be viewed as compensation to the community for reductions in environmental amenity. A number of countries in Europe have pollution taxes in place.

Application of this approach could see a tax on irrigation water to control the associated salinity and waterlogging problems. In the context of algal blooms arising from eutrophication of waterways, there is the possibility of placing a tax on agricultural fertilisers. Other candidates for a tax could be pesticides, insecticides or household detergents and washing powders containing phosphates.

However, there are practical drawbacks with pollution taxes. In principle the level of tax should be related to the damage caused. Yet, estimating damage caused by a particular product or activity will often be extremely difficult. For example, the MDBC said that local conditions will influence the extent of eutrophication resulting from fertiliser use. In irrigation areas, where drains are weedy, some of the phosphorus will be taken up by weeds. But in areas of high salinity no weeds grow in drains and more phosphorus passes through to end up in streams. The amount of damage will also depend on such things as soil and topographical characteristics, proximity to water bodies and the nature of those water bodies (eg a fast flowing river vis a vis a reservoir).

With reference to the environmental damage caused by irrigation water, the NSW Irrigators' Council said:

> ... there [is] firstly the difficulty of readily and reliably tracing the origins of raised salinities observed in streams or aquifers and attributing these to particular landholders. There [is] also the problem of judging the extent to which such saline inflows [are] part of natural processes or, on the other hand, how much they [are] caused by irrigation. Then there [is] the difficulty of measuring all salt transfers between one property and another and between a property and its nearby drains, streams and groundwaters.

> Also to be considered, when judging the impact of saline effluents from irrigated areas, [is] the question of their timing. A relatively large salt content may have virtually no adverse impact upon the receiving stream or drain if it occurs at a time of relatively high flow, whereas a much smaller salt flow at a time of low flow may have a major effect.

Under an ideal pollution tax, each polluter would have to be assessed individually according to the damage caused. Even if this were possible, the administrative costs could be high.

A uniform tax, while administratively cheap, does not take account of the differential impacts of each polluter. Nevertheless it may provide useful efficiency gains.

For example, Quiggin (1988) modelled the response of irrigators in the Murray River system to different sets of incentives, constraints and property rights structures, including a uniform increase in water charges. Effects on salinity, water use, the pattern of land use, and asset values were estimated. He found that a crude approach of uniform increases in water charges would result not only in reduced water use and salinity, but also in a better pattern of land use.

The Commission considers that in some situations pollution taxes can assist to reduce the adverse environmental impacts on water use and waste water disposal.

9.3 Regulatory reform

While there is scope for greater use of market-based measures to promote better water use practices and environmental outcomes, there is clearly a continuing need for regulation.

The process of setting environmental standards draws on a range of expertise and must have regard to a range of interests. The following section discusses some principles which the Commission believes should be observed in setting standards for environmental quality and for water resources. The scope for improving the current institutional arrangements is considered in Chapter 10.

The form of regulation

Regulatory measures essentially come in two forms: process-oriented regulation and outcome-oriented regulation. The first specifies how effluents must be produced and reduced, while the second specifies the acceptable standard of the effluent.

Process-oriented regulation can prescribe or prohibit certain production technologies or the use of certain substances, or it can prescribe the equipment to be used for pollution control. The requirement for secondary or tertiary sewage treatment in various jurisdictions is an example of an important process-oriented regulation in the water sector. Process-oriented regulation can variously specify the use of some variant of 'Best Available Technology' (BAT), 'Best Practicable Means' (BPM), or 'Best Available Technology Economically Achievable' (BATEA).

A major disadvantage of process-oriented regulation is its inflexibility. It does not allow water agencies to choose the method of achieving the underlying policy goals. Because of this inflexibility, the incentive for producers to seek out more efficient ways of achieving environmental goals is removed. The SWB said:

> An example of over-regulation is found in situations where environmental regulators seek to intervene in choices about levels of technologies used by suppliers, rather than setting the standards and leaving the management decisions as to how this is to be achieved to the most appropriate authority, the supplier.

BAT type measures pay no regard to the cost of achieving environmental enhancements. That is, rather than setting an overall standard after due consideration of the benefits and costs involved, BAT type measures are predicated on the view that the best available technology is necessarily appropriate.

BATEA does take into account costs, but its focus on ability to pay might mean that environmental requirements imposed on producers are set too low. One interpretation is that marginal producers need not be asked to install pollution abatement equipment. However, the New South Wales EPA disagreed with this assessment, stating that the basis for determining BATEA is not the capacity of an individual polluter to pay for a particular technology, but an independent assessment of the cost/benefit trade-offs in a particular environment.

Where there are a number of polluters all discharging the same types of waste, process-oriented regulation is administratively simple and relatively cheap. As noted by the New South Wales EPA, with the equipment in place, the need for monitoring is reduced. There will be occasions when it is the preferred approach. As the South Australian Government argued:

> If ... a regulatory regime is established only on the basis of outcomes, then for every polluter, an assessment must be made of the link between the polluter's processes and the environmental outcomes. When there are a number of potential polluters whose processes and potential environmental impacts are sensibly similar, then little is served by repeating this analysis exercise individually for each, only to repeat the determination of the same answer. In such cases, process regulation may be an efficient and convenient alternative. In South Australia, the controls on wastes from wineries and metal finishers are generally defined on a process basis ...

Similarly, in the case of existing sewage treatment plants, specification of primary, secondary or some form of tertiary level of treatment may be appropriate. However, there are alternative technologies, either already available or in the development phase. One option being considered by the SWB is to return the effluent to a storage to be treated and recycled as drinking water. Where new sewage treatment facilities are proposed, it may be more sensible to specify minimum acceptable discharge standards so that the most cost-effective technology can be selected.

The New South Wales EPA argued that it is impossible for a regulator to set standards and then ignore how they are met. It gave two reasons for this:

- Current pollution control laws prohibit the discharge of any pollutants to receiving waters unless the discharge is licensed. The provision of a licence implies that the regulating authority has agreed to the discharge subject to certain conditions. Hence there is an obligation on the regulator to approve of the polluting activity only if suitable practices are followed which guarantee adequate protection.

- It is impossible for a regulatory agency to mount fully comprehensive audit or compliance monitoring programs for all the polluting activities it licenses.

However, the Victorian Government said that the tendency for agencies to specify both the results and the means of achieving the results makes it difficult to assign responsibility in cases of non-compliance.

The Victorian Government was also critical of state-of-the-art solutions prescribed without consideration of the physical circumstances of the waste or the receiving environment. For example, it said such solutions could lead to the prohibition of ocean discharges of secondary or more highly treated sewerage effluent in favour of land disposal with potentially higher environmental costs.

Outcome-oriented regulation, as the term implies, sets water quality goals for the receiving environment and then prescribes the quantity or concentration of pollutants which may be discharged during a certain period.

In contrast to process-oriented regulation, outcome-oriented regulation is based on the relationship between the pollutants discharged and their effect on environmental quality. It therefore targets the underlying environmental goal more directly. In addition, dischargers have more flexibility in the processes used to achieve the regulated standard. That said, circumstances will determine the most appropriate approach.

Regional variation

Appropriate outcomes will, of course, vary across regions and with local conditions. This is because the natural water quality varies region by region and also because the assimilative capacity of the environment is not uniform. For instance, fast flowing rivers are better capable of flushing out nutrients than are wetlands with little water movement. Groundwater aquifers can take hundreds of years to recover from any kind of contamination.

It appears that such differences are often ignored in standard setting. For instance, a number of participants said that standards for sewerage effluent discharged into the ocean are unnecessarily stringent in some places and underestimate the assimilative capacity of the oceans.

The Northern Territory Government was concerned about the possibility of national criteria:

> ... the sewerage outfall to a marine environment from a major city in NSW cannot be "automatically" aligned with discharge of relatively benign mascerated domestic effluents into our northern waters with its 7 metre high tidal interchange. The appropriateness or otherwise of the local situation must remain to be judged in light of technical evidence assembled for the specific issue, and not dictated by some worthy "catchall".

The recent tightening of effluent quality requirements in some regions has resulted in some water authorities considering land disposal of treated sewerage effluent. But land disposal may not be appropriate in all areas, for instance where high water tables increase the risk of waterlogging. In some cases, disposal of tertiary treated sewerage effluent to waterways may be beneficial, if it helps to maintain flows during dry periods or dilutes other contaminants present.

In looking at alternative disposal methods, costs and benefits need to be properly assessed. For example, tertiary treated effluent is for the most part water with a very low concentration of contaminants. Transporting large quantities of very dilute effluent for land disposal at some distance from a treatment plant, rather than into the sea or a river, is costly. As well as the direct costs of transporting the effluent, there may be environmental and disamenity costs from land disposal. There is also the problem of finding areas which can handle the volumes of effluent involved.

The process of standard setting should also recognise differences in community preferences. Where a reduction in economic activity is likely to occur as a result of more stringent standards, those affected through the loss of jobs may prefer to trade lower environmental quality for the maintenance of their livelihood. Of course, this raises the problem discussed earlier of how to account for the preferences of future generations. The possibility that other producers or consumers in the same locality might benefit from tighter environmental control further clouds this trade-off.

In summary, the desirable form of regulation to control pollution discharges will depend on individual circumstances. As well as ensuring flexibility in the form of regulation used, it is important that there is flexibility to reflect different circumstances.

Setting standards

The need to cater for regional variations in environmental problems is part of the more general issue of ensuring that the standard setting process takes into account both benefits and costs.

A variety of criteria are used by regulatory agencies to determine standards. For example, in Victoria, standards for water quality are derived from the State Environment Protection Policy (SEPP) for The Waters of Victoria and for Port Phillip Bay, and are based on 'beneficial use'.[2] The then Australian and New Zealand Environment Council (ANZEC)[3] based its National Water Quality Guidelines on a set of 'protected environmental values', while the New South Wales Government has developed a set of 'protection categories' for its water resources.

In some cases the costs of achieving improvements in water quality can be very high. For instance, Melbourne Water Corporation said that nutrient standards could become so stringent in Port Phillip Bay that it may be forced to construct a new outfall into the ocean at a cost of at least $700 million. There are concerns that more stringent standards are being imposed without sufficient attention given to economic consequences, or to limits set by State Governments on price increases for water services. This will make it that much more difficult to increase cost recovery on service provision to commercial levels, and to provide funding for infrastructure improvements.

There are clearly grounds for such concerns. Many of the regulatory bodies responsible for setting environmental standards do not appear to be required to take sufficient account of the costs of achieving more stringent environmental standards. For example, the Western Australian EPA said that while it has an interest in economic matters, it has no economic brief and is not required to report on economic matters. The Commonwealth Department of Primary Industries and Energy said that regulatory systems are 'concerned with environmental conservation and protection as a strategic objective rather than optimising resource use'.

Notwithstanding community consultation on environmental enhancement issues, the community is rarely adequately informed on the costs and benefits, nor about the alternative technologies available for achieving desired outcomes. Public consultation on environmental standards is normally concerned with general policy rather than with environmental standards for specific activities. For instance, in Victoria the community participates in the development of SEPPs, but

[2] The term beneficial use refers to the quality of the environment - in this case a water body - which needs to be maintained for a particular use. Waste disposal is generally considered to be something from which water bodies must be protected. Hence, all States (except Western Australia) exclude waste disposal from their categories of beneficial uses.

[3] Now known as the Australian and New Zealand Environment and Conservation Council.

specific standards are set by the EPA consistent with the SEPP. Water authorities are required to implement the new standards regardless of the cost. Melbourne Water Corporation said that this is a major problem and that a process needs to be set in place to give the community the opportunity to consider whether it is prepared to pay those costs.

Some participants questioned whether the community is sufficiently well informed about the environmental and health effects of many substances to make rational decisions about water quality standards. Clearly, if the community is to make informed judgements, it is important that information is made available to allow more knowledgeable and open debate. Governments have recognised this and a range of policies have been implemented to give effect to this, including ICM (see Chapter 10).

Some agencies go to considerable lengths to gather information on the costs of environmental enhancement and make it public. For example, the SWB has undertaken a study of willingness to pay for various levels of water quality. In another example, the citizens of the Gold Coast were informed of the respective costs of ocean outfall versus land disposal of sewerage effluent. The Commission sees considerable merit in this approach.

Regulators, before setting standards, should undertake an assessment of benefits and costs, including an assessment of alternative technologies. This process should explicitly canvass consumers' willingness to pay for improved environmental outcomes. Such analysis would be one input into a decision-making process which would also embrace issues of sustainability and intergenerational equity.

In the discussion above the focus was on making standards more stringent. However, as more information becomes available, it may become evident that some standards should be relaxed. The same community consultation processes can assist this process.

Of course, community consultation and the pursuit of transparency is not costless. The benefits in terms of a better informed community, greater acceptance of government decisions, and improved environmental quality must be weighed against those costs.

Environmental restoration

Many of the standards now being promulgated are designed to assist the process of restoring the environment. Such initiatives are being supported by specific works to at least partially restore the environment to its former condition. Like any other investment, such projects should only go ahead if net benefits result. In earlier chapters, the Commission has gone to some lengths to suggest ways to improve decision-making on investment to extend WSD networks or enhance service quality. Similar disciplines are required for government investment in environmental restoration.

However, this raises the question of who should pay. Two principles are relevant. One is the beneficiary pays principle, the other is the polluter pays principle. Better economic outcomes will usually result from application of the polluter pays principle; that is, the cost of environmental damage is borne by those causing the damage. However, it is often difficult to sheet home responsibility for pollution to individuals, and impossible where the damage was caused by previous generations. Where the costs cannot be recouped from polluters, the beneficiaries of environmental enhancement should contribute in proportion to the benefits they receive.

Of course, many argue that it is not equitable to make the beneficiaries pay. The South Australian Fishing Industry Council said:

> ... the commercial fishing industry ... are essentially victims, and victims ... should not be paying. They would not be expected to pay in the case of common law.

A number of participants said that it is wrong to make the present generation of irrigators pay for damage caused in the past. The NSW Irrigators' Council said:

> Mitigating environmental damage resulting from the failure of the past New South Wales Governments to construct drainage infrastructure to serve some government irrigation distribution systems at the time when they were first developed must now be accepted as the financial responsibility of the State.

But what happened in the past is reflected in current land values and crop yields etc. The benefits of environmental restoration will be largely reflected in increased land values through more productive land, and higher incomes for landholders. Shifting the burden of environmental restoration to the community will therefore amount to a transfer of resources from the community to the beneficiaries. To the extent that the community benefits, eg in terms of improved environmental amenity and improved water quality, the community -- or governments on its behalf -- should pay. But to the extent that landholders benefit, they should pay.

Making beneficiaries contribute is crucial if assessment of willingness to pay and therefore the benefits of environmental enhancements are to be correctly assessed. Just as the failure to fully recover costs of service provision has contributed to wasteful investment in WSD infrastructure, so too would a policy of wholesale subsidisation for environmental works be fraught with problems.

The principle of shared costs already applies in some rural areas, where projects are underway to combat salinity and waterlogging. Benefits accrue to landholders and also to local government authorities through reduced damage to roads and public works, and to the community through improved environmental amenity. This range of beneficiaries is reflected in the funding of drainage works and other salinity abatement programs. For example, the cost of the Shepparton Irrigation Region Land and Water Salinity Management Plan is to be shared between the Victorian and Commonwealth Governments (25 per cent each), Local Councils (8.5 per cent) and landholders (41.5 per cent).

Application of the beneficiaries pay principle has seen 'environmental levies' imposed in some urban areas in Australia to raise funds for such works. For instance, Sydney households pay an environmental levy of $80 a year (for five years), to upgrade sewage treatment plants, clean up beaches and renovate stormwater systems. This is an appropriate way to finance such works. Specific purpose levies inform the community of the cost to individuals of environmental enhancement as well as the use to which their contribution is applied. This places greater discipline on agencies to ensure that the environmental enhancement is in accordance with the community's wishes and that the works are carried out in a cost effective way.

Of course, issues of intergenerational equity and sustainability mean that decisions on whether to invest in environmental enhancements cannot be based solely on the willingness of current generations to pay for those enhancements. However, an assessment of willingness to pay as part of the investment appraisal process is very important. In particular, it will serve to illustrate the extent of the required benefits (if any) to future generations to justify a project proceeding.

Where action to restore the environment is necessary, it is also important that alternative strategies are evaluated. The ACF argued that tree planting programs have been successfully used in Israel to combat salinity and high water tables, but that such strategies have largely been ignored in Australia. Western Australian research has indicated that there are several fast-growing, high water use, eucalypt species, which also give commercially promising yields, making them attractive to farmers. The Western Australian Department of Conservation and Land Management funded 840 hectares of timberbelt sharefarming in 1991 and plans to fund another 1250 hectares of planting in 1992 (Bartle, personal communication 1992). The intention is to demonstrate to landholders and the paper industry that programs to combat salinity can be combined with viable timber stands.

Tax deductions for specific activities is another way to encourage environmental restoration. Friends of the Earth suggested that expenditures to establish natural vegetation strips along rivers and watercourses should be made tax deductible. The Income Tax Assessment Act already provides for immediate deductibility for works that combat land degradation. Because of the links between land use and water quality, some activities aimed at combatting land degradation may also be effective in improving water quality. These would presumably already be eligible. The Commission sees merit in making certain works for environmental restoration tax deductible. Tax deductibility provides an incentive for landholders to carry out water quality improvement works. It also means that the community bears some of the cost in terms of tax revenue foregone.

Finally, where significant environmental damage is likely to persist for as long as an activity is undertaken, there may be grounds for encouraging shifts in land use. The MDBC said that significant salt load increases are inevitable in the Basin, and that significant land retirement is already occurring and is expected to continue.

In considering the possibility of phasing out some areas of irrigation, Alexandra (1992) said:

> ... this would need to be done with due respect for the social implications through the adoption of strategies which ensure minimal disruption. It may well be most efficient to use money now being sunk into salinity management to assist in the relocation of enterprises such as dairy farming back to the high rainfall areas from whence it was drawn with the attraction of cheap water and subsequent production.

The Commission's proposals for pricing reform and the extension of TWEs would provide incentives for irrigators in highly saline or waterlogged areas to leave the industry.

9.4 Monitoring and enforcement issues

Effective monitoring and enforcement is a necessary part of any pollution control regime. But monitoring -- the taking of samples and analysing them -- can be costly and time consuming. In the case of pollution from diffuse sources, it can be virtually impossible to determine the source.

Such costs place obvious limits on the degree of monitoring which it is sensible to undertake. Testing for substances which occur frequently, or which are relatively toxic, should be carried out more often than testing for relatively harmless substances or those not often encountered.

Who should undertake monitoring?

Monitoring of water quality etc is a part of self-imposed performance monitoring for many WSD authorities. Water authorities need to monitor industrial effluent to ensure that, after treatment, it complies with the standards set. Some States, eg Victoria and Queensland, require their water authorities to report on compliance with quality criteria guidelines formulated by either the World Health Organisation or the Australian Water Resources Council in co-operation with the National Health and Medical Research Council. In New South Wales, reporting of compliance with the above guidelines and with effluent discharge licences for sewage treatment works is voluntary.

Without some external monitoring, there would be scope and incentive for authorities to suppress episodes of non-compliance. Most participants (including some water authorities) support external monitoring of performance. The Geelong & District Water Board (GDWB) argued that monitoring

should be the responsibility of the authority which sets the standards, but that in-house testing is also appropriate where in-house expertise exists and because water authorities are responsible for the environment on which they impact. The ACT Electricity & Water Authority considered that self-monitoring should be combined with periodic audits by the regulator. The ACF said that it was appropriate to apply the principle of separation of powers to environmental and financial monitoring and that it might be desirable for the federal EPA to take on the environmental monitoring.

Much water related monitoring requires specialised knowledge. Accordingly, outside the water authorities, monitoring generally falls either to some government agency like an EPA or to a specialist contractor.

Community involvement in monitoring is possible where the task is simple, for example where the pollutant is easy to detect. In 1987, over 300 Victorian schools participated in a pilot program of 'SaltWatch', in which adults and children collected and analysed water samples from creeks, rivers, streams and bores. In Western Australia, school students are participating in monitoring by taking water samples from the Swan-Avon Rivers in the Ribbons of Blue Project.

Publishing the results of monitoring

The results of monitoring are generally published in some form, often in annual reports, but the community does not always have ready access. The GDWB said that in Victoria the results of monitoring are also published in public notices.

Making public the results of environmental monitoring is likely to improve the community's knowledge of water-related issues. Moreover, the bad publicity associated with failure to comply with standards constitutes an important discipline on WSD authorities to perform effectively in this area.

However, where an authority is consistently meeting standards, the frequent publication of test results may be a cost with little associated benefit. A blanket requirement to publish all monitoring results is unlikely to be efficient.

Environmental monitoring by an agency or authority other than the service provider is necessary to ensure that failures to meet standards are made public. Summary results of monitoring should be released in a form readily accessible to the media.

Enforcement

Incentives to comply with standards are generally provided through fines for non-compliance. Some participants argued that penalties for non-compliance are usually not high enough. Infrequent monitoring may make it worthwhile for polluters to risk illegally discharging effluents.

To encourage compliance with standards, penalties for violation should exceed the cost of treating the effluent. Penalties should be as high as the expected gains from non-compliance. Accordingly, the less frequent the monitoring, the higher the penalty should be.

10 RESOURCE MANAGEMENT AND OTHER ISSUES

The management of water resources in Australia is characterised by a complex network of decision-making across many departments and agencies (see Appendix B), some with responsibility for specific aspects of water, others with responsibility for land uses not directly related to water but which nevertheless impact on water quality.

Responsibility for water related functions lies with the States and is implemented by both State and Local Governments. No formal national framework exists for managing Australia's natural resources. The main Commonwealth role is to contribute to a national perspective and, at times, seek some complementarity in outcomes. The main mechanism used has been joint State-Commonwealth ministerial councils such as the Murray-Darling Basin Ministerial Council and and Australian Water Resources Council.

The success of initiatives such as the Murray-Darling Basin Commission (MDBC) suggests that with co-operation much can be achieved within the current institutional framework. A number of the recommendations in this report, for example national performance monitoring, will similarly require co-operation between the States with the Commonwealth acting in a co-ordinating capacity. This chapter considers some of the problems at the State and Local Government level, where there continues to be a lack of co-ordination between agencies involved in land and water resource management. New initiatives such as integrated catchment management (ICM) can help, together with institutional reforms, education, research and other non-price measures.

10.1 Institutional reform

Over the years, governments have set up a complex network of departments, agencies and authorities to deal with service provision and environmental issues. Each is likely to have its own objectives which in turn can conflict with the objectives of others.

In examining the current institutional arrangements the Commission found that there are some functions in water resources management which should be consolidated. In other areas, to avoid conflicts of interest, functions should be separated.

Consolidation of like functions

Participants provided examples of complex and overlapping decision making in water management. The Brisbane City Council said that in excess of 20 authorities and organisations have some direct responsibility concerning the Brisbane River. Similarly, the Nature Conservation Foundation of New South Wales said:

> ... the Hawkesbury-Nepean is governed by ... 12-plus acts of parliament, nine ministerial portfolios, numerous bureaucracies, ... 32 members of parliament, and 20-plus local governments and something like 160 aldermen and councillors. These are all the decision-makers for this one small area ...

The boundaries of authorities providing water services are more often determined by the historical development of communities and townships than by the natural watershed and catchment boundaries. This can be an impediment to environmental management because the activities of water users covered by one authority can have adverse effects on users elsewhere in the same catchment. An obvious example of this is urban drainage. The unco-ordinated nature of urban drainage systems contributes to the failure of authorities to deal effectively with urban run-off. Because of the links between urban run-off and waste water management it is essential that both systems are developed in a co-ordinated fashion. Mechanisms to achieve this were canvassed in Chapter 7.

The fragmented nature of water management functions contributes to problems in policy co-ordination, duplication of effort and, on occasion, the absence of effective control. The waste of bureaucratic resources alone is likely to be considerable, and to this must be added the costs and uncertainties which firms, the public and water, sewerage and drainage (WSD) agencies face in dealing with a host of bodies.

Apart from cost reduction, consolidation of like functions would permit clearer specification of policy goals and allow more of the competing considerations to be resolved within fewer and more responsible agencies. And policies relating to the use and control of water resources could be integrated with those relating to land use. A number of water authorities said that they had little or no input or control over development decisions in catchment areas.

Detailing the consolidation necessary goes beyond this inquiry. However, efforts to consolidate functions are already being made by the States. For instance, whole-catchment river management authorities are being established in Victoria.

The Australian Conservation Foundation (ACF) referred to reforms of natural resource management in New Zealand. There, a large number of statutes have been replaced by the Resource Management Act 1991, and 705 local authorities have been reorganised into 93 catchment based regional councils and territorial authorities.

In Australia, further co-operation between the States in environmental matters is foreshadowed in the Intergovernmental Agreement on the Environment. The National Environment Protection Authority (NEPA) will be established with a Minister from each of the States, Territories and the Commonwealth. Its responsibilities will include:

- establishing nationally applied measures for environment protection; and
- developing national environmental quality standards, goals and guidelines for air and water quality.

Another recent initiative is the National Landcare Program which will bring together policies and programs for community action on land, water and vegetation issues and encourage community groups to develop integrated landcare strategies. (DPIE)It is not clear how this will fit in with existing ICM programs (see below).

Separation of management, regulatory and service delivery functions

Notwithstanding the need to consolidate bodies with responsibility for like areas of water management and environmental control, the roles of WSD service provider and regulator should be kept separate. Without this separation, conflicting objectives can result in unacceptable compromises. For instance, the requirement to meet commercial objectives might be met by cost cutting in water treatment. Separation is also important to allow independent monitoring.

Many water authorities supported separation of service provision and environmental regulation. The Sydney Water Board (SWB) said:

> It is sensible to separate the operator and the environmental regulator providing the environmental monitoring programs ... are operated appropriately.

The ACT Electricity & Water Authority (ACTEW) said:

> Water supply and sewerage bodies should not have responsibility for setting environmental objectives. To have multiple goals reduces the likelihood of performing well in the fundamental objectives of water supply and waste water treatment.

Separation of the environmental regulatory function from the service delivery function is not to deny the important role that water authorities should have in the development of environmental standards. In particular, it is essential that information on the costs of achieving new standards be obtained from water authorities prior to the promulgation of those standards. Input from water authorities into land use planning procedures is also advisable. Some water authorities said that their lack of input or control over development decisions in catchment areas has contributed to a deterioration in the quality of water in reservoirs. For instance, the Ballarat Water Board said that the Melton Reservoir is affected by significant algal blooms, partly due to the increase in hobby farms in the catchment.

The Commission believes that there would be advantages in each State having a central body responsible for environmental regulation. The Western Australian Environment Protection Authority argued that some regulatory functions can be delegated, and that it had found it expedient and appropriate to delegate some responsibilities to the Western Australian Water Authority (WAWA) -- 'they are the people on the ground in touch with the situation'. However, it said it needs to maintain separation from WAWA in setting regulations for that body.

Whether the water management and service delivery functions should be separated is less clear. A feature of the reform in New Zealand is the separation of resource management functions within local government from the provision of services involving the use of natural and physical resources. In New South Wales, a three tier structure is proposed, separating the functions of resource management, service provision and environmental control. The Victorian approach combines the resource management and service provision functions but assigns the regulatory function to that State's EPA. The different approaches reflect different priorities. Total separation is based on the perception that it is best to let the service provider focus on just that. An integrated approach is based on the premise that there are interconnections between functions which cannot easily be separated. The Western Australian EPA said that separation of resource management and service provision could possibly make effective demand management by resource managers more difficult because the link with consumers would be broken.

Local circumstances and conditions will continue to influence whether or not service provision and resource management functions are combined. At the very least, it is important that the functions are clearly specified.

Integrated catchment management

The philosophy behind ICM is that the management of natural resources should be catchment based. It also incorporates the concept that communities should be involved in determining the environmental quality of local water resources and should have a say in how catchments are managed to maintain that quality. It accepts the need to balance social, economic and ecological issues within the resource management process. It accepts that changes in land use and lifestyles can impact on water quality, and that all interested parties should be represented in decisions regarding such changes.

Most State Governments are implementing ICM, but only New South Wales, where it is known as total catchment management (TCM), has enacted catchment management legislation. While there are differences in approach between the States, all rely heavily on community involvement to help establish standards and to participate in program development, implementation and monitoring.
Catchment management committees form the backbone of ICM programs. The New South Wales Catchment Management Act 1989 provides that the majority of committee members are landholders. It further provides that persons with 'an interest in environmental matters within the catchment area', persons nominated by local government authorities, and persons who are officers of government departments or authorities 'having responsibility for natural resource use or management within the catchment area' are represented on committees. Individuals can nominate themselves or others as committee members.

In New South Wales any individual or government agency can initiate a committee. The early committees were established on the initiative of government agencies, but the initiative is now coming more and more from the community. In Sydney, the SWB has been instrumental in setting up committees, approaching local councils, landowners and other community groups with requests for nominations.

The functions of TCM committees include the preparation and implementation (after approval has been given by the Minister) of catchment management strategies. A strategy can identify what action is necessary, and the agency best qualified to carry it out. For information and research, committees have access to the resources of government agencies. They can apply for funds to implement strategies.

The New South Wales legislation also provides for Catchment Management Trusts which are similar in composition and functions to committees, but in addition they have the power to raise funds through a land rate levied on all landholders.

In Victoria there is no specific legislation or prescribed procedure for ICM. The Victorian Government said that, rather than relying on co-ordinating groups, the Act concentrates on establishing regional authorities with rating and other powers necessary for the long term management of catchments. Sub 216 Vic GovDespite the absence of a legislative base, there are a number of local catchment committees operating in Victoria.

Under the Queensland strategy, released in October 1991, existing community action groups are encouraged to promote and adopt an integrated approach to the management of land and water. Where existing groups cannot adequately address such issues, the strategy provides for Catchment Care Groups to link the activities of landholders, community action groups and government agencies. Catchment Care Groups focus on relatively clear-cut issues, providing a forum for community discussion and a means to foster co-operative development of solutions to local catchment issues. More formal Catchment Co-ordinating Committees will be established under legislation to address more complex catchment management issues which involve a significant number of community groups and government agencies. Catchment management strategies are not legally binding, but provide guidelines, recommended policies and action plans which landholders and government agencies are encouraged to use. There is a State ICM Co-ordinating Committee to overview and guide the development and implementation of the ICM program in Queensland.

The Western Australian Government sees ICM as the prime means of natural resource management in the State. Existing legislation is used to implement ICM. An Office of Catchment Management (OCM) oversees the process. The Western Australian Government said that although community interests are directly represented on ICM groups, local government representation is critical to the success of ICM because of its powers to control land use; in setting catchment objectives, the views of some communities outside the catchment may also be relevant.

In South Australia, ICM is being implemented as part of a natural resources management strategy. The South Australian Government said that representation of local interests on bodies which manage the ICM process is important to avoid the perception that it is 'the domain of the bureaucrat'.

The Tasmanian Government said that its environmental problems are due not so much to an inadequate legislative framework, but to the failure of resource management authorities to discharge their responsibilities under the legislation. A comprehensive ICM policy is not seen to be a solution to this problem. Rather, the Government is reviewing the legislation with a view to encourage agencies to more closely co-ordinate land and water use decisions.

The MDBC can be seen as an example of integrated catchment management, where the catchment extends across State borders. Queensland became a full member on 1 July 1992. The Murray-Darling Basin Salinity and Drainage Strategy was developed after extensive public consultation and has helped to co-ordinate State efforts to control salinity and waterlogging in the Basin. More recently, the MDBMC has agreed to develop an Irrigation Management Strategy. Community consultation is through a Community Advisory Committee.

Some participants were critical of the way ICM is being implemented. Others said it was too early to judge its effectiveness.

The CSIRO was concerned that:

> ... not enough attention is being paid to the technical viability or efficiency of catchment management programs. There has been a lack of focus on truly worthwhile and achievable environmental improvements, and often enthusiastic action has preceded the basic technical work needed to develop viable action plans. Proper technical and economic analysis is needed in order to avoid inefficient conservation efforts.

The Victorian Government said that water quality is generally declining, particularly as regards nutrient contamination. The complexity of catchment management is poorly dealt with by the 'cult of co-ordination' in which everyone is involved and no-one is responsible:

> The best of these [catchment co-ordinating] groups have improved communication between the Government agencies and the community groups but they have failed to demonstrate tangible improvements in catchment management.

The Victorian program is in a very early stage of development, and it is not clear how it will mesh with existing and proposed river management authorities. The Association of Victorian River Management Authorities said it had initiated four of the five catchment management groups in Victoria.

The Ricegrowers' Association of Australia said:

> The biggest impediments to [ICM's] success appear to be the reluctance to recognise and use existing communities of common concern and the tendency for Government Departments to want to preserve their existing responsibilities and functions in the catchment.

The ACF agreed. It said that although the agencies themselves set up the committees, their entrenched practices are the greatest impediments to an integrated approach. Of the New South Wales model the ACF said:

> In our view the move in New South Wales has merely added another layer to a confusing set of institutional arrangements, rather than rationalising the existing institutions.

Melbourne Water Corporation said that there are significant benefits to be achieved from ICM and that control over the whole of a catchment can prevent upstream users from impacting adversely on those downstream. The Geelong & District Water Board (GDWB) raised the possibility of catchment management authorities taking responsibility for urban drainage.

The Department of Water Resources in New South Wales, while indicating that local representation has been restricted in some large catchments, argued that TCM may assist resource management in two ways:

- by encouraging a more holistic approach to the management of human activities which enables the complex relationships between ecological and biophysical systems and processes to be recognised and provided for in all decision-making and management activities. ... The challenge is to get the commitment and resources of agencies working together on joint policies and programs; and

- by encouraging better co-ordination between resource managers and users -- greater community participation through networks addressing natural resource management issues and needs within catchment areas. The challenge here is to focus the committees at both a biophysically and socially meaningful scale and representation.

However, it said that restrictions on local government representation have been a drawback. Local government involvement in ICM was also strongly supported by a number of other participants. Land use zoning is a local government function and inappropriate development within catchments can impact unfavourably on water quality. The Local Government and Shires Associations of NSW said that although there are councillors or aldermen on TCM committees, they are not empowered to formally represent local government interests.

Clearly ICM is being implemented in different ways between States as well as within States. The different approaches may be one reason for the different perceptions about its effectiveness. Because it is so new, and because the problems differ significantly from catchment to catchment, there are advantages in a flexible approach.

In the Commission's view, ICM is a worthwhile way to involve the community in catchment management issues, providing that ICM committees have access to adequate information. Representation on water authorities' boards of management could be helpful.

The case for addressing environmental problems from an integrated viewpoint does not conflict with the argument that separation of responsibilities for environmental regulation, service provision, and regulation and resource management is desirable. The functions of ICM committees are primarily advisory. They can act as a community watchdog and think-tank, without having the power to implement changes. If the concept is successful at this level, it could evolve into a mechanism for making decisions. Indeed, the MDBC said that ICM can be a success provided committees can set priorities on issues to be tackled and governments can delegate decision-making.

It is too early to gauge the quality of policy input emanating from catchment committees, its impact on policy makers, or the cost effectiveness of the process. At this stage, ICM is perhaps best viewed as an important trial to be modified, as appropriate, as a better picture is gained of its precise role.

10.2 Non-price measures can encourage conservation

Pricing reforms are an important part of an overall strategy to encourage the conservation of water and to address environmental issues. However, pricing reform alone may not be sufficient to ensure efficient water use. Indeed, some in the water industry use the term 'demand management' to refer exclusively to non-price influences on water consumption.

Non-price measures include educational and water awareness campaigns, multiple billing, encouraging the purchase of water efficient appliances by water efficiency rating, the fixing of leaks, changes in urban planning (eg the use of rainwater tanks) and the planting of low water use trees, shrubs and plants.

As part of its drive to make residents more aware of the amount of water they consume, the Brisbane City Council encourages residents to read their own meters. To date about 90 per cent of (metered) customers do this. Quarterly billing has been introduced by some water authorities in an attempt to make people more aware of seasonal peaks in their water usage.

The GDWB provided information on a public awareness campaign conducted in conjunction with its progressive implementation of user pays water pricing. The Board said that public awareness of the costs of wasting water and of the community benefits to be derived from the new tariff structures is an essential and complementary part of gaining consumer acceptance of pricing reforms.

In Melbourne, water conservation programs, begun during the 1982-83 drought, have, along with pricing reforms, reduced the annual increase in water use from 2.9 per cent to 2.2 per cent (MWRR 1992). However, water use in Melbourne is still growing faster than the population. The Melbourne Water Resources Review Panel has recommended that Melbourne Water Corporation spend up to 1 per cent of its revenue on a demand management program, involving: education (especially to reduce the use of water on domestic gardens); the promotion of water efficient appliances; and recycling waste water.

In the absence of pricing reforms, some attempts to change behaviour through improving awareness have not been successful. The ACTEW recently evaluated the effectiveness of its longstanding public education program on water conservation. While public awareness of the need to conserve water has increased, this has not led to a discernible decline in consumption.

Watson, Murphy and Moore, while acknowledging a role for awareness campaigns, found that 'green' attitudes may inadvertently lead to increased water consumption. This is because the perceived need to maintain an ecological balance will result in efforts to maintain trees and vegetation. While water used for other purposes may be conserved, the use of water to grow plants and trees will be seen as consistent with other measures to conserve water.

The Master Plumbers & Mechanical Services Association of Victoria referred to the scope to incorporate water saving products and technology at the design stage for houses and office buildings. It claimed that water used in a 30 storey office building can be reduced by over 100ÿ000 KL per annum, or the equivalent of the consumption of about 300 domestic premises. The extra design and material costs would of course have to be weighed against savings in water use over the life of the building.

Similarly, the Institute for Science and Technology at Murdoch University pointed to the savings that are achievable through use of water efficient technologies such as dual-flush toilets and shower roses. The Institute estimated that there would be a 20 per cent reduction in the waste water going to treatment plants by shifting to dual flush toilets over a 20 year period. However, with the relatively low price of water at present in many localities, there is little financial incentive to adopt the technology. For similar reasons (eg climate, planning covenants), rainwater tanks in the ACT are considered to have a payback period of almost 100 years.

In the Commission's view, pricing policies which reflect the costs of supply should be the primary mechanism used to provide information on the value of water. However, at the same time, there is scope for a wide range of complementary activities such as public awareness campaigns to make known to consumers the costs of wasting water. Indeed such campaigns may be a necessary part of pricing reform and may well be the best way to influence the water use practices of those not directly affected by pay-for-use pricing. Children, residents of flats without individual meters, and office workers are but some examples. The aim of these campaigns should not be to reduce consumption or to encourage recycling as such, but rather that consumers' decisions on water use are taken with a better appreciation of all the costs involved.

10.3 Research and extension

There is a wide range of Commonwealth, State and private organisations involved in water and water-related R&D. A fairly clear distinction can be drawn between organisations involved in rural or urban-related water research. The National Irrigation Research Fund (NIRF) estimated that some $13 million was spent on generic irrigation research in 1990-91. The Urban Water Research Association of Australia (UWRAA) estimated that between $20 million and $40 million is spent on R&D into urban issues and technologies.

The Land and Water Resources Research and Development Corporation (LWRRDC) is the main body responsible for funding and co-ordinating R&D activities in relation to Australia's land, water and related vegetation resources. Its focus is on funding research which impacts on primary industries. The Corporation's activities are funded solely by the Commonwealth Government.
Other Commonwealth bodies involved in water R&D include the MDBC, the NIRF and the CSIRO. The MDBC is responsible for funding research into Murray-Darling Basin management problems. The NIRF is charged with funding and co-ordinating generic irrigation research and facilitating technology transfer in the irrigation sector.

The CSIRO conducts a wide range of water-related research, principally under contract to various Commonwealth, State and private sector organisations. It spends about $20 million per annum on such research, which is focussed mainly on the development of new technologies and resource management issues. The Commonwealth is also jointly involved with various major water authorities and private companies in a number of Co-operative Water Research Centres around Australia.

The various State departments of agriculture, and rural water authorities, fund and/or undertake much of the rural-related water R&D. Urban water R&D is predominantly funded and/or undertaken in-house by the major urban water authorities. The major urban authorities also provide seed funding for urban water research through the UWRAA. Much of the research funded by the UWRAA is potentially of benefit to the smaller urban authorities.

Rural and urban water research is also undertaken by universities and a number of private R&D and industry organisations.

Extension services for water R&D, essentially to encourage the adoption of 'best practice' techniques in the WSD industry, are provided by a range of Commonwealth, State and private organisations including the LWRRDC, the National Soil Conservation Program (NSCP), Landcare groups, Greening Australia, the MDBC, various Commonwealth and State departments and agencies, and the research institutions themselves.

More detailed information on the institutional arrangements for water R&D in Australia is provided in Appendix B.

A number of participants claimed that the current R&D effort is insufficient to ensure sustainable and efficient water resource use. The CSIRO, the Australian Irrigation Council (AIC) and the NIRF all referred to the relatively low level of funding and research and the slow adoption of new and alternative technologies by water agencies and irrigators. The CSIRO said that:

> Historically, the industry has utilised relatively simple technology for water delivery and for waste water treatment and disposal. Technological change has been relatively slow. Investment in R&D as a percentage of turnover has been very low (less than 1 per cent) ... [However] ... this experience is not limited to Australia.

Both the AIC and the NIRF claimed that there is under-investment in generic irrigation research (ie. water research that extends beyond the individual commodity level), of the order of $9 million per annum.

To rectify the perceived problem, and to address funding imbalances which were said to lead to research being biased towards State, regional and local issues, both the NIRF and the AIC sought the Commission's support for a statute-backed levy on irrigators, with contributions matched dollar for dollar by the Commonwealth. The levy concept was also supported by the South Australian Government.

In accepting the need for all irrigators to strive for maximum efficiency, but rejecting the Commission's emphasis in its draft report on increased water pricing to achieve this, the NSW Irrigators Council said that:

> In many cases, this [efficiency] improvement can be accomplished by the adoption of better water management methods such as, for example, the recently developed methods for the better scheduling of irrigation. ... Improvement of performance by individual irrigators is best promoted by educating those who lack understanding of their deficiencies and are not fully aware of the problems they are helping to cause. Education needs to be supported by adequate research to fill knowledge gaps and search for better ways to irrigate.

The CSIRO also argued that increased funding for water and related research is essential to achieve the efficiency and productivity gains and environmental goals sought by the Commission and others. However, the CSIRO stressed the need for local water agencies to support and exploit technical advances resulting from research in the private and public sectors -- for performance, cost minimisation and export potential reasons. It also suggested that demands for greater economic efficiency and increased environmental needs will compel the industry to review its activities and to search for more efficient and environmentally benign methods, structures and policies.

Some participants questioned the current focus of R&D funding in the water industry. For instance, the SWB was critical of an apparent bias in Commonwealth and State Government research funding towards the irrigation sector, at the expense of research into urban issues such as drinking water quality.

The Commission acknowledges the importance of R&D in complementing the many institutional, pricing and resource management reforms it has proposed elsewhere in this report. As already noted, the scope for efficiency and productivity gains in the WSD industry is significant. R&D and extension activities will help ensure these gains are realised. Increased standards of urban water supply quality and the introduction of more stringent environmental standards will require cost-effective and innovative solutions if they are not to place enormous demands on the community's investment funds.

Similarly, in the irrigation sector, incentives for more efficient water use and the need to address the issues of salinity, waterlogging and nutrient run-off etc, will require innovative solutions, as well as effective extension mechanisms. Research on the need for environmental flows, valuation of the environment, the costs and benefits of total catchment management etc, is also important.

ABARE asked the Commission to spell out a list of research priorities for the WSD industry. However, such a task is best left for negotiation between governments, researchers and the wider industry. An indication of the research priorities already set by some R&D organisations is given in Appendix B.

In this inquiry it is neither possible nor appropriate to assess whether there is enough R&D undertaken in the rural and/or urban sectors of the WSD industry. Such an assessment would properly be made as part of a much more general review of funding of research in Australia.

That said, the extent of in-house and private sector R&D undertaken by WSD agencies suggests that many of the costs of undertaking water R&D can be recouped from customer charges. In these areas government funding is unnecessary. The same cannot necessarily be said for research of an informational or resource management nature. Here, the case for government funding is much stronger. Further, even if the level of investment is too low, to what extent is it due to features of the current arrangements which reduce the incentives for water users to commit resources to R&D activities? The claimed under-investment and slow adoption rates for new technology may reflect factors such as plentiful water supply in some areas, inefficient pricing regimes, and other institutional impediments which provide little or no incentive for conservation or cost minimisation, and thus for research into supplying and using water more efficiently, and sustainably. The CSIRO noted that:

> There are exciting possibilities for developing water, waste water and related environmental control technologies in Australia that will lead to a significant export industry. ... It is possible that corporatisation of the large water authorities could aid this process, in part because it would open up their horizons to the full range of trading and investment possibilities. In the field of R&D and technology, suitably structured corporations could have more incentive to take risks and pursue process and product developments and research opportunities, that in the past would have been irrelevant given legislative and associated administrative responsibilities.

The reforms proposed in this report should provide an incentive for governments, users and beneficiaries to invest more resources in R&D. Levies to fund R&D may be worth further investigation. Levies mean that those who benefit pay the cost. Again, however, it is impossible to assess the case for levies in the context of this inquiry, particularly as it has not been established categorically that there is under-investment in water R&D.

PART II: RURAL WATER

R1 RURAL WATER ISSUES

Part I of this report discussed the overall use and management of water resources in Australia -- urban and rural water alike.

The purpose of Part II is to bring together rural issues and the Commission's findings.

A State by State summary of institutional arrangements, recent developments and participants' views on rural water issues of particular relevance to each State is provided in Appendix E.

Water use in rural Australia

Rural industries account for the bulk of all water use in Australia. Irrigation alone uses around three quarters and when account is taken of water for 'stock and domestic' purposes, the rural sector makes up over 80 per cent of total use.

Water for stock and domestic purposes is in some instances provided by State-wide rural water authorities. In Victoria, for example, the Rural Water Corporation (RWC) provides water in the Wimmera and Mallee regions for filling farm dams. In Western Australia, piped supplies are provided by the Water Authority of Western Australia (WAWA) to about 25 per cent of farms in the cereal and sheep districts of the south-west. Elsewhere in Australia, water for stock and domestic purposes is pumped from rivers or bores, or comes from on-farm dams or local supplies of groundwater.

The mean annual water use for irrigation is of the order of 16 million ML, of which half is applied to pasture (see Table R.1).

Surface irrigation, for example flood and furrow, is the main method of applying irrigation water. However, there is growing use of pressurised systems, such as spray, micro-spray and drip, especially for horticultural production.

The bulk of irrigation is in New South Wales, Victoria and Queensland. Irrigated production of broad-acre crops such as oilseeds, cotton, sugarcane and rice, comes mainly from New South Wales and Queensland. Most irrigated pasture is in New South Wales and Victoria. Orchard, vineyard and other horticultural crops, together with livestock, account for most of the value of irrigated production in South Australia, Western Australia and Tasmania (see Table R.2).

Output per hectare of irrigated land is relatively high. While the area under irrigation in Australia represents less than 5 per cent of the area under crop and pasture, in 1988-89, the value of irrigated production of $4.6 billion, was almost one quarter of the farm-gate value of Australia's entire agricultural production.

In regard to water use efficiency, the Australian Irrigation Council (AIC) said:

> Most surface irrigation systems constructed in the past twenty years have been laser-graded along with some 30 per cent of pre-existing layouts. Laser-grading provides uniform watering, improved drainage and regular shaped fields which are easier to work. The outcomes are less water wasted to surface drains and to groundwater, better crops and higher returns. The use of recirculation systems, off-river storages and laser-grading can lead to very high water use efficiencies such as are relatively common for good cotton irrigators. There has been a big change in irrigated horticulture from less efficient application methods to under-tree micro-irrigation which also can achieve efficiencies in the order of 85-90 per cent.

Table R.1: **Mean annual water use for irrigation, 1989-90**

		Percentage used on:		
State/Territory	*Water use*	*Pasture*	*Crops*	*Horticulture*
	('000 ML)	*(%)*	*(%)*	*(%)*
New South Wales	8 300	41	46	13
Victoria	5 200	81	6	13
Queensland	1 200	8	82	9
Western Australia	338	55	19	26
South Australia	723	58	3	39
Tasmania	97	47	48	4
Northern Territory	10	10	90	0
Total	**15 868**	**50**	**35**	**15**

Source: AWRC 1992a

Table R.2: **Value of irrigated production, 1988-89**
($million)

State/Territory	*Trees, vines*	*Vegetables & other horticulture*	*Cereals, rice*	*Livestock pastures*	*Oilseeds, cotton, sugar*	*Total*
New South Wales	332	185	212	285	390	1 404
Victoria	75	333	2	468	4	1 182
Queensland	181	382	25	54	467	1 109
Western Australia	62	121	<1	20	<1	203
South Australia	286	157	<1	53	<1	496
Tasmania	31	109	-	39	-	179
Northern Territory	<1	7	<1	<1	-	7
Australian Capital Territory	-	<1	-	<1	-	-
Australia	**1 267**	**1 294**	**239**	**919**	**861**	**4 580**

Source: Submissions

There are many private irrigation schemes in Australia -- usually co-operatively owned by the landholders. In the Macquarie Valley in New South Wales, for example, where cotton is the dominant crop, most irrigation is by private diversion.

Much of the public investment in rural water supplies has been funded by Commonwealth and State Governments in the name of regional development. This has frequently meant that public investment has been undertaken with scant regard to economic and environmental outcomes. The legacy has been poorly maintained assets, relatively low farm incomes and damage to the environment.

Environmental costs

The relatively high levels of productivity under irrigation have come at a cost in terms of the natural environment.

Alteration of the natural seasonal flow of water down the major river systems, due to river regulation, has its own effect on ecosystems. Examples frequently quoted are the adverse effects on flora (such as redgum forests along the River Murray) due to the substantial reduction in the incidence of flooding; and the reduction in native fish stocks because river regulation has reduced the favourable conditions for reproduction.

Irrigation is also a contributor to salinity and high water tables in the immediate vicinity of many irrigation areas and, through its impact on river flows, on the nutrient and salt loading of river systems.

The major part of Australia's irrigated production comes from the Murray-Darling Basin, which is severely affected by salinity and waterlogging. Since the turn of the century, water tables in the Shepparton area, for example, have risen from 25 metres below the surface to only 2 metres below. Production losses in the Basin are already estimated to be $65 million annually.

Natural phenomena and the structure of the Basin are at the root of many of the problems of environmental degradation. But damage has been hastened and reinforced by the ways in which water has been supplied and used by farmers. The full extent of the problem has yet to emerge. As pointed out by the Murray-Darling Basin Ministerial Council:

> In recent years, monitoring of groundwater systems has confirmed alarmingly high salinities and rising water tables over much of the Basin. In many cases, this is not yet evident at the land surface. This deteriorating situation is largely in response to broadscale clearing of native vegetation and inappropriate irrigation practices. The implications for future land degradation and stream salinities are extremely serious. The relatively high funding levels for this category reflect the priority placed upon developing an understanding of the processes involved. (Murray-Darling Basin Ministerial Council 1990).

The Murray-Darling Basin Commission (MDBC) said that the area of shallow water tables in the irrigation areas of the southern Murray-Darling Basin will increase from 59 per cent in 1990 to approach 100 per cent of the irrigated area in 2010. In the Riverine Plains area alone, economic losses due to salinity are estimated by the MDBC to increase from $44 million per year now to $123 million per year in 2040 if no remedial action is taken. However, there will be a significant salt load increase for the Basin's rivers with or without drainage.

In recent years, considerable efforts have been made to protect the productivity of irrigation areas against rising water tables. In the Shepparton area, 95 ground water pumps provide absolute protection for horticulture. The water is disposed of to the River Murray or reused for irrigation. Elsewhere, saline water is pumped to one of 94 evaporation basins.

Irrigation is also a source of nutrients in rivers. In wet years when there is widespread run-off from catchments, diffuse sources are the major source of phosphorus. The MDBC referred to problem areas within irrigation, particularly in areas where high levels of salinity reduce the growth of weeds which would otherwise absorb some of the phosphorous within drainage channels. In dry years, urban communities are the dominant source of nutrients through their discharge of sewerage effluent and stormwater. There are 148 towns that discharge secondary treated effluent within the Basin.

The MDBC pointed out that high water tables need not mean a significant reduction in productivity, providing that salinity levels are low:

> ... to protect a hectare of land in Tragowel Plains or Kerang you could expect, to provide complete protection, to have to export 30 to 50 tonnes of salt per hectare per year. At Shepparton, to protect the same hectare of land you would need to export between 1 to 3 tonnes of salt per hectare per year.

As noted above, natural phenomena are at the root of many of the environmental problems, but these problems are exacerbated by:

- the absence of arrangements that would allow irrigation water to be diverted from marginal or degraded land; and

- the pricing of irrigation water well below the full cost of its provision.

The link between irrigation practices and environmental problems was most forcefully put by NSW Agriculture:

> The primary reason for the land degradation problems in the irrigated regions is the excessive use of water beyond plant requirements, which leads to accessions to groundwater, rising watertables and the resultant problems of salinity and waterlogging. ... Not only have water pricing policies encouraged high consumption rates but allocation policies, such as providing as high a reliability of supply as possible, have also contributed to the environmental problems by not reflecting the true scarcity of the water resource.

Tradeable water entitlements

Until comparatively recently, there was no mechanism to redistribute water to its most productive or highest value use. Together with the lack of pricing incentives to use water efficiently, this contributed to overuse of water in some regions, adding to environmental degradation in the form of increased salinity and waterlogging.

In the 1970s, faced with both increasing demands for water and increasing costs of augmenting supplies, State Governments made tentative moves away from a strict regulatory approach to water management. Tradeable water entitlements, at least on a temporary basis, have since been introduced in all States except Western Australia. The current arrangements in each State are summarised in Chapter 8.

The evidence to date indicates that tradeable water entitlements, especially permanent transfer, can bring substantial benefits. Transferability allows greater choice of response to changing market conditions and input costs, including increased water charges. By assigning a market price, trading provides signals to conserve water for sale to other users who can put it to more productive ends. And by providing a mechanism for irrigators to top up their water allocation if required, it also contributes to risk management.

In New South Wales, some 714 000 ML of entitlement were transferred between 1983 and 1990, increasing rural income in that State by an estimated $42 million over the period. In Western Australia, where the bulk of water in the South-West Irrigation Scheme is used on pastures, the Department of Agriculture said that the marginal value of irrigation water is around $30 per ML for dairy farming and that horticultural crops might more profitably use the water on suitable soil types. However, this adjustment is not occurring -- in part because of the absence of transferable water entitlements in that State.

A further advantage of permanent water transfer is the adjustment assistance it provides. The sale of water entitlements can enable landholders to move more easily out of irrigation and into dryland farming. Previously, entitlements had to be forfeited or property sold. However, as discussed in Chapter 8, the initial separation of the water right from the irrigated land will result in a one-off fall in the value of that land. Thus, in broad terms, the assistance provided will reflect the difference in the value of the water to the buyer and the seller.

At present, most trade in water is restricted to river pumpers within a catchment, and in most instances, only on a temporary (annual) basis. Such limitations reduce the efficiency with which water is allocated between uses, and reduce the potential of a trade in water to promote better environmental outcomes. For example, with transfers only on a temporary basis, efficiency is constrained by uncertainty about the availability of water in future seasons. In due course, trade in water could be between rural and urban users, and the environment, to the benefit of all.

Water pricing and cost recovery

The importance of improved water pricing for efficient management of water resources is acknowledged at all levels of government in Australia. The Commonwealth Department of Primary Industries and Energy said:

> Payment by all resource users of the full economic cost of their resource is fundamental to efficient resource management. With respect to water users, charges must include not only current and capital costs of delivery, but also the opportunity cost of water. Where water is supplied by government agencies, this outcome should be a matter of policy; ...

That said, prices for irrigation water have fallen short of full cost recovery throughout the history of irrigation in Australia.

Water is variously priced from $2 to more than $70 per ML for regulated flows. The National Irrigation Research Fund estimated that the average price is of the order of $10-$12 per ML. In many instances, water charges do not cover operating and maintenance costs and depreciation, let alone any return on the investment required to provide infrastructure.

Government acceptance of cost under-recovery has encouraged considerable public investment in irrigation infrastructure which has little commercial value. It has also provided a disincentive for investment in on-farm storages.

Because new public investment in irrigation is unlikely to be widespread, pricing questions for rural water are primarily concerned with charging to make proper use of existing infrastructure. Even so, poorly informed assessments of the capacity of farmers to pay and to adjust to higher charges, together with political expediency, continue to thwart moves to increase charges to an efficient level.

Conflicting objectives of governments have also played a part. For example, the South Australian Government said that in considering the recovery of total costs from current customers it:

> ... will not jeopardise the State's competitive position nor any existing development which has become dependent on affordable WSD services.

And, in commenting on the problems of achieving a commercial return, it said:

> The inability of governments to correct the situation through charges reflects a decision that the capacity of the community to pay and interstate competitiveness are more important objectives than the achievement of commercial rates of return. (No. .., p.22)

The Queensland Government said:

> Queensland believes that governments must retain the right to decide what they see as the benefits from investment of irrigation schemes and regional development. Governments must be free to weigh up the social and economic benefits to the community from investment in irrigation schemes.

There was considerable agreement on the part of irrigators that charges for water have been insufficient to provide funds for the perpetual replacement of irrigation works. However, there was also a consensus that today's irrigators should not have to pay to make up for the non-contribution of the irrigators of past decades.

Irrigators indicated conditional support for a user pays approach to water pricing. However, they argued that pricing reforms should be pursued only after the operational efficiency of the water authorities providing rural water has been improved; that all 'beneficiaries' should contribute to the costs of supplying water; and that prices for water should be set with regard to the capacity of irrigators to pay. Irrigators also argued that governments should meet a major part of the cost of refurbishing public irrigation assets.

Efficiency within rural water authorities

The operational efficiency of many of Australia's rural water authorities has come under scrutiny in recent years. For example, in New South Wales, options for restructuring the Department of Water Resources (DWR) are under consideration, including separation of the resource management and operational functions, and privatisation of the operational function. In Victoria, the RWC was recently broken up into five Regional Management Boards responsible for all aspects of service delivery in their regions, and a small central corporation to provide strategic direction.[1]

The expectation is that changes to the structure of rural water authorities could significantly reduce the costs of providing services. Irrigator organisations referred to substantial cost reductions achieved in New South Wales following the creation of regional Irrigation Management Boards.

The Macquarie Valley Irrigators Association said that irrigator interest in privatisation is due to dissatisfaction with the slow pace of improvements in workforce productivity in the public schemes. It said that the lower operating costs of private schemes are due to the reduced need for accounting and reporting to government; fewer and better motivated staff; greater irrigator cooperation in operation and maintenance activities; and fewer structures to operate and maintain.

Cost savings from improvements in rural water authorities' performance would reduce the magnitude of required price increases. However, improving the cost efficiency of service provision takes time and reform on the pricing front should not wait on the achievement of cost savings. In any event, even after identified cost savings have been realised, prices will still have to rise significantly if irrigators are to pay to maintain the service potential of existing systems in the future.

[1] The RWC was corporatised on 1 July 1992. The five Regional Mangagement Boards are expected to commence operating on 1 September 1992.

Beneficiaries of water use

Many participants argued that the subsidised provision of water is justified by the community-wide benefits which irrigation brings. The benefits were variously expressed in terms of the contribution which irrigated agriculture makes to Australia's export earnings; the stability of food prices; and the regional and national stimulus to economic activity generally. For instance, the Macquarie Valley Irrigators' Association said:

> Irrigated production for domestic consumption assists in stabilising food supplies and prices and without it, prices would be erratic and supply unreliable. (No. 71, p.2)

The NSW Irrigators' Council said:

> Irrigators, along with primary producers generally, know that they make an important contribution to Australia's economy. They know that they belong to the minority part of the workforce which produces Australia's wealth, as against the remainder whose role is redistributive rather than creative. (No. 13, p.6)

There was considerable support for the argument that the multiplier effects associated with irrigated agriculture bring disproportionate benefits to the wider community, and that the wider community should therefore contribute to the cost of supplying water.

The Commission does not accept that these arguments justify subsidised water prices. The benefits of public irrigation infrasturcture provision accrue primarily to water users. For instance, growers receive higher prices for 'out of season' production made possible by irrigation. Consumers also benefit and this is reflected in their willingness to pay the higher price. There is no point in requiring the community to subsidise water use merely to increase exports. The effect is to tax other sectors and jeopardise their competitiveness, and hence their capacity to generate exports. Water subsidies, like other forms of industry assistance, impose costs elsewhere in the economy which can result in a net loss for Australia.

And, as pointed out in Chapter 5, all activities have linkages with parts of the economy and therefore generate flow-on benefits or 'multiplier' effects. But multipliers do not address the question of whether the benefits of increased activity in one area outweigh the costs, nor do they evaluate the economic merits of other investment options. Thus, while multipliers provide some indication of the importance of irrigated agriculture to surrounding regions, and therefore an indication of some of the likely adjustment costs following changes to pricing arrangements, they say nothing about the efficiency of resource use.

However, the Commission recognises that where a dam or river provides, say, recreational or tourist services as well as irrigation water, it is not appropriate to charge irrigators for the full cost of maintaining that water source. This approach has formal recognition in New South Wales where irrigators pay a 'delivery service charge' to cover 70 per cent of all costs associated with 'running the rivers'. The other 30 per cent is met by the State Government in recognition of public benefits.

Capacity to pay

The argument that irrigators are limited in their capacity to pay higher prices for water was put very forcefully by irrigators. For example, the NSW Irrigators' Council said that a typical mixed farm (including rice) in the Murrumbidgee Irrigation Area has average annual water charges of $19 000 or more, which represent about 20 to 25 per cent of farm variable costs. In this case, the Council argued that:

> The net income from such a farm for 1990-91 will have been only some $30 000, so the scope for absorbing increases in water costs is very limited.
>
> ... While not all irrigators' profits have as much sensitivity to water costs ... most would be severely affected by any move by a Government to require recovery of capital and interest or to call for dividend payments. (Submission No. 13, p.6)

The effect of higher water prices will depend in part on how irrigators respond. They may reduce application rates, adopt water saving technologies, reduce the area under irrigation, change crops, move to dryland production or otherwise change their irrigation operations. Some may leave farming altogether.

The DWR has estimated that water accounts for about 13 per cent of on-farm operating costs of rice production in New South Wales. The proportion is much lower for other crops -- citrus 5 per cent, fruit 3 per cent and cotton 1 per cent.

Apart from rice, these estimates suggest that higher prices for water would not necessarily threaten the viability of many forms of irrigated agriculture. The adjustment costs could nevertheless be high. One reason is that the benefits of low water prices are often capitalised into land values. Consequently, higher prices for water would cause capital losses.

The effect of higher prices on the use of water will depend on the sensitivity of demand to price changes. The Western Australian Department of Agriculture said that for dairy farming in that State, the 'price elasticity' of demand for irrigation water is as high as -0.6. This means that a doubling in the price of irrigation water would reduce demand by 60 per cent. One reason for this significant sensitivity is that hay and grain feeding can substitute for irrigated pasture. By contrast, the Department noted that a recent survey undertaken in three government irrigation areas in the south-west of Western Australia found that a 50 per cent increase in water charges from their 1989-90 levels would not change irrigation water usage, while a doubling of price would likely result in 25 per cent of farmers ceasing irrigation.

In Victoria, about 85 per cent of water for irrigation is applied to pastures for dairying and the fattening of cattle and sheep. There has been a decline in milk production in the Gippsland region, which has a relatively high rainfall, and a corresponding expansion around Shepparton where irrigation is prominent. This suggests that higher prices for water might favour a return to dryland grazing. However, the VFF said that the marginal value of irrigation water in Victoria is quite high

-- perhaps $60 per ML for some commodities in some years. With water prices currently at $15 per ML, the residual value was said to be embodied in land values. Accordingly, the VFF argued that the main effect of higher water prices would be a fall in land values. Activities such as sheep and cattle fattening, for which the marginal value of water is low, could be directly affected but irrigated pasture would continue to be used for dairying.

The fact that cheap irrigation water has been capitalised into land values is not an argument for the indefinite retention of subsidies. As pointed out by Lloyd (1986), people who bought irrigation farms in earlier years have already received years of subsidisation, and those who bought farms recently would have been aware of the debate about water charges, and should have factored this into their negotiations.

The concept of 'capacity to pay' has obviously influenced the pricing policies of the rural water authorities, but it is not clear how they have assessed the capacity of particular groups of irrigators to pay.

Surveys of farm incomes typically find a spread of incomes even within categories of irrigated farming. To the extent that attention has been focussed upon marginally viable farms, adjustment may have been unduly postponed by the reluctance to increase water prices. However, attitudes are changing. The DWR said that there is scope to further recover costs in New South Wales through substantial increases in water charges -- for example, by users in the Irrigation Areas and Districts paying higher service delivery charges.

One indication of the capacity to pay is the value of water entitlements on the transfer market. The prices that have been paid in some States for water transfers and new water entitlements suggest that there is considerable capacity in parts of the irrigation sector to pay higher charges. In March 1991, an auction of new entitlements was held in the Gippsland region of Victoria. All 6000 ML of water were sold at a price of $160 to $200 per ML. This indicates that water has an annualised value of around $20 per ML over and above current charges to private diverters in this area. New allocations auctioned in Queensland, at St George and Goondiwindi, brought average prices in excess of $350 per ML.

Some participants questioned the worth of transfer prices as an indicator of irrigators' capacity to pay. The NSW Irrigators' Council, for example, said:

> There may indeed be instances where prices paid for the permanent transfer of water entitlements might suggest that higher water prices can be afforded by a particular purchaser. But this should not be taken as evidence of the levels of charges that the rank and file irrigator can afford.

As discussed in Chapter 8, the Commission accepts that transfer prices provide only limited information on the value of water across irrigation as a whole. However, this does not negate the general proposition that some irrigators value water in excess of the price charged for its provision. The question is one of degree rather than principle. As constraints on transfers are removed so that water can freely move to its highest value use, the value of entitlements will increasingly become a more reliable indicator of irrigators' capacity to pay higher prices.

Asset refurbishment

Most public irrigation systems in Australia are aging and in need of refurbishment. Moreover, problems of waterlogging and salinity mean that there is now a call for additional outlays to protect the existing investment in irrigation. According to the National Irrigation Research Fund:

> Inadequate surface and subsurface drainage for removing excess irrigation water and stormwater is becoming a major barrier to more efficient water use. This is especially true in irrigation regions developed in the past 50 years where no provision was made for drainage at the time of development. (No. 16, Attachment, p.3)

The viewpoint of many irrigators is reflected in proposals put forward by the VFF for debt write-off and a significant injection of public funds to bring Victoria's irrigation assets up to a reasonable condition and to remove a significant backlog of maintenance. The VFF argued that:

> ... These capital injections can be seen as an appropriate government contribution on behalf of the broader beneficiaries of Victoria's rural water systems.

In all States, further public investment in irrigation infrastructure is now conditional upon some capital contribution from irrigators, or a levy incorporated in water charges. With salinity mitigation works, governments tend to pay a proportion of the costs in acknowledgement of the intergenerational problems that would otherwise bedevil a solution.

The NSW Irrigators' Council, among others, was critical of the approach in New South Wales whereby the cost of constructing drainage schemes is now being borne in the ratio 2:2:1 by the Commonwealth, the State and irrigators. The Council said that:

> The irrigators feel somewhat disadvantaged by not having had the drainage as part of the original irrigation scheme, as was the case with irrigation development in some neighbouring State-constructed schemes and as is accepted good practice. These irrigators, in having to now contribute to have the construction take place thus belatedly, feel that in the above-described context their contribution represents an abnormally generous measure of "user pays" on their part. (NSW Irrigators' Council, No. 13, p.9)

NSW Agriculture, however, said that there is a strong case for irrigators to financially contribute to drainage schemes because irrigators are generally the primary beneficiaries.

The various rural water authorities have taken different approaches to refurbishment. In New South Wales, the intention is to move quickly to corporatise/privatise the Irrigation Management Boards and to progressively move irrigation infrastructure from direct government control and DWR management. The DWR indicated that, within the next five years, all of the Irrigation Areas

in New South Wales will be privatised, corporatised or encouraged to operate in some commercial mode. Where privatisation occurs, there will no longer be an open-ended community commitment to replace assets as has often been the case in the past. Rather, decisions on refurbishment will be the responsibility of irrigators and will therefore be based on commercial criteria.

Given that an important rationale for transfer of ownership is to give those paying for services more say on the levels of service etc they require, it will be preferable to allow them to decide on what refurbishments are appropriate. By negotiating the transfer prior to refurbishment, governments are also freed from involvement in the operation of these systems at an earlier date.

Governments generally see a need to refurbish assets to an acceptable standard or provide other incentives for groups of irrigators to take over their parts of the system. However, the dilemma is that while government funding of rehabilitation continues, privatisation will not be an attractive option for irrigators in areas requiring major rehabilitation.

In Victoria, for example, privatisation of the public irrigation system is not on the agenda and the State Government has begun what appears to be an open-ended task of asset refurbishment. The problem is not avoided by the recent change to corporatise the RWC and regionalise its operations. Even with responsibility for maintaining assets residing with the five regional boards, the assets remain the property of the State.

Self management of public irrigation schemes is favoured by the South Australian Government and irrigators. It has been agreed that the capital which irrigators contribute to refurbishment should entitle them to assume the management and ownership of government irrigation assets, should they agree to do so.

R2 COMMISSION'S RURAL WATER FINDINGS

The view that cost recovery is an appropriate objective for the Australian water industry is now shared by most governments, and the water authorities in all States are keen to implement reform. Reform of the rural water sector has nevertheless not been high on political agendas.

If evidence were needed of the sorts of problems that arise when users of water are not required to pay the full costs of services received, it is to be found in the plethora of ill-judged investments in public irrigation schemes.

As Australia's most recent large-scale public irrigation project, the Burdekin River Irrigation Area scheme in Queensland might have been expected to avoid the shortcomings of earlier schemes. The scheme is only half way through the development phase, yet the Commonwealth Government's contribution of some $130 million towards the cost of the Burdekin Dam has already been written off. The likelihood that the Queensland Government will recoup its investment in developing irrigation land in the Burdekin is discussed in section R4.

When taking investment decisions, governments clearly must have regard to a broad spectrum of considerations. However, there are many examples where public investment in irrigation has meant a loss of community amenity and a continuing drain on the public purse. It has to be asked whether Australians can any longer afford the problems that follow when regional policies or political expediency prevail over commercial good sense.

As some safeguard for the future, the Commission has proposed in Chapter 5 that public investments in new irrigation schemes and investments in asset refurbishment be subject to the same rate of return hurdle as proposed for new investments in the urban sector -- that is, a minimum of 5 per cent real.

However, the public irrigation assets already in place stem from earlier investments which had little regard to commercial outcomes. Some of these assets should be regarded as 'sunk' costs not to be recovered in prices charged to current users of water. Even so, water pricing policy should aim for full recovery of operating costs, and irrigators should expect to pay higher prices to justify refurbishment of these assets.

In Chapter 5, the question of future pricing arrangements for irrigation water is discussed in terms of the pricing of bulk water and the pricing of water distribution. The Commission concludes that prices for bulk irrigation water should, at the very least, cover irrigators' share of the costs of operating and maintaining all parts of bulk water supply systems, including storages. For systems where demand for water is sufficiently strong, a return on capital is appropriate. Consistent with arrangements in the urban sector, the Commission recommends that where the costs of environmental damage directly attributable to irrigation can be quantified, charges for bulk water should be increased accordingly.

The scope for cost savings in the delivery of bulk water is discussed in Chapter 3. These savings can reduce the magnitude of price increases, but they will not obviate the need for significant increases in the charges for bulk irrigation supplies. Higher levels of cost recovery call for both price increases and simultaneous cost saving initiatives by bulk water suppliers.

The Commission recommends that the price of bulk water be lifted immediately to a commercial level, while continuing to subsidise irrigators in the short term by means of an explicit government payment to the bulk water supplier. Among the advantages, discussed in Chapter 5, would be the discipline imposed on water agencies and their owner governments to evaluate what rate of return, if any, is feasible in a particular bulk water supply system.

The pricing of water distribution and drainage services is made more complex by the question of who should pay for the refurbishment of these systems. There is considerable pressure on governments to refurbish systems without adequately addressing the problem of an on-going government commitment to maintain non-commercial systems.

In Chapter 7, the Commission argues that privatisation of public irrigation distribution and drainage systems is necessary, and recommends that the transfer of ownership should occur prior to further refurbishment of distribution and/or drainage systems.

Once privatised, charging arrangements for irrigation distribution and drainage systems become a matter for the irrigators themselves to decide. They can also decide on the appropriate standards of refurbishment.

But the arguments for privatisation go much further than this. They stem from the concern that governments at present are taking decisions to refurbish existing assets without sufficient regard to the changes yet to come -- not the least of which will be much higher prices for bulk irrigation water and provision for water to be moved to higher value uses. On both commercial and environmental grounds, some parts of the public irrigation systems (developed in quite different circumstances) will not warrant refurbishment.

Those who see value in across-the-board refurbishment of existing irrigation assets seem to have ignored the contingent requirements for drainage and salinity control measures. In many localities there is the added complication that the full extent of waterlogging and salinity problems has yet to emerge. As noted by the MDBC, the area of shallow water tables in the irrigation areas of the southern Murray-Darling Basin will soon approach 100 per cent of the irrigated area.

In the longer term, there is no reason why the broad pricing principles for rural water should differ from those relevant to urban WSD services. However, in the rural sector, pricing reforms need to go hand in hand with reforms which give those paying for services more say on the levels of service, etc they require. Pending privatisation, management of the distribution and drainage components of public irrigation systems should be devolved to regional bodies. Steps in this direction are being taken in all of Australia's major irrigation areas.

The package of rural water reforms should extend to improvements in the system of transferable water entitlements, allowing water to be used to its best advantage. In Chapter 8, the Commission recommends that:

- permanent water transfers should be introduced in all irrigation systems;

- where feasible, provision should be made for permanent transfers between schemes; and

- arrangements to allow the transfer of water from irrigation to other uses should be implemented in all States.

There is also a need to change the way in which water entitlements are specified. Current arrangements provide few incentives to conserve water because irrigators cannot carry over unused entitlements for future use or sale. This contributes to water wastage, overwatering and the related environmental problems.

The inflexibilities in the current arrangements can be avoided to a significant degree where water storages are operated on a *continuous accounting* basis. Here, users of the storage are given credits for any part of their allocation which they choose to preserve. Another option is *dam capacity sharing*, whereby each user is allocated a percentage of empty reservoir capacity and a percentage of new inflows. Again, users who chose to preserve water would receive the benefits of that decision in subsequent seasons. These options are discussed in Chapter 8.

R3 PACE OF RURAL REFORM

The Commission's recommendations should come as no surprise to most of the rural water authorities in Australia. They have advocated similar reforms for many years and some have made progress in implementing parts of the package. Governments too, should not be surprised since the recommendations merely give content to the maxims which governments themselves placed before this inquiry.

There is close to unanimous agreement on the part of governments as to the need for rapid change, and the direction of change. However, in most jurisdictions, the `in principle' commitment to efficient and sustainable use of water resources has to date fallen short of decisive action. One reason is that governments, water authorities, irrigators and the community generally seem to have misjudged the pace at which reforms can and should be progressed.

Participants generally acknowledged the need for reforms and recognised that there will be constraints on ways in which resources are used in future. The DWR, for example, pointed out that the pursuit of sustainability objectives:

> ... will inevitably impose additional constraints on resource use and development (to redress costs which will be borne by present and future resource users and the community generally). However, it does so on the understanding that a decline in the condition of the resource leads to increasing and potentially worse costs for all individuals involved with that resource.

Many parts of the reform package recommended in this report have the support of irrigators. For example, the AIC expressed strong support for the adoption of transferable water entitlements.

However, the social implications of reforms in the rural water sector are of major concern to many participants. This is to be expected since many communities and industries owe their existence to abundant and cheap supplies of water for irrigation. In the Lower Murray-Darling Basin, in particular, whole communities rely upon water supplied in liberal quantities, with high reliability and at a subsidised price. In these circumstances, the United Farmers and Stockowners of South Australia rightly point out that the future of Australia's public irrigation schemes will be determined not only by social, economic and environmental objectives, but by the political influences exerted on water managers.

The trade-offs between efficient resource use and social cohesion were seen by the South Australian Government in the following terms:

> The rural support objective would no longer be promoted to stimulate development, but it remains relevant for existing development partly to protect existing rural investment and its economic contribution to the State, and also to maintain social justice. The viability of rural communities is also important because otherwise these people would increase pressure on metropolitan development. (No. .., p.15)

The reforms needed in the rural water economy go well beyond higher water charges. But it is the higher charges which will have the most immediate effect upon both irrigators and rural communities. On the one hand, higher charges and a reduction in water usage may mean a contraction in irrigation in some areas and consequent dislocation for local communities. On the other hand, the restructuring could allow an expansion of some crops in particular areas, and the environmental benefits could be widespread.

The inevitable shifts in income distribution will be resisted by those adversely affected, in ways already familiar to the water authoritiesy. As described by the DWR:

> Pricing policies were developed on several occasions through the 1980s and, in 1984, a 22 per cent increase in irrigation charges was introduced. The reaction from the irrigation community, particularly in the south of the State, resulted in a "no pay" campaign and subsequently in a deferral in price increases for the next two years.
>
> Further refinements to the water pricing policy were canvassed with the rural community in 1986 and 1987 and these led to further angry reactions. On this occasion, rural towns drawing water from the State's regulated streams led a campaign against the imposition of charges. These towns previously did not pay for bulk water.

Many of the benefits from reform will be dispersed and appear as incremental gains to the community over many years, whereas the dislocation which accompanies structural change tends to be obvious, is concentrated and generally immediate, and the individuals and communities affected have reason to resist change. This dispersion of benefits and concentration of costs characterises

virtually all microeconomic reform initiatives. It means that governments have the difficult task of minimising adjustment pressures on individuals and communities, and doing so in ways that do not unduly delay change.

The penalties of deferring reforms in rural water are large. Delays mean that the benefits of improved national income are forgone (see Chapter 3); opportunities for orderly adjustment are lost; governments continue to invest in and refurbish poorly performing assets; and the environment is placed further in jeopardy.

The severity of the looming environmental problems was portrayed in stark terms by the MDBC and the Centre for Water Policy Research (CWPR). The Centre argued that the pace and nature of the changes required in the Lower Murray-Darling Basin will be:

> ... more extreme than is commonly anticipated by those who tend to look to, or expect, that technological solutions will be adequate.

To safeguard the environment and at the same time bring orderly adjustment within the irrigation industries and communities, the CWPR advocated establishment of an irrigation adjustment authority which would purchase water (at full cost) for resale to irrigators at a subsidised price. By this means, support for the industry would be transparent, the subsidy could be phased out, and the authority could advise on strategies to help the irrigation industry adjust.

Following the release of the draft report, the CWPR expressed support for the Commission's reform package but reiterated its concern that the capital loss to owners of assets, and the reduction in incomes which could follow from implementation of the proposals, could lead to significant pressures for structural change in the lower Murray-Darling Basin. It stressed the need for planning, oversight and coordination of the adjustment process.

An important step in the direction of coordinated adjustment was taken in May 1992 when the Murray-Darling Basin Ministerial Council agreed to develop an Irrigation Management Strategy 'to achieve an economically and environmentally sustainable and self-sufficient irrigation industry in the southern Murray-Darling Basin by the year 2010'.

The policy and program initiatives, when developed, are to be tested in four regions:

- the Murrumbidgee Irrigation Area in New South Wales;
- pump irrigation districts in the Mallee regions of Victoria and South Australia;
- the Goulburn Valley in Victoria; and
- the Kerang region, including Tragowel Plains, in Victoria.

The Commission's recommendations for rural water (included with other recommendations in the Overview) should underpin much of the work of the Irrigation Management Strategy. Included in those recommendations are measures aimed at moderating the adjustment pressures likely to be faced by some irrigators and rural communities. For instance:

- although the recommendations call for an immediate increase in the price of bulk water to commercial levels, irrigators would be subsidised in the short term by means of an explicit government payment to the bulk water supplier (see Chapter 5);

- the rate of return sought (if any) on existing bulk water supplies should depend on the strength of demand for water (see Chapter 5);

- in its privatisation proposal, the Commission has recognised that there may be a need for governments to hand over money to provide groups of irrigators with an incentive to accept ownership (see Chapter 7); and

- an improved system of transferable water entitlements would provide a modicum of adjustment assistance to those irrigators who sell their water entitlements (see Chapter 8).

The Commission's recommendations should be seen as a package aimed at bringing together efficiency gains and more sustainable water use. The pace of change should be considerably faster than at present.

Apart from the adjustment measures built into the package, adjustment assistance would be available to irrigators through the Rural Adjustment Scheme (RAS). Under the RAS, assistance can be provided in the form of interest rate subsidies, loans and/or grants to farmers experiencing financial difficulties beyond their control. The RAS is intended to assist farmers to improve their performance by helping them to increase the size of their farms, to restructure their liabilities, improve their managerial and financial skills, or adopt better practices and technology. After all other options have been exhausted, the RAS helps eligible farmers without prospects to leave the industry.

The restructuring which is inevitable in the older irrigation areas calls for RAS funding which looks beyond the situation of individual farmers. Decisions to assist individuals should be taken with full regard to the rapidly changing circumstances and prospects for farming areas, and indeed whole regions.

R4 BURDEKIN RIVER IRRIGATION AREA: CASE STUDY

The Burdekin River Irrigation Area (BRIA) project was established to expand irrigated agricultural lands in the fertile areas of the lower Burdekin extending from the north bank of the Burdekin River to the Haughton River, and from the south bank to the Elliot River. Prior to the scheme, the area was used for grazing and some irrigation drawing upon groundwater supplies and a series of small dams and weirs.

The principal objective of the project was to provide water supplies for the irrigation of new sugar cane, rice and other crops to promote economic growth in the region. Other objectives were to provide water for:

- the irrigation of existing cane assignments along the Haughton river with the aim of stabilising and increasing production of these holdings;
- urban and industrial use in the major centres of the region, in particular, Townsville/Thuringowah; and
- the future installation of a 500 megawatt hydro-electric power station at the Burdekin Falls.

The Burdekin River was dammed at the Burdekin Falls in 1984. The dam impounds the largest body of fresh water in Queensland, and is capable of supplying over one million megalitres (ML) of water each year to the irrigation area.

Before the commencement of the scheme, a study was prepared by the Burdekin Project Assessment Committee to assess the viability of the project. The report (QWRC 1980), released in March 1980, made use of conventional cost benefit analysis.

The 1980 study

Two development possibilities for the Burdekin basin were assessed. The first involved a 1.75 million ML dam that would supply water to irrigate 45 125 hectares of crop and for urban use in and adjacent to the basin. The other involved an 8.5 million ML dam which would allow agricultural development identical to that for the smaller scheme and, in addition, would permit the construction of a hydro-electric power station.

While a future potential for hydro-electric power generation was identified, it was not considered likely to be economically feasible in the short to medium term. The report concentrated on the major water resource requirements associated with agriculture and urban development based on the smaller scheme.

Streams of benefits and costs were derived for project lives of 50 and 75 years. At that stage, the cost of the smaller project was estimated to be $155 million (in 1977 dollars). The scheme was expected to provide for irrigation of an additional 45 000 hectares annually at full development by which time about 660 new farms would be served.

Farm budgets for a range of property sizes and farming systems to cover the major soil types in the irrigation area were examined to assess farm viability. Agricultural benefits were estimated for the type, quantity and price of crops grown within the proposed area. Estimates of the increase in incomes for existing sugar cane growers in the project area were also assessed.

The report argued that the primary benefits which would accrue from the scheme would include:

- direct revenue resulting from the surplus of water and drainage charges and land rentals over annual costs of operation, maintenance and administration; and

- a further increase in net revenue in the event that Townsville city obtained part of its water supply from the Burdekin River.

Given the assumptions used about future costs, prices and productivity, the analysis indicated that the smaller scheme would be `a highly attractive investment' and provide an internal rate of return on the total investment of about 10 per cent. The smaller scheme was eventually built.

The 1990 study

In 1989-90, the Queensland Government directed the Water Resources Commission of Queensland (QWRC) and the Department of Primary Industries to review the progress in the BRIA and to propose future strategies for the project. The report (Noonan and McNee 1990), released in April 1991, noted that investigations had shown that the areas considered suitable for viable agriculture were significantly less than the initial estimates of 1980 and that the BRIA scheme had not realised earlier expectations.

The report examined the benefits and costs of the scheme under three development scenarios. The three scenarios assumed that development would be completed over 15 years, nine years and five years respectively. The starting point for each scenario was the project aim of developing 50 000 hectares of irrigation farm land which would support some 45 000 hectares of crop and release about 500 farms. The principle assumptions are summarised in Box R.1.

For each scenario, the net present value (NPV) was calculated as the difference between the present value of the benefits and associated costs over the life of the project. The benefits were assumed to be gross value of farm output less farm costs. The main emphasis of valuation was on sugar cane production, although a combination of crop rotations was stipulated for each scenario. The costs were taken to be the net public costs invested -- that is, the cost of public investment in the scheme and its operation less water charges. The discount rate used in the calculation of NPVs is not reported, but the Commission understands that a real rate of interest of 7 per cent was assumed.

Box R.1 **Burdekin development scenarios and assumptions**

Scenario 1 : Development over 15 years

The sugar industry in the Burdekin is assumed to expand only marginally faster than the State average. For rice, the industry target of 100 000 tonnes of paddy production per year is assumed to be achieved by a steady expansion from 30 000 tonnes per year. Horticulture is assumed to expand to some 4500 hectares.

Scenario 2 : Development over 9 years

The Burdekin is assumed to take up the sugar expansion rights from all mill areas which have little or no room to expand economically. The expansion of rice is curtailed to 50 000 tonnes of paddy per year. Horticulture is assumed to expand as in Scenario 1.

Scenario 3 : Development over 5 years

Under this scenario, it is assumed that the sugar industry is significantly deregulated, world demand remains high, and sugar expansion in the Burdekin is twice that in Scenario 2. Rice and Horticulture are assumed to expand less rapidly than in Scenario 2.

Source: Noonan and McNee 1990, p. 29.

In all scenarios, the analysis returned a positive NPV with Scenario 3 returning the highest (see Table R.3). Based on these findings, the report concluded that the scheme was a very attractive investment and would bring considerable benefits to the farmers, the Burdekin region and the State (Noonan and McNee 1990, p. 32).

The fast development scenario (Scenario 3) has since been abandoned because of the difficulty in keeping up with the stipulated time frame of development. The QWRC now believes that current development roughly approximates Scenario 2.

The current development program allows for $15-$20 million of annual expenditure which could generate 30 to 40 farms in most years.

Table R.3: **Burdekin development: Net Present Value as calculated in the 1990 study**

Scenario	*Term of development*	*Net present value*
	(Years)	*($ million)*
1	15	4.1
2	9	27.9
3	5	34.7

Source: Noonan and McNee 1990, p. 29.

Participants' comments

At the initial public hearing in Townsville, submissions were received from a number of growers who have taken up blocks within the BRIA and farmers outside the scheme. Participants expressed concerns about resumption and private development matters associated with the development of the BRIA.

As part of the process of compulsory resumption of land for the scheme, existing property owners have been offered a 'home' farm of about 100 hectares. Depending upon the size of the property resumed, they have the right to retain one or more 'retention' blocks on payment of a charge which the Queensland Government said reflects the difference between irrigated and dry land values in the region. At this stage, the charge is expected to average about $1800 per hectare. When resuming properties the QWRC, acting in its capacity as a land developer, has sought to recoup for the community any windfall gains attributable to the existence of the scheme -- for example, any additional value which a property derives from the improved security of water supplies. This has been resented by some property owners, particularly those who had either begun to develop, or planned to develop private irrigation schemes prior to notification of resumption.

DAVCO said that it had demonstrated its own self sufficiency in water prior to the announcement of the Burdekin Falls Dam and that it has subsequently been penalised by the resumption of land 'regardless of current use or tenure' and by charges for water which attempt to extract 'the full increase in the value of the land attributable to the advent of irrigation'.

Several participants whose properties have been resumed said that they have received less favourable treatment when acquiring a retention block than growers who have purchased blocks at auction. They pointed to the 'up-front' charge they have to pay for a retention block compared with the attractive terms available to purchasers of new farms at auction -- a deposit of 15 per cent, 10 equal annual repayments and an interest rate of 12 per cent.

While acknowledging that they are entitled to bid for retention blocks at auction -- thereby taking advantage of the favourable terms of sale -- they argued that the scope to purchase a contiguous block can be thwarted by financial constraints if the land is put to auction before final agreement has been reached on the terms of resumption.

Many growers have taken up blocks with inadequate capital for further development. At the public hearing in Townsville, participants suggested that the terms of sale should be restructured to have regard to the low levels of cash flow on newly developed properties. The user-pays approach was said to be inappropriate in a public irrigation scheme in which users have had no input into the type of system developed. Arguments were also put that non-farm beneficiaries of the scheme should be required to contribute.

Participants referred to poor accountability and the absence of any affordable avenue of appeal, and problems stemming from the delays in resuming land and resolving questions of compensation. The Burdekin Dam Project Landowners Committee (No. 110, p. 5) said that the threat of resumption, together with actions of the QWRC, has deterred bank funding, depressed the value of existing properties, removed the incentive for landholders to undertake further development and blocked private irrigation development. The Committee said that:

> The proclamation of the government irrigation scheme and intended resumption brought land use restrictions that eroded confidence and virtually froze all development activity ...

Restrictions on farm size and the regulations governing sugar cane production were also of concern to participants. DAVCO provided information which suggests that a sugar cane farm of around 100 hectares, with a 65 hectare assignment, has average costs roughly 50 per cent greater than a farm twice the size, and that average costs continue to fall until farms reach around 700 hectares in size.

The claim that farm sizes in the Burdekin are too small was disputed by the Queensland Government which said:

> The current policy bases farm size in terms of the minimum areas of suitable soils as follows:
>
> - 100 ha for sugar cane farms
> - 40 ha for horticulture farms
> - 300 ha for farms suitable only for rice.
>
> This policy was originally developed in conjunction with the Department of Primary Industries and further work confirmed the farm sizes in 1987. The Burdekin River Project Advisory Committee has strongly supported the adopted farm sizes.

Some participants argued that the BRIA is being developed in ways which preclude private development and subdivision on a larger scale. However, the Queensland Government said that since 1989 it has been prepared to consider the possibility of existing landholders developing irrigation land as an alternative to the QWRC. For a landholder to be permitted to develop a large parcel of land without resumption and resubdivision, the landholder must pay a capital contribution towards the cost of the State's works in recognition of the enhanced land value. The Government said that each case would be individually negotiated, but subject to conditions requiring among other things that:

- the parcel of land to be developed must meld acceptably with the surrounding subdivisions in terms of farm size, shape, topography, etc; and
- all works within the parcel would be the responsibility of the developer and all such works must be constructed to a minimum standard similar to those employed by the Commission in the design of farms. This would ensure any land developed, subdivided and sold by the developer would be of similar standards of infrastructure to blocks normally disposed of by the Commission.

A number of participants were critical of the design and construction of roads and the irrigation and drainage works undertaken by the QWRC. The Burdekin Dam Project Landowners Committee, for example, argued that over-design and problems in location of the irrigation and drainage systems:

> ... add up to a cost structure that is common in Government schemes and not seen in any large commercial irrigation systems in NSW and other states.

Invicta Canegrowers (transcript p. 1972)and other participants expressed concern that high capital costs of the Scheme contribute to high user charges for water.

The Lower Burdekin Rice Producers Co-operative Association claimed that water charges and the expectation of increases in those charges are holding back development of the BRIA. About 56 per cent (2100 hectares) of the rice produced in Queensland is from the BRIA, and a further 10 per cent (350 hectares) from the earlier Burdekin irrigation scheme. The Association pointed out that some 16 500 hectares of land within the BRIA are suitable for grain production, predominantly rice.

The Queensland Government's response

The above comments from participants were included in the Commission's draft report, along with the Commission's view that the resentment expressed by some participants seems to have been strengthened by a breakdown in communication with officers of the QWRC.

The Queensland Government's response included the following:

> The DAVCO claim of water self sufficiency for all his landholdings without the project cannot be supported by hydrology or demonstrated achievement. It is a fact that until the project was implemented it was not possible to grant extra allocations in the Burdekin. That is not to deny, however, the efforts made on a water distribution scheme by DAVCO albeit without a regulated supply to underpin its investment.
>
> However, that effort has been more than recognised by the Queensland Government in negotiating terms and conditions for land and water availability with DAVCO.
>
> Landholders claiming auction purchasers have a better deal than retention farmers have failed to acknowledge three factors:
>
> (i) the cost of the first retention farm, by Government policy to date, has been at its original dry land value, not irrigated value, thereby providing a substantial windfall capital gain to the land holder;
>
> (ii) generally, additional retention farms are paid for from the proceeds of the resumption claim and are netted from that claim -- it would be an additional windfall gain to those landholders if the Government paid them compensation in cash and then supported their retention farms with an interest subsidy. The Industry Commission should note in this regard that the Land Court has generally supported the resumption values offered by this Government where they have been contacted by landholders;

(iii) retention farms are not subject to competition at auction when the final cost may be significantly above the upset price.

The claim that "the user pays approach was said to be inappropriate in a public irrigation scheme in which users had no input into the type of system developed" is a denial of the role of the Government agency as a developer of the scheme. In reality, large scale irrigation development of those lands would never have been possible or advanced without Government backing to create an Irrigation Area. Having decided to so invest, the Government had to determine how it would apportion the benefits which would accrue to individuals from the project. It determined that those benefits could be best distributed by resumption and settlement along the "viable family farm" concept.

Thus, as the developer, the Government had to place a product onto the market which it believed was the most appropriate. In determining that, it looked very carefully at life cycle costs of the works, balancing capital against recurrent costs for optimum outcome. It also looked very carefully at the balance between public and private costs.

Having done so, it placed a product on the open market with more associated information about the product than had ever been presented before. Along this path, respected industry advice was formally accepted through a Project Advisory Committee to ensure that the product would be suitable -- in addition a constituted Farm Inspection Committee reviews all aspects of farm layout and water/drainage servicing for each block.

Purchasers have then bid at auction for these blocks. Surely the Government can expect that investors who are prepared to commit themselves to such purchases have taken the effort to review the product prior to purchase.

With the above in mind, the Industry Commission should recognise the role of the Government agency as a provider of a product in the market place, and note that the provider has taken on board many customer suggestions. However, it must still maintain the standard of its product so it can be confident of performance over time.

In this context, the claims of "a breakdown in communication" between some participants and WRC would more correctly be reported as a situation where the market provider refuses to further modify its product for the short term good of the individual at the long term cost of the project and community.

The question of farm size in a development irrigation area is always contentious, but the comments in the draft report about economies of scale miss the point. The increasing economies of scale that are claimed for farms of up to 700 ha in size would not be achieved by farming one large 700 ha paddock. Practical farming considerations indicate that even in the most favourable topographical situations, individual blocks greater than 100 ha would be most unlikely.

The benefits of managing larger areas come largely from efficient use of machinery and manpower. In a large farm, this would be achieved by working a series of smaller farms of 100 ha or less. Any grower can achieve this in the BRIA by purchasing multiple blocks at auction. Of course, purchasing multiple 100 ha blocks would cost more than one large block if normal valuation principles are followed. However, given that the Government set out to spread the benefits to individuals in this scheme, each purchaser will need to determine whether the economies of scale warrant such expansion.

> The demand for one purchaser to secure adjacent blocks at auction has not been overwhelming. At the same time, to test the market demand, blocks up to 250 ha have been made available. That demand has not been demonstrated to date in auction biddings.
>
> However, the Queensland Government has and will continue to regularly review the farm size offered.

The Commission is not in a position to adjudicate between landholders and the QWRC, but has focused upon questions of cost recovery.

Cost recovery in the BRIA

Public investments in irrigation should generally be made only if there is a reasonable expectation that the returns will enable the full recovery of costs, including the capital investment. However, once in place, it is sensible to continue to use irrigation infrastructure so long as returns at least cover operating and maintenance costs. That said, there can be little economic rationale for further investment in the BRIA unless there is reasonable expectation of a return on the capital yet to be invested.

An investment project such as the BRIA involves a stream of outlays and a stream of benefits over an extended period. Normally, capital costs will be incurred in the first few years after which there will be an annual flow of revenue and operating costs. Cost benefit analysis measures benefits relative to costs by aggregating all the costs and benefits over time in monetary terms. Thus in the case of the BRIA, a complete time profile of costs and benefits is the basic information required for a cost benefit analysis. This would typically show construction costs bunched in the early years, operating and maintenance costs continuing and perhaps increasing as the system ages and benefits rising as farms are established.

For the BRIA, however, a large component (two-thirds) of the project investment is in place. The Commonwealth and Queensland Governments have each contributed around $130 million in establishing the BRIA including the Burdekin Falls Dam. Capital outlays totalling over $220 million are still to be made by the Queensland Government to complete the scheme. The eventual cost of the project is estimated to be $480 million.

1990 financial analysis

The starting point for the 1990 BRIA project analysis undertaken by Noonan & McNee (1990) was investment analyses of pattern or model farms, based on budgets for individual farms. Different farming systems with different crop rotations were assumed. The study also examined the preferred farm size for different crops, ranging from 100 hectares for sugar farms to 300 hectares for rice farms.

The analysis took into account the future costs of completing the project and compared them with the gross benefits from the whole project (not with the incremental stream of net benefits from the additional investment in the project). In other words, on the cost side, the Commonwealth contribution to the scheme totalling $130 million was not part of the assessment.

If the Commonwealth contribution is taken into account, the estimated net present values become negative in all scenarios. This suggests (with hindsight) that the decision to invest in the scheme was ill judged (at least under existing arrangements in the sugar industry -- see below). However, the issue now is whether it is sensible for the Queensland Government to invest more money in developing irrigation land in the scheme.

In assessing the various scenarios for BRIA development, the 1990 review made use of a financial model of the State's direct income and expenditure for the project. Having excluded the Commonwealth Government's contribution to the dam and ancillary works, the review concluded that 'in all scenarios the Scheme can be expected to recoup the capital expenditure for the State after some 35 years of indebtedness. The longer term position is a healthy return on the State's investment' (p. 32).

The parameters used in the 1990 analysis are considered below.

Costs

The presumption is that costs will be recouped through the sale of developed land and through water and interest charges over time.

The Queensland Government estimated that capital expenditure of over $220 million will be required to complete the project. As noted above, the current development program allows for $15-20 million of annual expenditure which could produce 30 to 40 farms in most years. It was assumed that capital works completed in one year would allow farm sales in the next financial year.

Land sales

Most developed land in the BRIA is sold by auction. Reserve prices are set to reflect the market value of comparable farms. However, existing landholders are entitled to a retention farm without needing to participate in the auction process. The 100 hectare retention land is a type of compensation given to existing landholders.

The prices paid for new farms have varied with their size, location, soil types and the extent of on-farm improvements. Farms with an area of 100 hectares or more have returned an average of $2200 per hectare. According to the Queensland Government, current development costs borne by the QWRC are in the order of $6000 to $6600 per hectare. This is an amalgamated cost comprising connections to existing channels plus major new channel developments.

The Queensland Government said that the QWRC's financial model indicates that the $4000 per hectare shortfall will be bridged over a 35 year period through a margin over and above operating costs in its charge for water.

Operation and maintenance costs and water charges

Water charges have increased steadily in the BRIA over recent years from $17.24 per ML in 1983 to the current level of $29 per ML, in 1989 dollars. The present policy is that for water supplied by channels and pipelines to farm boundaries in irrigation areas, prices should raise revenue sufficient to cover operating, maintenance and administration costs, plus a capital contribution. The intention is that charges be indexed to the consumer price index, thus remaining at $29 per ML in real terms. However, the pricing policy for water supplied by the QWRC is under review.

Other sources of revenue from the scheme include charges of $10.45 per ML for water supplied from the Burdekin river for upstream farms; $16 per ML for waste water diverted from drains; one off capital contributions of $100 per ML for all allocations of water in excess of 800 ML for riparian irrigators, and $250 per ML over 800 ML for water supplied from the channel system. Sugar mills also contribute.

The QWRC's estimates suggest that operation and maintenance costs per ML of water supplied will decrease with the progress of development. The conclusion that the State will cover its costs after 35 years assumes that water charges can be maintained at a level which will provide a substantial margin over and above operating costs as a contribution to capital costs.

The 35 years payback period derived by the QWRC from its financial model depended heavily on its projected revenue from three sources:

- water supplied from the channel system;
- water sales to Townsville/Thuringowah; and
- water sales to riparian and groundwater irrigators.

However, the revenues from Townsville/Thuringowah users and from riparian and groundwater irrigators are not dependent on further capital investment in the scheme. In other words, these sales can be made without any further capital expenditure. It is therefore inappropriate to include them in the analysis.

The Commission amended the QWRC's financial model to net out these projected revenues. Further adjustments were made to the QWRC's accumulated deficit on the Burdekin scheme, reducing it by an amount equal to the outstanding interest costs on identifiable capital used to service Townsville/Thuringowah.

The effect of these adjustments, with land prices maintained at current levels in real terms, is to increase the payback period for Scenario 2 from 35 years to around 73 years.

Deregulation of sugar would benefit the BRIA

The first new farms were auctioned in March 1988. To date, 53 farms have been sold at auction or by negotiation, the majority to existing Burdekin growers. In October 1991, some farms with 50 hectares of sugar cane assignment were offered for sale. However, only three of the 13 farms offered were sold. A further farm was sold in June 1992.

The low demand for land and the low prices paid at the Burdekin auctions could well reflect the current low prices for sugar and the poor season in 1991. It would also reflect the regulatory controls imposed on the Queensland sugar industry.

The regulations include restrictions on the land available for cane growing and legislative provisions which allow the Queensland Sugar Corporation to compulsorily acquire and market all raw sugar produced in Queensland.

In its 1992 report on the Australian Sugar Industry, the Industry Commission found that the effect of the regulations is to:

- tax new production and exports by the application of a fixed 12 per cent payment differential in favour of established growers;
- help perpetuate a scale of cane growing which is below that required to realise the available economies of size;
- impede producers from responding to changes in market conditions;
- reduce competitive disciplines on the Queensland Sugar Corporation to see the highest market returns and to minimise costs; and
- discourage growers from pursuing agronomic practices.

The Commission recommended the progressive dismantling of all Queensland production and marketing controls on raw sugar. The principal social consequences of implementing the recommendations were considered to be an expansion of economic activity in cane growing areas, particularly in the Burdekin, Herbert River, Proserpine and Tully regions.

If sugar industry regulations were removed, the increased profitability of sugar cane growing in the BRIA would presumably be reflected in greater interest in land offered, and consequently higher prices. The Commission has therefore estimated the effects that sugar industry deregulation would have on the price of land in the BRIA.

Prior to the recent auction, some farms had been purchased by existing cane growers who then transferred cane assignment to the new blocks. In some cases, cane assignment has been purchased from other growers.

While cane assignment has been offered as part of the auction, it has been limited to 50 hectares. Thus, as noted above, farmers intending to grow cane have had to acquire assignment from other sources. In addition, any cane grown on this land would only attract the Pool 2 cane price which is 12 per cent lower than the Pool 1 price. Some participants commented that new growers have little hope of establishing a viable cane farm under these conditions and that blocks could only be farmed in conjunction with an existing property. The Queensland Sugar Corporation, in its evidence to the sugar inquiry, said that two of the three farms sold in the October 1991 auction were bought by neighbouring canegrowers seeking to extend their holdings.

If new growers were able to obtain the average price rather than the lower Pool 2 price, it would be expected that this additional margin would be reflected in the price bid for land. Based on a sugar price of US10 cents per pound and discount rates of 10 and 15 per cent, the Commission estimates that this margin would be worth an additional $2300 or $1500 per hectare respectively.

The impact on land prices of removing the need for cane assignment is more difficult to estimate. There is some evidence that the value of assignment for No 2 Pool in the Burdekin region in the second half of 1991 was of the order of $1000 per hectare. However, the Commission understands that the value has since fallen due to the expansion in available assignment.

Whatever the value of assignment, the thrust of the Commission's analysis is that deregulation of the sugar industry could increase land prices in the Burdekin from the current level of about $2200 per hectare to at least $4000 per hectare.

At a land value of $4000 per hectare, the payback period for the scheme would be reduced from 73 years to 48 years.

Conclusion

As Australia's most recent large-scale public irrigation project, the BRIA scheme might have been expected to avoid the shortcomings of earlier schemes. Yet the scheme is only half way through the development phase and the Commonwealth Government's contribution of some $130 million towards the cost of the Burdekin dam has been written off.

In a submission to the inquiry, the Queensland government rejected the notion that the Commonwealth contribution is written off since 'it will be recovered by the Commonwealth through many benefits of the development'.

In the Commission's view, this sort of reasoning has been used for too long to discount the cost to the community of poorly performing investments. Underlying the BRIA project has been the 1980 assessment that it was a highly attractive investment -- with a direct financial return to all funds invested in the scheme. That assessment was presumably influential in the decision to invest in the project rather than in competing avenues of public expenditure. In the 1990 review the Commonwealth Government's outlay was not part of the assessment (on the cost side), although it clearly contributed to the finding at that stage, that there would be a healthy return to the State's investment.

To now argue that the Commonwealth's investment has not been written off because there will be broad community benefits from the project, is to ignore the likelihood that funds invested in more productive ways would have generated even greater benefits for the wider community.

Two-thirds of the proposed investment in the BRIA is in place and can be regarded as a 'sunk-cost'. Consequently, the issue at this stage is whether or not there can be a reasonable expectation of a return on the investment (over $220 million) yet to be made by the Queensland Government to complete the scheme.

At present, the QWRC recoups only about one-third of its land development costs from land sales. The intention is that the shortfall will be bridged through a capital margin included in the price of irrigation water.

The financial model of the QWRC (amended as above) suggests that the payback period for the Queensland Government's investment in the BRIA is around 73 years. Whether this is realised depends crucially on the ability of the QWRC to maintain water charges in real terms through consumer price indexing. The QWRC will have the politically difficult task of maintaining a capital charge for a long time after the scheme has been completed.

Of course, the prices which growers are willing to pay for land are not independent of water pricing policies. Future land prices are likely to fall if current land prices are based on the expectation that water prices will fall in line with reduced operating costs, rather than maintained in real terms. This could increase the payback period.

The analysis in this section suggests that the viability of future government investment in the BRIA would be greatly enhanced by deregulation of the Queensland sugar industry. If the assignment system and two-pool pricing system were removed, the Commission estimates that land prices would increase from the current level of $2200 per hectare to at least $4000 per hectare. This would imply a payback period, with no return on Commonwealth Government funding, of about 48 years (as opposed to 73 years under the current arrangements) assuming a real rate of return of 7 per cent.

The model used by the Queensland Government to develop the BRIA involves public installation and ownership of infrastructure, family-size holdings, and generally restrictive land development policies. The opportunity to establish farms exploiting economies of size has been limited -- not the least by the production and marketing controls on cane. Less restrictive policies would increase the incentive for landholders to undertake private irrigation development, and thus could increase demand for water from the Burdekin. This could further increase the possibility that Queensland taxpayers will eventually recoup their investment in the scheme.

In any event, the Commission suggests that in future the financing of land purchases in the Burdekin be left to the private sector. This is to remove the political risk that with financing undertaken by the Queensland Government, payments due on land might sometimes be waived. It would also end the small interest rate subsidy to land purchasers provided by Queensland taxpayers.

Finally, any consideration of cost recovery must have regard to the environment, since there are many examples of unsustainable resource use in Australia's irrigation schemes. With few exceptions, the public schemes have reached a point where substantial outlays on drainage and other works have been needed to avoid further environmental damage.

The 1980 report on the establishment of the BRIA concluded that the proposed scheme would have no major adverse effect on the environment (QWRC 1980, p.191). It is now clear that there is a need to manage groundwater to prevent waterlogging and salinity, and to avoid damage to marine ecosystems, such as flushing prawns from the river system.

In a submission discussing coastal degradation from land runoff in the Great Barrier Reef region, the Great Barrier Reef Marine Park Authority (GBRMPA) said:

> Progress towards [integrated catchment management] in Queensland is taking place, albeit slowly, but much of the research and investigatory work into alternative land management practices is lacking and a system for organising such research not yet in place. GBRMPA has an active program examining the effects of land runoff on coastal ecosystems but the lack of a complementary program to examine causes of such runoff and irrigation methods negates much of the value of the program.

As in other systems, it is important that the costs of environmental damage be quantified and included in prices. The impact that this would have in extending the period of cost recovery for the BRIA makes deregulation of the sugar industry all the more important for the best interests of Queensland taxpayers.

R5 KIMBERLEY PIPELINE PROPOSAL

For a number of years, there has been concern about how to meet the future demand for water in the Perth region including the Goldfields and Agricultural Water Supply Systems. According to the WAWA, current total water demand may exceed the region's water resources soon after the turn of the century. One of the supply options being proposed to meet demand growth is to transfer water into the region from areas of the State with surplus water resources.

Several recent studies on the future water supply options for the Perth region have been undertaken. One proposal which has been a subject of these studies is the development of a pipeline to supply the Perth region with fresh water from the Kimberley. In May 1988 a report examining the issues surrounding the proposed pipeline was prepared. (Binnie and Partners 1988)

The Binnie Report considered three pipeline options for delivering water to Perth: the inland route, the Pilbara route and the coastal route. In addition, the report considered the possibility of transporting water to Perth from the Kimberley using large tanker ships. Consideration was also given to a scheme which would supply water to both Adelaide and Perth.

The report's main conclusion was that:

> If economic analysis of alternative water supply schemes were adopted as the main criteria for selecting a future source of water for Perth, then a scheme from the Kimberleys would not proceed.

The report said that the economic (unit) cost of water delivered to Perth was high compared to the cheapest alternative sources (Binnie and Partners 1988, p.6).

In November 1988, another study was undertaken by the Western Australian Water Resources Council (WAWRC) to investigate the long-term options for water supply to Perth and the south of the State, and to show how the area's growing water requirements can continue to be met in the future (WAWRC 1988).

The WAWRC looked at a number of options including the pipeline proposal (see Table R.4). A range of hypothetical scenarios was examined to identify any conditions under which Kimberley waters might be developed to jointly serve long-term growth in Perth and demands en-route.

The study confirmed that from a technical point of view, the project was feasible and concluded that a 1400 mm diameter inland pipeline appeared to be the most economical supply scenario.

Table R.4: **Ranked water supply options for Perth**

Source	*Yield*	*Cost* [a]
	(million m^3/year)	*($/$m^3$)*
Forest thinning	29	0.05
Excess drainage	40	0.30-0.55
South West sources	810	0.53
Moore subregion groundwater[b]	110	0.54
Brackish water	37	1.00
Reuse of waste water	43	0.70-1.70
Sea-water desalination	>500	1.80
Tanking (from the Kimberley)	>300	3.30
Pilbara pipeline	210	4.90-5.10
Kimberley pipeline	870	5.35

a Cost in January 1988 dollars, at 6 per cent discount rate
b not for domestic use
Source: WAWRC 1988.

The estimated cost of water supplied to Perth was between $3.50 and $5.40 per cubic metre ($m^3$) compared with sea water desalination at $1.80 and water supplied from the South West at $0.53 (see Table R.4). The South West option would involve piping water to Perth from rivers and groundwater reserves.

The report's main conclusion was that Perth was beyond the economically competitive range for use of Kimberley water and that there were insufficient benefits to outweigh the high costs of a Kimberley-Perth pipeline (WAWRC 1988, p.16).

In 1990, the Infrastructure Development Corporation (IDC) undertook another study of the viability of the pipeline proposal (IDC 1990). The study came up with an estimate of the cost of water to Perth of $3.40 per cubic metre. The Corporation also estimated the cost of the whole project to be in the vicinity of $8-9 billion.

As part of its brief, the IDC looked at the direct economic impact of the proposed investment on the State's economy and at the additional or multiplier flow-on effects. The multiplier effect included indirect effects on suppliers and induced effects in service industries.

The Corporation concluded that there appears to be no significant potential for economic activity or development resulting from the Kimberley-Perth water pipeline.

On the question of the benefits obtained en-route, the IDC concluded that:

> … a pipeline system designed primarily to deliver to an end terminal has variable capacity for intermediate off take depending on a number of factors relating to capacity and demand. Therefore, to supply a significant intermediate load, sustainable over the life of the project would necessarily entail a commensurate increase in capital and operating costs. At best this would have no benefit in terms of unit cost to Perth consumers. (IDC 1990, p.3)

In 1991, the Western Australian Government commissioned the Chase Manhattan Bank of Australia (CMBA) to undertake yet another study into the financial feasibility of the pipeline proposal (CMBA 1991). The Bank recommended that an independent feasibility study look into the economic, environmental, social, technical and engineering aspects of the proposal before considering methods of financing the project.

The CMBA concluded that if the proposal were to be found economically feasible, there are sources of finance available in Australia for national infrastructure projects of this type, for example, accumulated reserves of the superannuation funds.

The Commission understands that an Advisory Board has been set up by the Western Australian Minister for Water Resources to look into the feasibility of the proposal, taking into account the multiplier effects of the project. There is a view that water's role in inland development, creating jobs in the 'downstream processing' industries and in 'adding value' to mineral exports from the Pilbara, need to be considered. The Board is made up of representatives of major mining and other companies, and Aboriginal and environmental groups.

In its submission to this inquiry, the Chamber of Commerce and Industry of Western Australia commented that:

> ... it seems unbelievable that the Government has established a Kimberley Pipeline Taskforce with responsibility for overseeing a further Kimberley Pipeline Feasibility Study ... which will cost $3 million. It is hard to explain how the State Government can seriously contemplate piping water nearly 3000 kilometres costing at the least $3.45 per cubic metre when there is a viable alternative from the South West for $0.53 per cubic metre.

The Chamber recommended that the Kimberley Pipeline Taskforce be disbanded and the proposal abandoned once and for all, given the large body of evidence which rejects the feasibility of the project.

In the Commission's view, there is no justification for constructing or spending further resources in assessing the feasibility of the pipeline proposal.

The Kimberley rivers may well make an important contribution in the long term to the economic growth of Australia. However, the plethora of studies already undertaken demonstrate that Perth is beyond the economically competitive range for use of Kimberley rivers and that there are much more efficient water supply options available for the Perth area.

The economic feasibility studies undertaken (eg WAWRC 1988) indicate that the Perth region will be able to meet expected water demand in the medium term. Those studies show that in the longer term, the most economical supply option for Perth is to transfer water from the South West region. The South West region could meet Perth's water needs well into the middle of the next century.

Proponents of the pipeline proposal argue that there is mounting community disquiet about the environmental costs of damming the remaining South West rivers and the development of new borefields throughout the region. However, given the costs of piping water from the Kimberleys, environmental costs would have to be quite massive to see the pipeline proposal proceed in preference to the South West option. Even if environmental concerns were a major issue, the desalination option would be less than half the cost of the pipeline.

The argument that the pipeline would have multiplier (or spill-over) effects to the community should carry little weight. It ignores the fact that the capital invested in more productive and profitable activities would generate even greater multiplier effects for the community.

The community's investment in the Ord River dam is now sunk. This does not justify further big investments with no prospect of a return, simply to use some of that water. The likelihood that the Western Australia Government would be prepared to charge in excess of $5.00 a cubic metre for Kimberley water is remote. Hence, if the project proceeded, major government subsidies would be inevitable. Australians can no longer afford the loss of welfare that this would entail.

APPENDICES

APPENDIX A: INFORMATION SOURCES

The Commission received its terms of reference on 18 July 1991. An issues paper was released shortly after receipt of the reference to assist people to prepare their submissions. Some 140 submissions were received in response to the issues paper from a wide range of interested parties. The Commission held public hearings to discuss these submissions in: Melbourne on 1 and 2 October, Adelaide 8 October, Perth 10 and 11 October, Brisbane 16 October, Sydney 23 to 25 October, Moama 31 October and 1 November, Canberra 6 to 8 November and Townsville 18 and 19 November 1991.

The Commission released its draft report in March 1992. It received a further 86 submissions commenting on the draft and held a second round of hearings in Adelaide on 5 May, Perth 6 May, Melbourne 14 and 15 May, Sydney 19 and 20 May, Townsville 21 and 22 May, Shepparton 26 and 27 May and Canberra 18 June 1992.

Participants that made written submissions to the inquiry are listed in section A.1 below. Abbreviations used to identify participants in the report are shown in square brackets.

The Commission also consulted the interested parties listed in section A.2.

The Commission also engaged two consultants. London Economics was engaged to review international experiences with the private provision of WSD services -- with a view to identifying issues that would be of relevance to any future privatisation in the Australian water industry (London Economics 1992). Tasman Economic Research was engaged to investigate the distributional impacts on water users of a move to pay for use water pricing (Tasman Economic Research 1992). Copies of the consultants' reports are available, on request, from the Commission.

A.1 Inquiry participants

Aboriginal and Torres Strait Islander Commission *[ATSIC]* *
ACT Electricity and Water *[ACTEW]* (102, 140, 197)
ACT Planning Authority (106)
Appleby, Ms S (136)
Aquatec-Maxcon Pty Ltd (26)
Association of Victorian River Management Authorities (87, 180, 225)
Australian Bureau of Agriculture and Resource Economics *[ABARE*] (192)
Australian Conservation Foundation, *[ACF]* Queensland (25)
Australian Conservation Foundation, I*ACF*] Shoalhaven Branch (212)
Australian Conservation Foundation, I*ACF*] Victoria (36, 127, 159)
Australian Conservation Foundation, I*ACF*] Western Australia (54)
Australian Federation of Construction Contractors (92)
Australian Institute of Marine Science (117)
Australian Irrigation Council *[AIC]* (163)
Australian National Committee on Large Dams (165)

Australian Paper Manufacturers (38)
Australian Radiation Laboratory, Department of Community Services & Health (24)
Australian Water and Wastewater Association, Victorian Branch (58)
Australians for an Ecologically Sustainable Pop., New South Wales Branch (81, 178)
Ballarat Regional Board (95)
Ballarat Water Board (19)
Banana Shire Council (132)
Barcza, J & L. D (221)
Becke, Mr A J (109)
Benalla Water Board (22)
Bendigo Water Board (46)
Brisbane City Council *[BCC*] (59)
Broken Hill Water Board (79)
Bundaberg City Council (124)
Bundaberg Sugar Company Limited (43)
Burdekin Dam Project Landowners Committee (110)
Bureau of Meteorology (12)
Cairns District Cane Growers' Executive (108)
Campaspe Region Water Authority (168)
Canegrowers (70)
Canegrowers, Herbert River District (112)
Centre for Water Policy Research, University of New England *[CWPR*] (63, 189)
Chamber of Commerce and Industry, Western Australia (208)
Christensen Family (113)
City of Horsham (47)
City of Launceston (11)
City of Marion (18)
City of Shepparton (61)
City of Werribee (191)
Colac District Water Board (39, 151)
Commonwealth Department of Primary Industries & Energy *[DPIE*] (101, 210, 220, 226)
Condamine Balonne Water Committee (182)
Consulting Environmental Engineers (3)
Council of the City of Thuringowa (131)
Council of the Municipality of Mosman (10)
CSIRO (57)
CSR Sugar Mills (30)
Davco Farming (107, 129, 183)
Department of Agriculture, Western Australia (123)
Department of Mineral Resources, New South Wales (76)
Department of Water Resources, *[DWR*] New South Wales (80)
Dwyer Leslie Pty Limited (104)
Environment Standing Committee of the Aust. Institute of Environmental Health (40)
Environmental Protection Authority, [*EPA]* Western Australia (152)
Federal Bureau of Consumer Affairs (198)
First Mildura Irrigation Trust (164)
Ford, Mr N *
French, Mr R, University of New England (15)
Friends of the Earth (173)
Geelong and District Water Board [*GDWB*] (34, 175)
Glen Echo (84)

Great Barrier Reef Marine Park Authority (44, 206)
Greenfield, Dr P, Dept of Chemical Engineering, University of Queensland (20)
Griffith City Council (184)
Grigg, Dr T J, Graduate School of Management, University of Queensland (64)
Hacienda International Motor Inn, Sale (139)
Hamilton Water Board (146)
Hawkesbury River Environment Protection Society Inc. (114)
Hay Shire Council (1)
Health Department, Western Australia (55)
Heidecker, Dr E, University of Queensland, Department of Geology & Mineralogy (7)
Howell, Mr D *
Hunter Water Corporation [*HWC*] (73)
Institute of Science & Technology Policy, Murdoch University (153, 204)
Invicta Canegowers *
Johnstone Shire Council (31)
Kelly Farming Company (111)
Kimberly-Clark Australia Pty Ltd (42, 116, 172)
Latrobe Regional Commission (8)
Latrobe Region Water Authority (66)
Local Government Association of New South Wales and
Shires Association of New South Wales (94, 218)
Local Government Engineers' Association of Queensland Inc. (90, 176)
Londonderry R.A.G.E. (85, 185)
Lower Burdekin Rice Producers Co-operative Association Limited (119)
Macquarie Valley Irrigators Association (71)
Master Builders' Association of Western Australia (126)
Master Plumbers' & Mechanical Services Association of Victoria *[MPMSAV*] (48)
Max Motel, Nambucca Heads (138)
McInnes, Ms S (207)
Melbourne Water Corporation [*MWC]* (29, 157, 179, 211)
Memtec Ltd (6)
MIA Council of Horticultural Association (177)
Mid Goulburn River Management Board (91, 181)
Migmaplas Pty Ltd (82, 141)
Ministry for the Environment, New South Wales (77)
Municipality of Circular Head (188)
Murray-Darling Basin Commission [*MDBC*] (213)
Murray River Management Board (32)
Murray River Management Board and
Murray Irrigation Area and Districts Management Board (167)
Murray Valley League (224)
Murrumbidgee Irrigation Management Boards (33, 169, 223)
Murrumbidgee Valley Water Users' Association (9)
Musgrave, Prof W, Centre for Water Policy Research, University of New England (199)
Narrandera Shire Council (174)
National Farmers' Federation [*NFF]* (88, 97)
National Health & Medical Research Council (Water Quality Panel) [*NHMRC*] (56)
National Irrigation Research Fund [*NIRF*] (16)
Nature Conservation Council of New South Wales (162)
Neutron Probe Services Pty Ltd (142)
New South Wales Department of Agriculture (78)
New South Wales Environment Protection Authority (194)

Waterways Commission (53)
Watson, Mr R; Murphy, Ms M; and Moore, Dr S (89)
West Moorabool Water Board (50)
Western Australia Treasury (203)
Whyte, Mr J V (45)
Wright, Dr H, Kimberly-Clark Australia Pty Ltd (133)

* Provided verbal evidence at a hearing only
( ) Submission number(s)

A.2 Informal discussions

The Commission held informal discussions with the following organisations and individuals:

New South Wales

Australian Federation of Construction Contractors
Australian Water and Wastewater Association
Department of Public Works
Department of Water Resources
Hunter District Water Board
Local Government and Shires Association
Ministry for the Environment
New South Wales Farmers' Federation
New South Wales Irrigators' Council
State Pollution Control Commission
Sydney Water Board

Victoria

Association of Professional Engineers, Australia
Bendigo Water Board
Department of Conservation and Environment
Environmental Protection Authority
Geelong and District Water Board
Goulburn Regional Advisory Council
Melbourne Water Corporation
Melbourne Water Resources Review Panel
Murray Valley (Cobram) Irrigation Advisory Committee
Department of Water Resources
Patterson, Dr J and Anderson, Mr D
Rodney Shire Council
Rural Water Corporation
Rural Water Corporation, Shepparton
Salinity Program Advisory Council
Shepparton Water Board
Victorian Conservation Council
Victorian Farmers' Federation

Queensland

South East Queensland Water Board
Brisbane City Council
Davco Farming
Queensland Water Resources Commission

Western Australia

CSIRO, Division of Water Resources
Department of Agriculture
Environment Protection Agency
Gardiner, Mr (consultant/farmer)
Ord Irrigators Council
Ord Development Co-op
Ord Development Council
State Treasury
Water Authority of Western Australia
Waterways Commission

South Australia

Department of Engineering and Water Supply
Department of Environment and Planning (Environment Protection Council)

Tasmania

City of Clarence Council
City of Hobart Council
Department of Environment and Planning
Department of Health
Department of Primary Industry
Hydro-Electric Commission
Launceston City Council
Municipality of Sorell
Rivers and Water Supply Commission
Tasmanian Government

Northern Territory

Conservation Commission
Department of Health and Community Services
Department of Industry and Development
Department of Land and Housing
Department of Mines and Energy (Mining Environment Directorate)
Department of Primary Industries and Fisheries
Power and Water Authority
State Treasury
Work Health Authority

Australian Capital Territory

ACTEW
Department of Primary Industries and Energy
Lower Molonglo Water Quality Control Centre
Murray-Darling Basin Commission
Resource Assessment Commission

Other

London Economics
Maruia Society, New Zealand
Yorkshire Water Board

APPENDIX B: INSTITUTIONAL ARRANGEMENTS

This appendix provides an overview of the institutional arrangements for the provision of urban water, sewerage and drainage (WSD) services, water resources management, related environmental activities, research and development (R&D) and extension services. It also reviews various relevant government initiatives and programs in these areas. Institutional arrangements, programs and initiatives for irrigation and other rural services are, with the exception of R&D and extension matters, detailed in Appendix E.

B.1 Commonwealth Government involvement

Under the Australian Constitution, the Commonwealth has direct powers in two water-related areas: the Australian Fisheries Zone and meteorological activities. The right to manage and control the use of surface and groundwater resources remains primarily with the States.

However, because the development and management of water resources in the States has an important bearing on the Commonwealth's broad interests in economic management, resource allocation, distribution of income etc it participates in a range of water resource activities.

In 1984, the Commonwealth announced three major water policy objectives:

- the availability of water, adequate in quantity and quality, for all beneficial uses;
- the adoption of measures which improve the efficiency and effectiveness of water supply and use; and
- the development of a comprehensive approach to interrelated water and land management issues.

In working to achieve these objectives, the Government said, in 1989, that it will:

> - support and encourage State initiatives through the Australian Water Resources Council and the Murray-Darling Basin Ministerial Council
> - pursue the development of pricing policies which will encourage efficient water use and help prevent environmental degradation
> - take greater account of the inter-relationship between land use management - whether it be for agricultural, domestic or industrial purposes - and its effect on our water resources. (Commonwealth of Australia 1989, p 45)

It is mainly through co-operation with the States that the Commonwealth is able to pursue these objectives. This is facilitated directly through bodies such as the Australian Water Resources Council (AWRC), the Murray-Darling Basin Ministerial Council (MDBMC) and the Land and

Water Resources Research and Development Corporation (LWRRDC), and indirectly through the provision of financial assistance to the States and Territories for water resources development and management initiatives. Financial assistance is provided primarily through the Federal Water Resources Assistance Program (FWRAP). The Commonwealth also provides financial assistance to supply water to remote communities (including aboriginal communities) either through the Country Towns Water Supply Improvement Program (COWSIP) or through the Aboriginal and Torres Strait Islander Commission's (ATSIC) community infrastructure programs.

The Commonwealth Government's involvement in water resources matters also extends to the provision and funding of information and research; natural disaster relief; and, to coordination of environmental issues that transcend State boundaries.

The power to legislate and regulate on environmental matters rests mainly with the State and Territory Governments.[1] The Commonwealth's direct environmental powers derive mainly from the *World Heritage Properties Conservation Act 1983* and the *Environment Protection (Impact of Proposals) Act 1974.* Under these Acts, the Commonwealth can restrict development in world heritage areas and can require that an Environmental Impact Statement be prepared during the formulation of certain development proposals. However, the Commonwealth has also used various constitutional powers to influence water resources management, including:

- the power to regulate interstate trade and commerce, which the Commonwealth used to justify its membership of the Murray-Darling Basin Commission;

- the national defence power, which was used to support the establishment of the Snowy Mountains Hydro-Electric Scheme in 1949;

- the external affairs power, which was used to stop the Gordon Dam in Tasmania because it was in an area which had received World Heritage listing;

- provisions which allow the Commonwealth to grant financial assistance to a State on such terms and conditions as it thinks fit, have been used to provide considerable Commonwealth funding for water infrastructure; and

- other miscellaneous powers, such as the meteorological observations power, taxation powers, and the territories power. (Mulligan and Pigram, 1989)

Peak Commonwealth and joint Commonwealth/State bodies concerned with the environmental impact of WSD services are the Departments of Arts, Sport, Environment and Territories (DASET) and Primary Industries and Energy (DPIE), the AWRC and the LWRRDC. Other bodies involved in this area include the MDBMC, Snowy Mountains Council (SMC), the Commonwealth Scientific and Industrial Research Organisation (CSIRO) and the National Health and Medical Research Council (NHMRC).

[1] Local Governments are also empowered by State Local Government Acts to impose additional controls, although State Governments have the power to overrule Local Government decisions.

The Commonwealth Environment Protection Agency has been formally approved and is currently operating within DASET.

Commonwealth and joint Commonwealth/State water bodies

The major bodies through which the Commonwealth pursues its water policy objectives and those responsible for the delivery of its water-related programs are outlined below.

Department of Primary Industries and Energy

DPIE is primarily responsible for water policy co-ordination matters, information, research policy and coordination, and funding of assistance to certain types of water resource projects. The Department also provides secretariat services to the AWRC and the LWRRDC.

According to DPIE, the Commonwealth's involvement in water is two-dimensional. First, it seeks to promote the economic and sustainable management of water. Second, it is concerned with water use and allocations as an important influence on the economic performance and on-going viability of Australia's rural industries. The Department stated that the Commonwealth's water policy objectives are a component of broader integrated natural resource management policies and are designed to achieve:

- the long term productivity of Australia's water resources;
- community, industry and government partnerships in the management of water resources;
- institutional arrangements which encourage sustainable resource use;
- the resolution of conflict over access to resources by competing users; and
- global resource management strategies which meet Australia's responsibilities and needs.

Australian Water Resources Council

The AWRC is the water industry's peak forum and comprises Commonwealth, State and Territories Ministers who have primary responsibility for water resource management. It is chaired by the Commonwealth Minister for Primary Industries and Energy. The Council's terms of reference are to:

- provide a forum for consultation, co-operation and liaison for the development of water industry policy at international, Federal, State and Local levels;
- initiate and direct collaborative Commonwealth/State programs of investigations and data collection/dissemination;

- promote relevant water research; and

- enhance the long term management of the water industry and water resources for the benefit of the community.[2]

The Council is supported by a Standing Committee, comprising permanent heads of relevant State authorities and DPIE. The CSIRO and the Bureau of Meteorology are also represented and Ministers can nominate additional representatives in accordance with the requirements of the agenda for each meeting. The Standing Committee is serviced by a number of advisory committees and the Council can also establish ad hoc task groups for advice on particular topics.

In recent years the AWRC has extended its work to industry-wide issues such as pricing and financial policies (including inter-agency performance comparisons), resource management, technology, and organisational management and strategy. Since 1989, the Council has, as a priority, focussed its attention on a national approach to the management of water quality. This has involved the development of a framework for water quality management in co-operation with, amongst others, the Australian and New Zealand Environment and Conservation Council (ANZECC), and the drafting of national guidelines for drinking water quality with the NHMRC. Guidelines are also proposed for sewerage systems, water quality management in the rural environment, groundwater protection and urban stormwater systems.

The AWRC's activities are jointly funded by the Commonwealth and State Governments, and the major water authorities.

Land and Water Resources Research and Development Corporation

The role of the LWRRDC is to stimulate, co-ordinate and fund research and development activities in relation to the nation's land, water and related vegetation resources. Further information on the LWRRDC's activities is given in section B.10 of this Appendix.

Murray-Darling Basin Ministerial Council

Under the Murray Darling Basin Initiative and relevant agreements, the primary role of the MDBMC, which was established in 1985, is to promote and co-ordinate planning and management strategies for the sustainable use of the basin's land, water and environmental resources. It consists of Ministers with land, water and environmental responsibilities from the Commonwealth, New South Wales, Victorian, South Australian and Queensland[3] Governments.

[2] There is a Commonwealth-initiated proposal to merge the AWRC with the Australian Soil Conservation Council to form a national land and water resources council.

[3] The Queensland Government commenced its participation on 1 July 1992. The other four governments are foundation members of the MDBMC.

In 1989, the Council released two key strategies:

- a Natural Resources Management Strategy (NRMS), which provides a framework to achieve sustainable resources use through planning and management programs and joint community and government action; and

- as part of the NRMS, a Salinity and Drainage Strategy (SDS) to:

  - improve water quality in the River Murray for all beneficial uses;

  - control existing land degradation, prevent further land degradation and, where possible, rehabilitate land resources to ensure sustainable use; and

  - conserve the natural environment of the Basin and preserve sensitive ecosystems with respect to salinity.

Murray-Darling Basin Commission

The MDBC (formerly the River Murray Commission, which had operated since 1917), was established in 1988. It comprises eleven Commissioners, two each from New South Wales, Victoria, South Australia, Queensland and the Commonwealth, and an independent president.

The Commission is responsible for:

- managing the flow and quality of water in the Murray River and, administering the construction, operation, maintenance and control of works, involving some $2 billion of assets;

- advising the MDBMC on major policy questions relating to water, land and environmental issues of common interest to the Governments involved;

- implementation of the Salinity and Drainage Strategy; and

- funding research into Basin management problems.

It is effectively Australia's largest integrated catchment management authority.

After deducting Queensland's $150 000 contribution, administration costs incurred by the MDBC, which totalled $4.2 million in 1991-92, are shared equally by the Commonwealth, New South Wales, Victorian, and South Australian Governments -- as are construction, research and investigation costs. Any Queensland Government contribution to these latter activities is made on a case by case basis. Operations and maintenance costs are shared equally by New South Wales, Victoria and South Australia. The Queensland Government is currently not a party to any salinity agreements.

An Irrigation Management Strategy is currently being developed by the MDBC for approval by the MDBMC at its May 1993 Council meeting.

The annual budget for on-going programs in the Murray-Darling Basin is currently $71 million of which some $41 million is dispensed through the Commission.

Bureau of Meteorology

As the national hydrometeorological authority, the Bureau of Meteorology plays an important role in the assessment, planning and development of Australia's water resources. It contributes, for example, through its operation of the national hydrometeorological observation networks and data bank, and its provision of flood forecasting and warning, water resource assessment and hydrometeorological consultative services. In some instances, the cost of these activities is shared with State/Local Government agencies.

Snowy Mountains Council

The SMC, which was established in 1959, has responsibility for the control and direction of the Snowy Mountains Scheme. The water in the scheme has a dual purpose, being used for the generation of electricity as well as providing a regulated water supply for downstream irrigation and other uses. The Council's members include representatives from New South Wales, Victoria, the Commonwealth and the Snowy Mountains Hydro-Electricity Authority.

The Commonwealth recently initiated a joint review of the Snowy Mountains Scheme to examine the financial and institutional arrangements under which the Scheme is operated. The SMC said that the interim report recommended, among other things, corporatisation of the Scheme. Apparently a final report on this matter is unlikely to be released publicly. And while corporatisation remains a priority issue the Commission understands that it is unlikely to be entertained until other more fundamental institutional arrangements are resolved. In this regard, the Commonwealth Government has offered to buy out the contracts for supplying water and electricity currently held by the New South Wales and Victorian Governments.

Commonwealth Scientific and Industrial Research Organisation

The CSIRO conducts a wide range of water-related research. The Division of Water Resources has a total staff of more than 200 with laboratories in Perth, Adelaide, Griffith and Canberra. The Division's task is to develop new and improved practices for the definition, use and management of Australia's water resources. Other divisions involved in water-related research include the Division of Chemicals and Polymers, the Centre for Environmental Mechanics, the Division of Fuel Technology and the Division of Soils. CSIRO is also a partner with the LWRRDC, the MDBC and the Albury-Wodonga Development Corporation in the Murray-Darling Freshwater Research Centre at Albury, New South Wales.

CSIRO spends about $20 million per annum on water-related research.

National Health and Medical Research Council

The NHMRC has, since 1980, been jointly responsible with the AWRC for setting national drinking water guidelines. These guidelines are advisory only. Individual local health and water authorities are responsible for setting quality standards in individual jurisdictions. Authorities may choose to meet other standards set, for instance, by the World Health Organisation or ANZECC.

Commonwealth and joint Commonwealth/State water resources programs

Federal Water Resources Assistance Program

Since 1984-85, Commonwealth assistance to the States and Territories for water-related purposes has mainly been provided through the FWRAP. Assistance under this program has been provided for projects judged to further Commonwealth water policy objectives, to be of national significance, or to represent a special case warranting Commonwealth support (eg health and dam safety). Assistance for approved projects is by way of concessional loans and grants, and is provided only for headworks, research and information dissemination purposes.

In 1990-91, FWRAP payments to the States and Territories totalled $25 million ($21 million has been allocated for 1991-92) provided under six sub-programs, namely:

- urban and industrial water supplies, including the COWSIP scheme (see below);
- agricultural water supplies;
- floodplain management;
- salinity reduction and drainage;
- water conservation and efficiency improvement; and
- water planning.

Details of Commonwealth payments to the States under FWRAP for the period 1984-85 to 1991-92, are set out in Table B.1. Over the period, some 63 per cent of expenditure was committed to infrastructure projects; mostly dams for irrigation development, as well as urban and industrial water supply projects. Other major expenditures have been on structural and non-structural approaches to salinity and floodplain management.

According to DPIE, the emphasis on capital works funding has declined recently due to a shift in priority away from government regional development objectives towards sustainable resource development and efficiency of resource use.

Table B.1: **Water-related Commonwealth payments to the States and Territories, 1984-85 to 1991-92**
($'000)

Type of Payment	*84-85*	*85-86*	*86-87*	*87-88*	*88-89*	*89-90*	*90-91*	*91-92*
FWRAP Payments to the States								
Water resource assessment	6 780	6 865						
Salinity mitigation	1 378	981	1 160	1 250	5 446	9 845	972	430
MDB salinity mitigation	5 295	5 225	6 233	4 689	3 560	4 449	1 429	1 130
Floodplain management	5 429	6 440	5 566	5 607	6 910	8 101	7 161	7 804
Western Sydney flooding								970
COWSIP		1 656	3 233	4 919	6 197	4 362	5 052	4 955
Agricultural water supply	26 700	30 000	34 007	20 500	6 150	4 728	3 381	
Water conservation			125	125	190	445	1 270	1 272
Water planning	206	563	753	623	486	207	521	864
Urban & ind. water supply	14 740	10 297	11 250	6 164	5 750	5 250	5 250	3 500
Total	**60 528**	**62 027**	**62 327**	**43 877**	**34 689**	**37 387**	**25 036**	**20 925**
Murray Darling Basin Initiative								
Administration	207	316	313	359	430	672	822	967
Community Advisory Committee							71	77
Salinity investigations		231	193	217	263	509	407	286
Investigations & construction	1 095	1 828	1 922	1 345	663	687	1 650	1 026
Salinity construction					1 710	2 881	1 325	1 998
MDB Drainage Program							4 278	5 509
NRMS interstate						886	1 224	1 850
NRMS intrastate						1 041	4 431	5 150
Total	**1 302**	**2 375**	**2 428**	**1 921**	**3 066**	**6 676**	**14 208**	**16 863**
Payments to Commonwealth authorities	382	306	466	437	398	183	206	260
Water research programs	467	598	3 333	6 182	7 300	7 017	2 376	
Land and Water R&D Corporation							8 894	10 785
Sewerage research						200		
TOTAL WATER PROGRAM	**62 679**	**65 306**	**68 554**	**52 417**	**45 453**	**51 463**	**50 720**	**48 833**

Source: DPIE submission

Country Towns Water Supply Improvement Program

COWSIP was introduced in 1983-84 under the Community Employment Program and has since been continued as a sub-program under FWRAP. Under COWSIP, the Commonwealth provides financial assistance to the Northern Territory and State and Local Governments to improve the quality and quantity of water supplies for communities of fewer than 5000 people which would otherwise not be able to afford the capital works. The DPIE said that the provision of capital subsidies under this program reflects the limited ability of the local community to fund improvements which overcome water supply deficiencies and aims to encourage the adoption of alternative and low cost approaches to water supply. The Department also said that a key element of project formulation is to ensure that communities can afford to maintain the upgraded system once in place.

COWSIP expenditure in 1990-91 totalled $5 million (see Table B.1). A proportion of this has been spent on developing water supplies for Aboriginal communities. The priority to assist Aboriginal communities within COWSIP is determined by the individual State and Territory Governments. Apparently, virtually all of the Northern Territory's allocation goes towards infrastructure development for Aboriginal communities.

Aboriginal and Torres Strait Islander Social Advancement Program

Funds to develop Aboriginal water supplies are also provided under ATSIC's Social Advancement Program. The aim of this program is to improve the health and social well being of Aboriginals and Torres Strait Islanders to a standard commensurate with that of the general Australian community. The program covers, among other things, funding for community infrastructure such as power and water supplies and sewage disposal.

In 1989-90, expenditure on this program was $915 million. Included in the program is a payment for the Priority Communities Development Strategy, a sub-program which has provided more than 30 water supply systems to priority disadvantaged communities since 1988-89.

Murray-Darling Basin Initiative

The Murray-Darling Basin Initiative includes a suite of programs designed to promote equitable, efficient and sustainable use of the water, land and environmental resources of the Basin.

The Commonwealth allocated $15.8 million in 1991-92 for a range of projects, including investigations and construction for salinity mitigation and drainage, and the NRMS (see Table B.1). These programs are administered through the MDBC.

A key program in the initiative is the SDS, developed to address the Basin's river salinity, land salinisation and waterlogging problems.

The cost of salt to downstream urban, industrial and agricultural users has been put at around $37 million a year, while an estimated value of production forgone from land salinisation and waterlogging in the Basin is $65 million annually (Young, Cocks and Humphries 1990, p 3). In the Riverine Plains area alone, the MDBC said that economic losses due to salinity are estimated to increase from $44 million per annum now to $123 million per annum in 2040 if no remedial action is taken.

The SDS provides a framework to improve the quality of water in the Murray River through a system of debits or credits to New South Wales' and Victoria's salinity accounts. The aim of the

strategy is to reduce the level of salinity at Morgan, South Australia by a net 80 EC (units of electrical conductivity) through salt interception schemes to be funded by the States and the Commonwealth. In return for their contribution, New South Wales and Victoria will each receive 15 EC salinity credits, enabling them to discharge saline drainage into the river system. Additional salinity mitigation undertaken by the States, will earn additional salinity credits. Penalties will be imposed for salinity levels above the agreed baseline.

At this stage, interception and management programs are underway with salinity credits available on a pro rata basis according to the completion of effective salt interception works.

B.2 New South Wales

Administration

Water resources in New South Wales are controlled and managed by the Department of Water Resources (DWR), which reports to the Minister for Natural Resources.

The DWR's main responsibilities are to:

- co-ordinate policies and programs of State and Local Government authorities providing water supplies and other water services;
- plan for future water needs;
- operate the rural water supply networks;
- control the use and management of surface and ground water resources through water licensing and transfer systems;
- provide floodplain management and flood mitigation services in non-tidal areas;
- provide for wetlands, wild and scenic rivers and in-stream or environmental water needs;
- improve water quality;
- control salinity;
- maintain water resource assessment programs; and
- effectively manage the State's water infrastructure.

Many other government agencies have an interest in and effect on decisions made by the DWR. In 1989, the New South Wales Government established the Water Resources Council to co-ordinate this input. The Council's main responsibilities relate to forward planning and, conflict identification and resolution. Membership consists of an independent part-time Chairman and the

chief executives of the DWR, Sydney Water Board (SWB), Hunter Water Corporation (HWC), Soil Conservation Service (SCS), Public Works Department (PWD), Environment Protection Authority (EPA), NSW Agriculture, NSW Fisheries, Local Government and Shires Association, New South Wales Irrigators' Council, New South Wales Farmers Association and the Nature Conservation Council. The Council reports to the Minister for Natural Resources.

Urban services

Major metropolitan water supplies, wastewater services and some drainage services are managed by central bodies at Sydney and Newcastle. The SWB, which covers the Sydney, Blue Mountains and Illawarra areas, is a statutory authority which reports to the Minister for Housing. The HWC, which encompasses Newcastle and the surrounding Hunter Valley region, is a state-owned corporation.

Drainage services in these metropolitan areas are, in the main, the responsibility of local Municipal Councils. For instance, the SWB's role in urban drainage is currently limited to some 100 trunk drains (servicing 300ÿ000 properties) that are directly under its control.

In country towns of New South Wales, prime responsibility for provision of WSD services rests with some 122 general purpose Local Government Councils and six County Councils. In the main, the former provide services using their own-developed water supply systems and other infrastructure. Some however, purchase bulk water supplies from the DWR, for example, where the townships are linked to irrigation schemes, or from the County Councils which operate and manage regional water supply schemes. Schemes owned and operated by the Councils provide reticulated water to more than 1.5 million people in 375 towns and reticulated waste water to 1.3 million people in 264 towns.

Councils are assisted by the PWD which also operates two bulk water supply schemes -- the Fish River and South-West Tablelands Water Supply Undertakings. In addition, the Department administers the State's subsidy scheme for water supply and sewerage construction, and also constructs infrastructure on behalf of local governments.

A new Local Government Act, which proposes wide ranging reforms that will impact on the management and operation of Local Councils' water and sewerage services, is expected to be operational in New South Wales from 1 January 1993. In its draft report submission, the PWD said that:

> The new Local Government Act emphasises the need for management plans, annual performance reporting and commercial decision making by councils. In the event of continued unsatisfactory performance, the Government would have a number of options for improving service provision, including transfer of responsibility to an adjoining local government council or using the private sector to provide services.

Apart from Local Council operations, there are two statutory water authorities in country New South Wales, namely the Broken Hill Water Board, which provides a water supply and waste water service to the city of Broken Hill and surrounding area, and the Cobar Water Board, which provides bulk water supply to Cobar Shire Council and mines.

The bulk of the water supply and sewerage assets in country New South Wales have been constructed in the last 20-30 years and have an estimated current replacement value in excess of $6 billion.

Financial and technical assistance is provided to Councils under the Country Towns Water and Sewerage Program. The program provides up to 50 per cent of the capital cost of approved new works, after deducting developer contributions. Financial assistance is subject to a means test and consequently, some larger regional cities do not qualify for assistance. The PWD said that, due to diseconomies of small scale, subsidies are required to serve small communities to ensure that reasonable levels of service can be provided at an affordable cost, and may also be warranted to protect the environment and public health, and to assist Councils forced into water treatment by declining water quality or forced into higher quality sewerage treatment due to increased standards for effluent quality. In addition to the financial assistance provided for capital works, the cost of managing the program totalled $7.7 million in 1991-92.

Water resources management and environmental activities

Waterlogging and salinity problems are handled by several authorities: the DWR, the scs, NSW Agriculture and NSW Fisheries. The 'Salt Action Plan' is an interdepartmental program which also involves landholders and is co-ordinated through regional river basin management committees.

The administration of drainage and floodplain activities also involves a number of different authorities. Several authorities are often responsible for managing parts of the same drainage basin, while floodplain management is divided between the DWR in non-tidal areas, the PWD in tidal areas, and Local Government.

Similarly, a number of agencies have either a direct or indirect interest in aspects of water quality management, including the EPA, DWR, SWB, HWC, PWD, Maritime Services Board and the Departments of Planning; Conservation and Land Management; and Health; and the National Parks and Wildlife Service. Water Boards and Councils providing water supply and sewerage services also have effluent discharge responsibilities.

While the DWR has general responsibility for water quality in the State, including impacts on other States, environmental matters are now regulated by the EPA which sets classifications for inflows to waterways and licenses discharges accordingly. Local Councils also have the power to set environmental regulations, although they can be overruled by the State Government.

On 1 March 1992, the New South Wales Government established the EPA to replace and expand on the role of the State Pollution Control Commission. It brings together core elements of existing environmental, pollution, waste and hazardous substances control, policies and regulatory programs.

The New South Wales Government said that the EPA will take a positive role in pollution prevention and control, and in waste minimisation and regulation. This will include establishment of water quality goals and benchmarks for assessing control strategies as well as promotion of improved land-use planning provisions for catchment areas and areas adjacent to critical water resources. As noted above, it also licenses discharges into water bodies. Penalties of up to $1 million for illegal industrial pollution apply.

A number of special environmental programs are run by individual water authorities. For example, the Sydney Water Board's programs include the improvement of the quality of streams and rivers, and greater wetlands protection. Other such programs relate to controlling and ensuring the quality of urban run-off, recycling of sludge, reuse of effluent strategies (including pilot projects), and trade waste policies.

Total Catchment Management (TCM) initiative

Since 1984, the New South Wales Government has progressively sought to take account of the various interests of water users and land holders in catchment management. This process was formalised through the recently enacted Catchment Management Act. The Act is jointly administered by the DWR and the SCS.

A key objective of TCM is to involve the community in identifying solutions to natural resource problems and actively bringing about these solutions. Funds are provided to enhance catchment management through programs such as the National Soil Conservation Program, the NRMS, the One Billion Trees Program and the National Tree Program.

Institutional arrangements under the Act include the establishment of a State Catchment Management Co-ordinating Committee (SCMCC) with general community, landholder and agency representation to manage the initiative. Seven regional Catchment Management Committees (CMCs) have been established, covering the whole of the State west of the Great Dividing Range. A number of smaller TCM committees have been established or are mooted in coastal areas. These committees comprise representatives from landholders/landusers, Local Government, environmental groups (or individuals with environmental concerns), and government agencies. The first group has a legislated majority. The actual composition of these committees varies between regions, depending on the range of issues apparent within individual river catchments or sub-catchments. The legislation also provides for the establishment of Catchment Management Trusts (CMTs) to raise revenue from ratepayers in an area and to provide, construct, operate or manage, and maintain catchment works and buildings. So far only two trusts have been set up. The TCM initiative is closely linked with the Landcare initiative; a linkage that is being developed to reduce duplication of government effort and public confusion.

The regional CMC's functions include, to:

- promote and co-ordinate the implementation of TCM policies and programs;
- advise on and co-ordinate the natural resource management activities of authorities, groups and individuals;
- identify catchment needs and prepare strategies for implementation;
- co-ordinate the preparation of programs for funding;
- monitor, evaluate and report on progress and performance of TCM strategies and programs;
- provide a forum for resolving natural resource conflicts and issues; and
- facilitate research into the cause, effect and resolution of natural resource issues.

The SCMCC comprises 16 members whose responsibilities include, to:

- co-ordinate the implementation of TCM strategies;
- monitor and evaluate these strategies;
- advise the responsible Minister or other Ministers on any aspect related to TCM; and
- co-ordinate the functioning of CMCs and CMTs, and to maintain liaison with CMTs.

B.3 Victoria

Administration

Water resources in Victoria are administered by two major agencies: the Victorian Department of Water Resources (VDWR) and the Rural Water Corporation (RWC). However, there are a number of other government agencies with significant involvement in water management and water quality, including the Departments of Health, Conservation and Environment, Planning and Housing and, Agriculture; the Land Conservation Council; and Melbourne Water Corporation (MWC).

The VDWR is the central policy and planning agency providing advice to the Minister for Water Resources on matters of State-wide interest. It is also responsible for the Water Industry Consultative Committee, which provides a forum for the main bodies to resolve matters of common or conflicting interest.

The RWC, a recently corporatised government business enterprise, has overall responsibility for water resources management and the provision of water-related services for irrigation, stock and domestic, commercial, industrial, recreational, environmental and other beneficial uses in rural areas of Victoria.

Urban services

The largest urban authority in Victoria is the MWC, which provides WSD services to metropolitan Melbourne and near areas, covering some 80 per cent of the Port Phillip Bay catchment.

There are currently some 117 water agencies in country Victoria involved in the provision of WSD services. About two-thirds are Local Council-based operations. The remainder are statutory authorities, which often have Local Council representatives on their management Boards. Two operate sewerage-only services, with water supply being provided by the RWC. Some 55 urban water authorities purchase/receive bulk water from the RWC's channel systems.

Drainage services in urban areas of Victoria are generally provided by Local Councils. However, in metropolitan Melbourne and most other established urban areas now covered by the MWC, the Corporation owns and maintains the main stormwater trunk drains into which various municipality-owned drainage systems discharge. The only exception is the recently acquired area covered previously by the Dandenong and Western Port Authority, where virtually all drainage services are provided solely by the MWC. The Corporation said that this 'acquired' policy is to be applied in future to all new developments within its boundaries.

The Victorian Government has been active in promoting structural reform since the early 1980s when the State's Public Bodies Review Committee first commenced inquiring into the water sector.

Since then, the Victorian Government has reduced the number of water institutions from around 400 to some 117. This has been achieved through one-off amalgamations and the formation of regionally based multi-function water authorities. For example, the Latrobe Region Water Authority, the MWC and the Mid-Goulburn Regional Water Board, have together absorbed 18 smaller bodies. Investigations of possibilities for further amalgamations at the regional level are proceeding. Some of the benefits that these amalgamations have delivered are discussed in Chapter 3 of this report.

Water resources management and environmental activities

Virtually all WSD authorities and Local Councils with WSD responsibilities in Victoria undertake a similar range of trade waste, waterways, parks and open space, and environmental management activities. There is significant duplication of functions and activities, and overlapping management responsibilities within most catchment or river basin areas. Overlaid on this structure are the activities of some 23 River Management Authorities, which are semi-autonomous statutory bodies charged with responsibility for the care of waterways within their respective districts. They are predominantly State Government funded and are managed by Boards of volunteer members who arrange for and undertake erosion control, stream revegetation and fencing work, community education, research and planning activities.

While the VDWR oversights the management activities of all water authorities, the RWC has overall responsibility for water resources management in Victoria and undertakes specific management tasks that are of State-wide interest (eg water resources assessment, floodplain management). As indicated earlier, the activities of a number of other State Government agencies can have implications for the management, planning and development activities of the RWC and the individual service provision agencies.

There are no formal arrangements for integrated catchment management (ICM) activities in Victoria. However, a few Catchment Co-ordinating Groups have been formed by local communities under the auspices of the Victorian Water Act. Current examples of ICM in Victoria include the Gippsland Lakes Implementation Committee, the Wimmera River Catchment Co-ordination Group and about 15 salinity management groups. According to the Victorian Government, while devolving decision-making about catchment management to the regional or catchment level has improved the coordination and responsiveness of government agencies (with catchment management responsibilities) to meet community needs, it has failed to produce tangible improvements in catchment management. There has also been limited success in better aligning decision-making responsibilities with the flow of benefits and costs of the decisions made.

The Victorian Government also suggested that the current arrangements were inherently unstable because:

- the devolution of decision-making relies on the agreement and cooperation of many organisations, which is often hard to achieve, particularly when difficult decisions are to be made; and

- the heavy dependence on government funds to finance ICM activities results in groups not accepting responsibility for the `hard' decisions, supporting uneconomic regional projects where the benefits flow to the region but the costs don't, and spending a large proportion of their effort lobbying government for more money.

Community consultation concerns are also being addressed by a network of Advisory Committees that provide advice and feedback on local management and environmental issues to the regionally-based water authorities (eg Latrobe Region Water Authority).

Drinking water quality management problems have to a large degree been contained in Victoria due to the operation of a closed catchment policy.

The Environment Protection Authority (EPA) is the Victorian agency responsible for environmental quality standards, the regulation of waste treatment and disposal, and more generally for ensuring that there is an environmentally sound waste management system within the State. There are a number of regulatory tools at its disposal for the control of direct emissions:

- State Environment Protection Policies;
- works approvals and licences;
- Pollution Abatement Notices; and
- Industrial Waste Management Policies.

Traditionally the EPA has not regulated trade waste discharges to sewers. Rather, this has been left as the responsibility of sewerage authorities.

B.4 Queensland

Administration

The overall management of water resources in Queensland is the responsibility of the Water Resources Commission of Queensland (QWRC), a statutory authority reporting to the Minister for Primary Industries. The Commissioner for Water Resources exercises control over surface and ground water through the licensing of all artesian bores, sub-artesian bores within districts declared for the purpose, and works for the conservation and use of surface water, together with the issuing of permits for domestic and stock water use.

The Commission is required by legislation to:

- prepare a complete description and keep a record of naturally occurring surface and ground water;
- take steps to protect the quality and quantity of the State's water resources;
- investigate and survey any natural water resource;
- co-ordinate the investigation, evaluation and development of plans for the control of floodwaters and mitigation of flood damage;

- construct infrastructure and manage waters for the conservation, replenishment, utilisation and distribution of water;

- provide advice to local authorities in relation to water supply, sewerage, drainage, flood mitigation and swimming pools; and

- provide an extension and design service for on-farm development of water resources.

The QWRC develops, manages, operates and maintains all State-owned water conservation works.

Urban services

Urban water supply and sewerage services in metropolitan and country areas of Queensland are provided by 134 Local Councils, the largest being the Brisbane City Council. In total, Local Councils operate 360 water supply schemes and 220 sewerage schemes. Some of the Councils in the more remote areas service populations of less than 100. There are also some 31 Aboriginal Councils operating water supply schemes.

Many Local Councils operate integrated water supply schemes, while some obtain bulk supplies from State Government schemes operated and maintained by the QWRC. Where more than one Local Council draws water from the same source, joint arrangements are in place to provide bulk supplies -- regional water boards or agreements where smaller authorities adjoining major cities are supplied by the larger authority are the main approaches used. For instance, in south east Queensland, bulk raw water is provided by a statutory authority, the South East Queensland Water Board, and subsequent treatment and distribution of water is subject to a variety of agreements between Local Councils. According to the Queensland Government, regional water boards are designed to reduce the costs and complexity of setting up agreements between local authorities drawing supply from the same source.

The Queensland Government commented that, in general, boards established under mechanisms other than their own specific legislation have suffered from the following disabilities:

- boards of parochial representatives unable to plan regionally;

- organisations tied too closely to the Queensland Government;

- difficulties in transferring asset ownership from existing local authority owner; and

- an inability for local authorities to engage in deficit financing.

The Queensland Government said that some 87 of the State's 134 local authorities contain more than one urban centre and 41 of these have amalgamated their water supply services to the extent that they charge a common rate to operate a common fund. A further nine have undertaken the amalgamation of some of their schemes.

Some Local Councils also operate sewerage services in conjunction with other local authorities in the same region. Drainage services in urban areas are also primarily the responsibility of individual Local Councils.

Proposed amendments to the Local Government Act would, if enacted, introduce significant administrative and financial reforms for local authorities in their provision of WSD services. Further, the Queensland Government said that, through the Departments of Primary Industries (DPI) and Housing and Local Government (DHLG), it has recently been developing and promoting a 'Total Management Plan' approach to the planning and management of WSD infrastructure, embracing performance, emerging issues, objectives and strategies for each scheme.

The majority of local councils do not require any subvention from the government for service provision costs. Funding assistance is predominantly provided for capital works projects through the Local Bodies Capital Works Loan Subsidy Scheme. Subsidies of up to 20 per cent are payable for water supply and sewerage headworks and up to 10 per cent for urban stormwater drainage. The subsidies exclude components of works funded from other grants or developer contributions. They are not generally provided for urban reticulation works. The subsidy component of capital expenditure on WSD infrastructure in Queensland is estimated to make up approximately five per cent of total asset value.

A review of the impact of Local Government boundaries on planning and management of urban infrastructure has recently been completed by the Queensland Government. Although the changes recommended were unrelated to the concepts of water catchments or river basins, the Commission understands that, if accepted, the boundary changes will result in the bringing together of up to 17 pre-existing Local Councils within any one new Local Government Area. The Queensland Government said that the existence of certain cross-boundary inefficiencies was also identified in the recent boundaries review and that, as a result, it has called upon the nominated local authorities to take steps to address these inefficiencies, or face possible amalgamation.

Water resources management and environmental activities

In addition to the QWRC, the Department of Environment and Heritage (DEH), and the Land Use and Fisheries Group (LUFG) of the DPI, are involved in water resources management and water-related environmental activities.

The DEH is the agency responsible for conservation and management of the Queensland environment. It licenses discharges to water courses and monitors the discharge and the water course against environmental standards set. According to the Queensland Government, the DEH is currently preparing a new environment policy for water which will result in an increased emphasis on minimum levels of treatment, assimilative capacity and technology.

The LUFG is responsible for freshwater and marine fisheries.

Other State government agencies that can impact on water management activities of the QWRC and individual Local Council operations include the Departments of Health; DHLG; Business, Industry and Regional Development; Premier, Economic and Trade Development; and DPI (through the Queensland Forest Service). Also, the Great Barrier Reef Marine Park Authority, a Commonwealth statutory authority, has a major interest in the activities of sewerage authorities in north east Queensland.

Some participants argued that water and land use management responsibilities in Queensland are unnecessarily fragmented. CSR Sugar noted that some 18 State government departments, divisions or authorities, one Federal government department and 10 Local Councils impact on the management of the Brisbane River, resulting in extensive delays in dealing with water resource management problems.

All Local Councils have trade waste and land use planning responsibilities. However, only some 16 of the 134 local authorities have established trade waste policies. Major land use changes in 'declared' catchment areas must be approved by the Commissioner for Water Resources.

There is no specific legislation for floodplain management and responsibility is fragmented. Local Councils have primary responsibility for flood prevention and control. However, as noted by the Queensland Government, Local Government boundaries are not aligned with catchments or floodplains. Thus, co-operation between Councils is required.

The Queensland Government said that it was currently in the process of developing new strategies for conservation, ICM, water quality and water resources management. With regard to ICM, pilot studies have been established in the Johnstone River catchment and in the Lockyer Valley. However, there is no formal structure or legislation.

B.5 Western Australia

Administration

The vast majority of water resources legislation in Western Australia is administered by a State-wide statutory monopoly, the Water Authority of Western Australia (WAWA). An eleven-member Board of Management controls the Authority's operations. It reports to the Minister for Water Resources. Overlaying the activities of WAWA is the Western Australian Water Resources Council, which provides independent advice to the Western Australian Government on water management issues.

Urban services

WAWA is responsible for the operation and maintenance of the following urban WSD services:

- water supply, sewerage and arterial drainage services in the Perth metropolitan area;
- water supply schemes in the majority of country towns -- the exceptions being the Bunbury and Busselton schemes, which are run by statutory water boards, and a few schemes operated by mining companies; and
- sewerage and arterial drainage services in several country towns.

Local Councils across the State generally have responsibility for feeder drains due to their integration with road infrastructure, while some 17 small towns have their sewerage services provided by local authorities. WAWA said that it was currently reviewing its role and objectives in its metropolitan drainage business, with the likely outcome being that it will concentrate more on a strategic and co-ordinated stormwater management planning approach, rather than outright takeover of all drainage service activities.

All up, WAWA provides WSD services to a population of over 1.5 million in more than 300 communities throughout Western Australia. Metropolitan and country areas are supplied from both surface and ground water. The supplies are received through 12 regional and 108 local schemes. Further, the Authority operates 71 sewerage plants. It is also responsible for providing water and sewerage services to a number of remote Aboriginal communities. The capital cost of these latter works are fully reimbursed by ATSIC and the Aboriginal Affairs Planning Authority (AAPA). During 1990-91, ATSIC and AAPA together provided $5.4 million for upgrading, maintenance and construction of water supply and sewerage facilities for 88 town-based and remote Aboriginal communities.

Water resources management and environmental activities

WAWA is responsible for managing and regulating the use of all surface and ground water resources in Western Australia. It also jointly monitors drinking water quality with the Department of Health. The Department is also required to approve projects for the reuse of sewage effluent and has an interest in how catchments are managed. Drinking water catchments in Western Australia are subject to land use constraints which are more stringent than those applying to other catchments. WAWA said that, given the often conflicting roles it has as both service provider and resource manager, it has initiated a review to identify the form of institutional arrangements which will best meet the future needs of the community and the water industry in Western Australia.

There are a number of State Government agencies with an interest in catchment management activities including the Departments of Agriculture; Planning and Urban Development; and, Conservation and Land Management. Local Government Councils also have a significant interest

through their powers to control land uses. There are also two principal river and estuarine agencies in Western Australia, the Waterways Commission and the Swan River Trust. The Waterways Commission is charged with the responsibility for overall management of the State's public waterways that are in 'declared management areas', while the Swan River Trust was specifically established to manage the Swan and Canning Rivers. The Office of Catchment Management (OCM) is charged with the responsibility of bringing these Departments and authorities together to make sure they reach agreements to solve problems for the management of a catchment. OCM also has policy and technical roles to play. For instance, it is currently involved in developing 'Codes of Practice' for a range of land use activities, to ensure environmentally acceptable operation.

ICM has been established in Western Australia under existing environmental and planning legislation. There are already some 130 Land Conservation District Committees undertaking Landcare activities, but progress in establishing community-based Catchment Co-ordinating Groups to develop Catchment Management Plans has been much slower. At the State level, an Integrated Catchment Management Coordinating Group, a Chief Executive Officers ICM Group and a Cabinet Sub-Committee on ICM have all been established to progress ICM in Western Australia.

The EPA of Western Australia has the responsibility of providing the State Government with independent advice on the protection of the environment and administering legislation to control pollution. With regard to WSD activities it is involved in:

- assessing proposals for the development of new water supplies;
- assessing policies and strategies for water supply;
- assessing new proposals for irrigated agriculture;
- assessing and licensing waste water treatment plants;
- assessing and licensing proposals for the management of industrial waste water; and
- developing policies for the disposal of drainage waters and the acceptability of on-site sewage disposal.

Within `declared management areas', the EPA has delegated its responsibilities for pollution control to the Waterways Commission and the Swan River Trust.

B.6 South Australia

Administration

All major water resources and most public water supply schemes in South Australia are administered by the Engineering and Water Supply Department (EWS), which reports to the Minister for Water Resources.

The EWS's operations are influenced by its operation as a department rather than a separate authority. For example, until recently, Treasury required the EWS to pay all its revenues into the State's Consolidated Account, which meant that all of the Department's expenditures were subject to appropriation by Parliament. The Department now controls its own finances.

Urban services

The EWS is responsible for the provision of water supply services State-wide and sewerage services in major urban centres. Drainage services in urban areas are under the control of Local Councils. However, the South Australian Government said that recognition of the potential value in stormwater as a resource may have an impact on future institutional structures to manage metropolitan drainage.

The Department is also responsible for water supply to townships within Government Irrigation Areas along the River Murray.
The current replacement cost value of total WSD assets in South Australia is estimated to be $3.5 billion.

Capital grants are provided by the State Government to assist the development of local government stormwater drainage and common effluent disposal schemes.

Water resources management and environmental activities

Overlaying the EWS's role in water resources management is the South Australian Water Resources Council, which was set up to provide independent advice to the South Australian Government on overall management policies, and eight regional Water Resources Advisory Committees, set up to facilitate community participation in providing advice to the Minister on the management of specific water resources. The composition of these committees depends on the range of management issues in any one region.

Other government agencies that can impact on EWS's activities include the Departments of Agriculture, Environment and Planning, Lands, and Mines and Energy. A National Resources Management Committee, comprising the heads of relevant agencies, has recently been set up to better co-ordinate the input of these agencies.

Central to the EWS's management role is its total control of water resources and associated land use planning in 25 'proclaimed' areas. In these areas it has the power to prohibit certain land use activities and to set special environmental conditions (eg buffer zones in catchment areas).

While a trade waste charging regime has yet to be formalised in South Australia, a 10 per cent environmental levy is included in sewerage charges to assist in financing works to upgrade the standard of sewage treatment across the State.

The South Australian Government said it is taking steps towards the adoption of an integrated catchment management regime. It currently has trial ICM schemes running in the Mount Lofty Range and the Murray Valley. A program called Community Action for the Rural Environment was recently launched to bring together the environmental issues for river and agricultural environs into one program.

An Environment Protection Council advises the Minister for Environment and Planning on environmental policy matters. However, the EWS currently sets and monitors its own water quality standards and discharge licence conditions. An EPA has been proposed for South Australia which would, amongst other things, absorb the environmental functions presently undertaken by the EWS.

B.7 Tasmania

Administration

The Rivers and Water Supply Commission (RWSC), a statutory authority reporting to the Minister for Resources and Energy, has primary responsibility for the management of surface water resources in Tasmania. Its functions include:

- measurement, assessment and allocation of water resources;
- supervision of Local Government bodies (except cities) in their management of local WSD works; and
- authorising the construction of dams, other than Hydro-Electric Commission (HEC) and mining dams.

The Commission owns assets which have a written-down replacement value of about $150 million (including irrigation assets).

Tasmania's groundwater resources are administered by the Water Resources Division of the Department of Resources and Energy.

The HEC, which also reports to the Minister for Resources and Energy, has management responsibility for approximately one-third of the total exploitable water yield in Tasmania for power generation. It controls most of the water supply headworks in the State. However, once this water has passed through the HEC's turbines, control of the resource generally reverts to the RWSC.

Urban services

The reticulation and sale of water supplies to urban consumers in Tasmania is primarily the responsibility of 46 individual municipalities. These municipalities operate 68 water schemes servicing populations ranging from less than 100 to 31 000, and 80 sewerage schemes.

In the Hobart region, water is supplied in bulk to municipalities by the Hobart Regional Water Board (HRWB). Municipalities are fully responsible for the cost and management of reticulation within their Municipal Water Districts. In the Tamar Valley, municipalities generally purchase/receive bulk water from RWSC-owned regional water schemes. However, one municipality, Beaconsfield, operates the West Tamar Water Scheme as an agent for the Commission, while the 'old' City of Launceston has its own bulk supply and reticulation works which it operates and maintains. On the North West Coast, water is supplied in bulk to Municipalities by the North West Regional Water Authority (NWRWA), with local government authorities again being responsible for reticulation. In municipalities not serviced by the HRWB, the RWSC or the NWRWA, the supply of water is totally a function of the local municipal council.

Sewerage and drainage services are also provided by Local Councils. Councils have to seek RWSC approval to construct sewerage and drainage facilities and also need to obtain an environmental licence from the Department of Environment and Planning.

The RWSC administers a subsidy scheme which assists Municipal Councils to meet the operating costs of their WSD services. Municipalities are required to raise a minimum revenue to qualify for assistance. The cash deficit remaining after allowable expenses, forms the subsidy, provided it does not generally exceed 25 per cent of the operating costs for water schemes and 30 per cent for sewerage schemes. Capital subsidies are also provided under the COWSIP scheme. In addition, the State Government makes an annual contribution to the HRWB and the North Esk Regional Water Authority to meet interest payments on specific loan borrowings.

Water resources management and environmental activities

The RWSC has primary responsibility for water resources management activities in the State. However, a number of other State authorities have some powers over aspects of the approval and management of land and water uses -- in some cases specifically in relation to protection of water quality. They include the Forestry Commission; Parks, Wildlife and Heritage; Public Health; the Inland Fisheries Commission; and the Divisions of Environmental Management (DEM), Planning and Sea Fisheries.

The DEM is the main environmental policy and regulatory agency in Tasmania. However, Local Councils can also set standards and monitor them.

The Tasmanian Government said that integrated catchment management was not appropriate for Tasmania.

B.8 Northern Territory

Administration

The Power and Water Authority (PAWA), a statutory authority reporting to the Minister for Lands, Water and the Environment, is responsible for the assessment, planning and management of surface and ground water resources throughout the Northern Territory.

Urban Services

PAWA owns, operates and maintains infrastructure for the provision of water supply and sewerage services to Darwin, the majority of country towns and many aboriginal communities in the Territory. Drainage services are primarily the responsibility of Local Councils.

Water resources management and environmental activities

As noted above, PAWA is responsible for the management of the Territory's water resources. However, separate legislation exists which designates a Controller of Water Resources and a Commissioner of Water Development such that the responsibility for overall water resources management is kept at arm's length from the provision of commercial water supply and sewerage services.

The Authority is responsible for flood prevention and control, trade waste disposal, water quality and pollution control, environmental assessments of water and related developments, and the administration of permits and licences.

The water interests of a number of other government agencies often overlap with those of PAWA. The Northern Territory Conservation Commission oversees an administrative arrangement with PAWA to co-ordinate waste management and pollution control. It is also concerned with the recreational, aesthetic and in-stream values of water conservation, the management of aquatic fauna

and catchment management on a case by case basis. WSD infrastructure development requires input from the Public Works Commission and the Department of Lands and Housing, which also regulates land use in catchment areas. The Department of Health and Community Services (DHCS) is involved with setting health standards for drinking and recreational water quality. DHCS's responsibilities also extend to effluent disposal and identifying health hazards and environmental pollution. The Department of Mines and Energy, through its Mining Environment Directorate, has a monitoring and management role in regard to water availability and pollution levels at mines in the Northern Territory. The Directorate sets its own standards (under powers delegated to it by PAWA), conducts mine audits of water use and output, and seeks to enforce these standards through either caveats to mining leases or the Mines Management Act. Given that the Commonwealth has reserve powers over aboriginal affairs, the environment, and uranium and other mining activities in the Territory, there is potential for overlap between the activities of the Territory and Commonwealth agencies in these areas.

B.9 Australian Capital Territory

Administration

Water resources in the Australian Capital Territory (ACT) are vested with the ACT Electricity and Water Authority (ACTEW), a statutory authority reporting to the Minister for Urban Services. ACTEW was to be corporatised on 1 January 1992 but this did not proceed following a change of government.

Urban services

ACTEW is responsible for the provision of water supply and sewerage services to the Territory and also supplies bulk water to the City of Queanbeyan, in New South Wales. The Authority owns, operates and maintains all the associated storages and infrastructure required to provide these services. Drainage, however, is the responsibility of the Department of Urban Services, although the drains themselves are maintained under contract by ACTEW.

ACTEW has water and sewerage assets of about $1 billion, calculated on written down replacement value. It receives a Specific Purpose Payment annually from the Commonwealth as compensation for having to operate an unusually expensive sewage treatment plant.

Water resources management and environmental activities

In the ACT, there is an effective split of water resource management, operations and environmental regulatory functions between various arms of the ACT Government. Although ACTEW does have some resource management functions, it is predominantly set up as a service provider. The Department of Environment, Land and Planning brings together all of the agencies having responsibility for land and water resources planning, management and regulation, namely: the ACT Planning Authority which is responsible for land and water planning; the Environment and Conservation Division, which is responsible for conservation, land management, environmental protection and environment policy; and the Land Division, which is responsible for leasing and land development. The Department therefore provides a forum for a co-ordinated approach to land, water and environmental issues.

ACTEW does not have control over its catchments but maintains communications with the authorities responsible for the Territory Plan and with the DWR in New South Wales in regard to the Googong Dam.

B.10 Research and development (R&D) and extension services

There is a wide range of Commonwealth and State Government departments, authorities and agencies, as well as a number of private organisations involved in promoting, funding, co-ordinating and/or delivering research into water and water-related issues, or in developing new water and waste water treatment and disposal technologies for commercial adoption. In most instances, there is a clear demarcation between those organisations involved in R&D into rural-related water matters and those concerned solely with urban water R&D. The National Irrigation Research Fund (NIRF) estimated that some $13 million was spent on generic irrigation research in 1990-91, while the Urban Water Research Association of Australia (UWRAA) estimated that R&D into urban issues and technologies totals some $20-40 million per annum. Investment in R&D represents less than 1 per cent of turnover in each of these sectors.

The AWRC, the peak water industry forum, is charged with, among other things, the promotion of relevant water research. This involves mainly the dissemination of information relating to the need for and gains from R&D. For instance, CSIRO said that the AWRC's Water Technology Committee has estimated that the urban sector of the industry might achieve productivity gains of up to 20 per cent, over a period of years, through technology-neutral management changes, mainly in the asset management area, and particularly in the improved management and operation of small-diameter pipes in water and sewerage systems. It also noted that the Committee has indicated that increased standards of urban water supply quality could require a 300 per cent increase in water treatment assets (valued at $854 million in 1989) and that, due to the introduction

of more stringent environmental standards, urban sewerage treatment assets might have to be increased by some 30 per cent (valued at $2611 million in 1989), mainly to provide limited improvements in nutrient removal from existing plants. Similarly, in respect of the irrigation sector, salinity, waterlogging and nutrient run-off issues require solutions of both a management and technological nature.

The LWRRDC, a statutory authority formed in July 1990 to replace the research component of the National Soil Conservation Program (NSCP) and the activities of the former Australian Water Research Advisory Council (AWRAC), is the main Commonwealth body involved in the distribution of research funds and commissioning of water research projects. It is managed by a Board of seven directors, appointed by the Minister for Primary Industries and Energy on the basis of their technical and commercial skills, and a Commonwealth Government representative. The Corporation's main functions are to investigate, evaluate, co-ordinate, fund, monitor and report on R&D activities in relation to Australia's land, water and related vegetation resources, and to facilitate the dissemination, adoption and commercialisation of that R&D.

In broad terms, the LWRRDC's main focus is on funding land, water and related vegetation R&D which contributes to sustainability of resource use, increased land productivity, improved land and water quality, a better understanding of ecological processes, and better management and conservation of these resources. The Corporation has indicated that in future it will actively seek to increase funding of activities which integrate land, water and vegetation R&D in addressing resource and management issues.

Unlike many other Commonwealth-initiated R&D corporations and councils, funding is provided solely by the Commonwealth Government. However, it can increase its funding base by various means such as recovering costs for certain services, commercialising research results and soliciting donations. In 1990-91, Commonwealth funding totalled $11.1 million, of which $10.4 million was spent on some 230 research projects. Given a normal 3-year funding cycle, the LWRRDC expects to fund new projects annually worth about $3 million.

Funding has, in the main, been directed towards research projects that impact on primary industries. However, the Corporation has also provided funds, under certain conditions, for urban, estuarine and, air and atmospheric R&D. Accountability provisions under its Act, require the LWRRDC to prepare five year R&D plans and Annual Operational Plans for approval by the Minister for Primary Industries and Energy. When preparing R&D plans, it is also required to report on performance and consult with: the Australian Conservation Foundation; the National Association of Forest Industries; the National Farmers' Federation; the Soil Conservation Advisory

Committee; and the Standing Committee of the AWRC.[4] From 1991-92, applicants for project funding have been required to outline their proposed methods for ensuring effective dissemination and uptake of their research results, and the funds necessary to implement these strategies.

There are three other main Commonwealth related or initiated bodies involved in water R&D, namely the CSIRO, the MDBC and the NIRF.

CSIRO is the Commonwealth's main research delivery agent, conducting a wide range of water related research, both self-funded and under contract to various Commonwealth and State government agencies and private sector organisations. It spends about $20 million per annum on such research. In the main, CSIRO's water interests are focussed on the development of new technologies and resource management approaches.

The MDBC, through its Murray Darling Basin Initiative, is responsible for funding research into Basin management problems. Its main focus recently has been on salinity mitigation research and in developing a computer model for the total Basin.

The NIRF, which was initiated in 1987 by the AWRAC to address a perceived imbalance in irrigation research, has two broad objectives:

- to accelerate and coordinate irrigation research in Australia; and

- to improve irrigation technology transfer.

The Fund is managed by a Board of Directors, comprising eight members: six from State agricultural and rural water agencies and two from irrigator organisations. Since 1988-89, Commonwealth funding has been provided through the AWRAC and subsequently, the AWRC ($150 000 per annum), with a largely matching contribution by water and agricultural agencies in New South Wales, Victoria, Queensland, South Australia and Western Australia (the latter contributing only from 1991-92). The NIRF said that due to its membership and funding arrangements, most research is concentrated on State regional and local issues without a view to the broader national perspective. As a result of its recently completed National Irrigation Research Strategy, the NIRF has set the following four broad areas as future research priorities: sustainable irrigated cropping systems; water use efficiency; drainage pollution; and, salinity.

Water and water-related research is also funded or undertaken, to varying degrees, by a number of other Commonwealth organisations including: various primary industry commodity-based research corporations or councils; DASET; and, the Australian Science and Technology Council. The latter two organisations are concerned mainly with water-related environmental issues.

[4] The Queensland Government commenced its participation on 1 July 1992. The other four governments are foundation members of the MDBMC.

At the State level, much of the rural-related water research is either funded or undertaken (often on behalf of the above Commonwealth organisations) by State Departments of agriculture and primary industries, and the various rural water authorities and commissions. Other delivery agents for rural water research include tertiary institutions and a number of private R&D and industry organisations.

Conversely, urban water and waste water disposal R&D is predominantly funded and/or undertaken in-house by the major urban water authorities, or by various private companies doing mainly technology-driven commercial R&D projects. Available information indicates that, in 1990-91, R&D expenditure by the major urban water authorities ranged from 0.3 per cent (WAWA) to 2.3 per cent (SWB) of their gross revenues.

There are also a number of Co-operative Water Research Centres (CWRCs) around Australia. They are the result of joint venture agreements between the Commonwealth Government, major water authorities and various private companies. For example, the CWRC set up at the University of New South Wales is jointly funded by the Commonwealth, the SWB and Memtec Pty Ltd.

Seed funding for urban water research is also provided by the UWRAA. The Association's budget for 1992-93 is $800 000, with funds being contributed mainly by the major urban water authorities. Prior to the 1992-93 funding year, some $400 000 plus per annum was provided by the LWRRDC. Research funded by the UWRAA is said to be both commercially oriented and have wide application. As such, the results of this research are also of benefit to smaller urban authorities.

Technology transfer and general research adoption mechanisms are an integral part of any research effort. In recognition of this, many agencies funding water R&D require applicants to identify the adoption/transfer/commercialisation processes they intend to pursue as a condition. Extension services for water research are variously provided by a wide range of organisations including the LWRRDC, the AWRC, the NSCP, Landcare groups, Greening Australia, the MDBC, a wide range of State Departments and organisations (including water authorities), and the research institutions themselves.

APPENDIX C: PRICING AND COMMUNITY SERVICE OBLIGATIONS

C.1 Introduction

As discussed in the body of the report, there are a range of inefficiencies in the pricing of water, sewerage and drainage (WSD) services in most parts of Australia.

One important source of inefficiency is the failure to directly link charges to individuals' consumption of water. As shown in Table C.1, in most jurisdictions, the payment of an access charge entitles the consumer to a significant allowance of water for which no additional per KL charge is levied.

Another potential source of inefficiency is the imposition of non-commercial functions or community service obligations (CSOs) on WSD authorities. Authorities providing WSD services are being increasingly urged by governments to operate in a commercial fashion. But, at the same time, they are still required to perform a range of non-commercial functions which are generally not directly funded by governments. This appendix looks at CSOs in the water sector.

C.2 What are CSOs?

Governments have perennially used charges for water and sewerage services to meet wider social and development objectives.

However, these objectives have not always been made clear. As a result, legislative requirements often have to be interpreted by WSD authorities.

The charter of the Sydney Water Board (SWB) provides one example of loosely specified goals. The Board's Act specifies that it is responsible for:

- Ensuring water and related resources within the Board's area of operation are allocated and used in ways which are consistent with environmental requirements and provide the maximum long-term benefit for the area and the State;
- Providing water and related services to meet the needs of users in a commercial manner consistent with the overall policies of the Government.

In carrying out its functions, the Water Board pays particular attention to, [among other things]:

- Public interest and community needs ... (SWB 1991)

Such implicit or vaguely specified legislative requirements leave much discretion to authorities as to how to satisfy government policy objectives. For instance, the SWB's Act does not specify what phrases such as 'public interest and community needs' mean. Similar, and equally imprecise, language is found in many other authorities' charters.

The need to translate institutional goals into something meaningful at the operational level and to resolve potential conflicts, can create a number of problems for authorities. For example, the New South Wales Department of Water Resources (DWR) stated in its 1989-90 Annual Report that:

> ... our ability to deliver business services to our private client-base is often limited by our obligation to exercise our social/regulatory role. For example, in sharing available water supplies we must balance the concepts of commercial efficiency and social equity. We are also at times limited by our obligations under inter-state water sharing agreements to which New South Wales is a signatory. (DWR 1990, p 10)

Similarly, the SWB stated that:

> The current pricing system is commercially indefensible. The Board cannot effectively serve an increasing number of customers at a price below cost and meet Government and community expectations such as dividend payments, appropriate rates of return, welfare payments, maintenance and renewal of infrastructure, environment protection and provision of serviced residential land.

Poorly defined non-commercial objectives often lead to confusion about who should pay for CSOs. For example, the Geelong and District Water Board (GDWB), which has historically been required to provide free water to local councils in its region, argued that:

> Clearly, it is not the role of the Board to provide a subsidy to municipalities ... to water parks and gardens. The municipalities should pick up the true costs of watering parks and gardens, so the community the municipalities serve recognises the true costs of having beautiful green gardens in our environment.

Many WSD authorities are now seeking to separate CSOs from their other activities, with a view to making them more transparent and to permit direct funding by governments. Direct funding is seen by WSD authorities as important so that they can operate on a more commercial basis.

But this raises questions of what exactly is a CSO, how to identify it, and how should it be valued.

Definitions

Defining what constitutes a CSO is a complex issue. In its report on Rail Transport, the Commission adopted the following definition:

A Community Service Obligation arises when a government requires a public enterprise to carry out activities which it would not elect to provide on a commercial basis, or which could only be provided commercially at higher prices. (IC 1991c)

There are three characteristics of this definition:

- legislative or ministerial direction to WSD authorities to provide a specific service or function including specification of the conditions under which it is to be supplied;
- the specified service provides an identifiable community or social benefit; and
- the service or function would not otherwise be supplied, under the same conditions, in a commercial environment.

A government directive

The first characteristic of the definition may seem relatively straightforward. In practice, however, directives for WSD authorities to provide community services have not always been made explicit or public. In some cases, CSOs may be based on historical obligations which are no longer current government objectives. For example, providing free or subsidised WSD services to institutions such as churches, hospitals and schools is a long established practice, even if no formal requirement now exists to do so. In this regard, ACT Electricity and Water (ACTEW) said that:

> The policy of half-price excess water to schools and certain other bodies of a like type, and half-price sewerage services to bodies such as churches, schools, and hospitals, reflects political decisions taken long ago and which have "rolled on" to be carried by ACTEW. ...
>
> It is doubtful that these concessions can be characterised as Community Service Obligations ... because no explicit direction to ACTEW remains afoot to continue them and with limited exceptions there is no statutory obligation requiring that they be continued.

Melbourne Water Corporation proposed that this uncertainty be dealt with as follows:

> ... if government require that the activity continue at a subsidised level, it should be considered a CSO. If the authority decides to continue on the same basis, it must be judged a commercial decision reflected in its financial performance.

Some non-metropolitan water authorities in Victoria are intending to move away from providing concessional water to certain organisations such as schools, hospitals, public parkes and gardens etc. The SWB already charges for water and sewerage services used by State Departments and authorities.

Social policy objective

The second characteristic of a CSO is that the service or function provide an identifiable social or community benefit that would not otherwise be met. Again application of this criterion is not without problems. There is the fundamental question of what constitutes an identifiable

community or social benefit. While many would see the provision of subsidised water to pensioners and other disadvantaged groups as clearly meeting this test, does the provision of free or subsidised water to churches, public institutions etc provide a social or community benefit? Also, should the concept of community benefit be limited to those receiving services, or should it also include those employed in providing services? Thus, for example, should preferences given by WSD authorities to in-house labour, which might otherwise be unemployed, be regarded as a CSO?

Non-commercial activity

The criterion related to non-commercial activity raises two problems: how to distinguish between non-commercial impositions on WSD authorities and poor performance by those authorities; and how to determine what is commercial behaviour and what is not.

The absence of competition and performance monitoring in the water sector has given WSD authorities scope to pursue non-commercial objectives, with little or no concern for their associated costs and hence impact on commercial performance. That is, costs can simply be passed on to other users. The SWB said that:

> Water authorities, because of government controls have been notorious for using their monopoly position to achieve distributional aims and objectives.

It is therefore important that the CSO tag not be used to excuse substandard commercial performance or to validate poor investment decisions.

There is also the problem of determining what concessions would be provided by a commercially orientated organisation for 'good commercial reasons'.

Many private sector organisations engage in pricing practices which, if carried out by a government utility, would be targeted as a CSO. For example, private enterprises often offer concessions to children, students and pensioners. It is true that the marginal cost of allowing additional customers to use privately provided services such as air transport is relatively small before full capacity is reached. Thus, even at 'subsidised' prices, there is a net contribution to revenue. Such behaviour is therefore nothing more than rational price discrimination on the part of the operator. Accordingly, such concessions need not impose any cost on the operator and/or other customers. A similar argument could be used to justify subsidised access to water networks where there is excess capacity. However, as discussed in Chapter 6, care is required here because the addition of new customers is likely to pull forward the timing of the next augmentation in system capacity.

The cost of fine tuning pricing regimes may mean that it is not commercially sensible to charge different prices to users in different locations. It is also common practice in the private sector for firms to engage in ostensibly non-commercial practices to promote a 'good corporate citizen' image.

These examples serve to illustrate that in the absence of a commercial test, there are necessarily uncertainties about what is a commercial practice and what is not. In the case of the WSD sector, such uncertainty is reinforced by the fact that the charters under which many authorities operate do not clearly spell out their obligations in this area.

Not surprisingly therefore, efforts by WSD authorities to identify CSOs have raised many problems. For instance, the South Australian Government said that:

The issue [of formally identifying and evaluating CSOs] is not perceived as one of identifying cross subsidies as such -- it is more to do with evaluation of the impact of specific Government polices on the capacity of services to be provided on a commercial basis.

and further that:

> Indeed for a government to direct its WSD authority to remove all [cross subsidies or differences in financial returns on investment] would impose unwarranted administrative costs which could themselves be regarded as CSOs.

In a similar vein, the GDWB said that many cross-subsidies are not CSOs but rather sound commercial practice. The Board stated that:

> It would be grossly inefficient to try to identify all cross-subsidies associated with current pricing structures and/or to regard them as CSO's. ... Similarly, there will be cross-subsidisation in commercial areas due to lengths of mains, capacity use of the system, different standards of effluent etc. The cost of gathering that information in order to set subsidy free prices, would be very high indeed and very difficult.

C.3 CSOs in the water sector

Information provided by WSD authority participants on the nature, funding arrangements and, where available, the annual cost of their CSOs is set out in Table C.2. The Commission has not attempted to assess whether all of the CSOs reported in the table would meet the criteria set out above.

However, despite the above-mentioned uncertainties and difficulties, some requirements imposed on water authorities by governments can clearly be regarded as CSOs.

Subsidies to specific users or groups of consumers

One group of CSOs comprises the provision of subsidised water and sewerage services to specific users or groups of consumers. For example, subsidies to pensioners in the form of concessional water and sewerage rates are government policy in all States and Territories. The level of these subsidies varies from region to region. For example, in New South Wales country areas, water charges to pensioners are 50 per cent of the standard charges, while in Brisbane they are 40 per cent of the standard charges.

The cost of this group of CSOs is significant. For example, pensioner rebates in Sydney and Melbourne alone are worth around $30 million and $20 million per annum, respectively.

As detailed in Table C.2, the funding arrangements for pensioner rebates also vary across States and Territories. Governments in Victoria, South Australia, and the Australian Capital Territory, directly fund 99 per cent of the cost, with the remainder (administration costs) being borne by the WSD authorities. In New South Wales, the State Government funds only 50 per cent of the rebate. As noted above, many WSD authorities also provide free or heavily subsidised WSD services to churches, hospitals, nursing homes, child care centres and government departments. Some authorities provide free water for use in parks and other municipal areas. However, as discussed earlier, there is some uncertainty about whether these services are mandatory or not. Typically no direct government funding is provided to meet the cost of these concessions.

Provision of non-commercial services

The second group of CSOs comprises mandated requirements to extend services to areas which would not be supplied on commercial grounds alone. For example, the provision of water and sewerage systems in remote country towns and Aboriginal communities could be classed as CSOs where governments subsidise the capital cost of the infrastructure.

However, from the perspective of operational efficiency, the more interesting group are decreed augmentations to systems which are not directly funded by government and which must therefore be paid for either by raising charges to existing users of those systems or by taxpayers taking a lower rate of return on their equity in the authorities concerned. For example, prior to its recent corporatisation, the then Hunter Water Board was only funded for 50 per cent of the cost of mandated extensions of sewerage services to fringe areas.

Uniform pricing arrangements

The third important group of CSOs in the water sector are mandated uniform pricing arrangements across large areas which have significantly different costs of supply.

Within towns, and perhaps even cities, the efficiency benefits of setting different charges for users according to their proximity to water sources, treatment works etc, are likely to be outweighed by the additional administrative costs of doing so, with the consequence that uniform pricing may be commercially rational. For example, the Brisbane City Council said that:

> There are clearly cross-subsidies occurring across the City between customers within the one grouping, e.g., customers in all sewerage catchments are charged the same rate irrespective of the capital and operating costs of the catchments, and remote parts of the water supply system are treated in the same way as those nearer the treatment plants. In this regard, the Council sees the City as a single community of interest, and is not prepared to consider differential annual charges on the basis of location. Such a pricing system would be expensive and administratively complex.

However, as the region serviced becomes larger, uniform pricing is less likely to be a commercial proposition. Indeed, the Hunter Water Corporation said that it is looking at the possibility of differential charging across its operating regions. The SWB imposes different developer charges across Sydney.

Yet, in other areas of Australia, WSD authorities are required by government to charge uniform prices across very big regions. The most notable examples are the State-wide uniform pricing arrangements for water and sewerage services in South Australia, Western Australia, and the Northern Territory. South Australian Government policy, for example, endorses the view that 'equal services be charged equally' irrespective of the proximity of bulk supplies or treatment facilities. As discussed in Chapter 2, these uniform State-wide charging policies largely explain the low or negative real rates of return for country water and sewerage services in South Australia, Western Australia and the Northern Territory.

Also, it seems clear that uniform pricing across amalgamated authorities in Victoria goes beyond a commercial response to the setting of charges in the face of administrative costs. The Bendigo Water Board said that:

> ... smaller communities will never have a safe drinking water supply if they have to fund [WSD infrastructure] themselves. For them, a subsidy is the only way, whether it be by provision of a one-off capital grant from government, or an amalgamation of smaller communities with larger ones. Both options entail different types of subsidy either of which may be viewed as a community service obligation ...

The Victorian Government acknowledged that in the past cross subsidies had been negotiated to encourage voluntary amalgamation. However, it went on to argue that the current policy does not require, or indeed encourage, uniform pricing across merged authorities. It said that:

> ... the current minister has indicated his preparedness to take action for restructuring [amalgamation] on a compulsory basis, and in a number of those areas you will find that there is no move to force uniform pricing or cross-subsidisation, but simply to pass on to all the communities the benefits of a larger organisation with better financial leverage, lower administrative costs, better expertise, etcetera, and the pricing levels being charged in a number of districts that were formerly smaller authorities have changed because of that rather than because of a conscious cross-subsidisation policy.

Other CSOs

Other activities which are categorised by some participants as CSOs include catchment policy and management, flood mitigation and flood plain management, environmental and water quality management (including salinity reduction, water conservation strategies and water research), the provision of picnic facilities and other recreational facilities around water catchment areas, and water advisory services. The cost of these activities is usually met by the Commonwealth and/or State governments.

Property based charging

Property based charging for WSD services is also sometimes thought of as a CSO, in that it broadly redistributes income from business to households, and from wealthy to poor households.

But the extent to which property based charging reflects a directive from government is unclear. At least in Victoria there is no explicit government requirement for WSD authorities to continue to base charges on property values. The Latrobe Regional Commission said that:

> Distortions caused through pricing structures which produce cross-subsidies are not imposed on the industry by Governments. The [Victorian] Water Act enables water authorities to charge prices which reflect payment for use, so cross-subsidies which derive from rate based pricing are voluntary rather than compulsory obligations.

However, the many property based charging systems still existing in that State can be seen as the legacy of legislation applying until 1990 requiring that property value be the sole determinant in general pricing arrangements.

Further, some WSD authorities said that government discourages any immediate attempt to dispense with property based charging. For example, the SWB argued that:

> ... most of the water authorities have been trying to move on to user pays but have not been able to get rid of their property tax bases either at the speed which they desire or [are] effectively positively discouraged by their governments to move at the speed at which they desire.

Similarly, Melbourne Water Corporation argued that:

> Given the existing incidence of property based charges and political sensitivity to the impact of change, movement off the rate base may be at a slower rate than that desired by the authority.

And, South Australia's new water pricing policy relies heavily on property charges.

While, property-based charges have some CSO characteristics, they also have a number of redistributive impacts seemingly at odds with the generally accepted goals of wealth distribution. There is no clear link between ability to pay and the economic circumstances of individual users. For example, small businesses using relatively little water may pay a much higher price than, say, a large motel in the CBD does. Similarly, occupants of flats and home units may subsidise the water use of more, or equally, affluent people residing on standard suburban blocks. The distributional impact of property based charging is discussed in detail in Chapter 6.

C.4 Funding arrangements

From an efficiency perspective, the way in which CSOs are funded is critically important. The Commission has recommended that all CSOs should be directly funded in full by the governments concerned. Direct funding ensures that the adverse efficiency effects of subsidies are not multiplied by a requirement to fund concessions by overcharging other users. Direct funding is also important in making assistance transparent.

If direct funding of CSOs is to be implemented, a method for valuing obligations needs to be established.

Valuing CSOs in the water sector raises a number of problems. One problem raised by the Water Authority of Western Australia (WAWA) is the costing of CSOs where water and sewerage charges are based on property values. WAWA said that:

> Property values for establishments owned by [charities, sport clubs, religious bodies, various other non-profit groups, State Government and local authorities] are not available to the Water Authority from the same source as for rated properties. As a consequence it is not easily possible to assess the fixed charges that would be payable if such customers were treated in the same way as rated non-residential customers. Although a number of approaches are possible to quantify the benefits provided, all involve significant implementation costs.

A much more significant problem is how common (or joint) costs should be treated for valuation purposes. Many of the costs incurred by WSD agencies can only arbitrarily be split between say, water and sewerage or between different groups of customers. The main issue here is whether or not common costs should be apportioned across all users, including the beneficiaries of CSOs.

The Commission's views on the appropriate basis for valuing CSOs are discussed in Chapter 6 of this report.

Table C.1: Charging and pricing arrangements for metropolitan and country urban water and sewerage services by Various WSD authorities, 1991-92

Organisation	Type of property	Water Properties metered/ Access charge	Water allowance: usage charge	Sewerage Access charge/trade waste charge/environmental levy
METROPOLITAN URBAN				
New South Wales				
Hunter Water Corporation	Domestic	Properties metered: 100 % Access charge: based on the size of water meter; ranges from $80 p.a. for 20 mm to $50 000 p.a. for 500 mm service	Water allowance: none Usage charge: two tier decreasing block tariff 0 to 1000 KL - 71.8 cents/KL over 1000 KL - 64.0 cents/KL	Access charge: based on the size of water meter, ranges from $250 p.a. for 20 mm to $156 250 p.a. for 500 mm service (b) Usage charge: $1.16/KL discharge to sewer (b)
	Non-domestic	Access charge: based on the size of water meter; ranges from $112 p.a. for 20 mm to $70 000 p.a. for 500 mm service. Also based on property value - 2.6 cents/$ (Note: this property based charge is to be phased out by 1995)	Water allowance: none Usage charge: two tier decreasing block tariff 0 to 1000 KL - 71.8 cents/KL over 1000 KL - 64.0 cents/KL	Access charge: as for domestic. Plus property based charge - 10 cents/$ Usage charge: two tier decreasing block tariff (b) 0 to 1000 KL - 29 cents/KL over 1000 KL - 15 cents/KL Trade waste charges: based on quantity and quality of the waste discharged Environmental levy: $75.29 p.a. for all users
Sydney Water Board	Domestic	Property metered: majority Access charge: $97.20 p.a. for metered and $140.68 p.a. for unmetered properties. Plus 0.0448 cents/$ of land value over $33 000	Water allowance: none Usage charge: four tier increasing block tariff ranging from 16.4 cents/KL for up to 219 KL 64.3 cents/KL for above 300 KL	Access charge: $241.92 p.a. plus 0.1148 cents/$ of land value over $33 000
	Non-domestic	Access charge: $163.80 p.a. 1.643 cents/$ of improved land value over $2500	Water allowances: none Usage charge: as for domestic	Access charge: $332.40 p.a. plus 2.893 cents/KL of improved land value over $2500 Trade waste charge: based on quantity and quality of the waste discharged Environmental levy: $80 p.a. for all users

Table C.1: (Continued)

Organisation	Type of property	Water: Properties metered/ Access charge	Water: Water allowance: usage charge	Sewerage: Access charge/trade waste charge/environmental levy
Victoria				
Melbourne Water Corporation (1992-93)	Domestic	Properties metered: 100 % Access charge: based on property value - 2.549 cents/$ with minimum charge of $60 p.a.	Water allowance: none Usage charge: two tier increasing block tariff 0 to 350 KL - 30 cents/KL above 350 KL - 60 cents/KL	Access charge: Rateable properties: based on property value - 5.806 cents/$ with minimum charge of $140.80 p.a. Non-rateable properties: $80.50 per flushing unit
	Non-domestic	Access charge: based on property value - 3.531 cents/$ with minimum charge of $70 p.a.	Water allowance: linked to property based charge 1 KL for every 60 of rate paid Usage charge: 6 cents/KL for consumption above allowance	Access charge: as for domestic Trade waste charges: based on the quantity and quality of the waste discharged
Queensland				
Brisbane City Council	Domestic	Property based rates Access charge: 0.6432 cents/$ with minimum of $202.66	Water allowance: none Usage charge: none	Access charge: based on property value - 0.334 cents/KL with minimum charge of $157.80 p.a.
	Non-domestic	Access charge: 0.6432 cents/$ with minimum of $101.30	Water allowance: none Usage charge: ranging from 65 cents/KL to $1.30/KL	Access charge: as for domestic plus pedestal charges Environmental levy: $20 p.a. for all users Trade waste charges: based on the quantity and quality of the waste discharged
	Domestic	Optional water meter scheme (User pays system) Access charge: $172.20 p.a.	Water allowance: none Usage charge: 0 to 175 KL - 30 cents/KL over 175 KL - 60 cents/KL	
	Non-domestic	Access charge: based on the size of water meter ranges from $160 p.a. for 20 mm to $36 000 p.a. for 300 mm service (Note: metered domestic and non-domestic users can opt to be charge under this or the above scheme at present)	Water allowance: none Usage charge: ranging from 62 cents/KL to $.120/KL	

Table C.1: (Continued)

Organisation	Type of property	Water: Properties metered/ Access charge	Water: Water allowance: usage charge	Sewerage: Access charge/trade waste charge/environmental levy
Western Australia				
Water Authority of Western Australia	Domestic	Properties metered: majority Access charge: $113.40 p.a.	Water allowance: 150 KL p.a. Usage charge: five tier increasing block tariff for consumption above allowance ranging from 51.4 cents/KL for 151 to 350 KL to 96.0 cents/KL for over 1950 KL	Access charge: based on property value ranging from 6.92 cents/$ for value to $4900 to 4.50 cents/$ for value over $13 000. Minimum charge is $127 p.a.
	Non-domestic	Access charge: based on property value from 4.68 cents/$ for value over $1.6 million. Minimum charge is $250 p.a.	Water allowance: linked to property based charge - access charge plus 10% divided by 0.528 Usage charge: two tier increasing block tariff for consumption above allowance up to 600 KL - 52.8 cents/KL over 600 KL - 58.9 cents/KL	Access charge: based o property value ranging from 4.48 cents/$ for value up to $8000 to 4.45 cents/$ for value over $1.6 million. Minimum charge is $250 p.a. Trade waste charge: based on quantity and quality of the waste discharged
South Australia				
Engineering and Water Supply Department	Domestic	Properties metered: majority Access charge: based on property value - 0.08% of Capital value over $117 000 with Minimum charge of $116 p.a. (Note: domestic water pricing is currently under review)	Water allowance: 136 KL p.a. Usage charge: 85 cents/KL for consumption above allowance	Access charge: based on property value - 0.2% of capital value with minimum charge of $162 p.a.
	Non-domestic	Access charge: based on property value - 0.183% of of capital value with minimum charge of $116 p.a.	Water allowance: linked to property based charge - 1 KL for every 85 cents of rate paid Usage charge: as for domestic	Access charge: as for domestic Environmental levy: 10 per cent of the sewerage charge for all properties
Tasmania				
Local Government	Domestic and non-domestic	Properties metered: varies between municipalities Access charge: based on land value ranging from 1 cents to 5.57 cents in the dollar with minimum charge of $130 to $300 p.a.	Water allowance: where metered generally above 360 KL p.a.	Access charge: based on land value ranging from 1.5 cents/$ t 5.2411 cents/$ with minimum charge of $135 to $271 p.a.

Table C.1: (Continued)

Organisation	Type of property	Water: Properties metered/ Access charge	Water: Water allowance: usage charge	Sewerage: Access charge/trade waste charge/environmental levy
Australian Capital Territory				
ACT Electricity and Water (1992-93)	Domestic and non-domestic	Properties metered: majority Access charge: $208 p.a.	Water allowance: 350 KL p.a. Usage charge: 56 cents/KL for consumption above allowance	Access charge: $244 p.a. Non-domestic users also pay a pedestal charge of $244 p.a. for each pedestal in excess of two Environmental levy: $25 p.a.
Northern Territory				
Power and Water Authority	Domestic and non-domestic	Properties metered: 100% Access charge: none	Water allowance: none Usage charge: 38 cents/KL	Access charge: $251 p.a. for domestic users and charges ranging from $251 p.a. plus first two pedestals to $21 256 p.a. plus $134 p.a. per pedestal in excess to 149 united for non-domestic users Trade waste charges: currently under review
COUNTRY URBAN				
New South Wales				
Broken Hill Water Board	Domestic and non-domestic	Properties metered: 100% Access charge: (na) but based on land value with minimum charge payable	Water allowance: linked to property based charge Usage charge: (na)	Access charge: (na) but based on land value
Local Government	Domestic and non-domestic	Properties metered: 92% Access charge: ranges from $100 to $700 p.a. (most are rate based charges)	Water allowance: linked to property based charge. Average allowance is 400 KL Usage charge: ranges from 20 cents/KL to $1/KL	Access charge: ranges from $100 to $700 p.a. (most are rate based charges)

Table C.1: (Continued)

Organisation	Type of property	Water Properties metered/ Access charge	Water allowance: usage charge	Sewerage Access charge/trade waste charge/environmental levy
Victoria				
Ballarat Water Board	Domestic	Properties metered: (na) Access charge: (na) but based on property value with minimum charge payable	Water allowance: linked to property based charge and rages from 300 KL to 800 KL p.a. Usage charge: (na)	Access charge: (na)
	Non-domestic	Access charge: (na) but based on property value with minimum charge payable	Water allowance: (na) Usage charge: (na)	
Benalla Water Board	Domestic and non-domestic	Properties metered: 100% Access charge: (na) but based on property value	Water allowance: linked to property based charge Usage charge: (na)	Access charge: (na) but based o property value
Bendigo Water Board	Domestic and non-domestic	(c)	(c)	Access charge: (na) but based on property value with minimum charge payable Trade waste charge: (na)
Colac District Water Board	Domestic and non-domestic	Properties metered: 99 % Access charge: (na) but based on property value (Note: from July 1992, the Board will introduce a new tariff structure which includes: an access charge based on connection size; a fixed water allowance; and a usage charge for consumption that exceeds fixed allowance)	Water allowance: linked to property based charge Usage charge: none	Access charge: (na) Trade waste charge: based on quality of sewerage discharged

Table C.1: (Continued)

Organisation	Type of property	Water: Properties metered/ Access charge	Water: Water allowance: usage charge	Sewerage: Access charge/trade waste charge/environmental levy
Geelong and District Water Board	Domestic	Properties metered: 98% Access charge: based on the size of the connection ranging from $75 p.a. for 25 mm to $7500 p.a. for 200 mm service	Water allowance: none Usage charge: two tier increasing block tariff 0 to 500 KL - 44 cents/KL above 500 KL -57 cents/KL	Access charge: (na) but based on property value
	Non-domestic	Properties metered: majority Access charge: based on the size of the connection ranging from $164 p.a. for 25 mm to $16 400 p.a. for 200 mm service	Water allowance: none Usage charge: 57 cents/KL	Access charge: (na) but based on property value Environmental levy: based on property value and ranges from about $70 p.a. to $120 p.a. for all users
Portland Water Board	Domestic and non-domestic (1989-90)	Properties metered: (na) Access charge: based on property value - 4.78 cents/$ with minimum charge payable	Water allowance: (na) Usage charge: (na)	Access charge: based on property value - 4.36 cents/$ with minimum charge payable Trade waste charge: based on quality of sewerage discharged
Roachester Water Board (d)	Domestic and non-domestic	Properties metered: 100% Access charge: $100 p.a. per property $90 p.a. for vacant land	Water allowance: none Usage charge: three tier increasing block tariff 0 to 200 KL - 12 cents/KL 201 to 500 KL - 41 cents/KL above 500 KL - 51 cents/KL	Access charge: $220 p.a. per property $90 p.a. for vacant land
Shepparton Water Board	Domestic and non-domestic	Properties metered: 95% Access charge: based on property value - 1.85 cents/$ with minimum charge payable	Water allowance: (na) Usage charge: 24.4 cents/KL	Access charge: based on property value - 2.01 cents/$ Trade waste charge: based on quantity and quality of sewage discharged
Sunraysia Water Board	Domestic and non-domestic	Properties metered: 100% Access charge: (na) but based on property value	Water allowance: (na) Usage charge: 26 cents/KL for consumption above allowance	Access charge: (na) but based on property value

Table C.1: (Continued)

Organisation	Type of property	Water Properties metered/ Access charge	Water allowance: usage charge	Sewerage Access charge/trade waste charge/environmental levy
Queensland				
Budaberg City Council		Properties metered: (na)		
	Domestic	Access charge: (na) but based on property value with minimum charge payable	Water allowance: 600 KL p.a. Usage charge: 36 cents/KL for consumption above allowance	Access charge: (na) but based on property value
	Non-domestic	Access charge; (na) but based on property value	Water allowance: 600 KL p.a. Usage charge: 44 cents/KL for consumption above allowance	Access charge: (na) but based on property value with additional charge for additional pedestals
Johnstone Shire Council		Properties metered: only those properties where exce consumption is expected to occur	Water allowance: unmetered properties - unlimited metered properties - based	
	Domestic	Access charge: $200 p.a.		Access charge: $200 p.a.
	Non-domestic	Access charge: schedule of fees applies ranging from $240 p.a. to $12 000 p.a. depending on type of activity	Water allowance: (na) Usage charge: 48 cents/KL	Access charge: (na)
Rockhampton City Council		Properties metered: none		
	Domestic	Access charge: $287.50 p.a.	Water allowance: (na) Usage charge: (na)	Access charge: (na) but based on the number of pedestals used on the property for domestic and non-domestic users
	Non-domestic	Access charge: (na) but levied on accordance with the flood area of the property	Water allowance: (na) Usage charge: (na)	

Table C.1: (Continued)

Organisation	Type of property	Water: Properties metered/ Access charge	Water: Water allowance: usage charge	Sewerage: Access charge/trade waste charge/environmental levy
Townsville City Council	Domestic	Properties metered: majority Access charge: $269.36 p.a.	Water allowance: 776 KL p.a. Usage charge: 61.26 cents/KL for Consumption above allowance	Access charge: $316.24 p.a. per pedestal (includes charge for refuse collection)
	Non-domestic	Access charge: $27.60 per 10 square meters of total floor area of all buildings on the land or 0.728 cents/$ of the unimproved value of the land, whichever is greater, with minimum charge of $202.18 p.a.	Water allowance: linked to the size of Property Usage charge: 93.38 cents/KL for consumption above allowance	Access charge: $356.32 p.a. per pedestal (includes charge for refuse collection)
Western Australia				
Water Authority of Western Australia	Domestic and non-domestic	Properties metered: majority Access charge: based on property value - 0.183 cents/$ with minimum charge of $116 p.a.	Water allowance: (na) Usage charge: 85 cents/K: (e)	Access charge: based on property value - 0.252 cents/$ with minimum charge of $162 p.a.
South Australia				
Engineering and Water Supply Department	Domestic and non-domestic	Properties metered: majority Access charge: based on property value - 0.183 cents/$ with minimum charge of $116 p.a.	Water allowance: (na) Usage charge: 85 cents/KL (e)	Access charge: based on property value -0.252 cents/$ with minimum charge of $162 p.a.
Tasmania				
Local Governments	Domestic and non-domestic	Properties metered: varies between municipalities Access charge: based on land value ranging from 1 cent to 5.57 cents in the dollar with minimum charge of $130 to $300	Water allowance: where metered, generally about 360 KL p.a. Usage charge: (na)	Access charge: based on land value ranging from 1.5 cents to 5.2411 cents/$ with minimum charge of $135 to $271 p.a.

Table C.1: (Continued)

Organisation	Type of property	Water: Properties metered/ Access charge	Water: Water allowance: usage charge	Sewerage: Access charge/trade waste charge/environmental levy
Launceston City Council	Domestic	Properties metered: (na) Access charge: (na) but based on property value with minimum charge payable	Water allowance: 365 KL p.a. Usage charge: (na)	Access charge: (na) but based o property value with minimum charge payable
	Non-domestic	Access charge: (na) but based on property value with minimum charge payable	Water allowance: 28 litres per dollar of property value Usage charge: (na)	Access charge: (na) but based on property value with minimum charge payable
Northern Territory				
Power and Water Authority	Domestic and non-domestic	Properties metered: (na) Access charge: (na)	Water allowance: none Usage charge: 38 cents/KL	Access charge: $251 p.a. for domestic users and charges ranging from $251 p.a. for the first two pedestals to $21 256n p.a. plus $134 p.a. per pedestal in excess of 149 units for non-domestic users

(na) Not available - information not provided in source documents
a Information provided is for 1991-92, unless otherwise indicated.
b Sewer charge is subject to discharge factor - the assessed percentage of water usage disposed of through the sewer
c The Board is only responsible for sewerage services. The Rural Water Commission provides water supply to the area.
d The Rochester Water Board recently amalgamated with Elmore Water Board and Echuca Water Board to form the new Campaspe Region Water Authority. The pricing regime refers to Rochester and Lockington regions only.
e Except for the Streaky Bay region where a charge of $1.70 applies for water used in excess of 360 KL p.a.
Source: AWRC 1992b, submissions and Annual Reports of various WSD authorities.

Table C.2: Community service obligations undertaken by various WSD authorities, 1989-90 (a)

Organisation	Nature of CSOs	Estimated cost ($'000)	Funding method
METROPOLITAN AREA			
New South Wales			
Hunter Water Corporation (1990-91)	Pensioner rebate scheme (b)	2596	New South Wales Government funds 50% of the pensioner rebates. Remaining 50 % and other CSOs are internally funded
	Hardship relief scheme	2	
Sydney Water Board	Extensive - includes:		
	Pensioner rebate scheme (b)	30 450	New South Wales Government funds 50% of pensioner rebates. Remaining 50 % and other CSOs are internally funded
	Exemptions from access charges for local governments, parks, hospitals, churches and charitable institutions	32 500	
	Hardship relief scheme (b)	150	
	First home buyers' scheme (b) (c)	97	
	Administration of the Government's Special Environmental Programme	nsc	
	(Note: the Board is currently reviewing its COSs)		
Victoria			
Melbourne Water	50% pensioner rebate scheme up to a maximum of $67.50 for both water and sewerage charges	18 000	Victorian Government funds 99% of pensioner rebate scheme
	Free water to institutions (eg hospitals, churches, schools and government departments)	4000	Internally funded
	Administration of rate waiver scheme (b)	132)	Victorian Government reimburses the Board the value of the rates waived. The administrative costs are internally funded
	Administration of retro-fits scheme (b)	30)	
	Drainage and planning rate exemptions	705	Internally funded
Queensland			
Brisbane City Council	40 % pensioner rebate scheme	6100	Majority internally funded with some minor compensation provided by the Queensland Government
	Lowering and raising of sewerage manholes in residential properties	800	
	Maintenance of fire hydrants	750	
	Advice to households	nsc	
	Free water supply to parks and recreational areas	nsc	

Table C.2: (Continued)

Organisation	Nature of CSOs	Estimated cost ($'000)	Funding method
Western Australia			
Water Authority of Western Australia (1990-91)	Pensioner scheme rebate (b)	12 000	Internally funded
	Concession on water and sewerage charges to non-rated government properties, charities etc (b)	5000	
	Apprentice training at a level above the needs of the Authority	1000	
	Water resources management	9000	
	Infill sewerage	13 000	
	Cross subsidies to country operations:		
	Water, sewerage, drainage and irrigation services	40 000	
	Shortfall in replacement cost depreciation	26 000	
South Australia			
Engineering and Water Supply Department (e)	Rebates to particular organisations and public institutions (b)	9400	Internally funded
	Pensioner remission scheme (b)		
	remission grants	11 500)	Funded (except for administration costs) by the Department of
	administration	220)	Family and Community Services
	Community service undertakings such as water resource management; flood mitigation; apprentice training; River Murray diversions; liquid waste disposal; Brukunga Acid Neutralisation Plant	20 600)	An agreed (minor) contribution from the South Australian Government, with the remainder internally funded
	Social justice initiatives such as provision of water and sewerage services to remote Aboriginal communities	1200)	
	Uniform pricing	nsc)	Internally funded
	Water conservation advisory service	nsc)	

Table C.2: (Continued)

Organisation	Nature of CSOs	Estimated cost ($'000)	Funding method
Tasmania			
Hobart Regional Water Board	Free water supplies to the City of Hobart for hospitals, houses for the aged, child care centres and homes etc	137	Not identified
	Free water supplies to the Royal Tasmanian Botanical Gardens in Hobart and the Southern Regional Lawn Cemetery at Kingston	20	
Northern Territory			
Power and Water Authority (e) (1990-91)	Remote community water and sewerage services	11 081	Funded by the Commonwealth Government
	Uniform pricing	nsc	Internally funded
	Pensioner rebate scheme (b)	nsc	Pensioner rebate schemes and water resource management activities are funded directly by the Northern Territory Government
	Baseline data collection and processing for both surface and ground water	nsc	
	Floodplain management	nsc	
	Rural advisory services	nsc	
	Identification of water resources for potential horticultural Development	nsc	
	Projects to assist development of the mining industry	nsc	
Australian Capital Territory			
ACT Electricity and Water (1990-91)	50 % pensioner rebate scheme	899	Pensioner rebate scheme is funded by the ACT Housing and Community Services Bureau. Other CSOs are internally funded
	50 % concession on excess water and sewerage charges to bodies such as churches, schools and hospitals (f)	nsc	

Table C.2: (Continued)

Organisation	Nature of CSOs	Estimated cost ($'000)	Funding method
New South Wales			
Broken Hill Water Board (1990-91)	Water concession for pensioners (b), free water to local government and other bodies for parks and gardens, and water at reduced charges to benevolvent and charitable institutions (b)	288)))	Internally funded
	Sewerage concession for pensioners (b)	110)	
Department of Water Resources	Various eg protection and enhancement of the aquatic environment	nsc	Some compensation provided by the New South Wales Government
Local Government (g)	50 % pensioner rebates up to a maximum of $87.50	10 000	New South Wales Government funds 50 % of the pensioner rebate, with the remainder internally funded
Snowy Mountains Council	Provides recreational facilities, search and rescue operations, and township maintenance and provision of associated community services	nsc	Not identified
Victoria			
Ballarat Water Board	50% pensioner rebate scheme up to a maximum of $67.50 for both water and sewerage charges	791	Victorian Government funds 99% of pensioner rebate
	Free water to municipalities for parks and gardens etc	nsc)	Internally funded
	Compulsory sewerage scheme rebates (h)	nsc)	

Table C.2: (Continued)

Organisation	Nature of CSOs	Estimated cost ($'000)	Funding method
Bendigo Water Board	50% pensioner rebate scheme up to a maximum of $67.50 for both water and sewerage charges	nsc	Victorian Government funds 99% of pensioner rebate
	Subsidy to churches and other specified charitable organisations (b)	nsc)	Internally funded
	Compulsory sewerage scheme rebates (h)	nsc)	
Colac District Water Board	50% pensioner rebate scheme up to a maximum of $67.50 for both water and sewerage charges	nsc	Victorian Government funds 99% of pensioner rebate
	Compulsory sewerage scheme rebates (h)	nsc	Internally funded
Geelong and District Water Board	50% pensioner rebate scheme up to a maximum of $67.50 for both water and sewerage charges	nsc	Victorian Government funds 99% of pensioner rebate
	Subsidised water to pubic parks, gardens and playgrounds - 23% off water usage charge and a 34% off a connection charge.	nsc))	Internally funded
	Subsidised water to benevolent institutions - 61% off water usage charge and a 34% off a connection charge	nsc)	
Hamilton Water Board	50% pensioner rebate scheme up to a maximum of $67.50 for both water and sewerage charges	91	Victorian Government funds 99% of pensioner rebate
	Subsidies for small urban centres		
	Free water to the City of Hamilton for parks, gardens and public reserves	nsc	Internally funded
Latrobe Regional Water Authority	50% pensioner rebate scheme up to a maximum of $67.50 for both water and sewerage charges	nsc	Victorian Government funds 99% of pensioner rebate
	Recreational facilities	nsc)	Internally funded
	Flood warning system	nsc)	
Portland Water Board (1990-91)	50% pensioner rebate scheme up to a maximum of $67.50 for both water and sewerage charges	92	Victorian Government funds 99% of pensioner rebate
	Compulsory sewerage scheme rebates (h)	3	Internally funded
Rochester Water Board (i)	50% pensioner rebate scheme up to a maximum of $67.50 for both water and sewerage charges	32	Victorian Government funds 99% of pensioner rebate

Table C.2: (Continued)

Organisation	Nature of CSOs	Estimated cost ($'000)	Funding method
Rural Water Commission (1988-89)	Various, eg flood warning systems, water industry research and water testing for water boards etc	11 500	Funded by the Victorian Government
Shepparton Water Board (1990-91)	50% pensioner rebate scheme up to a maximum of $67.50 for both water and sewerage charges	nsc	Victorian Government funds 99% of pensioner rebate
	Compulsory sewerage scheme rebates (h)	22	Internally funded
Queensland			
Water Resources Commission	Not identified (j)		
Tasmania			
Hydro-Electric Commission	Provides special lake levels and river flows in lakes, streams and water courses under its control, for leisure and recreational purposes. The Commission is required to ensure adequate provision of water, free of charge, for stock, domestic and irrigation needs	nsc	Not identified

nsc Not separately costed.
a Information provided is for 1989-90, unless otherwise indicated.
b Subsidy rate not specified.
c The First Home Buyers scheme is being phased out.
d This exemption is not mandated by the Victorian Government.
e The authority also supplies water and sewerage services to country areas.
f These concessions are not mandated by the ACT Government.
g Includes local councils providing WSD services to country urban centres in NSW that are not serviced by the Sydney, Hunter, Broken Hill, Cobar, Gosford and Wyong Water Boards.
h Under the compulsory sewerage scheme rebate, Victorian Water Boards are required to provide rebates of 50% of the annual sewerage charges, up to a maximum each year of 10% of the capital costs paid by the landowner. The rebates apply for a period of up to 10 years and are internally funded by the Boards.
i Rochester Water Board recently amalgamated with Elmore Water Board and Echuca Water Board to form the new Campaspe Region Water Authority. The figures reported refer to Rochester and Lockington regions only.
j Identification of CSOs is currently proceeding.
Sources: IAC 1989, submissions and Annual Reports of various WSD authorities

APPENDIX D: ECONOMY-WIDE GAINS FROM PRODUCTIVITY IMPROVEMENTS

The likely economy-wide effects of improved performance through better asset replacement methods and staffing practices are quantitatively assessed in this appendix. To do this, the Commission used a version of the ORANI model which was specially developed for this inquiry. These productivity improvements are considered in isolation from other possible reforms, such as price adjustments to achieve a desired rate of return target.

D.1 Potential cost savings

The productivity improvements considered in the simulations are based on information supplied to this inquiry by the AWRC. This material updates earlier work on potential industry-wide cost savings reported in IC 1990 and Manoel and Reynolds 1989 and disaggregates the estimates across five water and sewerage sub-industries.

Around two-thirds of the cost of providing water and sewerage services is accounted for by the costs of infrastructure: dams, pumping stations, treatment plants, water and sewerage mains, and irrigation channels. Thus higher productivity in the areas of construction, operation and maintenance has the potential to bring about significant reductions in the overall cost of providing WSD services.

Table D.1 summarises the AWRC's estimates of the potential savings in asset replacement costs. The biggest cost reduction -- 30 per cent -- is available for medium and small size water and sewerage mains. In 1989-90, medium and small diameter mains accounted for around one half of the estimated replacement value of water and sewerage assets ($82 billion).

The differences in the estimated cost savings reported in Table D.1 reflect the varying extent to which project management and control is already applied in different types of construction activity; the extent to which competitive tendering for asset replacement is already used; and whether emerging technologies, such as trenchless main laying and replacement, are applicable. Traditionally, cost saving iniatives have focussed on the planning and construction of strategic assets, such as dams and large mains. For example, contracting out is already used extensively for most strategic assets. However less costly assets, such as medium and small size mains, are still frequently installed by agencies' own labour. According to the AWRC, re-evaluation of the materials used in these assets and a total quality control approach could potentially be very beneficial.

Table D.1: **Distribution of asset costs and potential savings, 1989-90**

	Asset value ($m)				*Feasible reduction in asset cost (%)*		
Assets	*Metro*	*Non-Metro*	*Irrigation*	*Total*	*Metro*	*Non-Metro*	*Irrigation*
Large mains							
water	4 953	3 415	183[a]	8 551	10	10	10a
sewerage	2 756	1 230	-	3 986	10	10	-
Medium mains							
water	3 660	10 245	-	1 3905	30	23	-
sewerage	2 982	1 331	-	4 313	30	30	-
Small mains							
water	9 100	-	-	9 100	30	-	-
sewerage	9 870	4 406	-	1 4276	30	30	-
Pumping stations							
water	719	429	55	1 203	15	10	10
sewerage	1 013	397	-	1 410	15	10	-
Treatment plants							
water	1 245	581	-	1 826	10	10	-
sewerage	3 891	1 500	-	5 391	10	10	-
Storage dams	3 208	3 195	4 596	10 999	10	10	10
Reservoirs/tanks	1212	804	-	2 016	15	10	-
Irrigation channels	-	-	4 187	4 187	-		5
Inlet/service structures	-	-	751	751	-		10
Total	44 609	27 533	9 772	81 914			

a All mains
Source: Information supplied by the AWRC

The savings identified in Table D.1 would only be realised once the existing assets have come to the end of their economic lives and need replacing. The estimated economic lives and average age of assets currently in place Australia-wide are presented in Table D.2.

Table D.2 shows that most assets are around a third to half way through their economic lives. The timeframe within which the cost reductions identified are likely to be achievable is: 25 to 45 years for mains, pumping stations, treatment plants, reservoirs, irrigation channels and inlet structures; and around 80 years for dams. Thus, most of the asset related cost savings could be achieved within 45 years.

Table D.2: **Estimated life and average age of various asset categories [a], 1989-90**
(years)

	Mains	*Pumping Stations*	*Treatment plants*	*Storage dams*	*Reservoirs and tanks*	*Irrigation channels*	*Inlet/service structures*
Economic Life	60 to 70	35 to 48	40 to 60	120 to 125	70 to 80	77	51
Average Age	20 to 30	15 to 22	13 to 22	34 to 48	30	33	24

a The estimates abstract from the current level of maintenance.
Source: AWRC database

The cost savings identified in Table D.1 would reduce the replacement cost of water and sewerage assets by 18 per cent or around $15 billion (in 1989-90 dollars). The distribution of the cost savings across metropolitan and non-metropolitan services is detailed in Table D3. Keeping the rate of return at its 1989-90 level (1.7 per cent), the annual savings from the smaller capital stock amount to around $390 million.

Table D.3: **Distribution of estimated declines in the replacement value of assets, 1989-90**

	Asset replacement cost $ million	*Decline in asset replacement cost per cent*
Metropolitan water	24 097	21
Metropolitan sewerage	20 512	23
Non-metropolitan water	18 669	14
Non-metropolitan sewerage	8 864	23
Irrigation	9 772	8
Total	81 914	18

Source: AWRC information.

The information provided by the AWRC also identifed cost savings from improved staffing practices and improvements in the areas of administration and maintenance. These were estimated to be around 10 per cent, amounting to $182 million in 1989-90.

The total estimated savings from improved asset replacement and improved staffing, administration and maintenance would be around $570 million annually. Keeping operating revenue at its 1989-90 level, the average rate of return on assets used in the provision of water and sewerage services would rise to close to 3 per cent.

D.2 The ORANI model

Model details

Simulations of the economy wide impacts of these cost savings were carried out using a version of ORANI[1] developed for this inquiry: ORANI-WATER. In this version of the model, five WSD sub-industries are separately identified: Metropolitan water, Metropolitan sewerage, Non-metropolitan water, Non-metropolitan sewerage and Irrigation.

The economic environment

The effects of reform, as estimated by the model, can depend heavily on the chosen economic environment. In the analyses conducted for this report, the behaviour of households, firms and government represents a response over the long run. The main features of this long run environment are as follows.

- *investment and fixed capital*

  The capital stock for industries other than those in the WSD sector adjusts through investment and inter-industry capital flows to maintain base period after-tax rates of return.

  Aggregate real investment is in fixed proportion to the aggregate stock of capital. To achieve this, the economy-wide average rate of return on capital varies in response to changes in the composition of the capital stock.

- *labour market*

  Changes in aggregate demand for labour are reflected in adjustments to real wages. Aggregate labour supply responds to changes in real disposable income. The unemployment rate is held fixed.

- *public sector*

  The public sector borrowing requirement is held fixed in real terms. Changes in aggregate government revenue and expenditure are reflected in across-the board changes in the rates of tax on labour (household) and non-labour (corporate) incomes.

[1] ORANI is a large multisectoral model of the Australian economy. It captures the interdependencies between industries that arise from the purchase of each others outputs of goods and services; competition for available resources, such as labour and capital; and other constraints that operate generally (eg the balance of trade). In short, the ORANI model provides considerable detail on individual industries within an economy-wide framework.

D.3 The simulations

The productivity improvements simulated arise from the cost savings estimated from information supplied by the AWRC. The improvements associated with lower asset replacement costs were represented as delivering the same level of service with a smaller capital stock than at present - ie 'doing the same with less'. Savings of 10 per cent on operating, maintenance and administration costs industry-wide, were modelled as a reduction in the water and sewerage industry's labour requirements.

In the simulations it was assumed that water and sewerage charges remain unchanged. Instead the cost savings are assumed to increase the capacity of water agencies to pay a return on government equity. As, by assumption, the public sector borrowing requirement remains unchanged, increased payments by the water authorities lead to reductions in general tax rates. An alternative interpretation of this tax reduction is that consumers pay lower fixed charges for water and sewerage services.

The simulated effects of more cost-effective service provision by the authorities will depend to a large extent on the cost structure of the industry and on who benefits from the tax savings made possible by lower water and sewerage costs. In 1989-90, metropolitan water and sewerage each accounted for around 30 per cent of total industry costs, while non-metropolitan water, non-metropolitan sewerage and irrigation represented 22, 12 and 4 per cent of total costs, respectively.

The results are summarised in Table D.4. Improved productivity in the water and sewerage industries is estimated to permanently increase GDP by 0.21 per cent. This gain would have been worth around $800 million in 1990-91. Around one third of the rise in GDP ($270 million) is due to productivity gains arising from improved staffing practices. The remaining two thirds of the GDP increase ($530 million) is due to reduced asset replacement costs.

Table D.4: **Estimated long-run effects of improved productivity**
(per cent changes)

	Improved asset replacement	*Improved staffing practices*	*Total*
GDP	0.14	0.07	0.21
Real consumption	0.21	0.12	0.33
Real investment	0.23	0.05	0.28
Consumer price index	0.02	0.00	0.02
Import volumes	0.16	0.07	0.23
Export volumes	- 0.06	0.01	- 0.05
Balance of trade[a]	- 0.04	- 0.01	- 0.05
Pre-tax nominal wage	0.11	0.06	0.17
General tax rates	- 0.94	- 0.57	1.51

a Expressed as a percentage of base period GDP.
Source: Commission estimates using ORANI-WATER.

The main contribution to the 0.21 per cent rise in GDP comes from the metropolitan water and sewerage industries, contributing 0.07 and 0.08 per cent, respectively. Together these account for over two-thirds of the estimated economy-wide gains. The importance of the contribution made by metropolitan water and sewerage reflects the large share of total assets employed in this part of the industry and the greater scope for cost savings.

Lower cost structures made possible by the productivity gains enhance the ability of WSD authorities to pay a return on government equity. As the public sector borrowing requirement is held fixed, this allows a reduction in tax rates of 1.5 per cent. Reductions in tax rates for households lead to higher disposable incomes, which in turn lead to a 0.33 per cent increase in real consumption. Lower company tax rates contribute to the simulated 0.28 per cent increase in real investment.

The consumption and investment led growth in domestic demand is estimated to result in a 0.23 per cent increase in imports and a 0.15 per cent increase in real wages. The CPI would remain virtually unchanged. The real wage rise leads to a decline in the international competitiveness of exporting industries. Exports are simulated to contract slightly (0.05 per cent). The balance of trade also deteriorates slightly.

As noted earlier, it will take from 25 to 45 years before all the savings arising from improved non-storage dam asset replacement could be realised. In the case of storage dam assets, the savings could not be realised for around 80 years on average. Accordingly, the economy-wide gains associated with reduced asset replacement costs will not be realised until well into the 21st century. Moreover, the AWRC said that the water industry is currently going through a period of relatively low replacement investment. Asset replacement investment is not expected to return to its long-run norm until about 2010. This suggests that only a fraction of the gains from reduced asset replacement costs are potentially realisable in the next twenty years. Given this, the principal source of cost savings over the next decade would come from reductions in operations, maintenance and administration expenditure.

APPENDIX E: RURAL WATER ARRANGEMENTS AND ISSUES: STATE SUMMARIES

This appendix provides summaries for each State of the institutional arrangements for the provision of rural water and drainage services, recent developments and participants' views on a range of rural water issues.

E.1 New South Wales

The overall management of water resources in New South Wales is the responsibility of the Department of Water Resources (DWR). The Department also provides water to about 75 000 customers who include irrigators in Irrigation Areas and Districts, private irrigators (river pumpers), stock and domestic users, country towns and industries. However, in country towns of New South Wales, prime responsibility for provision of services rests with local government councils.

Irrigation contributes about 25 per cent of the value of agricultural production in New South Wales. Apart from public irrigation schemes there are a number of private schemes, principally in the Murray and Macquarie Valleys. The major crops irrigated are oilseeds, cotton, rice, vegetables and other horticulture, together with pastures.

Water allocation

All but one of the major rivers flowing west from the Great Dividing Range are controlled by at least one large dam -- some have two or three storages. The DWR said that additional dams could yield only a small increment in water supply at a high economic cost and, in most cases, with substantial social and environmental consequences.

There is an embargo on new licences to use water on most regulated streams in New South Wales. However, in the Lachlan, Murrumbidgee and Murray River systems, in particular, it has been a long standing practice of the DWR to increase allocations from the river progressively throughout the season to redistribute under-use by some irrigators. The DWR said:

> In some cases, the present embargoes and low levels of use combine to provide an extremely high, and perhaps economically unjustifiable, security of supply to current entitlement holders. In these cases, the embargo could be lifted and auction/tender used to allocate some of the existing resource.

For 'normal' security entitlements (see below), security was said to be close to 80 per cent for the Murray and Murrumbidgee Valleys, but less than 50 per cent for the most northern valleys. Irrigators expressed concern that the level of security could decline as a result of further allocations of water.

The NSW Irrigators' Council referred to the additional flexibility provided by the arrangement in that State whereby irrigators can overdraw or use part of the following year's entitlement in the current year.

Tradeable water entitlements

The temporary transfer of water entitlements has been permitted since 1983. Permanent transfer arrangements have been available for private diverters since 1989. Permanent transfers are allowed at individually negotiated prices. The DWR imposes a transfer fee and approves a transfer only if there are no significant third party effects and supply channel capacity and the environment are not significantly affected. Provisions for permanent transfer in public irrigation systems are expected shortly.

The DWR said that irrigators are becoming more familiar with the concept of permanent transfers and the recession may encourage more users to sell entitlement or portions of entitlements. Intensive use of the transfer arrangements have been confined to specific areas. Even so, some 714 000 ML of entitlement had been transferred by 30 June 1990. A peak of 342 000 ML was transferred in the drought year of 1987-88. The arrangements are estimated to have increased the value of irrigation output in New South Wales by $42.5 million. The DWR attributed the uneven incidence of transfers to the perception of irrigators that by purchasing water entitlements, they will jeopardise their chances of being allocated additional water at the end of the season at no cost.

The DWR is giving consideration to transfer arrangements which might apply to unregulated streams, groundwater and off-allocation entitlements -- as well as inter-valley/basin transfers of surface water.

Asset refurbishment

Rural water supply infrastructure under the control of the DWR has a current replacement value of around $4 billion. Much of this has been poorly maintained. The Murray-Darling Basin Commission pointed out that the cost of rehabilitating irrigation infrastructure in the New South Wales component of the Basin alone would be of the order of $220 million over the next 15 years.

Investment in irrigation infrastructure is largely confined to asset refurbishment, upgrades to meet dam safety standards and outlays on the State's salinity and drainage program. The DWR said that where infrastructure upgrading will directly benefit users, partial user funding is now sought. For example, irrigators serviced by the Dumaresq-Macintyre system on the Queensland border have accepted a fourfold increase in water prices as part of an agreement with the New South Wales Government to enlarge Pindari Dam at a capital cost of $80 million. Irrigators will contribute some $37 million by way of higher charges over a period of 17 years.

The New South Wales Government and irrigators in the Irrigation Areas and Districts agreed in 1989 to a joint funding proposal to accelerate asset rehabilitation over the subsequent five years. Water charges now include an asset rehabilitation levy of $0.55 per ML. The $1.5 million raised from irrigators will be matched by additional government funds for asset refurbishment and applied in accordance with a program developed in consultation with water users. The refurbishment funded in this way is additional to the normal level of government grant funding (some $9 million) that goes into refurbishment. The DWR also requires local communities to contribute to works in support of the Salinity and Drainage Strategy of the Murray-Darling Basin Ministerial Council.

Much of the discussion at the public hearings in Sydney, Moama and Shepparton concerned questions of refurbishment: who should pay; what should be the pace of refurbishment; what parts warrant refurbishment; is the community justified in making the investment when there is little prospect of a real rate of return?

The NSW Irrigators' Council argued that:

> ... since the assets of most systems are now at an advanced age, irrigators' contributions will not raise sufficient funds to fully provide for the surge in replacement costs expected over several years. The substantial depreciation funds which should have accumulated over the past life of the assets to meet this need do not exist. The Government's five year plan cannot make good that deficiency. Irrigators are already contributing at the fair rate, the rate that covers depreciation indefinitely if starting afresh. It would be unjust for them to be expected to contribute at a greater rate to make up for the non-contribution of the irrigators of past decades.

Any decision to refurbish the system should ideally have regard to changes yet to come -- not the least of which might be higher prices for water including provision for depreciation, a return on funds invested in refurbishment and payments for water supplied through the Snowy Mountains Scheme. It is these considerations, amongst others, that will influence the future demand for water, and hence the value of refurbishment.

The approach of the DWR is to move quickly to corporatise/privatise the water boards. It is intended that all irrigation infrastructure will be removed progressively from direct government control and DWR management. The DWR will then become the bulk supplier of water to the supply take-off point for each Irrigation Area or District. The DWR put forward the view that within five years all of the Irrigation Areas will have been privatised, corporatised or encouraged to operate in some commercial mode.

Privatisation of the Jemalong-Wyldes Plains Irrigation District and the Coleambally Irrigation Area was not achieved by the target date of 1 July 1992. Broadly held doubts about the pace of privatisation were summarised by the Ricegrowers' Association of Australia:

> While it is the current N.S.W. Government's intention to corporatise or privatise all public irrigation schemes in the next five years, the reality is this may not happen because irrigators and Government may not be able to resolve hand-over terms or a change in Government could see privatisation removed from the agenda.

Landholder interest in privatisation is related to the age and condition of the water supply and drainage infrastructure. Many argue that governments will need to refurbish some assets to an acceptable standard or provide other incentives for groups of irrigators to take over the system. On the other hand, while government funding of rehabilitation continues, privatisation will not be an attractive option for irrigators in areas requiring major rehabilitation.

To the extent that privatisation is achieved, the community's commitment to replace assets in future will not be open-ended as it now is. And decisions on refurbishment are more likely to have regard to commercial outcomes.

A number of irrigation schemes already operate commercially in New South Wales as privately owned co-operatives. One of these, the Narromine-Trangie scheme in the Macquarie Valley is said to have provided a model for the Jemalong-Wyldes Plains proposal.

Water charging and pricing

Successive governments in New South Wales have regarded the capital costs of storages as 'sunk' costs and have not attempted to recover this capital in any form. The DWR said that there is general recognition of the need to recover operation and maintenance costs of storages and rivers. However, at present the cost of maintaining dams is totally met by government 'in recognition of the fact that major storages are 'national' works from which public benefits are derived'. The same policy does not apply to metropolitan storages.

For rural users of water, charges are linked to the government's 'running the rivers' policy. Under this policy, 70 per cent of the total cost of delivering water from dams to the point where it is diverted from the river, on a State-wide average basis, is to be recovered from irrigators, towns and industry. The New South Wales Government meets the remaining 30ÿper cent of costs, again in recognition of the public benefits.

The DWR said that the current pricing policy should not be seen as a final position, rather that it:

> ... is evolving and represents only the current status in long term negotiation and development between the Department, the Government and users. The policy will continue to be refined through the 1990s to take better account of costs, including possibly the operation and maintenance costs of storages.

The DWR said that there is full cost recovery from river pumpers. Diversions are metered for the purpose of billing. For water distributed within Irrigation Areas and Districts, the policy is also to achieve full cost recovery. However, water charges at present fall well short of this level.

As a one-off subsidy, the New South Wales Government wrote off 'sunk' capital in storages in the early 1980s.

And, in relation to water distribution infrastructure in the Irrigation Areas and Districts, assets existing at 1 July 1984 are regarded as fully depreciated. This means that an adjustment is made to asset values for calculating depreciation. The amount of the adjustment is a government subsidy to operating expenses.

Irrigators in the Irrigation Areas and Districts have recently been required to contribute, through levies and charges, to alleviation of waterlogging and salinity problems. However, water charges have not generally had a component to cover environmental damage. The New South Wales Government said that reforms in the water sector are leading in a direction whereby the environmental effects of water use will be reflected in the prices paid by polluters 'and in an integrated pollution control regime based on market and regulatory mechanisms'.

There is no provision in water charges for a financial return on public funds invested in irrigation. During the public hearings in Sydney, the DWR said that, headworks aside, the target is to break even on expenditure with no component for interest. The real rate of return estimates compiled for the Australian Water Resources Council showed an average of -3.5 per cent for gravity irrigation, and -3.8 for pumped irrigation in 1988-89. However, given the water policies adopted since then, the real rate of return would have increased.

The failure to include in water charges the maintenance costs of storages could present difficulties should the Snowy Mountains Hydro-Electricity Authority be corporatised. The Authority expressed the view that downstream water users should pay for water released from its storages. If agreed, any such charge would have to be imposed by the relevant water authorities.

As pointed out by the DWR, there is scope to open up pricing policy so that specific components are more visible -- whether or not governments then chose to apply a full user pays approach:

> ... the prices we charge for water for industry should reflect that full cost -- the dam and all the headworks should be in the business equation and should reflect that cost to industry and other major commercial users. If government wishes to subsidise ... the irrigation industry, that is a matter for government policy. But I think that it is important that we show the full business equation in how we operate and everyone can then see just where the costs of the operation go.

The DWR, in common with rural water authorities elsewhere in Australia, expressed concern that rapid increases in water charges have the potential to cause social upheaval in rural communities. The DWR also acknowledged the need for better definition of the costs of its own operations and more efficient delivery of its services.

One indicator of irrigators' capacity to pay is the going price for water transfers. For example, prices for permanent transfers in the Murrumbidgee region have ranged from nominal to $400 per ML. Using a 10 per cent discount rate, this latter figure gives an equivalent annualised price of up to $40 per ML.

In the Irrigation Areas and Districts, the pricing of water is now a function of irrigation management boards. The boards are required to operate in a commercial manner. According to the DWR, this means that prices should cover operation and maintenance costs and a contribution to the replacement of assets. However, the management boards have discretion to determine the level and structure of charges. Agreements currently in place and being negotiated provide for increasing water charges to generate funds for investment in drainage schemes.

The charging structure within the Areas and Districts is complex. The traditional charging structure has been a decreasing block tariff. The Lower Murray-Darling Management Board has adopted an increasing two-tier structure (ie a higher charge per ML for water use above 12ÿML per hectare). The Murray and Lachlan Management Boards have retained the two-tier decreasing block structure, but within the Murray Irrigation Area and Districts a two-part tariff is being implemented with a $2 per ML access charge and a flat usage charge. The overall price in the latter case is now $9-$10 per ML plus the asset levy of 93 cents per ML.

The devolution of pricing decisions to the management boards has not avoided disputation in regard to the apportionment of costs, particularly where there are several categories of irrigators such as horticulturalists and rice growers within the one scheme.

Within the Murrumbidgee Irrigation Areas and Districts there are high security irrigation users (horticulturalists), normal security users (large area irrigators) and miscellaneous users (town supplies, stock and domestic, and large residential holdings). Operation and maintenance costs are now apportioned between the various groups of users. To raise the required amount from large area users (ricegrowers), the Irrigation Management Board applies a price matrix whereby charges per ML vary according to large area water deliveries. The matrix for 1991-92 is:

Usage	750000ML	800000ML	850000ML
Areas	$10.15 per	ML$9.50 per	ML$8.95 per ML
Districts	$ 6.35 per	ML$5.95 per	ML$5.60 per ML

In describing the matrix, the Ricegrowers' Association of Australia said:

> In a year like 1991-92 when the D.W.R. announced resource availability at 120 per cent of allocation, if a ricegrower in an Irrigation Area used 120 per cent of his allocation (and few did because of the strict environmental controls on ricegrowing) he would pay $8.95 for every megalitre used...
>
> The [Irrigation Management Board] is currently investigating further changes to the matrix principle whereby an irrigator using more than his farm allocation would pay a higher price than that in the matrix for the additional megalitres. The price for the additional megalitres would be the average price inclusive of the fixed, up-front charges.

Since 1989, a number of changes have been made to reduce cross subsidies in the provision of water:

- regional delivery service charges now apply to river pumpers;

- there are now significant differences in charges for water according to the level of security. Two levels of security are specified. `High security' users are assured of receiving their full entitlement, except in periods of drought. Remaining water is then distributed to holders of `normal security' entitlements;

- some cross subsidies have been avoided within the Irrigation Areas and Districts. The Murrumbidgee Management Board, for example, has increased its charges for small farms (horticulture) to offset the high level of service that was previously partly cross subsidised by charges on large area farms;

- towns which were previously entitled to draw water from regulated rivers without charge now pay a delivery service charge at the `high security' rate; and

- towns drawing from the channel supply system in the Irrigation Areas and Districts previously paid the same water distribution charges as irrigators. They now pay a delivery service charge at the `high security' rate as well as the asset rehabilitation levy.

Corporatisation/privatisation

The New South Wales Government proposes to separate the regulatory and advisory functions of the DWR. This will involve separating storage and river operations from resource management. It will also involve separating Irrigation Area and District management from government. As a first step, irrigation management boards have been established for the four main groupings of Irrigation Areas and Districts. The members are irrigators. The Minister may delegate specific powers of decision, but at this stage, the Boards' responsibilities are to advise over the full range of management issues.

The DWR said that options being considered for storage and river operations in the medium term include:

- commercialisation, but no structural change;

- separation of the resource management and operational functions, and corporatisation of the operational function; and

- privatisation of the operational function.

The DWR argued that:

> In the short term, there is a strong case for having all river regulation, including operation of all storages which affect flows to a significant degree, controlled directly by the resource manager.

The task of separating the regulator and operator functions of the DWR has been carried a step further with the recent establishment of the Environment Protection Authority in New South Wales. The NSW Irrigators' Council expressed support for the decentralisation/regionalisation which has already occurred and said that economies were appearing in costs, particularly overheads. The DWR is encouraging the irrigation management boards to move in the direction of corporatisation/privatisation. As noted above, the Jemalong-Wyldes Plains Irrigation Districts and Coleambally Irrigation Area are expected to be the first to privatise. The New South Wales Government said that the structures under which separation will occur are to be developed as part of a review of privatisation of Irrigation Areas and Districts. The options being considered include full privatisation, corporatisation, and creation of public subsidiary companies which remain in government ownership. There will remain a degree of Ministerial involvement in the pricing of water supplied to the management boards by the DWR. The DWR will retain control of headworks and the run-of-the-river `at least until the operating environment is more conducive to further separation'.

Managing the environment

Environmental protection in New South Wales was discussed by the Ministry for the Environment in terms of the trade-offs needed between conflicting industries -- as where one form of agriculture vies against another. For example, water used in the production of cotton can wash into rivers and affect export beef cattle operations downstream. Another trade-off highlighted was between productive sectors and sewage treatment. Some 250 local councils in New South Wales outside the major urban areas dispose of their sewage to the aquatic environment. The Ministry for the Environment argued that the current New South Wales regulatory approach has worked well for point sources of pollution. Nevertheless:

> There is a pressing need to reduce the nutrient level of the effluent from many of the sewage treatment plants in New South Wales.

The Ministry for the Environment pointed out that the regulatory approach has inadequately controlled diffuse sources of pollution. Diffuse pollution was also highlighted by the DWR:

> Diffuse source pollution remains probably the most significant cause of water quality degradation in NSW and the most difficult to address. Land-use policies have yet to deal with this issue effectively.

The DWR said that water authorities have the task of managing water resources but do not have control over land-use planning decisions.

> Agricultural land planning and management historically has been dominated by advisory activities which have concentrated on farm-level production and on-site erosion. Implications to broader catchment processes, such as the water cycle and the movement of pollutants etc, have yet to be addressed adequately.

Both the Ministry for the Environment and the DWR placed emphasis upon institutional reforms in dealing with resource degradation.

> The issue is really about the adequacy of existing management objectives and mechanisms -- wherever they may lie -- to protect the full range of natural resources and ecological and catchment processes, and whether policy and management across administrative boundaries can be more effectively coordinated to deal with the full range of resource issues.

The DWR pointed to improvements needed in agricultural production to reduce the application and export of nutrients from cropped areas and to contain and recycle tailwater. However, it emphasised the need for action to protect or restore the capabilities of the natural system, for example:

- the buffer and filtering functions of healthy riparian strips along watercourses and wetlands;
- the presence and health of wetlands as natural stores and nutrient cycles; and
- the maintenance and restoration of natural drainage networks and associated vegetation belts.

NSW Agriculture argued that although salinity has been the focus of media attention, the financial losses due to waterlogging are often more significant. The Department stressed the extent to which environmental problems can be traced back to inefficiencies in the provision and use of water. It argued that:

> The primary reason for the land degradation problems in the irrigated regions is the excessive use of water beyond plant requirements, which leads to accessions to groundwater, rising watertables and the resultant problems of salinity and waterlogging.
>
> Not only have water pricing policies encouraged high consumption rates but allocation policies, such as providing as high a reliability of supply as possible, have also contributed to the environmental problems by not reflecting the true scarcity of the water resource.

The argument that underpricing of water has contributed to over-irrigation, rising water tables and attendant salinity and environmental problems was discounted by irrigators. The NSW Irrigators' Council said:

> Irrigators absolutely reject this proposition. When all costs including their pumping costs, their labour costs for irrigating and their on-farm irrigation investment are taken into account, obtaining water for irrigation is far from cheap. For this very reason irrigators certainly do not ignore opportunities to become more efficient in their irrigating and reduce their costs.

NSW Agriculture recommended a number of ways to improve the allocation of water resources (marginal cost pricing, transferable water entitlements, optimal supply reliabilities). The Department argued that with the reforms in place, water would be used in its most efficient uses, and some environmental problems would be alleviated. However, it said that on their own the reforms would not lead to socially optimal water management by irrigators because of:

> ... the existence of external effects, in particular rising watertables, waterlogging and salinity. This results in the situation where the objective of society and the objective of the individual farmer do not coincide. In general, irrigation farmers will ignore the off-site costs in making their own decisions since they do not bear them and they are not held responsible for or accountable for them.

NSW Agriculture saw the solution partly in terms of community involvement in catchment management and the development of regional action plans. Total Catchment Management (TCM) was described as a means of broadening the perspective of all natural resource users.

The Ministry for the Environment and the DWR also highlighted the contribution which TCM can make to improved water quality.

The Catchment Management Act (1989) establishes a State Catchment Management Coordinating Committee and provides for the establishment of regional or local catchment committees or trusts. The committees have advisory and coordinating roles while the trusts -- there are two at present -- have operational and rating powers.

Catchment management is discussed further in Chapter 10, while details of the TCM arrangements in New South Wales are given in Appendix B.

E.2 Victoria

The Rural Water Corporation (RWC), a recently corporatised (see below) government business enterprise, is responsible for the provision of water and related services to rural Victoria. The RWC is accountable to the Minister for Water Resources. Along with the Melbourne Water Corporation, non-metropolitan water and sewerage authorities and river management authorities, the RWC is required to submit business plans to the Minister for Water Resources.

In the Wimmera and Mallee regions, the rural water system (stock and domestic) provides water on an annual basis for filling farm dams. However, the bulk of water supplied through the rural water system is for public and private irrigation schemes. Private irrigation accounts for 7 per cent of the area under irrigation. Most private irrigation is of single farm units, but there are some cooperatives (principally along the lower River Murray) which involve common distribution works to individual farms.

About 25 per cent of the value of irrigated production in Australia comes from Victoria. Orchard, vineyard and other horticultural crops, along with irrigated pasture, account for the bulk of production. About 85 per cent of water for irrigation is applied to pastures for dairying and the fattening of cattle and sheep. Irrigated agriculture contributed $755 million (at the farm gate) to the northern Victorian economy in 1989-90. Milk production was the largest component, contributing some 37 per cent, followed by horticulture 25 per cent and meat cattle 18 per cent.

Water allocation

Irrigators in Victoria enjoy a high security of water entitlement. The traditional approach has been to allocate water on a pro rata or formula basis. However, commencing in the mid-1980s, water that became available on the Loddon, King and Goulburn Rivers was put to auction. The completion of the Dartmouth Dam was one source of new entitlements. The additional water brought prices between $150 and $775 per ML. The Victorian Government referred to the importance of auctions in changing perceptions amongst rural water users:

> The debates and discussions before and since the auctions have brought home the message that water users will have to pay the full costs, including all environmental costs ... (No. 49, p4)

At an auction of new entitlements held in Gippsland in March 1991, all 6000 ML of water were sold at a price of $160 to $200 per ML.

Tradeable water entitlements

Water for irrigation purposes is not scarce in Victoria and hence the incentives to transfer water are limited.

The temporary transfer of water entitlements was introduced in Victoria in the 1987-88 irrigation season. Temporary transfers were available for three gravity supplied irrigation districts (Goulburn-Murray, Campaspe and Macalister), private diversion licences throughout the State, and for irrigation under annual permits in the Horsham area. Other features included:

- prohibition on transfers in the five River Murray pumped districts engaged in horticulture because their water allocations were based on plant requirements;
- transfers negotiated between individuals;
- a minimum of 30 per cent of water right to be retained on any holding (this requirement was later removed);
- transfers subject to approval by the RWC to ensure that supply, capacity, drainage, and salinity criteria were met; and

- the consent of both the owner and any lessee or share farmer was required before water could be transferred from a property.

The new Water Act provides for both temporary and permanent transferability of water entitlements. Permanent transfers will be permitted between owners of holdings within and between prescribed irrigation districts, or to the RWC. A similar, although separate, provision allows for permanent transfer by private diverters. No provision has yet been made for intersectoral transfers of water. Permanent transfers are expected to commence shortly.

The new Act also allows for rights to water to be specified in capacity sharing terms. The Victorian Government has begun the task of analysing different management arrangements on the supply side and is investigating the effects of water trading and pricing. A programming model can convert existing water entitlements into a system of `capacity sharing'.

Corporatisation

Major changes to the structure of the RWC were introduced on 1 July 1992. The aim is to unbundle and regionalise the Corporation's activities so as to enhance the role of customers in decision making and facilitate adoption of modern business practices including contracting and/or franchising all or part of service delivery.

The restructuring involves the creation of five Regional Management Boards (RMBs) responsible for all aspects of service delivery in their regions and a small central corporation to provide strategic direction. The RMBs are expected to be operational on 1 September 1992.

At the draft report hearing, the VFF said that a central corporation should be a transitional measure only. The VFF argued that the Victorian Government's approach does not meet its concept of independent regional organisations:

> It is critical to the success of the reforms that Regional Organizations have full autonomy in relation to decisions on levels of service, pricing, borrowing and expenditures. A structure in which regions have management authority, so long as their decisions are consistent with the policies of a strong Central Corporation, is not regionalisation at all.

The VFF proposed full devolution to the regions through the formation of autonomous and independent regional water corporations. These corporations would have the power to delegate or contract out operational, maintenance, renewal or construction functions. Further, the VFF said that:

> The regions would have the responsibility to set their own level of service and structure of tariffs and pricing. Regions which wished to pursue common tariff policies, with a strong egalitarian slant, could do so. Other regions which were happy to have the underlying costs of water reflected in the delivery price could also choose to do so. (No. 23, p.8)

According to the VFF, its proposal could reduce the cost of providing rural water and associated services by around 40 per cent or $60 million per annum, and would result in additional savings of $10-15 million over and above the model enacted. These savings, it said, would be achieved mainly by greater clarity of purpose, extensive contracting out and better work practices -- the latter being enhanced under the VFF proposal by the creation of 'greenfield' organisations.

Asset refurbishment/privatisation

There is a major maintenance backlog in Victoria's irrigation systems. The RWC said that currently it is investing at least 30 per cent less than that required to keep all assets up to current service levels or past service levels. The RWC's business plan specifies an increase in capital investment from $22 million per year in 1989-90 to $63 million by 1994-95. The Murray-Darling Basin Commission provided information that the cost of rehabilitating irrigation infrastructure in the Victorian component of the Basin could be $300 million over the next 15 years.

Because much of the irrigation in Victoria has been encouraged by the public provision of subsidised water, the value to the community of refurbishing the system is not clear cut. Given that a more commercial approach is now to apply, it is possible that some parts of the system do not warrant refurbishment. A user-pays approach, together with transferable water entitlements implies a reduction in the demand for irrigation water, with consequent implications for the amount, location and type of infrastructure required.

Questions of asset refurbishment go beyond irrigation channels and structures. Decisions which have the effect of carrying forward the existing irrigation systems must also have regard to the contingent requirement for additional drainage and salinity control measures. The Commission understands that in the Goulburn Valley, for example, at least 40 per cent of the area is not drained. If parts of the system were privatised, decisions to refurbish the existing assets would have regard to the likely outcomes under more commercial pricing arrangements. However, privatisation is not on the agenda.

Under legislation setting up the new RWC, ownership of all water supply assets remains vested with the central corporation, although it can delegate responsibility for distribution assets to the RMBs. Thus, the assets will be owned and controlled by a public authority. There is no strategy for privatisation of the distribution system, but this need not rule out the formation of irrigator co-operatives. The RMBs are to have the task of assessing service levels in relation to cost. To date, no part of the existing system has been discontinued, but at the cost recovery levels currently sought (zero rate of return), parts of the system do not appear to be viable. With decision making at the local level, systems might be retained as is, or discontinued, or irrigators might be prepared to pay for improved services and improved assets.

The RWC said that the future of irrigators needs to be linked to community planning in relation to salinity mitigation, rural adjustment and land tenure arrangements generally.

> ... it is not tenable to continue to irrigate some soils that are basically unsuitable for irrigation and where the people really can't make a business out of irrigation anyway.

It seems to the Commission that the Victorian Government has begun a potentially open-ended task of asset refurbishment. Such an outcome is not avoided by the VFF's proposal that reforms involve full devolution to regional water corporations accountable to water users and the State Government. The proposal called for debt write-off and a significant injection of public funds for maintenance and refurbishment of assets. Responsibility for maintaining assets would rest with the regional water corporations, but the assets would remain the property of the State.

Water charging and pricing

Charges for irrigation water comprise:

- a fixed annual charge per ML of water allocated and registered as a water right attached to a block of land, and
- a charge per ML for water used above the water right.

The arrangements provide an allocation of water in return for a fixed fee, regardless of whether that amount is required by irrigators. Consequently, there is no incentive to reduce water consumption below the water right. The VFF pointed out some of the effects of the present arrangements:

> Fruit growers have a particular problem with the current block tariff structure because it reduces the incentive for the installation of micro-irrigation systems. The Northern Victoria Fruitgrowers' Association argue the conversion of old orchards from flood to micro-irrigation systems has been slow as a consequence.

The Victorian Government said that:

> ... the Tragowel Plains, Campaspe and Shepparton Region draft Salinity Management Plans have all pointed out that the present irrigation tariff structures encourage irrigation inefficiency or 'over-watering'. Additional pressure on drainage systems and groundwater levels result when volumes greater than plant requirements are applied. (No. 49, p.25)

The Australian Conservation Foundation argued that the subsidisation of irrigation water has inhibited the development of higher rainfall agricultural land as well as on-farm irrigation schemes.

Notwithstanding a $350 million write off of RWC debt in 1985, the charges for irrigation water fall well short of full cost recovery. The Victorian Government pointed out that, in 1989-90, RWC customers met only 43 per cent of the full costs of irrigation, stock and domestic water supplies:

> The RWC scarcely covers its direct cost of operations, let alone any contribution to replace worn out and obsolescent capital works. RWC costs do not include superannuation benefits to RWC employees or the cost of overdraft facilities.

The Victorian Government disagreed with the approach in New South Wales whereby irrigators are only required to meet 70 per cent of the costs of 'running the rivers'. It said that full cost recovery should be pursued:

> Any instances of Government services being performed should be individually agreed to and the cost provided by Government in line with an agreed service contract.

There is no mechanism at present to bring to account the costs of the Department of Conservation and Environment in managing streams in the rural areas of Victoria.

Real rate of return estimates compiled for the Australian Water Resources Council show an average of -1.2 per cent for gravity irrigation, and -1.6 per cent for pumped irrigation in 1988-89.

The Victorian Government has announced pricing reforms to be phased in from this year. These are expected to involve two-part tariffs: a fixed component covering overheads and access costs, and a volumetric component.

The Victorian Government said that it is determined that the two largest bodies in the water sector (Melbourne Water Corporation and the RWC) should strive to achieve specified target rates of return. It went on to argue that the rate of return should be dictated by the market and that:

> ... the appropriate target rate of return at present should be greater than 5 per cent. The water sector is competing for funds which would commonly earn 8 per cent elsewhere and so it is reasonable for the equity holders in the water sector to expect a commensurate return, having regard to the level of risk and often long-term nature of investment in the water industry.

Against this background, the RWC has been set the target of achieving a zero real rate of return over a 14 year period. In the absence of productivity gains, real charges for irrigation will have to increase.

The VFF questioned the validity of the real rate of return approach:

> If the government is entitled to a return on equity then it should be related to the current market value of the assets, not the written down current replacement value. Given the asserted high levels of subsidy necessary to keep the system operating, and the poor state of repair of the major assets indicated by the RWC's own huge estimates of required refurbishment expenditures, it is debatable whether the assets have a significant market value at all. (No. 23, p. xviii)

These are issues discussed in Part I of this report.

Use of rural adjustment funds

In Victoria, rural adjustment funds are administered by the Rural Finance Corporation.

Under Part A of the Rural Adjustment Scheme (RAS), assistance is provided in the form of interest subsidies, loans or grants to farmers assessed as having prospects of long-term profitability, but who are experiencing short term financial difficulty. Payments to Victorian irrigators under Part A, in 1991-92, amounted to nearly $8 million, which was 36 per cent of the total available funds.

Part B of the RAS involves funds for carry-on purposes for farmers assessed as having prospects for long-term profitability, but experiencing a short-term downturn through economic and/or climatic factors beyond their control. There has recently been no assistance provided to irrigators in Victoria under Part B.

Part C provides assistance to farmers who have been assessed as being without prospects of a return to profitable operation. Payments to irrigators in Victoria in 1991-92 under Part C amounted to $2.6 million or 25 per cent of the total available.

Rural adjustment funds paid to Victorian irrigators in recent years are shown in Table E.1.

Table E.1: **Rural Adjustment Scheme funds paid to Victorian irrigators**

RAS category[a]	*Year*	*Irrigators*	*Assistance*
Part A		*(no.)*	*($'000)*
Loans[b] for farm	1989-90	86	4 300
build-up, better	1990-91	90	5 900
irrigation systems etc	1991-92	117	6 900
Subsidies for interest			
relief on existing	1989-90	78	449
borrowings, debt	1990-91	154	1 227
reconstruction	1991-92	163	1 081
Part C			
Aggregate household	1989-90	na	272
support	1990-91	na	1 270
	1991-92	na	1 600
Farmers who left	1989-90	4	107
the industry[c]	1990-91	24	620
	1991-92	35	1 000

a No assistance was provided under Part B.
b The Rural Finance Corporation issues three or four times as much in commercial loans.
c The maximum a farmer can receive is $30 000. All farmers who received assistance had less than $30 000 in assets. Most of those who left the industry were dairy farmers.
Source: Rural Finance Corporation

Managing the environment

Environmental problems attributable to rising water tables and consequential salinity are particularly acute across northern Victoria. The VFF said that 34 per cent of land in the Shepparton region is salt affected and that this is forecast to increase to 62 per cent by the year 2040. The Kerang area is more severely affected. The VFF concluded that:

> Salinity problems will increasingly require farmers to face the prospect of changes to existing farm management practices and, in the extreme, cessation of irrigation farming altogether. Overall, salinity and other environmental pressures, combined with economic pressures, point to significant structural adjustment within irrigated areas of the State. (No. 23, p.88)

There is growing pressure for the diversion of some irrigation water resources to urban and industrial uses, and for environmental flows. There are also constraints on any augmentation of supplies. The Victorian Land Conservation Council has identified a number of 'wilderness' areas and 'heritage' rivers including the Mitta-Mitta, Owens, Big, Mitchell, Wonangatta and Snowy Rivers. The Council has recommended that any new water diversions on these rivers not impair their environmental and heritage values.

Participants expressed considerable support for reforms which will allow the competing demands for water to be brought within a market framework. The VFF said that it strongly recommends market solutions to meeting competing demands for water rather than political intervention. The Victorian Government argued that the proper approach is to raise the shadow prices to reflect the growing relative and absolute scarcity of environmental amenity.

The Government supported the Commission's draft recommendation that the States should formalise water entitlements for environmental purposes, and that any additional water for the environment should be purchased.

The Australian Conservation Council (ACC) argued that the management of land and natural resources in Victoria is in need of review, and suggested that Victoria might look to new legislation along the lines of the New Zealand Natural Resources Act.

> Whilst on the one hand we are faced with the imperative to address the very serious (and worsening) problems of water management in Victoria, we are obstructed by a confusing mass of legislation and an equally confusing diversity of state, local and quasi government authorities. Problems in land use and natural resource management are by no means confined to water.

The Department of Conservation and Environment is responsible for streamside management in Victoria. However, the care and maintenance of some of Victoria's major rivers and creeks is in the hands of 24 River Management Authorities (RMAs) -- statutory bodies operating under the Water Act, 1989 and managed by Boards and volunteer community members. They undertake erosion control, stream revegetation and fencing work, community education, research and planning.

The RMAs have been working towards the care of streams across whole catchments. This has brought increasing involvement in the work of Landcare and other land conservation groups. Some RMAs are members of Catchment Co-ordinating Groups that encourage all land and water managers and the various interest groups in their catchments to work together. The Association of Victorian River Management Authorities argued that a strong River Management Authority may be a prime requirement for integrated catchment management (ICM), as well as support from a central policy body. ICM initiatives in Victoria are detailed in Appendix B.

E.3 Queensland

The Water Resources Commission of Queensland (QWRC) provides water for urban, rural and industrial purposes (see Table E.2). Through the QWRC, the Queensland Government owns and operates eight Irrigation Areas, 17 Irrigation Projects, and three Water Supply Schemes. The Burdekin River Irrigation Area project is examined in detail in section R4 of Part II of this report.

Table E.2: **QWRC rural water supply, 1989-90**

Type of supply	*Consumers*	*Outlets*	*Allocation*
	(no.)	(no.)	(ML)
Rural irrigation			
- channel system	1 954	3 744	503 088
- private diversion	2 326	3 503	433 922
- groundwater	1 062	1 477	208 554
- waterharvesting	-	-	-
Rural urban			
- towns or shires	51	83	69 747
- individual consumers	220	220	-
Rural industrial			
- mining	16	18	33 128
- power	5	6	16 683
- other	14	32	3 587
Stock and domestic	305	305	981
Hydro-electricity	1	1	44 530
Total	5 984	9 429	1 314 220

Source: Queensland Government submission

Irrigation Areas are typified by delivery of water to the farm boundary by a pipeline or channel; either by gravity from the main storage, by pumping from regulating and reregulating weirs, or a combination of both.

Irrigation Projects are typified by the maintenance of regulated supply in a stream from which water is diverted to farms by private works.

Water Supply Schemes involve pipelines from regulated streams and other works from which water is delivered to several classes of user; predominantly major industry and power generation.

All three types of scheme are multi-purpose. Irrigation Areas and Projects also supply urban and industrial demands, and Water Supply Schemes meet some rural stock and domestic requirements.

Some schemes have reached full development, but irrigation activity is expanding as schemes currently under construction are completed. Most existing schemes have uncommitted land and water resources available for further irrigation.

There are 41 water and drainage boards of various types constituted under the Water Resources Act 1989 which is administered by QWRC. In addition, there are four water boards that are not statutory bodies and 51 bore water boards administered wholly by the QWRC.

The water and drainage boards are essentially cooperative private group schemes operating under varying degrees of supervision by the QWRC. They comprise a government representative and a small number of landholders. Board operations are funded by charges on landholders. Water boards also receive government subsidies to the value of 25 per cent of the capital costs of domestic and stock-watering works. The subsidy does not apply to irrigation works. Drainage boards receive a 10 per cent subsidy on capital works.

Of the 18 water boards, five provide private water for irrigation purposes from surface water supplies or supplement groundwater supplies by artificial recharge. Included in this category are the North and South Burdekin Water Boards which were set up to artificially recharge the groundwater supplies of the Burdekin River delta from surface water supplies. The remaining 13 provide water for stock and domestic purposes (as do the four non-statutory boards).

The six bore water boards (one inactive) were set up to provide water for stock and domestic purposes. They each serve from three to six properties.

The 21 drainage boards are intended to provide improved local drainage. All but one are situated in the wet tropical regions and drain from four to 85 farms.

Several participants referred to the scope for improved productivity (notably for sugar) through drainage of non-irrigated land in the wet tropics. The Northern District Sugar Industry Productivity

Group favoured an integrated catchment management approach to harness community support for drainage and flood mitigation works. The Group sought funding for catchment management works in the wet tropics equivalent to the funding for drainage and flood mitigation typically associated with public irrigation projects.

In 1989-90, there were about 70 000 operative licences and permits to take water. About 8000 were waterworks licences within Irrigation Areas and Projects. The remainder were largely licences to draw from unregulated streams and groundwater and permits for domestic and stock purposes. Irrigation areas make up less than 30 per cent of the area of crop under irrigation.

In addition to State Government funding, Queensland's major public irrigation schemes have been developed with capital grants from the Commonwealth. Projects for which payments have been made to Queensland under the Federal Water Resources Assistance Program include the Bundaberg and Eton irrigation schemes and the Burdekin Dam. In the eight years commencing 1984-85, Queensland received 42 per cent of grants made under that program.

Water allocation

In the past, water allocations were formally tied to the irrigated land. They could not be sold separately and could be used only on the land to which they were attached. Allocations were granted without charge, other than in Irrigation Areas where land was sold after development by the QWRC.

Since April 1990 the policy has been to sell all new and increased allocations from existing and new works under construction and from all new schemes at the planning stage. Sales have been by auction, public tender or at a price set by the Minister to reflect the market-place value of new allocations. Where holdings in new irrigation areas (such as the Burdekin scheme) are being sold, the allocations may be included as part of the total land package.

Traditionally, water supplies in Queensland have been allocated on a high security basis and allocations are generally in line with or greater than normal annual use. The Queensland Government said:

> As schemes become increasingly fully committed, the WRC is moving on a case by case basis (after extensive consultation with existing clients/users) from the previously very safe/conservative allocation policy to a more flexible policy with respect to risk.

Within any one QWRC scheme, a uniform reliability applies to all irrigators apart from those with licences to 'harvest' water or divert 'out of allocation' flows. With the exception of the lower charge for water harvesting, the QWRC has had no explicit policy to provide water at different levels of reliability for irrigation purposes, nor of charging different prices based on reliability. Higher charges and higher reliabilities have applied for some urban and other non-irrigation supplies although the link between price and reliability has not always been explicit.

There are now moves to provide for different levels of risk and reliability.

There are various arrangements for the carryover of water. Arrangements range from the carryover of current year's allocation for a period up to two months, to the carryover of an allocation equivalent to the extent of air space in an applicant's farm storage at the end of a water year. Carryover entitlements are set aside if the headworks storage fills.

The Queensland Government said that advance draws have been introduced in some irrigation schemes:

> Essentially, water that is drawn as an advance on the next water year's entitlement is charged at the basic rate and debited against the next year's announced allocation entitlement. The debit is zeroed if the headworks storage fills.

Tradeable water entitlements

Transferable water entitlements were not an issue in Queensland until recently because water resources were generally not fully committed. Transfers are now possible under the following conditions:

i) Free grant water allocations
   - temporary transfers and retransfers only;
   - for 12 months at QWRC discretion based on system constraints and externalities;
   - history of beneficial use necessary; and
   - licensees pay the fixed charges and clients pay for all water used.

ii) Purchased water allocations
   - transfer and retransfer on temporary or permanent bases by negotiation with the QWRC.

Permanent transfer directly between users is not permitted under Queensland legislation. Intersectoral transfers are determined by the QWRC.

Asset refurbishment

The written down replacement value of the irrigation component of QWRC schemes was about $2.3 billion as at June 1990.

Concern about asset refurbishment is comparatively recent. Asset replacement has been largely funded by special appropriation from State funds. The expenditure generally has not been recovered through water charges and there has been no requirement for contributions to sinking funds. There is now concern that infrastructure is depreciating without provision being made for

major asset refurbishment or replacement. Financial arrangements whereby asset replacement costs can be met by water charges are under investigation as part of the QWRC's water pricing policy review. In the meantime, the Government has said that refurbishment of older schemes will be conditional upon a capital contribution from irrigators.

Water charging and pricing

In 1989-90, revenue from water, drainage and other charges in the Irrigation Areas and Projects exceeded recurrent expenditure by $3.4 million, before providing for depreciation, debt servicing, or substantial components of head office and regional/district office overheads.

The Queensland Government said that the following principles apply to QWRC water charges:

- for water supplied by channels and pipelines to farm boundaries in Irrigation Areas the prices charged are designed to raise revenue sufficient to cover operation, maintenance and administration costs, plus some contribution towards asset replacement where possible;

- the charges set for water diverted by private landholders from regulated supplies are set at around 25-50 per cent of the base rate for channel supplies in recognition of the lower cost incurred by QWRC, and the higher costs incurred by the landholder;

- private diversions from unregulated streams, with a few exceptions, do not attract annual charges. Private diversions from unregulated flows within a regulated stream attract much lower charges in recognition of the very much lower level of reliability associated with water harvesting; and

- water from groundwater resources attracts charges where infrastructure has been provided to induce artificial recharge of the aquifer, or where overcommitment requires some form of regulation.

Charges are set by water and drainage boards to fully recover their direct expenditure.

The Queensland Government pointed out that charges for irrigation water would need to increase by over 450 per cent on average to achieve a 4 per cent real rate of return. However, such increases are not compatible with the State Government's current commitment to limit increases to no more than the increase in the CPI.

The inability to cover all costs in water charges (because it could render the use of water unprofitable) casts doubt on the viability of the State's irrigation systems. This is a problem common to public irrigation projects throughout Australia. It is of added concern in Queensland where much of the infrastructure has been constructed in the last 10 years and where the State Government remains committed to regional development involving public investment in irrigation.

Irrigators pay a minimum charge based on a fixed percentage of their nominal allocation. The fixed percentage varies between 50 per cent and 100 per cent of nominal allocation across the various schemes. There is a basic minimum charge of around $340 in Irrigation Areas and less in Irrigation Projects.

For water supplied by channels and pipes to farm boundaries in Irrigation Areas, the price within the nominal allocation varies from $18.40 to $33 per ML. In schemes where existing supplies are fully committed or approaching full commitment, increasing block charge structures apply for use above announced allocations. With the exception of the Mareeba-Dimbulah Irrigation Area, there is no difference in price based on crop type.

The QWRC is developing a multi-part tariff structure with an access or allocation charge reflecting the cost of maintaining schemes in a state of readiness to supply, and a usage component reflecting the added costs of supplying water.

In the Mareeba-Dimbulah Irrigation Area, a three-part tariff has been piloted whereby:

- a *connection* tariff covers such things as the administration of the account, stream, drain and meter maintenance and catchment land management;

- an *allocation* tariff covers fixed costs related to the nominal allocation of water to a property; and

- a consumption tariff covers the variable costs associated with each holding's metered water use each year. It relates to the cost of delivering the water actually used.

Charges under the three-part tariff are designed to recover direct operation, maintenance and administration expenditure and a small contribution to asset replacement. They do not at this stage systematically provide for depreciation or a real rate of return.

The Queensland Government said that the extension of multi-part tariffs to other schemes will depend on the outcome of the review of the State's overall water pricing policy. The review will also consider the question of a return on assets and dividend arrangements that might apply to QWRC activities.

The Government argued that even under the existing system, there is generally an incentive to conserve water even though the minimum charge includes a substantial volume which is paid for whether it is used or not. This, it said, is because:

- in many schemes (e.g. cotton growing areas and the sugar growing area of the Burdekin), annual water use will inevitably be above the minimum volume and users are fully aware of the mounting costs of wasted water.

- in many schemes throughout Queensland, water is repumped by irrigators e.g. through travelling irrigators. Thus, water used has a considerable added cost to the irrigator.

- drainage charges are levied to recover the costs associated with operating and maintaining the drainage system. In 1989-90, drainage charges of $12.50 per hectare of land served were levied in five of the eight Irrigation Areas.

As in the other States, the expansion of irrigated farming in Queensland has been influenced by the subsidised provision of water in public irrigation schemes. The resulting pattern of farming is now a constraint on the pace of pricing reform. Even so, the Queensland Government noted that there are indications for many of the schemes that the capacity to pay is higher than existing charges. Prices for water entitlements recently auctioned in St George and Goondiwindi regions were $300 to $600 per ML and $310 and $650 per ML respectively. These prices suggest a capacity to pay at least $30 per ML more than current charges.

At the public hearings in Townsville, the Condamine-Balonne Water Committee, along with many other participants, argued that water authorities should recognise the widespread beneficiaries of water use and not single out irrigators when considering cost recovery mechanisms.

An unusual feature of water pricing policy in Queensland is the contribution required from sugar mills. The Bundaberg Sugar Company criticised the concept of a secondary industry paying for a resource used by a related primary industry. The Company said that the mill levy is collected regardless of whether cane growers use the water, or whether water is applied to crops other than cane.

Groundwater management

The QWRC is responsible for the management of artesian groundwater resources throughout Queensland and sub-artesian groundwater in Declared Districts.

The Great Artesian Basin underlies about 65 per cent of Queensland. Poorly maintained bores have meant that discharge from the Basin is extremely wasteful and diminishing. The Queensland Government noted that 86 per cent of the water discharged is wasted, mainly by evaporation. The discharge peaked in 1914 at approximately 1600 ML per day. Currently the discharge is some 700 ML per day and this is expected to decline to 590 ML per day by 2010.

Approximately 750 bores are not controlled. The Queensland Government, through the QWRC, has commenced a rehabilitation program to control these bores and encourage landholders to reticulate bore water by pipe rather than open drains. The estimated cost of the bore rehabilitation scheme is $15 million over 15 years. The funding arrangements are 40 per cent Commonwealth Government, 40 per cent State Government and 20 per cent landholder.

In Declared Districts, the QWRC is responsible for the licensing of bores and the allocation of water entitlements. The Queensland Government said that the uncontrolled use of groundwater for irrigation has resulted in over-exploitation and/or quality deterioration in some areas.

In declared groundwater areas, allocations are volumetric but are only metered in areas of intensive groundwater use. Where there are no capital works to augment/replace groundwater supplies, water charges are based on allocation. Where capital works have been constructed to artificially recharge groundwater supplies or replace groundwater use with regulated surface water supplies, water from groundwater sources is charged for according to use.

Corporatisation/privatisation

The Queensland Government is considering its policy on the corporatisation of State Government business enterprises. The Government said that privatisation of the QWRC is not an option. However, consideration will be given to placing the water production and water management activities of the QWRC on a more commercial footing. Commercial in this context is said to mean clear, consistent financial objectives, commercial accounting and management principles and an emphasis on the delivery of products and services to customers.

E.4 Western Australia

The Water Authority of Western Australia (WAWA) is responsible for the provision of water-related services and for the management of water resources throughout Western Australia. The Authority is accountable to the Minister for Water Resources.

The service provided by WAWA includes urban and country urban water supply, sewerage, main drainage and irrigation. The Authority serves a population of 1.5 million in more than 300 towns and communities throughout the State, the exception being areas served by the Bunbury and Busselton Water Boards, and sewerage services provided to 17 small towns by local authorities. Metropolitan and country areas are supplied from both surface and groundwater sources.

There are financial transfers between urban and rural users of water services in Western Australia. They come about from the deficits incurred on WAWA's country operations, which are no longer funded from consolidated revenue. The services include reticulated water supplies in country areas; sewerage schemes in some country areas; rural drainage; and irrigation. The financial transfers are reflected in the estimated returns on WAWA's assets employed on metropolitan and country operations (see Table E.3).

Table E.3: **Estimated real rates of return for WSD services in Western Australiaa, 1989-90**
(per cent)

WSD services	*Metropolitan*	*Country*
Water	4.8	-1.0
Sewerage	4.0	1.8
Drainage	3.9	-1.4
Irrigation	na	-10.4
Total	4.4	-1.5

na not applicable
a Figures not strictly comparable with figures for 1988-89 reported in Chapter 2.
Source: WAWA (1990).

A feature of the water sector in Western Australia is the provision of stock and domestic water, under pressure, to towns and rural properties in the South-West, Great Southern, Central and Goldfields Regions. The scheme provides a subsidised piped water supply to about 25 per cent of farmers in the cereal and sheep districts.

WAWA also operates irrigation districts at Waroona, Collie, Harvey, Preston Valley, Carnarvon and the Ord River. Irrigators have an allocation, the security of which varies from year to year with the state of the storage. The availability of supply in the south-west of the State has increased in line with the reduced demand for irrigation supplies in recent years.

The prices charged for irrigation, stock and domestic water do not cover costs and in some situations fall short of meeting operating and maintenance costs. The Authority is extending replacement cost depreciation to its country assets but full replacement cost depreciation is not expected to be achieved for 10 to 15 years. It was achieved for metropolitan assets in 1984.

Stock and domestic water

One effect of the subsidised provision of stock and domestic water is that farmers are discouraged from investing in alternative sources of water.

The Western Australian Department of Agriculture estimates that the cost of on-farm supplies is only 25 per cent of the cost of scheme water. However, in areas already serviced by the scheme there is little incentive for farmers to develop on-farm supplies, other than for paddocks remote from the reticulation main. Farmers in adjacent areas are also discouraged from developing on-farm supplies because of the expectation that the subsidised piped supplies may be extended. The Department pointed to the further effect that access to the scheme, or the expectation that the scheme may be extended, may discourage the development of low cost community supplies and the trade in on-farm supplies.

There is considerable farmer interest in extending the scheme and the Commission understands that there are Ministerial initiatives for extensions in localised areas. The capital costs of extension are believed to be of the order of $300 000 per farm. The Department of Agriculture said that farmers have recently been willing to pay up to 30 per cent of costs for a piped connection that would supply water at half the flow rate traditionally provided by WAWA.

The disincentive to develop on-farm supplies is reinforced insofar as farmers can truck water from special sources provided in areas that are declared water deficient. It is government policy that all farmers should have access to water within 40 kilometres of farms.

Water charging and pricing

The area under irrigation in Western Australia (24 000 hectares) represents about 1.5 per cent of total irrigation in Australia. Orchards, vineyards and other horticultural crops make up the bulk of the value of irrigated production along with dairying.

On the whole, prices charged for irrigation water do not cover operation and maintenance costs. The full cost of operation is currently only recovered in the Preston Valley, a relatively new scheme. In 1989-90, WAWA's operating deficit on irrigation was $8.8 million. This is reflected in the negative real rate of return on irrigation assets (see Table E.3).

A range of charging systems apply in government irrigation schemes. For example, in the Harvey, Waroona/Collie and Carnarvon regions fixed charges are based on the area of property irrigated with a volumetric charge applying to water used in excess of the annual allocation. In the Preston Valley, charges are based solely on the volume of water used, while in the Ord River scheme charges are entirely property based.

WAWA referred to a history of subsidisation of water for irrigation. The level of cost recovery has been increasing in response to improved operating efficiency and higher charges, but in some cases:

> ... proposals for increased charges have been effectively resisted by farming communities on the basis of hardship and on the basis that existing charges are already reducing total water purchases made by the irrigators.

WAWA was itself critical of the current pricing arrangements:

> ... the irrigation districts in the South West are using water resources that could be utilised at a greater value in the future to support urban and industrial development.

The Authority went on to argue that unless farms can compete while paying the full cost of irrigation services, the community would be better off not renewing irrigation assets. However, it said that the pace of reform must ultimately be determined by government.

Asset refurbishment

The infrastructure for irrigation schemes has been largely, and in most cases wholly, funded by government. Many of the structures are reaching or have exceeded their design life and re-investment may now be required. The problem is to determine the extent to which refurbishment of assets is warranted, and how it might be funded.

A study by WAWA of public irrigation in the south west of the State has shown that:

- farm water use declined by about 25 per cent over the five years to 1988-89, and WAWA revenue similarly declined;
- revenue from the scheme would have to increase by at least 90 per cent if the users were to fully pay for maintaining the service over the next 30 years; and
- the economic justification for re-investment in the scheme is dependent on the degree and cost of salinity mitigation strategies necessary to maintain agricultural productivity.

The Department of Agriculture said that the marginal value of irrigation water in Western Australia is around $30 per ML for dairy farms:

Consequently it would not pay to invest in expensive ways of replacing infrastructure (eg widespread replacement of supply channels to prevent seepage loss) because benefits from saving the water would be less than costs.

Privatisation would be one way to arrive at a commercial view of the value of refurbishment.

Management of public irrigation systems

Since 1987, WAWA has operated on a regionalised basis with two regions in the Perth metropolitan area and six regions encompassing the remainder of the State. The latter regions are responsible for service provision to both urban and rural customers.

The Western Australian Government has announced its intention to examine the corporatisation of government trading enterprises such as WAWA. Privatisation is not on the agenda.

The potential benefits of corporatisation were seen by WAWA to be:

- a genuine arm's length relationship between government and the water authority;

- further reform of pricing and tariffs to better align charges with the costs of service provision;
- streamlining of existing accountability and regulatory frameworks; and
- acceptance by government that all investment decisions must be consistent with the commercial objectives of maximising value and achieving target real rates of return.

WAWA argued that there is a need for greater flexibility in the management of its human resources. At present, WAWA is required to conform to public sector employment practices. It said that this is a significant constraint on productivity gains.

With or without corporatisation, the future management of the irrigation service in the South-West, Carnarvon and Ord Irrigation Districts is under review. In reference to a South-West Irrigation Strategy Study, WAWA said:

> A range of options from full privatisation of the irrigation distribution system, to maintenance of the current regionalized service by the Water Authority are being considered. An intermediate case is also being discussed. This involves the establishment of a "management body", responsible to the current Water Authority Board but with power to recommend levels of service, maintenance programs and pricing arrangements that ensure that the distribution scheme is run as a financially viable business.

In support of privatisation, the Department of Agriculture said:

> Even if the Carnarvon and South-West Schemes were leased to the farmers at token cost, the Water Authority would be better off because it would not have to meet the operating and maintenance loss and infrastructure replacement cost.

The Department identified other advantages of privatisation. For example:

> In the Carnarvon Scheme, problems such as water stealing may be better resolved by farmers accepting responsibility for management of the resource. It may help to impress on farmers that water is not stolen from the Government, but from each other.

Transferable water entitlements

The use of transferable water entitlements in irrigation districts and proclaimed groundwater areas has been under consideration by the Western Australian Water Resources Council. The Department of Agriculture said that significant gains are possible by transferring water from low value uses. The Department pointed to significant differences in the marginal value of water even between farmers:

> Greater differences are likely to be found between cattle and horticultural enterprises in the South-West, between different kinds of horticultural enterprises at Carnarvon, and between farms on different soil types in the South-West. Farmers currently watering marginally saline or poorly structured soils may have an incentive to sell or lease water to other farmers.

The Department of Agriculture considered that channel and pipe capacities could limit the use of transferable water rights in some areas unless beneficiaries were willing to pay the cost of increasing that capacity. However, it said that the temporary transfer of water entitlements could allow for a more flexible response to seasonal variations in the Carnarvon and South-West Irrigation Schemes.

In its submission following the release of the draft report, WAWA said that the most economic outcome for irrigation in the South-West region may be to gradually scale down the area supplied over a 10 to 15 year period by 40 to 50 per cent. In considering the administrative structure that might promote such a change, WAWA said:

> The establishment of a market that promoted transfer of water between farmers but particularly transfer between sectors of the water industry is one favoured approach.

Integrated catchment management

An Office of Catchment Management (OCM) has been established as a focus for integrated catchment management (ICM). The OCM also acts as secretariat for the Integrated Catchment Management Co-ordinating Group, consisting of senior officers from all State agencies involved in land and water management.

Statutory environmental limits (or firm management targets) are being set on a catchment basis -- for instance for the Peel-Harvey coastal catchment where nutrient management is essential in reversing environmental degradation.

The OCM argued that corporatisation of the major agencies has contributed to the withdrawal of resources from areas such as stream monitoring and advice to regional ICM groups:

> The contraction occurring in all government agencies at present means that the amount of ground between agencies is increasing, the gaps are getting wider and the ability of agencies to bridge those gaps is being reduced.

Ord River Scheme

Irrigation on the first farms in the Ord River Scheme began in 1963 but the main dam was not completed until 1971. Some 14 000 hectares have been released in Stages 1 and 2 of the Scheme which was initially intended to cover 72 000 hectares.

Water released from the Ord dam is raised by a diversion dam to provide gravity fed water to a major part of the system. Horticultural farms along the river bank pump directly from Lake Kununurra or the Ord River below the diversion dam. Pumps on Lake Kununurra raise water to irrigate a further section where irrigators pay more for water than do broad acre farmers elsewhere in the Scheme.

There are now 102 farmers, the majority of whom produce horticultural crops. Sixty-four farms have an area of 2-20 hectares and 38 have 65-400 hectares.

The major crops are bananas, vegetables, hybrid seed, culinary grains, stockfeed grains, hay, mangoes and leucaena pastures for cattle fattening. The Department of Agriculture said that irrigators are successfully responding to niche markets for horticultural crops, but field cropping is only marginally profitable. In 1990, the gross on-farm return was about $25 million.

The Ord Development Council said that there are opportunities for major expansion of banana production and cattle fattening, and for a sugar industry. A privately funded mini-mill for the production of sugar was purchased in 1991.

Water from the Scheme supplies two diamond mines, and the installation of a hydro-electric power station is planned to commence during 1992 to supply the Argyle diamond mine. The Ord Scheme has also encouraged tourism in the region.

The concerns raised by the Ord Development Council were similar to those voiced by irrigation groups elsewhere in Australia, notably:

- the need for greater efficiency on the part of the water authority leading to lower maintenance and operating costs (a review of the operations of WAWA is to be undertaken in 1992); and

- concern that the benefits of irrigation to the whole community should be recognised and that all beneficiaries should contribute to cost recovery (the concept of `beneficiary pays' is discussed in Section R1 of Part II of this report).

The Ord Development Council also sought Commonwealth and State Government funding for further development of the Scheme, and said that WAWA has a responsibility to stimulate development in the expectation of increasing revenue from additional users of water.

Like many other irrigation systems, there is little prospect of the community recovering its investment in the Ord River Scheme. The issue now is how to achieve the best outcome for the community from a scheme which is unlikely to have gone ahead had there been a requirement for full cost recovery.

From time to time, major structures or sections (perhaps valves and spillway gates) may need to be replaced. Such refurbishments are only warranted if the expected benefits exceed the cost of the replacement and the expenditure can be recovered in user charges. Otherwise it would be efficient to forego the expenditure and allow the system to deteriorate or be truncated.

Costs in relation to drainage, sedimentation of the dam and catchment regeneration are also part of the equation. The Department of Agriculture said that with the present rate of sedimentation deposition, there will be security of supply of water for irrigation farming well beyond 100 years. However, rising groundwater and salinity problems commonly emerge after some years of irrigation. The demise of the rice industry in the Ord Scheme may have retarded the rate of

groundwater recharge, but the Department of Agriculture said that it is likely that the supply and drainage infrastructure is having a major effect on groundwater tables. Groundwater mounds have been identified and the Department referred to the possibility that remedial works will be necessary in the medium term. Monitoring by the Mines Department, WAWA and the Department of Agriculture all contribute to the current cost of maintaining the Scheme.

The costs of operating and maintaining the Ord Scheme (excluding the above add-ons) are of the order of $2 million per annum of which the current users of water meet less than half. In 1990-91, total revenue was $727 000 of which $477 000 was paid by irrigators as water rates and service charges and the remainder by the mining industry as water sales.

WAWA has been moving to recover a higher proportion of its operating costs, and increased water charges by 15 per cent for 1991-92. The Ord Development Council indicated some expectation on the part of irrigators that water prices will be increased to recover costs. In keeping with the recommendations in Part I of this report, it is important that after the forthcoming review of the operations of WAWA, every effort be made to progressively recover from users of water the full operating and maintenance costs of the Ord Scheme.

But what of new industries or expansions of the area under irrigation involving additional infrastructure?

WAWA said that it would expect such developments to be on a full cost recovery basis -- unless there was a government decision 'to treat it as a community service obligation in support of regional development'.

Having regard to the inefficiencies (in terms of both economic and environmental outcomes) which have followed from public investments in the name of regional development, the Commission can only reiterate its concern that any initiatives leading to further areas of irrigation, or public investment in irrigated agriculture, be on a fully commercial basis with water charged at full cost. A proposal to pipe Kimberley water to Perth is discussed in Section R5 of this report.

E.5 South Australia

In South Australia, the Engineering and Water Supply Department (EWS) has responsibility for all aspects of water resources management. It carries out all State regulatory functions for inland water resources; it is the major provider of water supply and urban sewerage services; and it is the largest single operator of irrigation schemes. Some separation of these roles is under consideration and it is likely that a future Environmental Protection Agency will become responsible for licensing of discharges to water courses.

The major water systems, being based on the River Murray, are inherently secure from drought as a result of the regulation of such a large catchment and the need for flushing flows to be maintained to control salinity. The main transfer and storage systems have a significant degree of spare capacity. As downstream users of the water, South Australians are very dependent upon inter-government co-operation in management of the river under the Murray-Darling Basin Agreement.

Production from private and public irrigation schemes contributes about 20 per cent of the value of agricultural output in South Australia. More than half of the water is applied to pasture, but the bulk of the value of production comes from orchards, vineyards and other horticultural crops.

The EWS is required to provide and maintain facilities for supplying and distributing water within the government irrigation areas. It is also responsible for the construction, operation and maintenance of the schemes.

Water allocation

Any person using water from a proclaimed area in South Australia requires a licence. There are three proclaimed water courses (the Murray and Little Para rivers and Bolivar Outfall Channel) and ten proclaimed groundwater regions. More than half of the State's irrigation water is from groundwater resources, most of which are proclaimed.

The Murray River is the most important single source of irrigation water. The volume of water taken for irrigation is determined by allocations for both private irrigators and those in government irrigation areas. The Highland Irrigation Areas (HIA) established on this watercourse account for about 14 per cent of total irrigation water used. Private irrigation schemes and individuals pumping from the Murray use a further 24 per cent. New allocations have been severely restricted since 1968.

About 68 per cent of the irrigation water pumped in the HIAs in 1991-92 was supplied under low pressure. About 10 per cent was high pressure and 22 per cent open channel.

About two-thirds of HIA irrigators are metered and others are billed per hour of supply. The South Australian Government proposes to introduce metering for all irrigators as rehabilitation of the older irrigation areas proceeds. Each entitlement has the same security of supply, although in the North Adelaide Plains, differences arise due to location.

Transferable water entitlements

Transferability of water entitlements was introduced in 1983 for private diverters on the Murray River; in 1984 for groundwater users in the Northern Adelaide Plains groundwater basin; and in 1989 for the government irrigation areas along the Murray. Both permanent and temporary transfers are permitted and both are used.

Between 1983-84 and 1990-91, approximately 23 000 ML of water was transferred along the Murray and about 2000 ML in the North Adelaide Plains. Transfers represented about 0.8 per cent of allocations in the Murray area and 0.3 per cent in the North Adelaide Plains in 1989-90. From this perspective, transfers have not been extensive. Even so, the Government argued that:

> The availability of a free market transfer mechanism is an ... instrument for the government policy of encouraging structural adjustment in the State's agricultural sector. ... The experience to date is that a significant proportion of the water so far transferred has been previously unused entitlement; so called 'sleeper' water. That this is now put to productive use is a gain in efficiency.

On the River Murray, two systems apply:

- Where water is drawn under licence (private) from the river, allocations are generally transferable along the length of the river within the State, with some conditions applying to ensure that there is no land degradation due to salinity or drainage.

- Within the government irrigation areas, under some conditions, water can be transferred between users within each government system. The limitation is on the capacity of the supply system to deliver water between locations. There is no transferability between government irrigation systems or across State borders.

The advice of Regional Water Resource Committees is sought before authorising transfers. Few applications have been refused. The Government referred to the need for constraints on transfers in some circumstances:

> On the River Murray, transfers are not permitted where they will lead to a significant increase in river salinity or where they will be a nuisance to neighbouring properties. In reality every transfer, because it is likely to be using water which previously was not used, will aggravate the salinity problem. ...
>
> Because there is overuse of the groundwater [in the North Adelaide Plains] each transfer is subject to a reduction in the size of the allocation. At present, transfers between irrigators are subject to a 10 per cent reduction and transfers to industrial use are subject to a 70 per cent reduction. The difference ensures that if there is a long term trend to industrial use, it will be at sustainable levels.

The Government indicated its support for intersectoral transfers (eg from irrigation to metropolitan use). To date little water has been transferred from one productive use to another, but it said that:

> In some cases, irrigators have sold their entire water entitlement and pursued another land based development such as subdivision for rural living or marina development.

At the draft report hearing, the South Australian Government said that the main intent of the transfer system is to enable diversion licences along the river to change hands -- rather than the transfer of water within and from irrigation districts. There is currently no opportunity for transfer from government irrigation areas to private diversion or vice versa, or between irrigators in different government irrigation areas even though they obtain water from the same source, the River Murray.

Within irrigation districts, the South Australian Government said that the emphasis was on:

> ... structural adjustment involving amalgamation of land holdings into larger entities that can be formed more economically. Generally that has taken precedence over any consideration of movement of the water.

Water charging and pricing

A fixed charge per irrigator is applied by the EWS for irrigation water supplied in the government schemes. The charge is calculated by multiplying half the yearly water allowance by the prevailing price for water in the irrigation area. Currently the charge is $47.60 per ML. A volumetric charge applies for water used above the allowance. It doubles and quadruples for water used above 100 per cent and 120 per cent of allocation, respectively. The price penalty for excess water use ensures that allocations are rarely exceeded.

The base charge is applied whether the water is used or not. This is said to encourage irrigators to sell water allocations which they are not able to use. It may also lead to overwatering. The Government proposes that charges should eventually be volumetric and based on long run marginal cost.

Private irrigators are not charged for their allocation. A penalty of $800 per ML applies for water used above the annual entitlement, but the majority of private irrigation farms are not metered.

In some cases, a small depreciation charge, based on historical asset costs, is collected from irrigators, but in the majority of cases irrigators contribute nothing to the capital costs of service provision. In South Australia, as elsewhere, water services have been provided by governments as a means of stimulating regional development. The Government said that this is no longer the policy, but maintaining services irrespective of their commercial prospects remains a consideration.

The South Australian Government is giving consideration to rate of return targets for its public authorities, including the EWS. Estimates compiled by the Australian Water Resources Council show that in 1988-89 the real rate of return to gravity irrigation in South Australia was -5.2 per cent, and for pumped irrigation -1.3 per cent. The increase in irrigation charges which would be required for an 8 per cent return on assets was estimated by the Government to be of the order of 415 per cent. The inability to recover full costs 'let alone a shadow price for the externalities' was said to be an impediment to structural adjustment within irrigated agriculture.

Asset refurbishment

The infrastructure in public irrigation systems is old and in need of refurbishment. As in other States, funds have not been accumulated for refurbishment and the Government is now faced with decisions on which schemes to refurbish in circumstances in which many irrigators presently contribute nothing to infrastructure costs.

The problems generated by earlier subsidised developments were described by the South Australian Government as follows:

> Now the development is too poor to pay at levels required to operate the existing infrastructure on a commercial basis and too valuable socially and in terms of regional economies to abandon. The existing investment will probably need to be treated as a sunk cost. The expected cost recovery should ideally be limited to cover a redefined level of infrastructure investment which is capable of viable performance.

The United Farmers and Stockowners of South Australia expressed similar concerns:

> In a narrow, commercial sense, looking at irrigation alone, refurbishment of those systems may not be economic. However, there are ... very significant social and political objectives to be considered, as well as wider economic issues, reflecting the contribution of those areas to regional social infrastructures and economies.

There are currently nine Government HIAs along the River Murray. A program to replace inefficient channel networks was begun in the 1960s but ceased in 1985 after five of the Areas had been modernised.

The intention now is to rehabilitate the four Areas still supplied by concrete channels. Contributions from irrigators, the State Government and Commonwealth Government are proposed in the ratio 20:40:40.

The package of proposals has the agreement of a growers' negotiating committee elected to represent the nine Areas. As part of the package, the charges levied on growers for irrigation services from 1991-92 are intended to cover:

- the full cost of operations, administration, minor construction, and contributions to an asset replacement fund designed to cover all future asset replacement following the completion of the program; and

- the contributions of growers to the rehabilitation program.

It is further proposed that the South Australian Government assume responsibility for some $50 million of debt incurred prior to the commencement of the program.

The estimated cost of the program is of the order of $39 million. The work required for the complete rehabilitation of the supply network of HIAs has been programmed into three separate three year periods. The objective in the first period is the rehabilitation of the Moorook Irrigation Area and the Nookamka Division of the Cobdogla Irrigation Area. A total of $13.5 million is required, with a projected grower contribution of $2.7 million.

At the time of the first round of public hearings for this inquiry, the Commonwealth Government had committed $500 000. The Department of Primary Industries and Energy said it was seeking further analysis of regional viability, including drainage and environmental impacts:

> We are in the process of reaching agreement with the South Australians whereby they will develop a strategy demonstrating that the economics, for example, of partial rehabilitation as opposed to complete rehabilitation of the highlands area to see whether or not the economics are better and indeed in our view partial rehabilitation is the only thing that is economic in some areas of the highlands.

In July 1992, the Department of Primary Industries and Energy advised the Commission that the forthcoming Commonwealth Budget is expected to contain financial assistance for a three-year package of works in areas which are accepted as economically viable and sustainable:

> Commonwealth commitment to a second and third phase of rehabilitation will be considered in light of the performance of the first three year program as well as the outcome of further significant investigations which will in part, identify sites considered unsuitable for rehabilitation.

The viewpoint that some parts of the system might not be rehabilitated was not apparent in the approach described by the South Australian Government.

The South Australian Government said that refurbishment of the remaining 33 per cent of assets is to be completed during the period 1992-1999. The Government argued that full refurbishment is necessary because:

- four of the eight districts (6 per cent by area) have been refurbished;
- all areas are required to contribute to the completion of refurbishment;
- there is a uniform water price in all districts and because refurbished areas have lower operating costs, the operating surplus in the refurbished areas offsets the operating deficit in the unfurbished areas; and
- it would be inequitable if unfurbished areas had to bear their full operating costs when other areas were fortunate to be refurbished before them and could enjoy reduced operating costs.

This seems to the Commission to be a very questionable basis on which to undertake full refurbishment. To date no area has been excluded.

The South Australian Government said that the rate of return on public investment in the HIAs before rehabilitation is of the order of -1 per cent. After rehabilitation the projected rate of return is -0.5 per cent. The Government said that the motivation to spend State and Commonwealth money on rehabilitation is:

> ... to facilitate the self management of the irrigation schemes and in doing so, remove in perpetuity, operating deficits from this sector.
>
> Governments have clearly placed a premium on the ability for irrigators in the future to influence their own livelihoods, an outcome that is best achieved through self management of current government irrigation infrastructure. As argued previously, this is not possible without refurbishment.
>
> To the extent that irrigation infrastructure is refurbished, current irrigators are the beneficiaries. As Government funds represent eighty (80) percent of the finance for this work taxpayers, including those irrigators that pay tax, contribute the finance. There are, however, benefits from the work that accrue to the broader community including any flow on of increased irrigator incomes to the local community (not included in any cost benefit analysis to date), reduced salt degradation of the river and reduced operational deficits.

The Loxton Irrigation Area, which is owned by the Commonwealth and operated by the South Australian Government, is not included in the proposal to refurbish the HIAs.

Corporatisation/privatisation

The EWS now operates 'off budget' and, subject to other changes, is expected to offer services on a commercial basis. The South Australian Government said that corporatisation is not accepted as necessary for reform:

> Rather government is seeking to achieve reform through vigorous commercialisation within the existing departmental framework. ...
>
> Just as corporatisation is not under consideration, nor is any change in the basis for establishing conditions of employment, although much is being done to make the conditions themselves more flexible through award restructuring.

The Government said that privatisation is not a necessary precondition for the efficient operation of public agencies, but that self management of irrigation schemes is favoured by the Government and irrigators.

As part of the package to rehabilitate the HIA, it has been agreed that the capital contributed by growers should entitle them to assume the management and ownership of government irrigation assets, should they agree to do so on an individual basis.

In recent years, irrigator elected district boards have been given increased responsibility in operations and management decisions. The South Australian Government said that in the period 1992 to 1994, boards will be restructured to achieve grower autonomy and responsibility and to complete the transition to full commercialisation through the adoption of business plans empowering a regional board to set service levels, budget and the price of water within government guidelines.

The intention is that 1998 should see full privatisation, with irrigators responsible for all operations beyond the point of bulk supply. The Government said that corporatisation is not an essential step between regional management and self management. It is intended that a self managed organisation will operate under a proposed Irrigation Management Act.

Managing the environment

The South Australian Government expressed concern at the delays in bringing about the co-ordination needed for sustainable use of land and water resources. Co-ordination is presently supervised by a Natural Resources Management Committee comprising heads of the relevant agencies. Its expansion into a Natural Resources Council is under consideration.

An integrated catchment management approach has been adopted in the Mt Lofty Ranges and the Murray Valley. Based on the limited experience to date, the Government said that to be successful the process needs to be comprehensively organised and funded. For the Mt Lofty Ranges, the main water issue has been the load of nutrients entering water supply reservoirs. For the Murray Valley, salinity is said to be reasonably well controlled, but nutrient loads and the link between the regulated flow regime and the ecological health of the backwater and riverine plains are newly emerging issues.

As part of the rehabilitation of the HIA, existing irrigation channels will be replaced by pipes. This will eliminate channel spills and leakages and contribute to better irrigation practices -- thereby lessening environmental degradation.

Apart from localised loss of artesian pressure, deterioration of water resources of the Great Artesian Basin is said to be slow.

The South Australian Fishing Industry Council was highly critical of the continuing contamination of waterways, and water flow management which gives little or no consideration to the impact upon fish stocks. The Council referred to a 'tyranny of small decisions which result in the overall degradation of the resource and its associated systems'.

A State Environment Protection Authority is to be established during 1992.

E.6 Tasmania

The Rivers and Water Supply Commission (RWSC), together with the Water Resources Division in the Department of Resources and Energy, is responsible for the management of water services in Tasmania. The RWSC owns six dams, treatment plants, bulk mains, pumping stations and channels, with a written-down asset value of $150 million.

The Hydro-Electric Commission (HEC) controls approximately 95 per cent of Tasmania's water resources for electricity generation purposes. Generally within hydro electricity water districts, all water resources are vested in the HEC. Once the water passes through the turbines, control of the resource goes to the RWSC.

A small amount of irrigation comes under the control of local government and there are four government irrigation schemes operated and maintained by the RWSC. The Tasmanian Government said that 5 per cent of the water used for irrigation is from subsidised government schemes. In 1990-91, 69 properties irrigating 2300 hectares were serviced by the public schemes. Other irrigators draw from on-farm dams or divert straight from streams. The RWSC is responsible for issuing licences for on-farm water supplies.

Although more than half of the area irrigated is for pasture, the value of irrigated production comes largely from horticulture. The predominant technique is spray irrigation. By mainland standards, the public irrigation schemes in Tasmania are of very recent origin. They nevertheless fall well short of full cost recovery.

Water allocation

Water allocation within the State Government irrigation schemes is undertaken by the RWSC on the following basis:

- 1 ML of water for every hectare of land fit for irrigation by gravity; or
- 1 ML for every 1.5 hectares of land fit for irrigation in the whole of the holding, whichever is the greater, with a minimum allocation of 12 ML.

Irrigation Rights are attached to the land and not to the owners. Riparian rights also exist. The HEC is required to release water to meet riparian rights `for all reasonable requirements'.

In August each year, irrigators are invited to advise whether they wish to increase or reduce their Irrigation Right for the coming season and their final entitlements are then determined. The rates for Irrigation Rights are paid at the start of each season. Irrigation Rights in Tasmania have a 95 per cent reliability of supply. Additional inflow into storage headworks in any year is sold as excess water to irrigators who request additional supplies.

Transferable water entitlements

Temporary (one year) entitlement transfers have operated for the last three years in the Winnaleah Irrigation District since a shortage of irrigation water was identified in that scheme. All arrangements are administered by the RWSC. There have been no shortages in other State-run schemes. The Tasmanian Government said that:

> Temporary transfers allow those irrigators who wish to irrigate additional crops to do so and allow other irrigators who do not intend to use all of their entitlement to 'free up' that water and to also obtain what in effect is a rate rebate. (No. 98, p23)

Water charging policies

The RWSC sets the charges for government irrigation schemes. In the South East and Winnaleah Irrigation Schemes the charge is $40 per ML for the Irrigation Right and $40 for all water taken in excess of the Right. A pumping charge also applies to Stage 2 of the South East Scheme. In the Cressy-Longford Irrigation Scheme, the charge is $15.25 per ML of Irrigation Right and $13.50 per ML for all water used.

There is no charge for water which is pumped from streams by farmers. Water is released without charge by the HEC. Farmers only pay a licence fee when constructing a dam on their property.

There is a provision for HEC to sell water. The Tasmanian Government said that:

> Charges are made for water released to other authorities (for irrigation or industrial use, etc) where, as a result of the release, the HEC loses the water for its core business of electrical energy production. The charges made are determined to cover the current value of the water had it been utilised to produce electrical energy. (No. 98, p4)

Charges in the government irrigation schemes are intended to cover operational costs but not capital costs. Capital investment is subsidised through borrowing concessions and State Government subsidies for interest and principal repayments on borrowings. In 1990-91, $2.7 million was provided by way of subsidy for the three newer irrigation schemes (the South East, Winnaleah and Meander Schemes) and $90 000 for the Cressy/Longford irrigation scheme. The Tasmanian Government said that new irrigation schemes will only be established on a full cost recovery basis.

Further, the HEC is effectively subsidising some irrigators on the Ouse, Shannon and Lake Rivers where, in order to exploit the potential to generate power, it has entered into undertakings to supply unlimited amounts of free water. Additional capital works have been required. The Tasmanian Government expressed concern that the open ended commitment given by the HEC in 1964 continues to be a financial burden to it and a source of embarrassment:

> The HEC cannot easily extricate itself from this situation because the supply of free water to the irrigators along the Shannon, Ouse and Lake Rivers has come to be regarded as a legal right.

The Tasmanian Government said that to achieve a 4 per cent real rate of return the annual charges for water would have to increase three to five times. Referring to policies which have required the users of water to meet only a small part of the cost, the Government said:

> The consequence is that there are irrigation schemes which would not be viable without low costs of water supplies and there are then the political problems for Governments seeking to increase charges. (No. 98, p19)

Unlike irrigation, the State-owned bulk water authorities are moving to achieve a minimum 4 per cent return on assets.

Asset refurbishment

Infrastructure within public irrigation schemes in Tasmania is very young. The Government indicated that the need for refurbishment has been minimal, but no provisions have been made for future asset replacement:

> ... the disparity between the true cost of water and the current pricing policy will result in an inability of these schemes to generate reserves.
>
> The community needs to be made aware of the true cost of services and pricing policies adopted which will avoid major funding difficulties in the future. (No. 98, p17)

The Government said that asset valuation in Tasmania is in its infancy and that:

> ... the main problem is not the theoretical approach to how assets should be valued but rather the practical problem of determining the condition of assets. (No. 98, p20)

Corporatisation/privatisation

All water and drainage authorities (including the RWSC) under the control of the State Government have been 'commercialised', and new legislation has been enacted which will require certain performance standards from the local councils supplying urban water, sewerage and bulk water allocation. Institutional changes in the irrigation area do not appear to be on the agenda.

Managing the environment

The Tasmanian Government said that the legislative and institutional framework is adequate to provide 'sustainable' resource management. However, it identified the following broad areas of neglect:

- degraded river water qualities due to excessive chemical and sediment loads and bacterial contamination.
- increasing evidence of rising water tables and dryland salinity.
- possible groundwater aquifer contamination.
- inadequate floodplain control.
- structurally, ecologically and aesthetically degraded rivers and streams.

The Government argued that Integrated Catchment Management is not an appropriate solution to environmental problems given the small size of Tasmania. Rather, it considers that a planning and zoning approach:

> ... would ensure that decisions on water and land use were taken in an integrated manner and could also take account of the necessary water quality. Such an approach would be based upon catchment management plans (or their equivalents) and result from a consultation process, coordinating the needs and desires of various authorities and the community.

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